



Always with 
Smart + Technology + Human



SAMWHA PRODUCTS GUIDE



SAMWHA ELECTRIC

Leading Innovation Growth

**A company who connects people, technology and the future -
Samwha Electric stands at the center of the world**

Samwha Electric Co., Ltd., which has been in business since 1980 as a truly all-around maker of electrical tubing materials and fittings based on its advanced technology and reputation, has been highly recognized for performance and value in the markets such as petrochemistry plants, local and overseas nuclear power plants, engineering works, construction sites, shipyards and machine tools.



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We Create Leading Solution

A light brightening up the hope of tomorrow,
Challenge behind the scenes has already started.
Soundless yet powerful heartbeats continue.

Samwha's advanced technology proves its real merits out of sight and even in unexpected small places aiming for respect for man's life and dignity, protection of environment, creation of happy future value by using safely and comfortably electricity, the invisible power that makes the World move.

Samwha's varied solutions made with constant reliability and advanced technology confidently secure absolute safety and convenient construction.

Samwha promises solemnly to be with its customers at all times at the center of every place where electricity is being used, and its effort and sincerity will be continued now and in the future forever until the demand for each of its customers has been completely fulfilled.



Samwha's Vision for the Present and the Future

We will become the 21st century leader in the electrical construction material manufacturing area, who focuses on green business and touches the hearts of customers beyond giving satisfaction



A Company with Samwha Values

Samwha's Origin and Development

What Samwha makes is something different and reliable, and becomes a benchmark.

Samwha's obstinately long and distinguished experience in pursuit of progress of electrical construction material field is the living history of the industry.

Its steady and substantial growth could be done by virtue of its customers' constant support and encouragement as each step forwarded with a sense of duty and responsibility that leads the industry as a representative.

The credibility that what Samwha makes something different and reliable is its precious asset and honor which can't be traded with anything, and pride not to be compromised.

Lay the groundwork for
a high-technology company

1980~1989

- | | | | |
|-------------|---|-------------|---|
| 1980 | 02 Converted to corporate body and Samwha established | 1984 | 07 Busan business office set up |
| | 02 Seoul business office set up | | 12 Technical tie-up with Osaka Rasen, Japan |
| | 06 Patent on utility model for Cable Tie obtained | | 12 Appointed as a promising small and medium enterprise by SC First Bank |
| | 09 Patent on utility model for Terminal Block obtained | 1986 | 03 Patent on utility model for Common Terminal Unit obtained |
| | 10 Patent on registration of design for Power Supply Wiring Equipment | | 07 Patent on registration of design for Settling Equipment for Electrical Pipe obtained |
| 1981 | 11 Factory registration approved. | 1989 | 03 Factory #2 registration approved |
| 1982 | 09 Technical tie-up with Sankei, Japan | | 04 UL listed for Terminal Block |
| 1983 | 09 Joining Korea Electronics Association and registering electronic industry at KEA | | 07 Q Mark for the entire products obtained |
| | 10 Prize of Minister, Ministry of Commerce and Industry awarded for Master Controller at the 14th selection for superb development by KEA | | 12 Construction work of Cheonan Factory completed |

Present a blueprint
for the next big push

1990~1999

- 1990 02 KS Mark for Flexible Metal Conduit obtained
10 Extension work of Cheonan Factory completed
- 1994 08 KS Mark for Fittings of Flexible Metal Conduit obtained
- 1998 01 Certificate of ISO 9001 obtained
03 Certificate of EM Mark obtained
09 Certificate of EQ Mark obtained

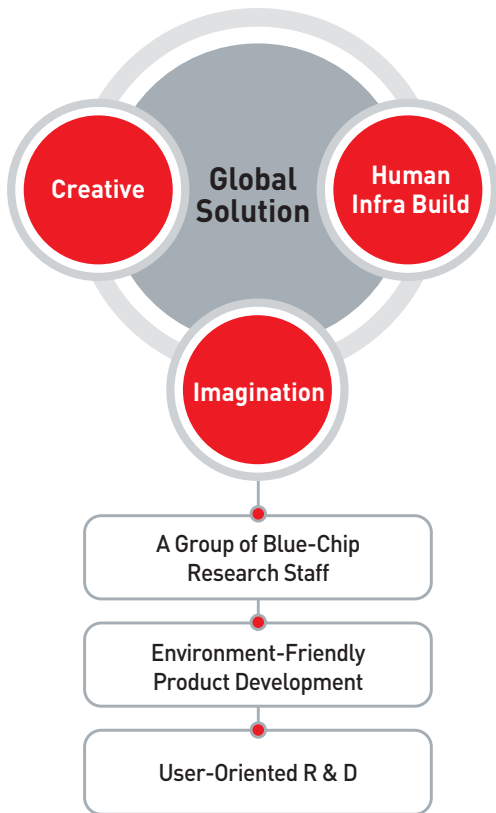
Grow into global business

2000~

- 2000 07 Baseefa Certificate obtained
- 2001 05 UL Certificate obtained for the entire sizes of the
1st Class Flexible Metal Conduit
- 2003 04 Europe integrated CE Certification Mark obtained
- 2004 04 ABS(American Bureau of Shipping) Certificate obtained
- 2005 05 Appointed as a panel company on industrial and technical
policy of Ministry of Commerce, Industry and Energy
- 2006 01 ERP system adopted and built up
09 Certificate of ISO 14001 obtained
- 2008 11 Ulsan business office set up
12 Certificate of KEPIC obtained
- 2009 08 CRM system adopted
- 2010 04 Technical Institute registered and established
- 2011 02 Seoul business office moved

Creating Solution Through Innovation





Leading Company of Electrical Construction Materials in 21C

Samwha has made ungrudging investments and efforts into R&D, a fortune growth engine.

As an integrated institute was renovated from a system which had been operated with the R&D work force as a central figure, it could possess more vital research capabilities in the aspects of acquisition, creation, sharing and application of knowledge to accomplish innovations in technique.

A Group of Blue-Chip Research Staff

The well trained R&D staff with a long experience and accumulated know-how take the lead in brand-name product development through the capabilities of analyzing variously, combining, and applying expert knowledge.

Environment-Friendly Product Development

Beginning with obtaining a certificate of ISO 14000 in 2006, all of the Samwha products have been designed at an early stage of R&D and manufactured caring about protection of the environment, conservation and recycling of resources.

User-Oriented R&D

Through the advanced technologies leading the industry and CRM (Consumer Relation Management), Samwha listens to VOC(Voice of Customer) in connection with sales-marketing-R&D-production - A/S, conducts an user-oriented R&D based on market needs, and produces reliable products convenient to handle at job sites.



QUALITY & SERVICE

With High Facility & Quality





We are developing customer confidence and satisfaction by operating an environment-friendly workplace equipped with the finest facilities and the state-of-the-art systems and a systematic quality control of products

Samwha secures safety and credibility in any working circumstances with the internally best production facility.

It is its mission and reward to its customers who return with trust to supply high quality products surpassing KS standard at as reasonably competitive or lower prices as possible than its competitors since its establishment.

In order to care about any little unavoidable inconvenience and discontent occurring even at that, A/S system has been operated to take an immediate action anytime and anywhere.

Production Quality Control

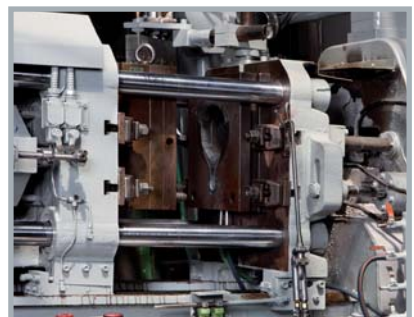
- Thorough implementation and observance of the established QC system
- Rigid QC control as per each work process
- The finest production surpassing KS standards

Credibility

- Product design considering various regulations and practical functions
- Verification of product reliability through credible tests
- Continuous quality improvement activities through feedback

Customer Service

- Establishment of a regular A/S system to meet customers demand
- Activities for immediate measures against claims and preventing reoccurrence
- Technical assistance for proper production selection and use by customers



BUSINESS SHOWINGS

**We Create
the Next Samwha**





Customers recognized our customer satisfaction-oriented business through the realization of customer value, advanced technologies, reliable solutions, and the excellent quality and performance of products.

The customers who have experienced Samwha's excellent solutions and services return to Samwha retaining the fact in memory.

It is because Samwha, which has concentrated only on electrical construction material field since its foundation, can provide appropriate solutions for customers' needs by supplying the products made with high technical skills proved by various kinds of the nationwide and international certificates.

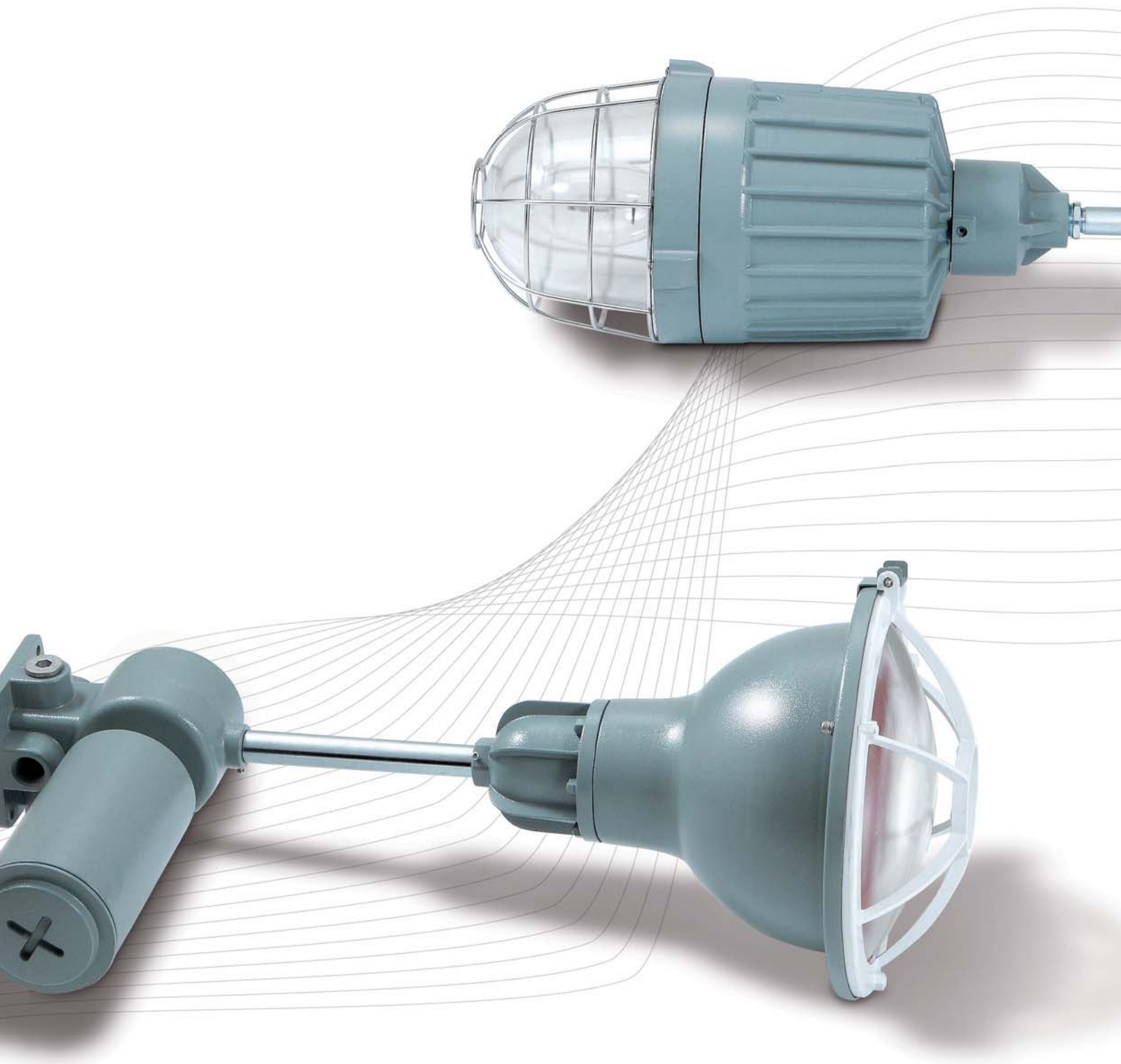
The reputation for Samwha proves gradually its real worth not only local projects but also overseas ones.

Samwha has confidence that the solutions recognized first by its customers are its most powerful competitive edge and source of customer surprise.



Safe Lighting, Pleasant Lighting

Samwha's lighting fixtures, which have obtained the Explosion Proof Certification, are both heatproof and corrosion resistant products. They are always capable of creating a safe, pleasant lighting environment even in the most hazardous areas.





Lighting Fixtures



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Lighting Fixtures

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[illegible]

	HID											Mounting type						Ex d		Ex nR II	Non-Haza	IP grade	Compliance
	Metal halide			High Pressure sod				Mercury vapor															
	175	250	400	100	150	200	250	400	200	250	400	Pendant	Ceiling	Stanchion	40°	90°	II B	II C					
	◆	◆	◆	◆	◆		◆	◆		◆	◆	◆	◆	◆	◆	◆		◆			IP66	IEC 60079-0,1	
	◆	◆	◆	◆	◆		◆	◆		◆	◆	◆	◆	◆	◆	◆			◆		IP66	IEC 60079-0,15	
	◆	◆	◆	◆	◆		◆	◆		◆	◆	◆	◆		◆	◆	◆				IP54	IEC 60079-0,1	
												◆	◆	◆	◆	◆		◆			IP66	IEC 60079-0,1	
												◆	◆		◆	◆	◆				IP54	IEC 60079-0,1	
												◆	◆				◆				IP65	IEC 60079-0,1	
												◆	◆						◆		IP66	IEC 60079-0,15	
													◆							◆	IP66	IEC 60529	
	◆	◆	◆		◆	◆	◆	◆	◆	◆	◆	◆	◆		◆	◆				◆	IP65	IEC 60529	
												◆	◆		◆	◆				◆	IP65	IEC 60529	
																		◆			IP66	IEC 60079-0,1	
																	◆				IP66	IEC 60079-0,1	
	◆	◆	◆		◆	◆	◆	◆	◆	◆	◆						◆				IP65	IEC 60079-0,1	
	◆	◆	◆		◆	◆	◆	◆	◆	◆	◆								◆		IP66	IEC 60079-0,15	

A

Lighting Fixtures

LEU Series - Ex d II C IP66 Lighting Fixture

- Ex d II C IP66
- IEC 60079-0, 1
- IEC 60529



■ Applications

- LEU Series Lighting Fixtures are designed for installations where moisture, dirt, dust, corrosion and vibration may be present, or IEC 60529 IP66 areas where wind, water, snow or high ambient can be expected.
- They can be used in locations made hazardous due to the presence of flammable or explosive gases, vapors and combustible dusts as defined by the IEC 60079-0,1.
- Applications include classified areas such as paint manufacturing plants, ammunition facilities, oil and gas producing and refining plants, off-shore and dockside installations, tank farms, pipeline pumping stations and marine loading and fuel transfer terminals.
- Hazardous areas, both indoors and outdoors where long life and low maintenance costs are desired.

■ Features

- Fixture is factory wired; power is fed through "wireless" connection block which serves as a mechanical seal between conduit and ballast compartments, eliminating the need for a field installed seal. The result is fast, easy installation.
- Wide range of light sources and wattages to meet specific lighting needs – 30 and 85 Fluorescent; 100, 150, 250 and 400W high pressure sodium (HPS); 250 and 400W mercury vapor (MV); 175, 250 and 400W metal halide (MH).
- Four light sources – Compact fluorescent, high pressure sodium, metal halide and mercury vapor.
- Mounting choice – Pendant, Ceiling, 25° Stanchion, 40° or 90° wall mount, all with "wireless" design that allows fast, easy fixture installation.
- Integral ballasts – separate ballasts are not required. Lowest installed cost.
- Corrosion resistant – Copper-free aluminum die cast construction. Baked powder epoxy finish, electro statically Exposed hardware is stainless steel.
- Pendant type is standard.

■ Standard Materials

- Copper-free Aluminium (Cast Aluminium Alloy)
- Globe : Heat Resistant Glass
- Reflector : High Purity Aluminium
- Guard & Accessory : Stainless Steel

■ Options

- Fuse – to protect ballast and capacitors against abnormal line conditions.
 - ⇒ One fuse required for 120 or 277VAC units
 - ⇒ Two fuses needed for 208,240 or 480VAC units
- Instant re-strike ballast – enables a hot HPS lamp to immediately re-strike after a momentary loss of arc due to voltage fluctuation or power outage. It has no effect on the warm-up period of cold lamps (Max 150W HPS only).
- Dome reflector or 30° angle reflector.
- Protect Guard.
- High power factor – Minimum P. F. 90%.

■ Standard Finishes

- Spray (Color : Munsel No. 7.5BG 6/1.5)

■ Compliances

- IEC 60079-0 Equipment – General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- ANSI /ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- ISO 261 Metric screw thread

■ Certification

- Certified by KOSHA (Korea Occupational Safety & Health Agency)

■ Weight

- 18 kg

■ Technical Data

- Voltage Range - AC 100V-480V
- Watts Range - 30-400W

Model Number Logic

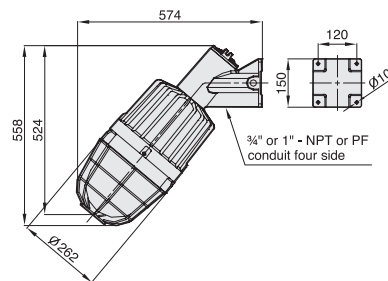
0	LEU	00	00	00	0	0
Lamp Type C-Fluorescent S-HPS (High pressure sodium) M-Metal V-Mercury	Series Constant	Lamp Wattage 03- 30W-C 08- 85W-C 10-100W-S 15-150W-S 17-175W-M 25-250W-M.S.V 40-400W-M.S.V	Voltage @ 60Hz 12-AC120V 20-AC208V 22-AC220V 24-AC-240V 27-AC277V 48-AC480V	Mounting Type PT-Pendant CL-Ceiling ST-Stanchion 4B-40° Bracket 9B-90° Bracket	G-Omit G if guard is not required	P-Omit P if High powerfactor is not required

ex) Metal Halide High power factor type Stanchion Mounting, AC220V, 250W, Guard required
MLEU 25 22 ST G P

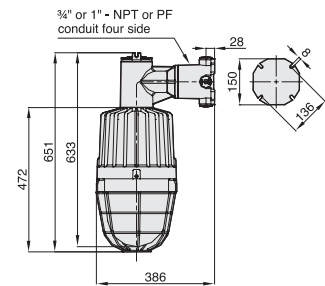
Dimensions

Dimensions (mm)

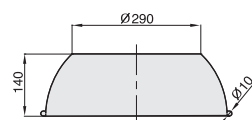
40° Wall Mount Type



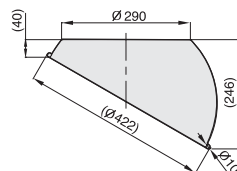
90° Wall Mount Type



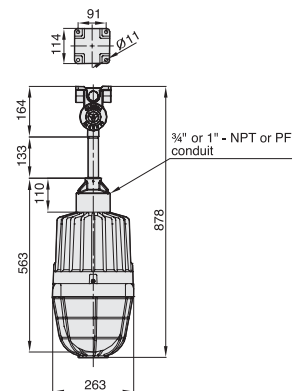
Standard Type Reflector



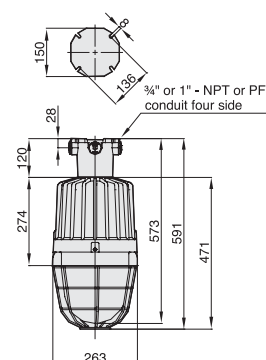
30° Dome Type Reflector



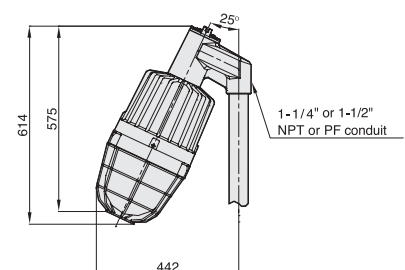
Pendant Type



Ceiling Type



Stanchion Type





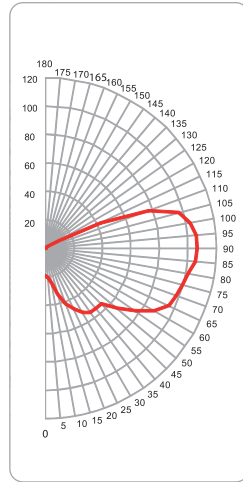
Lighting Fixtures

LEU Series - Ex d II C IP66 Lighting Fixture

- Ex d II C IP66
- IEC 60079-0, 1
- IEC 60529

■ Photometric Data

- High Pressure Sodium 100W (Reflector: Non)

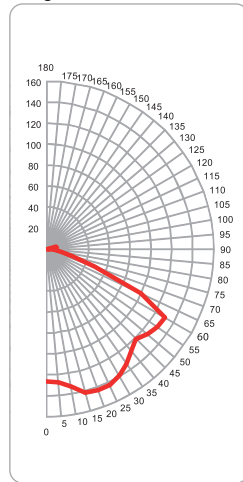


Angle	cd/1000 lm	Angle	cd/1000 lm
0	19	90	107
5	21	95	107
10	25	100	103
15	34	105	97
20	42	110	77
25	47	115	43
30	53	120	11
35	55	125	1
40	55	130	0
45	55	135	0
50	66	140	-
55	77	145	-
60	88	150	-
65	96	155	-
70	98	160	-
75	100	165	-
80	102	170	-
85	106	175	-

ZONAL CAVITY METHOD

% EFFECTIVE Ceiling Cavity Reflectance 1cc	80				70				50				30				10				0
% Wall Reflectance 1w	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance																				
0	.84	.84	.84	.84	.79	.79	.79	.79	.70	.70	.70	.61	.61	.61	.53	.53	.53	.50			
1	.71	.66	.61	.56	.66	.61	.57	.52	.53	.49	.46	.46	.43	.40	.39	.36	.34	.31			
2	.64	.54	.47	.41	.58	.50	.44	.38	.43	.38	.34	.37	.33	.29	.31	.27	.25	.21			
3	.56	.46	.38	.32	.51	.42	.35	.30	.36	.30	.26	.30	.26	.22	.25	.22	.18	.15			
4	.50	.40	.32	.26	.46	.37	.30	.24	.31	.25	.21	.26	.22	.18	.22	.18	.15	.12			
5	.46	.34	.27	.21	.42	.32	.25	.19	.27	.21	.17	.23	.18	.14	.19	.15	.12	.09			
6	.42	.30	.23	.17	.38	.28	.21	.16	.24	.18	.14	.20	.15	.12	.17	.12	.09	.07			
7	.38	.27	.19	.14	.35	.25	.18	.13	.21	.15	.11	.18	.13	.09	.15	.11	.08	.06			
8	.35	.24	.17	.12	.32	.22	.16	.11	.19	.14	.10	.16	.11	.08	.13	.09	.06	.05			
9	.33	.22	.15	.10	.30	.20	.14	.10	.17	.12	.08	.15	.10	.07	.12	.08	.05	.04			
10	.30	.20	.13	.09	.28	.18	.12	.08	.16	.11	.07	.13	.09	.06	.11	.07	.05	.03			

- High Pressure Sodium 100W (Reflector: Dome)

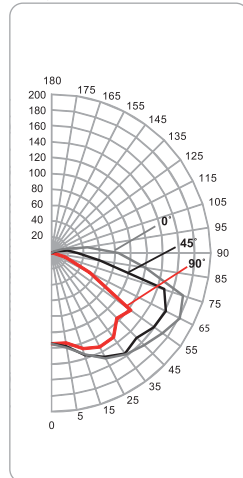


Angle	cd/1000 lm	Angle	cd/1000 lm
0	126	90	1
5	128	95	5
10	133	100	10
15	142	105	9
20	143	110	3
25	143	115	0
30	139	120	-
35	133	125	-
40	126	130	-
45	121	135	-
50	126	140	-
55	129	145	-
60	131	150	-
65	100	155	-
70	49	160	-
75	26	165	-
80	14	170	-
85	5	175	-

ZONAL CAVITY METHOD

% EFFECTIVE Ceiling Cavity Reflectance 1cc	80				70				50				30				10				0
% Wall Reflectance 1w	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance																				
0	.66	.66	.66	.66	.64	.64	.64	.64	.61	.61	.61	.58	.58	.58	.56	.56	.56	.56	.56	.54	
1	.61	.58	.56	.54	.59	.57	.55	.53	.54	.52	.51	.52	.50	.49	.49	.48	.47	.46	.46	.46	
2	.55	.51	.47	.44	.54	.50	.46	.43	.47	.45	.42	.46	.43	.41	.44	.42	.40	.40	.39	.39	
3	.50	.44	.40	.36	.49	.43	.39	.36	.42	.38	.35	.40	.37	.34	.38	.36	.34	.34	.32	.32	
4	.46	.39	.34	.31	.45	.38	.34	.30	.37	.33	.30	.35	.32	.29	.34	.31	.29	.27	.27	.27	
5	.42	.34	.29	.26	.40	.34	.29	.25	.32	.28	.25	.31	.27	.24	.30	.27	.24	.23	.23	.23	
6	.38	.30	.25	.22	.37	.30	.25	.21	.29	.24	.21	.27	.24	.21	.26	.23	.20	.19	.19	.19	
7	.35	.27	.22	.18	.34	.26	.21	.18	.25	.21	.18	.24	.20	.17	.23	.20	.17	.16	.16	.16	
8	.32	.24	.19	.16	.31	.24	.19	.16	.23	.18	.15	.22	.18	.15	.21	.18	.15	.14	.14	.14	
9	.33	.22	.17	.14	.29	.21	.17	.14	.21	.16	.13	.20	.16	.13	.19	.16	.13	.12	.12	.12	
10	.27	.20	.15	.12	.27	.19	.15	.12	.19	.15	.12	.18	.14	.12	.17	.14	.11	.10	.10	.10	

- High Pressure Sodium 100W (Reflector: Non)



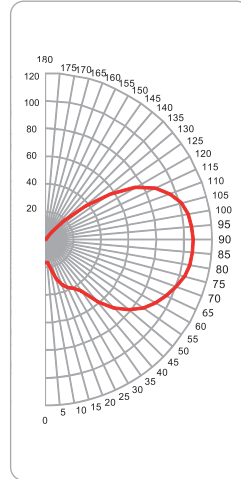
Reflector	90	45	0
Angle	cd/1000lm	cd/1000lm	cd/1000lm
180	-	-	-
175	-	-	-
165	-	-	-
155	-	-	-
145	-	-	-
135	-	-	-
125	-	-	-
115	-	-	3.16
105	-	5.37	15.37
95	-	20.63	45.79
90	-	32.63	84.53
85	2.00	60.84	119.47
75	18.53	148.95	173.58
65	54.32	161.05	181.26
55	122.74	159.05	172.42
45	116.21	151.47	164.42
35	131.79	156.21	157.89
25	133.47	146.53	149.58
15	127.05	135.26	134.84
5	114.63	118.74	120.84
0	114.63	114.63	114.63

ZONAL CAVITY METHOD

% EFFECTIVE Ceiling Cavity Reflectance 1cc	80				70				50				30				10				0
% Wall Reflectance 1w	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0			
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance																				
0	.68	.68	.68	.68	.66	.66	.66	.66	.62	.62	.62	.59	.59	.59	.56	.56	.56	.55			
1	.60	.57	.54	.51	.58	.56	.53	.50	.52	.50	.48	.50	.48	.46	.47	.46	.44	.43			
2	.54	.49	.45	.41	.53	.48	.44	.40	.45	.42	.39	.43	.40	.37	.41	.38	.36	.35			
3	.49	.42	.37	.33	.47	.41	.36	.33	.39	.35	.32	.37	.34	.31	.35	.32	.30	.28			
4	.45	.38	.32	.28	.43	.37	.32	.28	.35	.30	.27	.33	.29	.26	.31	.28	.26	.24			
5	.41	.33	.23	.23	.40	.32	.27	.23	.31	.26	.23	.29	.25	.22	.28	.25	.22	.20			
6	.38	.29	.24	.20	.36	.29	.24	.20	.27	.23	.19	.26	.22	.19	.25	.21	.19	.17			
7	.34	.26	.21	.17	.33	.26	.20	.17	.24	.20	.17	.23	.19	.16	.22	.19	.16	.15			
8	.32	.24	.18	.15	.31	.23	.18	.15	.22	.18	.14	.21	.17	.14	.20	.17	.14	.13			
9	.29	.21	.16	.13	.28	.21	.16	.13	.20	.16	.13	.19	.15	.12	.18	.15	.12	.11			
10	.27	.19	.14	.11	.26	.19	.14	.11	.18	.14	.11	.17	.13	.11	.17	.13	.11	.10			

■ Photometric Data

• High Pressure Sodium 400W (Reflector: Non)

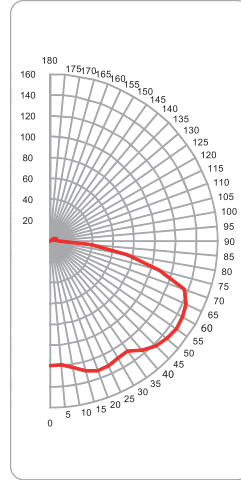


Angle	cd/1000 lm	Angle	cd/1000 lm
0	17	90	107
5	17	95	106
10	22	100	104
15	30	105	101
20	35	110	96
25	38	115	88
30	41	120	75
35	45	125	57
40	59	130	37
45	70	135	19
50	79	140	7
55	86	145	-2
60	92	150	0
65	96	155	-
70	100	160	-
75	104	165	-
80	106	170	-
85	107	175	-

ZONAL CAVITY METHOD

% EFFECTIVE Ceiling Cavity Reflectance 1cc	80				70				50				30				10				0
% Wall Reflectance 1w	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance																				
0	.97	.97	.97	.97	.90	.90	.90	.90	.78	.78	.78	.66	.66	.66	.56	.56	.56	.56	.56	.51	
1	.83	.76	.71	.66	.76	.71	.66	.61	.60	.56	.52	.50	.47	.44	.41	.38	.36	.32	.32	.26	
2	.73	.63	.55	.49	.67	.58	.51	.45	.49	.43	.38	.40	.36	.32	.32	.29	.26	.23	.19	.15	
3	.65	.54	.45	.38	.59	.49	.41	.35	.41	.35	.30	.33	.29	.24	.26	.23	.19	.15	.12	.09	
4	.59	.46	.37	.31	.54	.43	.35	.28	.36	.29	.24	.29	.24	.20	.23	.19	.15	.12	.09	.07	
5	.53	.40	.31	.25	.48	.37	.29	.23	.31	.24	.19	.25	.20	.16	.20	.15	.12	.09	.07	.05	
6	.48	.35	.27	.21	.44	.32	.25	.19	.27	.21	.16	.22	.17	.13	.17	.13	.10	.07	.05	.03	
7	.44	.31	.23	.17	.40	.29	.21	.16	.24	.17	.13	.19	.14	.10	.15	.11	.08	.05	.03	.02	
8	.41	.28	.20	.14	.37	.26	.18	.13	.21	.15	.11	.18	.12	.09	.14	.10	.06	.04	.03	.02	
9	.38	.25	.18	.12	.34	.23	.16	.11	.19	.13	.09	.16	.11	.07	.12	.08	.05	.03	.02	.01	
10	.35	.23	.15	.11	.32	.21	.14	.10	.18	.12	.08	.14	.10	.06	.11	.07	.04	.03	.02	.01	

• High Pressure Sodium 400W (Reflector: Dome)

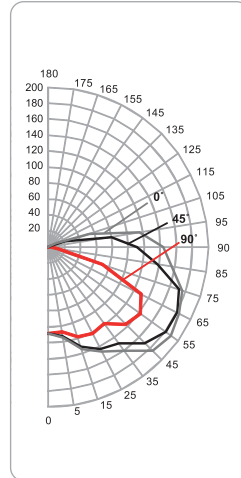


Angle	cd/1000 lm	Angle	cd/1000 lm
0	119	90	9
5	119	95	5
10	123	100	3
15	129	105	4
20	132	110	5
25	132	115	6
30	130	120	5
35	129	125	4
40	137	130	2
45	142	135	1
50	146	140	-
55	147	145	-
60	146	150	-
65	143	155	-
70	136	160	-
75	108	165	-
80	75	170	-
85	39	175	-

ZONAL CAVITY METHOD

% EFFECTIVE Ceiling Cavity Reflectance 1cc	80				70				50				30				10				0
% Wall Reflectance 1w	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance																				
0	.89	.89	.89	.89	.87	.87	.87	.87	.82	.82	.82	.78	.78	.78	.75	.75	.75	.73			
1	.79	.74	.70	.67	.77	.73	.69	.65	.69	.66	.63	.65	.63	.60	.62	.60	.58	.56			
2	.70	.63	.57	.51	.68	.61	.55	.50	.58	.53	.49	.55	.51	.47	.52	.49	.46	.44			
3	.63	.53	.46	.40	.60	.52	.45	.40	.49	.43	.39	.47	.42	.38	.44	.40	.37	.35			
4	.57	.46	.39	.33	.55	.45	.38	.33	.43	.37	.32	.41	.36	.31	.39	.34	.31	.29			
5	.51	.40	.33	.27	.49	.39	.32	.27	.37	.31	.26	.36	.30	.26	.34	.29	.25	.23			
6	.47	.35	.28	.22	.45	.35	.27	.22	.33	.27	.22	.31	.26	.21	.30	.25	.21	.19			
7	.43	.31	.24	.19	.41	.30	.23	.18	.29	.23	.18	.28	.22	.18	.27	.21	.17	.16			
8	.39	.28	.21	.16	.38	.27	.21	.16	.26	.20	.16	.25	.19	.15	.24	.19	.15	.13			
9	.36	.25	.18	.14	.35	.25	.18	.14	.24	.18	.13	.23	.17	.13	.22	.17	.13	.11			
10	.34	.23	.16	.12	.33	.22	.16	.12	.21	.16	.12	.21	.15	.11	.20	.15	.11	.10			

• High Pressure Sodium 400W (Reflector: Angle)



Reflector	90	45	0
Angle	cd/1000lm 400W	cd/1000lm 400W	cd/1000lm 400W
180	-	-	-
175	-	-	-
165	-	-	-
155	-	-	-
145	-	-	-
135	-	-	-
125	-	-	0.54
115	0.08	1.94	10.98
105	0.50	21.48	53.26
95	2.36	79.90	114.98
90	3.88	110.44	143.54
85	11.88	138.56	155.78
75	71.56	172.12	175.92
65	129.84	180.62	183.70
55	142.46	180.98	189.14
45	136.74	170.28	184.44
35	118.32	149.24	160.14
25	121.50	143.10	146.92
15	118.50	131.12	134.40
5	107.64	112.46	114.44
0	108.60	108.60	108.60

ZONAL CAVITY METHOD

% EFFECTIVE Ceiling Cavity Reflectance 1cc	80				70				50				30				10				0
% Wall Reflectance 1w	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance																				
0	.84	.84	.84	.84	.81	.81	.81	.81	.76	.76	.76	.72	.72	.72	.67	.67	.67	.67	.65		
1	.74	.69	.65	.62	.71	.67	.63	.60	.63	.60	.57	.59	.56	.54	.55	.53	.51	.51	.49		
2	.66	.59	.53	.48	.64	.57	.51	.47	.53	.49	.45	.50	.46	.43	.47	.44	.41	.41	.39		
3	.59	.50	.44	.38	.57	.49	.43	.37	.46	.40	.36	.43	.38	.34	.40	.36	.33	.31			
4	.54	.44	.37	.32	.52	.43	.36	.31	.40	.34	.30	.38	.33	.29	.35	.31	.28	.26			
5	.49	.39	.32	.26	.47	.38	.31	.26	.35	.29	.25	.33	.28	.24	.31	.27	.23	.21			
6	.45	.34	.27	.22	.43	.33	.26	.22	.31	.25	.21	.29	.24	.20	.27	.23	.19	.18			
7	.41	.30	.23	.19	.39	.29	.23	.18	.27	.22	.17	.26	.21	.17	.24	.20	.16	.15			
8	.38	.27	.20	.16	.36	.26	.20	.15	.25	.19	.15	.23	.18	.14	.22	.17	.14	.12			
9	.35	.24	.18	.13	.33	.24	.18	.13	.22	.17	.13	.21	.16	.12	.20	.15	.12	.11			
10	.32	.22	.16	.12	.31	.21	.16	.12	.20	.15	.11	.19	.14	.11	.18	.14	.10	.09			



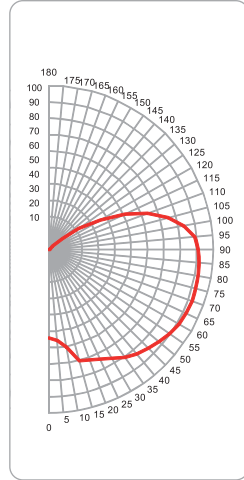
Lighting Fixtures

LEU Series - Ex d II C IP66 Lighting Fixture

- Ex d II C IP66
- IEC 60079-0, 1
- IEC 60529

■ Photometric Data

- Mercury Vapor, Metal Halide 175W (Reflector: Non)

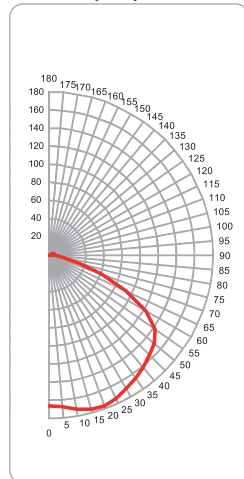


Angle	cd/1000 lm	Angle	cd/1000 lm
0	54	90	91
5	56	95	89
10	61	100	84
15	70	105	75
20	72	110	64
25	74	115	51
30	77	120	36
35	80	125	22
40	83	130	10
45	86	135	2
50	88	140	0
55	90	145	-
60	91	150	-
65	92	155	-
70	93	160	-
75	93	165	-
80	92	170	-
85	92	175	-

ZONAL CAVITY METHOD

% EFFECTIVE Ceiling Cavity Reflectance 1cc	80				70				50				30				10				0
% Wall Reflectance 1w	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0			
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance																				
0	.88	.88	.88	.88	.83	.83	.83	.83	.73	.73	.73	.65	.65	.65	.57	.57	.57	.54			
1	.76	.70	.65	.61	.71	.66	.61	.57	.58	.54	.51	.50	.48	.45	.44	.41	.39	.36			
2	.67	.59	.52	.46	.62	.55	.49	.43	.48	.43	.39	.42	.38	.34	.36	.33	.30	.26			
3	.60	.50	.42	.36	.56	.47	.40	.34	.41	.35	.30	.35	.31	.27	.30	.26	.23	.20			
4	.54	.44	.36	.30	.51	.41	.34	.28	.36	.30	.25	.31	.26	.22	.26	.22	.19	.16			
5	.49	.38	.30	.24	.46	.36	.28	.23	.31	.25	.21	.27	.22	.18	.23	.19	.16	.13			
6	.45	.34	.26	.20	.42	.31	.24	.19	.27	.22	.17	.24	.19	.15	.20	.16	.13	.11			
7	.41	.30	.22	.17	.38	.28	.21	.16	.24	.18	.14	.21	.16	.12	.18	.14	.11	.09			
8	.38	.27	.20	.15	.35	.25	.18	.14	.22	.16	.12	.19	.14	.11	.16	.12	.09	.07			
9	.35	.24	.17	.13	.33	.23	.16	.12	.20	.14	.11	.17	.13	.09	.15	.11	.08	.06			
10	.33	.22	.15	.11	.31	.21	.15	.10	.18	.13	.09	.16	.11	.08	.14	.10	.07	.05			

- Mercury Vapor, Metal Halide 175W (Reflector: Dome)

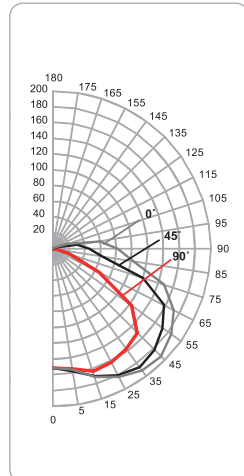


Angle	cd/1000 lm	Angle	cd/1000 lm
0	166	90	2
5	168	95	3
10	173	100	4
15	176	105	5
20	177	110	5
25	174	115	3
30	170	120	1
35	165	125	0
40	161	130	-
45	156	135	-
50	151	140	-
55	142	145	-
60	122	150	-
65	93	155	-
70	61	160	-
75	35	165	-
80	17	170	-
85	7	175	-

ZONAL CAVITY METHOD

% EFFECTIVE Ceiling Cavity Reflectance 1cc	80				70				50				30				10				0
% Wall Reflectance 1w	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0			
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance																				
0	.77	.77	.77	.77	.75	.75	.75	.75	.71	.71	.71	.68	.68	.68	.65	.65	.65	.64			
1	.70	.68	.65	.63	.69	.66	.64	.61	.63	.61	.59	.60	.59	.57	.58	.57	.55	.54			
2	.64	.59	.55	.52	.63	.58	.54	.51	.55	.52	.50	.53	.51	.48	.51	.49	.47	.46			
3	.59	.52	.47	.43	.57	.51	.46	.42	.49	.45	.42	.47	.44	.41	.45	.42	.40	.38			
4	.54	.46	.41	.36	.52	.45	.40	.36	.43	.39	.35	.42	.38	.35	.40	.37	.34	.33			
5	.49	.41	.35	.31	.48	.40	.34	.31	.38	.34	.30	.37	.33	.30	.36	.32	.29	.28			
6	.45	.36	.30	.26	.43	.35	.30	.26	.34	.29	.26	.33	.29	.25	.32	.28	.25	.24			
7	.41	.32	.26	.22	.40	.31	.26	.22	.30	.25	.22	.29	.25	.21	.28	.24	.21	.20			
8	.38	.29	.23	.19	.37	.28	.23	.19	.27	.22	.19	.26	.22	.19	.26	.22	.19	.17			
9	.35	.26	.20	.17	.34	.26	.20	.17	.25	.20	.17	.24	.19	.16	.23	.19	.16	.15			
10	.32	.24	.18	.15	.31	.23	.18	.15	.22	.18	.15	.22	.17	.14	.21	.17	.14	.13			

- Mercury Vapor, Metal Halide 175W (Reflector: Angie)



Reflector	90	45	0
Angle	cd/1000lm	cd/1000lm	cd/1000lm
180	-	-	-
175	0.29	-	-
165	0.21	-	-
155	-	-	-
145	-	-	-
135	0.14	-	-
125	-	-	-
115	0.29	-	3.50
105	-	5.14	18.79
95	-	30.86	60.36
90	-	45.43	81.86
85	2.29	62.36	103.71
75	21.43	119.64	148.36
65	65.36	157.93	172.29
55	122.64	171.79	185.00
45	151.14	181.79	193.64
35	157.71	186.43	191.29
25	161.50	180.14	183.21
15	163.93	170.43	171.57
5	154.36	157.93	156.00
0	151.36	151.36	151.36

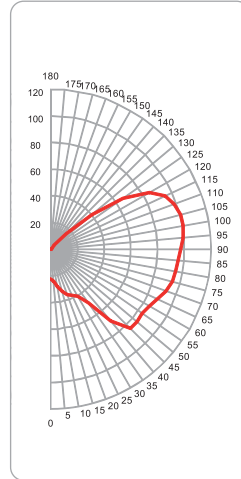
ZONAL CAVITY METHOD

% EFFECTIVE Ceiling Cavity Reflectance 1cc	80			70			50			30			10			0		
% Wall Reflectance 1w	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance																	
0	.75	.75	.75	.75	.73	.73	.73	.73	.69	.69	.69	.66	.67	.66	.62	.62	.62	.61
1	.68	.64	.61	.58	.66	.63	.60	.57	.59	.57	.55	.56	.54	.53	.54	.52	.51	.46
2	.61	.56	.51	.47	.60	.54	.50	.47	.52	.48	.45	.49	.46	.44	.47	.44	.42	.41
3	.56	.49	.43	.39	.54	.48	.43	.39	.45	.41	.38	.43	.40	.37	.41	.38	.36	.34
4	.51	.43	.38	.33	.50	.42	.37	.33	.40	.36	.32	.39	.35	.32	.37	.34	.31	.29
5	.47	.39	.33	.28	.45	.38	.32	.28	.36	.31	.28	.34	.30	.27	.33	.29	.26	.25
6	.43	.34	.29	.24	.42	.34	.28	.24	.32	.27	.24	.31	.27	.23	.30	.26	.23	.24
7	.39	.31	.25	.21	.38	.30	.25	.21	.29	.24	.20	.27	.23	.20	.26	.23	.20	.18
8	.37	.28	.22	.18	.35	.27	.22	.18	.25	.21	.18	.25	.21	.17	.24	.20	.17	.16
9	.34	.25	.20	.16	.33	.25	.19	.16	.23	.19	.16	.23	.18	.15	.22	.18	.15	.14
10	.31	.23	.17	.14	.30	.22	.17	.14	.21	.17	.14	.21	.16	.13	.20	.16	.13	.12

■ Photometric Data

• Mercury Vapor, Metal Halide 400W (Reflector: Non)

ZONAL CAVITY METHOD

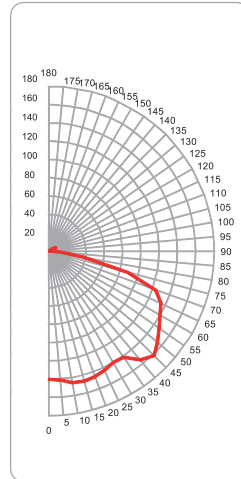


Angle	cd/1000 lm	Angle	cd/1000 lm
0	23	90	98
5	24	95	100
10	29	100	101
15	33	105	101
20	36	110	99
25	38	115	94
30	41	120	85
35	49	125	66
40	70	130	40
45	84	135	16
50	85	140	4
55	84	145	0
60	85	150	-
65	88	155	-
70	92	160	-
75	94	165	-
80	95	170	-
85	96	175	-

% EFFECTIVE Ceiling Cavity Reflectance 1cc	80			70			50			30			10			0		
% Wall Reflectance 1w	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance																	
0	.97	.97	.97	.97	.90	.90	.90	.90	.78	.78	.78	.66	.66	.66	.56	.56	.56	.51
1	.83	.76	.71	.66	.76	.71	.66	.61	.60	.56	.52	.50	.47	.44	.41	.38	.36	.32
2	.73	.63	.55	.49	.67	.58	.51	.45	.49	.43	.38	.40	.36	.32	.29	.26	.22	
3	.65	.54	.45	.38	.59	.49	.41	.35	.41	.35	.30	.33	.29	.24	.26	.23	.19	.15
4	.59	.46	.37	.31	.54	.43	.35	.28	.36	.29	.24	.29	.24	.20	.23	.19	.15	.12
5	.53	.40	.31	.25	.48	.37	.29	.23	.31	.24	.19	.25	.20	.16	.20	.15	.12	.09
6	.48	.35	.27	.21	.44	.32	.25	.19	.27	.21	.16	.22	.17	.13	.17	.13	.10	.07
7	.44	.31	.23	.17	.40	.29	.21	.16	.24	.17	.13	.19	.14	.10	.15	.11	.08	.05
8	.41	.28	.20	.14	.37	.26	.18	.13	.21	.15	.11	.18	.12	.09	.14	.10	.06	.04
9	.38	.25	.18	.12	.34	.23	.16	.11	.19	.13	.09	.16	.11	.07	.12	.08	.05	.03
10	.35	.23	.15	.11	.32	.21	.14	.10	.18	.12	.08	.14	.10	.06	.11	.07	.04	.03

• Mercury Vapor, Metal Halide 400W (Reflector: Dome)

ZONAL CAVITY METHOD

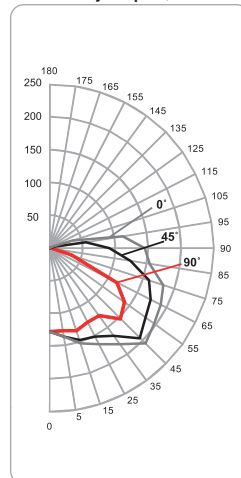


Angle	cd/1000 lm	Angle	cd/1000 lm
0	140	90	3
5	142	95	3
10	146	100	2
15	147	105	3
20	146	110	6
25	144	115	8
30	140	120	7
35	141	125	4
40	155	130	1
45	162	135	-
50	155	140	-
55	146	145	-
60	140	150	-
65	134	155	-
70	124	160	-
75	89	165	-
80	38	170	-
85	12	175	-

% EFFECTIVE Ceiling Cavity Reflectance 1cc	80				70				50				30				10				0
% Wall Reflectance 1w	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0			
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance																				
0	.86	.86	.86	.86	.84	.84	.84	.84	.80	.80	.80	.76	.76	.76	.72	.72	.72	.71			
1	.78	.74	.70	.67	.75	.72	.69	.66	.68	.66	.63	.65	.63	.61	.62	.61	.59	.57			
2	.70	.63	.58	.53	.68	.61	.56	.52	.58	.54	.51	.56	.52	.49	.53	.50	.48	.46			
3	.62	.54	.47	.42	.60	.53	.47	.42	.50	.45	.41	.48	.44	.40	.46	.42	.39	.37			
4	.57	.47	.40	.35	.55	.46	.40	.35	.44	.38	.34	.42	.37	.33	.40	.36	.33	.31			
5	.52	.41	.34	.29	.50	.40	.34	.29	.38	.33	.28	.37	.32	.28	.35	.31	.27	.25			
6	.47	.36	.29	.24	.45	.35	.29	.24	.34	.28	.24	.32	.27	.23	.31	.26	.23	.21			
7	.43	.32	.25	.20	.41	.31	.25	.20	.30	.24	.20	.29	.23	.19	.28	.23	.19	.17			
8	.39	.29	.22	.17	.38	.28	.22	.17	.27	.21	.17	.26	.21	.17	.25	.20	.16	.15			
9	.36	.26	.19	.15	.35	.25	.19	.15	.24	.19	.15	.23	.18	.14	.22	.18	.14	.13			
10	.34	.23	.17	.13	.33	.23	.17	.13	.22	.16	.13	.21	.16	.12	.20	.16	.12	.11			

• Mercury Vapor, Metal Halide 400W (Reflector: Angle)

ZONAL CAVITY METHOD



Reflector	90	45	0
Angle	cd/1000lm	cd/1000lm	cd/1000lm
180	-	-	-
175	-	-	-
165	-	-	-
155	-	-	-
145	-	-	-
135	-	-	-
125	-	-	-
115	-	0.67	4.53
105	0.22	9.36	36.00
95	1.33	55.64	112.56
90	2.36	91.31	144.56
85	6.31	124.31	155.17
75	34.39	159.03	182.14
65	115.42	172.17	190.17
55	140.44	180.47	196.75
45	152.61	194.81	206.69
35	127.92	165.14	181.67
25	126.94	152.00	164.86
15	133.14	148.14	153.25
5	128.28	136.64	137.19
0	127.64	127.64	127.64

% EFFECTIVE Ceiling Cavity Reflectance 1cc	80				70				50				30				10				0
% Wall Reflectance 1w	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0			
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance																				
0	.82	.82	.82	.82	.80	.80	.80	.80	.75	.75	.75	.71	.71	.71	.67	.67	.67	.65			
1	.73	.69	.65	.62	.71	.67	.63	.60	.63	.60	.57	.59	.57	.55	.56	.54	.52	.50			
2	.66	.59	.54	.49	.63	.57	.52	.48	.54	.50	.46	.51	.47	.44	.48	.45	.42	.40			
3	.59	.51	.44	.39	.57	.49	.43	.39	.47	.41	.37	.44	.40	.36	.41	.38	.35	.33			
4	.54	.45	.38	.33	.52	.44	.37	.32	.41	.36	.31	.39	.34	.30	.37	.33	.29	.28			
5	.49	.39	.33	.27	.47	.38	.32	.27	.36	.31	.26	.34	.29	.26	.32	.28	.25	.23			
6	.45	.35	.28	.23	.43	.34	.27	.23	.32	.26	.22	.30	.25	.22	.29	.24	.21	.19			
7	.41	.31	.24	.20	.40	.30	.24	.19	.28	.23	.19	.27	.22	.18	.25	.21	.18	.16			
8	.38	.28	.21	.17	.36	.27	.21	.17	.25	.20	.16	.24	.19	.16	.23	.19	.15	.14			
9	.35	.25	.19	.14	.34	.24	.18	.14	.23	.18	.14	.22	.17	.13	.21	.16	.13	.12			
10	.32	.22	.16	.12	.31	.22	.16	.12	.21	.16	.12	.20	.15	.12	.19	.14	.11	.10			



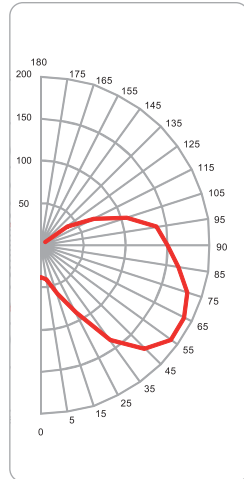
Lighting Fixtures

LEU Series - Ex d II C IP66 Lighting Fixture

- Ex d II C IP66
- IEC 60079-0, 1
- IEC 60529

■ Photometric Data

• Fluorescent 30W (Reflector: Non)

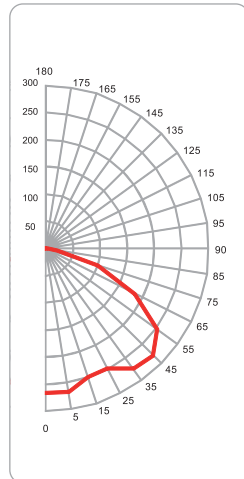


Angle	cd/1000 lm	Angle	cd/1000 lm
0	38	75	182
5	40	85	165
15	61	90	150
25	90	95	139
35	139	105	107
45	173	115	69
55	191	125	38
65	191	135	6

ZONAL CAVITY METHOD

% EFFECTIVE Ceiling Cavity Reflectance 1cc	80				70				50				30				10				0			
% Wall Reflectance 1w	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance																							
0	.60	.60	.60	.60	.57	.57	.57	.57	.51	.51	.51	.46	.46	.46	.41	.41	.41	.39						
1	.52	.48	.44	.41	.49	.45	.42	.39	.40	.38	.35	.36	.34	.32	.31	.30	.28	.26						
2	.45	.40	.35	.31	.43	.37	.33	.29	.33	.29	.26	.29	.26	.24	.25	.23	.21	.19						
3	.40	.33	.28	.24	.38	.31	.26	.22	.28	.24	.20	.24	.21	.18	.21	.18	.16	.14						
4	.37	.29	.23	.19	.34	.27	.22	.18	.24	.20	.16	.21	.17	.14	.18	.15	.13	.11						
5	.33	.25	.19	.15	.31	.23	.18	.14	.21	.16	.13	.18	.14	.11	.16	.12	.10	.08						
6	.30	.22	.16	.12	.28	.20	.15	.12	.18	.14	.10	.16	.12	.09	.13	.10	.08	.06						
7	.27	.19	.14	.10	.25	.18	.13	.10	.16	.12	.08	.14	.10	.07	.12	.09	.06	.05						
8	.25	.17	.12	.08	.23	.16	.11	.08	.14	.10	.07	.12	.09	.06	.11	.08	.05	.04						
9	.23	.15	.10	.07	.22	.14	.10	.07	.13	.09	.06	.11	.08	.05	.09	.06	.04	.03						
10	.21	.14	.09	.06	.20	.13	.09	.06	.11	.08	.05	.10	.07	.04	.08	.06	.04	.02						

• Fluorescent 30W (Reflector: Dome)

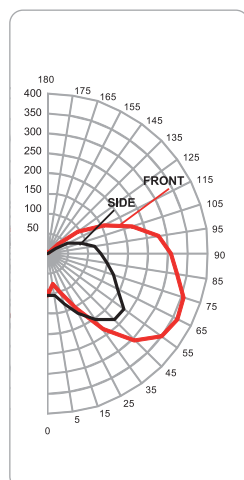


Angle	cd/1000 lm	Angle	cd/1000 lm
0	266	75	101
5	269	85	20
15	248	90	3
25	248	95	-
35	274	105	-
45	280	115	-
55	254	125	-
65	185	135	-

ZONAL CAVITY METHOD

% EFFECTIVE Ceiling Cavity Reflectance 1cc	80			70			50			30			10			0		
% Wall Reflectance 1w	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance																	
0	.52	.52	.52	.52	.51	.51	.51	.51	.49	.49	.49	.47	.47	.47	.45	.45	.45	.44
1	.48	.45	.43	.42	.46	.44	.43	.41	.42	.41	.40	.41	.39	.38	.39	.38	.37	.36
2	.43	.39	.36	.33	.42	.38	.36	.33	.37	.34	.32	.35	.33	.32	.34	.32	.31	.30
3	.39	.34	.30	.27	.38	.33	.30	.27	.32	.29	.26	.31	.28	.26	.30	.27	.26	.25
4	.35	.30	.26	.23	.34	.29	.26	.23	.28	.25	.22	.27	.24	.22	.26	.24	.22	.21
5	.32	.26	.22	.19	.31	.26	.22	.19	.25	.21	.19	.24	.21	.18	.23	.20	.18	.17
6	.29	.23	.19	.16	.28	.23	.19	.16	.22	.18	.16	.21	.18	.15	.20	.18	.15	.14
7	.27	.20	.16	.13	.26	.20	.16	.13	.19	.16	.13	.19	.15	.13	.18	.15	.13	.12
8	.25	.18	.14	.11	.24	.18	.14	.11	.17	.14	.11	.17	.13	.11	.16	.13	.11	.10
9	.23	.16	.12	.10	.22	.16	.12	.10	.15	.12	.10	.15	.12	.10	.14	.12	.09	.09
10	.21	.15	.11	.08	.20	.14	.11	.08	.14	.11	.08	.13	.10	.08	.13	.10	.08	.07

• Fluorescent 30W (Reflector: Angle)



FRONT		SIDE	
Angle	cd/1000 lm	Angle	cd/1000 lm
0	104	0	104
5	78	5	107
15	101	15	133
25	153	25	168
35	234	35	202
45	306	45	234
55	350	55	234
65	364	65	196
75	355	75	173
85	326	85	150
90	306	90	133
95	280	95	118
105	222	105	87
115	156	115	55
125	92	125	23
135	35	135	-
145	3	145	-
155	-	155	-

ZONAL CAVITY METHOD

% EFFECTIVE Ceiling Cavity Reflectance 1cc	80				70				50				30				10				0
% Wall Reflectance 1w	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance																				
0	.50	.50	.50	.50	.48	.48	.48	.48	.44	.44	.44	.40	.40	.40	.36	.36	.36	.35			
1	.44	.41	.38	.36	.41	.39	.36	.34	.35	.33	.31	.32	.30	.29	.28	.27	.26	.24			
2	.39	.34	.30	.27	.37	.32	.29	.26	.29	.26	.24	.26	.24	.22	.23	.22	.20	.18			
3	.35	.29	.25	.21	.33	.28	.24	.20	.25	.22	.19	.22	.20	.17	.20	.18	.16	.14			
4	.31	.25	.21	.17	.30	.24	.20	.17	.22	.18	.15	.19	.17	.14	.17	.15	.13	.12			
5	.28	.22	.18	.14	.27	.21	.17	.14	.19	.15	.13	.17	.14	.12	.15	.13	.11	.09			
6	.26	.19	.15	.12	.24	.18	.14	.11	.17	.13	.11	.15	.12	.10	.13	.11	.09	.08			
7	.24	.17	.13	.10	.22	.16	.12	.10	.15	.11	.09	.13	.10	.08	.12	.09	.07	.06			
8	.22	.15	.11	.08	.21	.15	.11	.08	.13	.10	.08	.12	.09	.07	.11	.08	.06	.05			
9	.20	.14	.10	.07	.19	.13	.10	.07	.12	.09	.06	.11	.08	.06	.10	.07	.05	.04			
10	.19	.13	.09	.06	.18	.12	.08	.06	.11	.08	.06	.10	.07	.05	.09	.06	.05	.04			

LNS Series - Ex nR II IP66 Lighting Fixture

- Ex d II IP66
- IEC 60079-0, 15
- IEC 60529



■ Applications

- LNS Series Lighting Fixtures are designed for installations where moisture, dirt, dust, corrosion and vibration may be present, or IEC 60529 IP66 areas where wind, water, snow or high ambient can be expected.
- They can be used in locations made hazardous due to the presence of flammable or explosive gases, vapors and combustible dusts as defined by the IEC 60079-0,15.
- Applications include classified areas such as paint manufacturing plants, ammunition facilities, oil and gas producing and refining plants, off-shore and dockside installations, tank farms, pipeline pumping stations and marine loading and fuel transfer terminals.
- Hazardous areas, both indoors and outdoors where long life and low maintenance costs are desired.

■ Features

- Wide range of light sources and wattages to meet specific lighting needs-30 and 85 Fluorescent; 100, 150, 250 and 400W high pressure sodium (HPS) ; 250 and 400W mercury vapor (MV); 175, 250 and 400W metal halide (MH).
- Four light sources – Compact fluorescent, high pressure sodium, metal halide and mercury vapor.
- Mounting choice – Pendant, Ceiling, 25° Stanchion, 40° or 90° wall mount
- Integral ballasts – separate ballasts are not required. Lowest installed cost.
- Corrosion resistant – Copper-free aluminum die cast construction. Baked powder epoxy finish, electro-statically applies Exposed hardware is stainless steel.
- Pendant type is standard.

■ Standard Materials

- Copper-free Aluminium (Cast Aluminium Alloy)
- Globe : Heat Resistant Glass
- Reflector : High Purity Aluminium
- Guard & Accessory : Stainless Steel

■ Options

- Fuse – to protect ballast and capacitors against abnormal line conditions.
⇒ One fuse required for 120 or 277VAC units
⇒ Two fuses needed for 208, 240 or 480VAC units
- Instant re-strike ballast – enables a hot HPS lamp to immediately re-strike after a momentary loss of arc due to voltage fluctuation or power outage. It has no effect on the warm-up period of cold lamps (Max 150W HPS only).
- Dome reflector or 30° angle reflector.
- Protect Guard.
- High power factor – Minimum P. F. 90%.

■ Standard Finishes

- Spray (Color : Munsel No. 7.5BG 6/1.5)

■ Compliances

- IEC 60079-0 Equipment – General requirements
- IEC 60079-15 Construction, test and marking of type of protection “n” electrical apparatus
- ANSI /ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- ISO 261 Metric screw thread

■ Certification

- Certified by KOSHA
(Korea Occupational Safety & Health Agency)

■ Weight

- 16 kg

■ Technical Data

- Voltage Range – AC 100V~480V
- Watts Range – 30~400W



Lighting Fixtures

LNS Series - Ex nR II IP66 Lighting Fixture

- Ex nR II IP66
- IEC 60079-0, 15
- IEC 60529

Model Number Logic

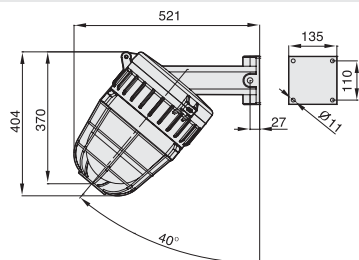
0	LNS	00	00	00	0	0
Lamp Type C-Fluorescent S-HPS (High pressure sodium) M-Metal V-Mercury	Series Constant	Lamp Wattage 03- 30W-C 08- 85W-C 10-100W-S 15-150W-S 17-175W-M 25-250W-M.S.V 40-400W-M.S.V	Voltage @ 60Hz 12-AC120V 20-AC208V 22-AC220V 24-AC-240V 27-AC277V 48-AC480V	Mounting Type PT-Pendant CL-Ceiling ST-Stanchion 4B-40° Bracket 9B-90° Bracket	G-Omit G if guard is not required	P-Omit P if High powerfactor is not required

ex) High Pressure Sodium, Normal type 90° Bracket Mounting, AC277V, 400W, No guard

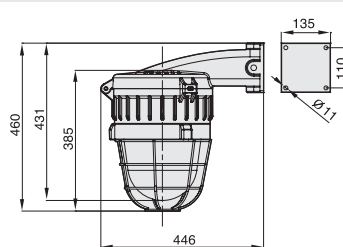
Dimensions

Dimensions (mm)

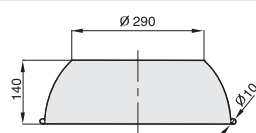
40° Wall Mount Type



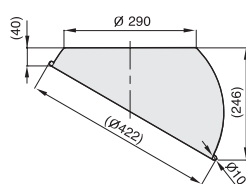
90° Wall Mount Type



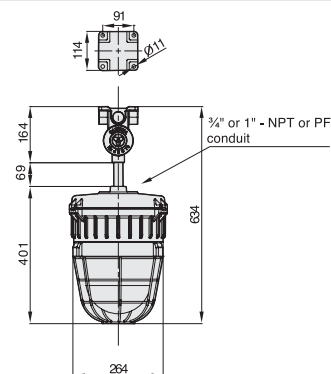
Standard Type Reflector



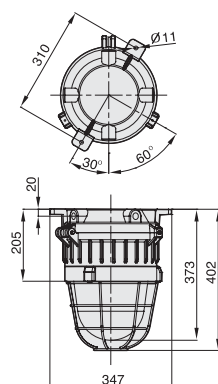
30° Dome Type Reflector



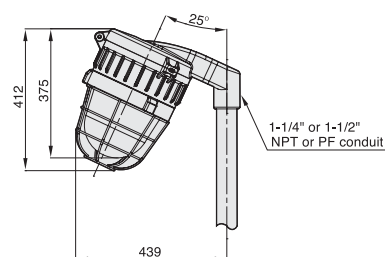
Pendant Type



Ceiling Type

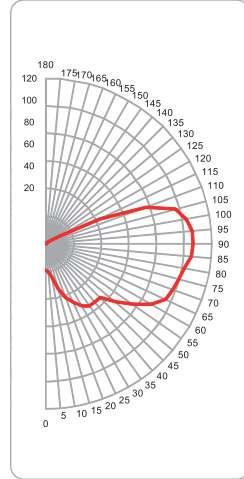


Stanchion Type



■ Photometric Data

• High Pressure Sodium 100W (Reflector: Non)

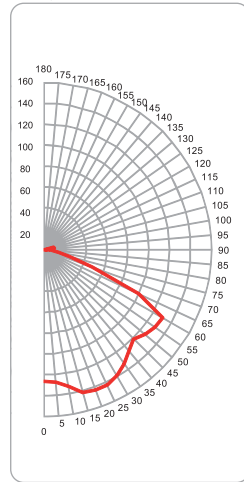


Angle	cd/1000 lm	Angle	cd/1000 lm
0	19	90	107
5	21	95	107
10	25	100	103
15	34	105	97
20	42	110	77
25	47	115	43
30	53	120	11
35	55	125	1
40	55	130	0
45	55	135	0
50	66	140	-
55	77	145	-
60	88	150	-
65	96	155	-
70	98	160	-
75	100	165	-
80	102	170	-
85	106	175	-

ZONAL CAVITY METHOD

% EFFECTIVE Ceiling Cavity Reflectance 1cc	80				70				50				30				10				0
% Wall Reflectance 1w	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0			
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance																				
0	.84	.84	.84	.84	.79	.79	.79	.79	.70	.70	.70	.61	.61	.61	.53	.53	.53	.50			
1	.71	.66	.61	.56	.66	.61	.57	.52	.53	.49	.46	.46	.43	.40	.39	.36	.34	.31			
2	.64	.54	.47	.41	.58	.50	.44	.38	.43	.38	.34	.37	.33	.29	.31	.27	.25	.21			
3	.56	.46	.38	.32	.51	.42	.35	.30	.36	.30	.26	.30	.26	.22	.25	.22	.18	.15			
4	.50	.40	.32	.26	.46	.37	.30	.24	.31	.25	.21	.26	.22	.18	.22	.18	.15	.12			
5	.46	.34	.27	.21	.42	.32	.25	.19	.27	.21	.17	.23	.18	.14	.19	.15	.12	.09			
6	.42	.30	.23	.17	.38	.28	.21	.16	.24	.18	.14	.20	.15	.12	.17	.12	.09	.07			
7	.38	.27	.19	.14	.35	.25	.18	.13	.21	.15	.11	.18	.13	.09	.15	.11	.08	.06			
8	.35	.24	.17	.12	.32	.22	.16	.11	.19	.14	.10	.16	.11	.08	.13	.09	.06	.05			
9	.33	.22	.15	.10	.30	.20	.14	.10	.17	.12	.08	.15	.10	.07	.12	.08	.05	.04			
10	.30	.20	.13	.09	.28	.18	.12	.08	.16	.11	.07	.13	.09	.06	.11	.07	.05	.03			

• High Pressure Sodium 100W (Reflector: Dome)

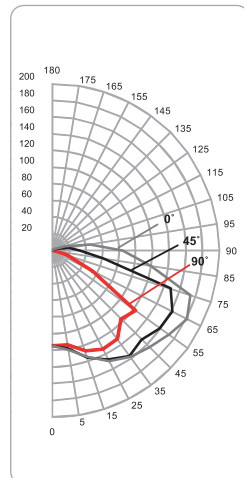


Angle	cd/1000 lm	Angle	cd/1000 lm
0	126	90	1
5	128	95	5
10	133	100	10
15	142	105	9
20	143	110	3
25	143	115	0
30	139	120	-
35	133	125	-
40	126	130	-
45	121	135	-
50	126	140	-
55	129	145	-
60	131	150	-
65	100	155	-
70	49	160	-
75	26	165	-
80	14	170	-
85	5	175	-

ZONAL CAVITY METHOD

% EFFECTIVE Ceiling Cavity Reflectance 1cc	80				70				50				30				10				0
% Wall Reflectance 1w	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance																				
0	.66	.66	.66	.66	.64	.64	.64	.64	.61	.61	.61	.58	.58	.58	.56	.56	.56	.56	.56	.54	
1	.61	.58	.56	.54	.59	.57	.55	.53	.54	.52	.51	.52	.50	.49	.49	.48	.47	.46			
2	.55	.51	.47	.44	.54	.50	.46	.43	.47	.45	.42	.46	.43	.41	.44	.42	.40	.39			
3	.50	.44	.40	.36	.49	.43	.39	.36	.42	.38	.35	.40	.37	.34	.38	.36	.34	.32			
4	.46	.39	.34	.31	.45	.38	.34	.30	.37	.33	.30	.35	.32	.29	.34	.31	.29	.27			
5	.42	.34	.29	.26	.40	.34	.29	.25	.32	.28	.25	.31	.27	.24	.30	.27	.24	.23			
6	.38	.30	.25	.22	.37	.30	.25	.21	.29	.24	.21	.27	.24	.21	.26	.23	.20	.19			
7	.35	.27	.22	.18	.34	.26	.21	.18	.25	.21	.18	.24	.20	.17	.23	.20	.17	.16			
8	.32	.24	.19	.16	.31	.24	.19	.16	.23	.18	.15	.22	.18	.15	.21	.18	.15	.14			
9	.33	.22	.17	.14	.29	.21	.17	.14	.21	.16	.13	.20	.16	.13	.19	.16	.13	.12			
10	.27	.20	.15	.12	.27	.19	.15	.12	.19	.15	.12	.18	.14	.12	.17	.14	.11	.10			

• High Pressure Sodium 100W (Reflector: Angle)



Reflector	90	45	0
Angle	cd/1000lm	cd/1000lm	cd/1000lm
180	-	-	-
175	-	-	-
165	-	-	-
155	-	-	-
145	-	-	-
135	-	-	-
125	-	-	-
115	-	-	3.16
105	-	5.37	15.37
95	-	20.63	45.79
90	-	32.63	84.53
85	2.00	60.84	119.47
75	18.53	148.95	173.58
65	54.32	161.05	181.26
55	122.74	159.05	172.42
45	116.21	151.47	164.42
35	131.79	156.21	157.89
25	133.47	146.53	149.58
15	127.05	135.26	134.84
5	114.63	118.74	120.84
0	114.63	114.63	114.63

ZONAL CAVITY METHOD

% EFFECTIVE Ceiling Cavity Reflectance 1cc	80				70				50				30				10				0
% Wall Reflectance 1w	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0			
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance																				
0	.68	.68	.68	.68	.66	.66	.66	.66	.62	.62	.62	.59	.59	.59	.56	.56	.56	.55			
1	.60	.57	.54	.51	.58	.56	.53	.50	.52	.50	.48	.50	.48	.46	.47	.46	.44	.43			
2	.54	.49	.45	.41	.53	.48	.44	.40	.45	.42	.39	.43	.40	.37	.41	.38	.36	.35			
3	.49	.42	.37	.33	.47	.41	.36	.33	.39	.35	.32	.37	.34	.31	.35	.32	.30	.28			
4	.45	.38	.32	.28	.43	.37	.32	.28	.35	.30	.27	.33	.29	.26	.31	.28	.26	.24			
5	.41	.33	.23	.23	.40	.32	.27	.23	.31	.26	.23	.29	.25	.22	.28	.25	.22	.20			
6	.38	.29	.24	.20	.36	.29	.24	.20	.27	.23	.19	.26	.22	.19	.25	.21	.19	.17			
7	.34	.26	.21	.17	.33	.26	.20	.17	.24	.20	.17	.23	.19	.16	.22	.19	.16	.15			
8	.32	.24	.18	.15	.31	.23	.18	.15	.22	.18	.14	.21	.17	.14	.20	.17	.14	.13			
9	.29	.21	.16	.13	.28	.21	.16	.13	.20	.16	.13	.19	.15	.12	.18	.15	.12	.11			
10	.27	.19	.14	.11	.26	.19	.14	.11	.18	.14	.11	.17	.13	.11	.17	.13	.11	.10			



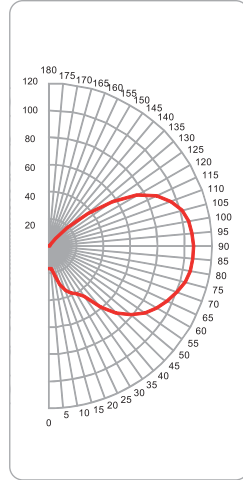
Lighting Fixtures

LNS Series - Ex nR II IP66 Lighting Fixture

- Ex nR II IP66
- IEC 60079-0, 15
- IEC 60529

■ Photometric Data

- High Pressure Sodium 400W (Reflector: Non)

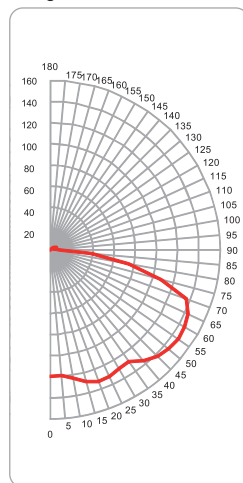


Angle	cd/1000 lm	Angle	cd/1000 lm
0	17	90	107
5	17	95	106
10	22	100	104
15	30	105	101
20	35	110	96
25	38	115	88
30	41	120	75
35	45	125	57
40	59	130	37
45	70	135	19
50	79	140	7
55	86	145	2
60	92	150	0
65	96	155	-
70	100	160	-
75	104	165	-
80	106	170	-
85	107	175	-

ZONAL CAVITY METHOD

% EFFECTIVE Ceiling Cavity Reflectance 1cc	80				70				50				30				10				0
% Wall Reflectance 1w	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance																				
0	.97	.97	.97	.97	.90	.90	.90	.90	.78	.78	.78	.66	.66	.66	.56	.56	.56	.56	.56	.56	.51
1	.83	.76	.71	.66	.76	.71	.66	.61	.60	.56	.52	.50	.47	.44	.41	.38	.36	.32	.29	.26	.22
2	.73	.63	.55	.49	.67	.58	.51	.45	.49	.43	.38	.40	.36	.32	.29	.26	.23	.19	.15	.12	.09
3	.65	.54	.45	.38	.59	.49	.41	.35	.41	.35	.30	.33	.29	.24	.26	.23	.19	.15	.12	.09	.07
4	.59	.46	.37	.31	.54	.43	.35	.28	.36	.29	.24	.29	.24	.20	.23	.19	.15	.12	.09	.07	.05
5	.53	.40	.31	.25	.48	.37	.29	.23	.31	.24	.19	.25	.20	.16	.20	.15	.12	.09	.07	.05	.03
6	.48	.35	.27	.21	.44	.32	.25	.19	.27	.21	.16	.22	.17	.13	.17	.13	.10	.07	.05	.03	.02
7	.44	.31	.23	.17	.40	.29	.21	.16	.24	.17	.13	.19	.14	.10	.15	.11	.08	.05	.03	.02	.01
8	.41	.28	.20	.14	.37	.26	.18	.13	.21	.15	.11	.18	.12	.09	.14	.10	.06	.04	.03	.02	.01
9	.38	.25	.18	.12	.34	.23	.16	.11	.19	.13	.09	.16	.11	.07	.12	.08	.05	.03	.02	.01	.00
10	.35	.23	.15	.11	.32	.21	.14	.10	.18	.12	.08	.14	.10	.06	.11	.07	.04	.03	.02	.01	.00

- High Pressure Sodium 400W (Reflector: Dome)

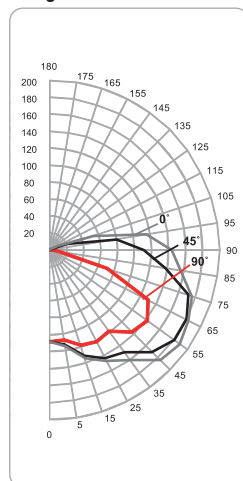


Angle	cd/1000 lm	Angle	cd/1000 lm
0	119	90	9
5	119	95	5
10	123	100	3
15	129	105	4
20	132	110	5
25	132	115	6
30	130	120	5
35	129	125	4
40	137	130	2
45	142	135	1
50	146	140	-
55	147	145	-
60	146	150	-
65	143	155	-
70	136	160	-
75	108	165	-
80	75	170	-
85	39	175	-

ZONAL CAVITY METHOD

% EFFECTIVE Ceiling Cavity Reflectance 1cc	80				70				50				30				10				0
% Wall Reflectance 1w	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance																				
0	.89	.89	.89	.89	.87	.87	.87	.87	.82	.82	.82	.78	.78	.78	.75	.75	.75	.75	.75	.75	.73
1	.79	.74	.70	.67	.77	.73	.69	.65	.69	.66	.63	.65	.63	.60	.62	.60	.58	.56	.54	.52	.49
2	.70	.63	.57	.51	.68	.61	.55	.50	.58	.53	.49	.55	.51	.47	.52	.49	.46	.44	.42	.40	.37
3	.63	.53	.46	.40	.60	.52	.45	.40	.49	.43	.39	.47	.42	.38	.44	.40	.37	.35	.33	.31	.29
4	.57	.46	.39	.33	.55	.45	.38	.33	.43	.37	.32	.41	.36	.31	.39	.34	.31	.29	.27	.25	.23
5	.51	.40	.33	.27	.49	.39	.32	.27	.37	.31	.26	.36	.30	.26	.34	.29	.25	.23	.21	.19	.17
6	.47	.35	.28	.22	.45	.35	.27	.22	.33	.27	.22	.31	.26	.21	.30	.25	.21	.19	.17	.15	.13
7	.43	.31	.24	.19	.41	.30	.23	.18	.29	.23	.18	.28	.22	.18	.27	.21	.17	.16	.14	.12	.10
8	.39	.28	.21	.16	.38	.27	.21	.16	.26	.20	.16	.25	.19	.15	.24	.19	.15	.13	.11	.09	.07
9	.36	.25	.18	.14	.35	.25	.18	.14	.24	.18	.13	.23	.17	.13	.22	.17	.13	.11	.09	.07	.05
10	.34	.23	.16	.12	.33	.22	.16	.12	.21	.16	.12	.21	.15	.11	.20	.15	.11	.09	.07	.05	.03

- High Pressure Sodium 400W (Reflector: Angle)



Reflector	90	45	0
Angle	cd/1000lm	cd/1000lm	cd/1000lm
180	-	-	-
175	-	-	-
165	-	-	-
155	-	-	-
145	-	-	-
135	-	-	-
125	-	-	0.54
115	0.08	1.94	10.98
105	0.50	21.48	53.26
95	2.36	79.90	114.98
90	3.88	110.44	143.54
85	11.88	138.56	155.78
75	71.56	172.12	175.92
65	129.84	180.62	183.70
55	142.46	180.98	189.14
45	136.74	170.28	184.44
35	118.32	149.24	160.14
25	121.50	143.10	146.92
15	118.50	131.12	134.40
5	107.64	112.46	114.44
0	108.60	108.60	108.60

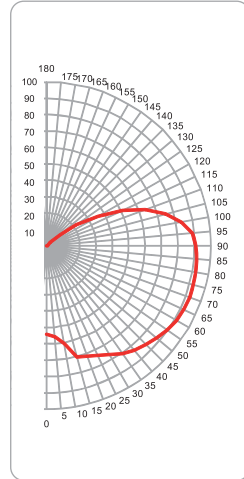
ZONAL CAVITY METHOD

% EFFECTIVE Ceiling Cavity Reflectance 1cc	80				70				50				30				10				0
% Wall Reflectance 1w	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance																				
0	.84	.84	.84	.84	.81	.81	.81	.81	.76	.76	.76	.72	.72	.72	.67	.67	.67	.67	.67	.67	.65
1	.74	.69	.65	.62	.71	.67	.63	.60	.63	.60	.57	.59	.56	.54	.55	.53	.51	.49	.47	.44	.41
2	.66	.59	.53	.48	.64	.57	.51	.47	.53	.49	.45	.50	.46	.43	.47	.44	.41	.39	.37	.34	.31
3	.59	.50	.44	.38	.57	.49	.43	.37	.46	.40	.36	.43	.38	.34	.40	.36	.33	.31	.29	.27	.24
4	.54	.44	.37	.32	.52	.43	.36	.31	.40	.34	.30	.38	.33	.29	.35	.31	.28	.26	.24	.22	.20
5	.49	.39	.32	.26	.47	.38	.31	.26	.35	.29	.25	.33	.28	.24	.31	.27	.23	.21	.19	.17	.15
6	.45	.34	.27	.22	.43	.33	.26	.22	.31	.25	.21	.29	.24	.20	.27	.23	.19	.18	.16	.14	.12
7	.41	.30	.23	.19	.39	.29	.23	.18	.27	.22	.17	.26	.21	.17	.24	.20	.16	.15	.13	.11	.09
8	.38	.27	.20	.16	.36	.26	.20	.15	.25	.19	.15	.23	.18	.14	.22	.17	.14	.12	.10	.08	.06
9	.35	.24	.18	.13	.33	.24	.18	.13	.22	.17	.13	.21	.16	.12	.20	.15	.12	.11	.09	.07	.05
10	.32	.22	.16	.12	.31	.21	.16	.12	.20	.15	.11	.19	.14	.11	.18	.14	.10	.09	.07	.05	.03

■ Photometric Data

• Mercury Vapor, Metal Halide 175W (Reflector: Non)

ZONAL CAVITY METHOD

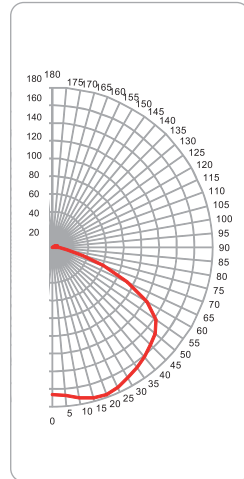


Angle	cd/1000 lm	Angle	cd/1000 lm
0	54	90	91
5	56	95	89
10	61	100	84
15	70	105	75
20	72	110	64
25	74	115	51
30	77	120	36
35	80	125	22
40	83	130	10
45	86	135	2
50	88	140	0
55	90	145	-
60	91	150	-
65	92	155	-
70	93	160	-
75	93	165	-
80	92	170	-
85	92	175	-

% EFFECTIVE Ceiling Cavity Reflectance 1cc	80				70				50				30				10				0
% Wall Reflectance 1w	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance																				
0	.88	.88	.88	.88	.88	.83	.83	.83	.73	.73	.65	.65	.65	.57	.57	.57	.57	.54			
1	.76	.70	.65	.61	.71	.66	.61	.57	.58	.54	.51	.50	.48	.45	.44	.41	.39	.36			
2	.67	.59	.52	.46	.62	.55	.49	.43	.48	.43	.39	.35	.31	.27	.30	.26	.23	.20			
3	.60	.50	.42	.36	.56	.47	.40	.34	.41	.35	.30	.25	.21	.17	.20	.16	.13	.10			
4	.54	.44	.36	.30	.51	.41	.34	.28	.36	.30	.25	.21	.17	.13	.16	.12	.09	.06			
5	.49	.38	.30	.24	.46	.36	.28	.23	.31	.25	.21	.17	.13	.09	.11	.08	.06	.04			
6	.45	.34	.26	.20	.42	.31	.24	.19	.27	.22	.17	.13	.09	.06	.08	.05	.03	.02			
7	.41	.30	.22	.17	.38	.28	.21	.16	.24	.18	.14	.11	.08	.05	.07	.04	.03	.01			
8	.38	.27	.20	.15	.35	.25	.18	.14	.22	.16	.12	.09	.06	.04	.05	.03	.02	.01			
9	.35	.24	.17	.13	.33	.23	.16	.12	.20	.14	.11	.08	.05	.03	.04	.02	.01	.00			
10	.33	.22	.15	.11	.31	.21	.15	.10	.18	.13	.09	.06	.04	.02	.03	.01	.00	.00			

• Mercury Vapor, Metal Halide 175W (Reflector: Dome)

ZONAL CAVITY METHOD

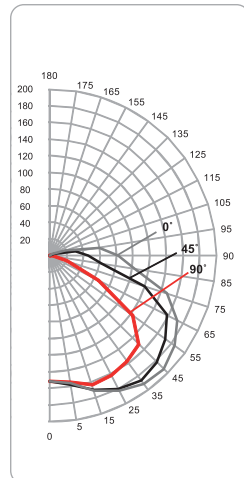


Angle	cd/1000 lm	Angle	cd/1000 lm
0	166	90	2
5	168	95	3
10	173	100	4
15	176	105	5
20	177	110	5
25	174	115	3
30	170	120	1
35	165	125	0
40	161	130	-
45	156	135	-
50	151	140	-
55	142	145	-
60	122	150	-
65	93	155	-
70	61	160	-
75	35	165	-
80	17	170	-
85	7	175	-

% EFFECTIVE Ceiling Cavity Reflectance 1cc	80				70				50				30				10				0
% Wall Reflectance 1w	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance																				
0	.77	.77	.77	.77	.75	.75	.75	.71	.71	.68	.68	.65	.65	.65	.65	.64					
1	.70	.68	.65	.63	.69	.66	.64	.61	.63	.61	.59	.60	.59	.57	.58	.55	.54				
2	.64	.59	.55	.52	.63	.58	.54	.51	.55	.52	.50	.53	.51	.48	.51	.49	.47	.46			
3	.59	.52	.47	.43	.57	.51	.46	.42	.49	.45	.42	.47	.44	.41	.45	.42	.40	.38			
4	.54	.46	.41	.36	.52	.45	.40	.36	.43	.39	.35	.42	.38	.35	.40	.37	.34	.33			
5	.49	.41	.35	.31	.48	.40	.34	.31	.38	.34	.30	.37	.33	.30	.36	.32	.29	.28			
6	.45	.36	.30	.26	.43	.35	.30	.26	.34	.29	.26	.33	.29	.25	.32	.28	.25	.24			
7	.41	.32	.26	.22	.40	.31	.26	.22	.30	.25	.22	.29	.25	.21	.28	.24	.21	.20			
8	.38	.29	.23	.19	.37	.28	.23	.19	.27	.22	.19	.26	.22	.19	.26	.22	.19	.17			
9	.35	.26	.20	.17	.34	.26	.20	.17	.25	.20	.17	.24	.19	.16	.23	.19	.16	.15			
10	.32	.24	.18	.15	.31	.23	.18	.15	.22	.18	.15	.22	.17	.14	.21	.17	.14	.13			

• Mercury Vapor, Metal Halide 175W (Reflector: Angle)

ZONAL CAVITY METHOD



Reflector	90	45	0
Angle	cd/1000lm	cd/1000lm	cd/1000lm
180	-	-	-
175	0.29	-	-
165	0.21	-	-
155	-	-	-
145	-	-	-
135	0.14	-	-
125	-	-	-
115	0.29	-	3.50
105	-	5.14	18.79
95	-	30.86	60.36
90	-	45.43	81.86
85	2.29	62.36	103.71
75	21.43	119.64	148.36
65	65.36	157.93	172.29
55	122.64	171.79	185.00
45	151.14	181.79	193.64
35	157.71	186.43	191.29
25	161.50	180.14	183.21
15	163.93	170.43	171.57
5	154.36	157.93	156.00
0	151.36	151.36	151.36

% EFFECTIVE Ceiling Cavity Reflectance 1cc	80				70				50				30				10				0
% Wall Reflectance 1w	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance																				
0	.75	.75	.75	.75	.73	.73	.73	.73	.69	.69	.66	.67	.66	.62	.62	.62	.61				
1	.68	.64	.61	.58	.66	.63	.60	.57	.59	.57	.55	.56	.54	.53	.54	.52	.51	.46			
2	.61	.56	.51	.47	.60	.54	.50	.47	.52	.48	.45	.49	.46	.44	.47	.44	.42	.41			
3	.56	.49	.43	.39	.54	.48	.43	.39	.45	.41	.38	.43	.40	.37	.41	.38	.36	.34			
4	.51	.43	.38	.33	.50	.42	.37	.33	.40	.36	.32	.39	.35	.32	.37	.34	.31	.29			
5	.47	.39	.33	.28	.45	.38	.32	.28	.36	.31	.28	.34	.30	.27	.33	.29	.26	.25			
6	.43	.34	.29	.24	.42	.34	.28	.24	.32	.27	.24	.31	.27	.23	.30	.26	.23	.24			
7	.39	.31	.25	.21	.38	.30	.25	.21	.29	.24	.20	.27	.23	.20	.26	.23	.20	.18			
8	.37	.28	.22	.18	.35	.27	.22	.18	.25	.21	.18	.25	.21	.17	.24	.20	.17	.16			
9	.34	.25	.20	.16	.33	.25	.19	.16	.23	.19	.16	.23	.18	.15	.22	.18	.15	.14			
10	.31	.23	.17	.14	.30	.22	.17	.14	.21	.17	.14	.21	.16	.13	.20	.16	.13	.12			



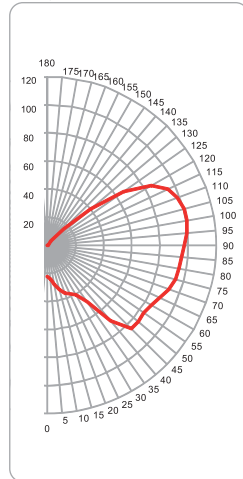
Lighting Fixtures

LNS Series - Ex nR II IP66 Lighting Fixture

- Ex nR II IP66
- IEC 60079-0, 15
- IEC 60529

■ Photometric Data

- High Pressure Sodium 400W (Reflector: Non)

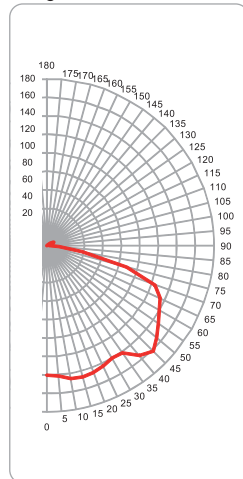


Angle	cd/1000 lm	Angle	cd/1000 lm
0	23	90	98
5	24	95	100
10	29	100	101
15	33	105	101
20	36	110	99
25	38	115	94
30	41	120	85
35	49	125	66
40	70	130	40
45	84	135	16
50	85	140	4
55	84	145	0
60	85	150	-
65	88	155	-
70	92	160	-
75	94	165	-
80	95	170	-
85	96	175	-

ZONAL CAVITY METHOD

% EFFECTIVE Ceiling Cavity Reflectance 1cc	80				70				50				30				10				0
% Wall Reflectance 1w	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance																				
0	.95	.95	.95	.95	.88	.88	.88	.88	.76	.76	.76	.65	.65	.65	.54	.54	.54	.49	.49	.49	.49
1	.82	.76	.70	.66	.75	.70	.65	.61	.59	.55	.52	.49	.46	.44	.40	.38	.36	.31	.31	.31	.31
2	.72	.63	.56	.49	.66	.58	.51	.46	.49	.43	.39	.40	.36	.32	.32	.29	.23	.22	.22	.22	.22
3	.64	.54	.45	.39	.59	.49	.42	.36	.41	.35	.30	.34	.29	.25	.27	.23	.20	.16	.16	.16	.16
4	.58	.47	.38	.31	.53	.43	.35	.29	.36	.29	.25	.29	.24	.20	.23	.19	.16	.13	.13	.13	.13
5	.53	.40	.32	.26	.48	.37	.29	.24	.31	.25	.20	.25	.20	.16	.20	.16	.13	.10	.10	.10	.10
6	.48	.36	.27	.21	.44	.33	.25	.19	.27	.21	.16	.22	.17	.13	.17	.13	.10	.07	.07	.07	.07
7	.44	.31	.23	.18	.40	.29	.21	.16	.24	.18	.13	.19	.14	.11	.15	.11	.08	.06	.06	.06	.06
8	.40	.28	.20	.15	.37	.26	.19	.14	.21	.16	.11	.18	.13	.09	.14	.10	.07	.05	.05	.05	.05
9	.37	.25	.18	.13	.34	.23	.16	.12	.19	.14	.10	.16	.11	.08	.12	.08	.06	.04	.04	.04	.04
10	.35	.23	.16	.11	.32	.21	.14	.10	.18	.12	.08	.14	.10	.06	.11	.07	.05	.03	.03	.03	.03

- High Pressure Sodium 400W (Reflector: Dome)

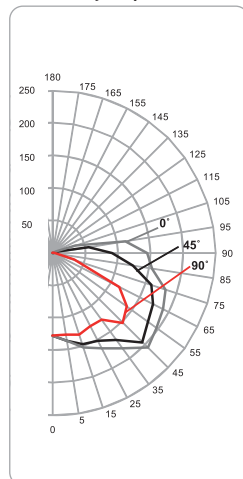


Angle	cd/1000 lm	Angle	cd/1000 lm
0	140	90	3
5	142	95	3
10	146	100	2
15	147	105	3
20	146	110	6
25	144	115	8
30	140	120	7
35	141	125	4
40	155	130	1
45	162	135	-
50	155	140	-
55	146	145	-
60	140	150	-
65	134	155	-
70	124	160	-
75	89	165	-
80	38	170	-
85	12	175	-

ZONAL CAVITY METHOD

% EFFECTIVE Ceiling Cavity Reflectance 1cc	80				70				50				30				10				0
% Wall Reflectance 1w	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance																				
0	.86	.86	.86	.86	.84	.84	.84	.84	.80	.80	.80	.76	.76	.76	.72	.72	.72	.71	.71	.71	.71
1	.78	.74	.70	.67	.75	.72	.69	.66	.68	.66	.63	.65	.63	.61	.62	.61	.59	.57	.57	.57	.57
2	.70	.63	.58	.53	.68	.61	.56	.52	.58	.54	.51	.56	.52	.49	.53	.50	.48	.46	.46	.46	.46
3	.62	.54	.47	.42	.60	.53	.47	.42	.50	.45	.41	.48	.44	.40	.46	.42	.39	.37	.37	.37	.37
4	.57	.47	.40	.35	.55	.46	.40	.35	.44	.38	.34	.42	.37	.33	.40	.36	.33	.31	.31	.31	.31
5	.52	.41	.34	.29	.50	.40	.34	.29	.38	.33	.28	.37	.32	.28	.35	.31	.27	.25	.25	.25	.25
6	.47	.36	.29	.24	.45	.35	.29	.24	.34	.28	.24	.32	.27	.23	.31	.26	.23	.21	.21	.21	.21
7	.43	.32	.25	.20	.41	.31	.25	.20	.30	.24	.20	.29	.23	.19	.28	.23	.19	.17	.17	.17	.17
8	.39	.29	.22	.17	.38	.28	.22	.17	.27	.21	.17	.26	.21	.17	.25	.20	.16	.15	.15	.15	.15
9	.36	.26	.19	.15	.35	.25	.19	.15	.24	.19	.15	.23	.18	.14	.22	.18	.14	.13	.13	.13	.13
10	.34	.23	.17	.13	.33	.23	.17	.13	.22	.16	.13	.21	.16	.12	.20	.16	.12	.11	.11	.11	.11

- Mercury Vapor, Metal Halide 400W (Reflector: Angle)



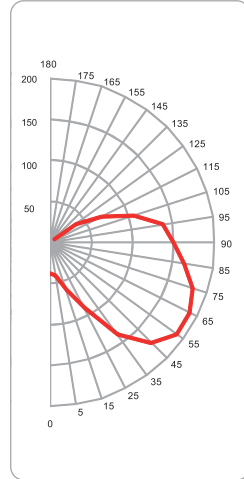
Reflector	90	45	0
Angle	cd/1000lm	cd/1000lm	cd/1000lm
180	-	-	-
175	-	-	-
165	-	-	-
155	-	-	-
145	-	-	-
135	-	-	-
125	-	-	-
115	-	0.67	4.53
105	0.22	9.36	36.00
95	1.33	55.64	112.56
90	2.36	91.31	144.56
85	6.31	124.31	155.17
75	34.39	159.03	182.14
65	115.42	172.17	190.17
55	140.44	180.47	196.75
45	152.61	194.81	206.69
35	127.92	165.14	181.67
25	126.94	152.00	164.86
15	133.14	148.14	153.25
5	128.28	136.64	137.19
0	127.64	127.64	127.64

ZONAL CAVITY METHOD

% EFFECTIVE Ceiling Cavity Reflectance 1cc	80				70				50				30				10				0
% Wall Reflectance 1w	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance																				
0	.82	.82	.82	.82	.80	.80	.80	.80	.75	.75	.75	.71	.71	.71	.67	.67	.67	.65	.65	.65	.65
1	.73	.69	.65	.62	.71	.67	.63	.60	.63	.60	.57	.59	.57	.55	.56	.54	.52	.50	.50	.50	.50
2	.66	.59	.54	.49	.63	.57	.52	.48	.54	.50	.46	.51	.47	.44	.48	.45	.42	.40	.40	.40	.40
3	.59	.51	.44	.39	.57	.49	.43	.39	.47	.41	.37	.44	.40	.36	.41	.38	.35	.33	.33	.33	.33
4	.54	.45	.38	.33	.52	.44	.37	.32	.41	.36	.31	.39	.34	.30	.37	.33	.29	.28	.28	.28	.28
5	.49	.39	.33	.27	.47	.38	.32	.27	.36	.31	.26	.34	.29	.26	.32	.28	.25	.23	.23	.23	.23
6	.45	.35	.28	.23	.43	.34	.27	.23	.32	.26	.22	.30	.25	.22	.29	.24	.21	.19	.19	.19	.19
7	.41	.31	.24	.20	.40	.30	.24	.19	.28	.23	.19	.27	.22	.18	.25	.21	.18	.16	.16	.16	.16
8	.38	.28	.21	.17	.36	.27	.21	.17	.25	.20	.16	.24	.19	.16	.23	.19	.15	.14	.14	.14	.14
9	.35	.25	.19	.14	.34	.24	.18	.14	.23	.18	.14	.22	.17	.13	.21	.16	.13	.12	.12	.12	.12
10	.32	.22	.16	.12	.31	.22	.16	.12	.21	.16	.12	.20	.15	.12	.19	.14	.11	.10	.10	.10	.10

■ Photometric Data

• Fluorescent 30W (Reflector: Non)

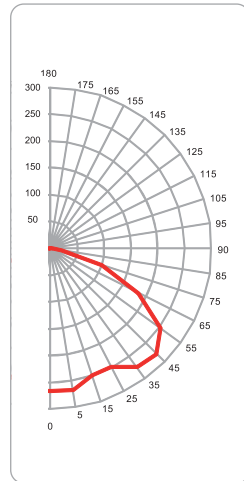


Angle	cd/1000 lm	Angle	cd/1000 lm
0	38	75	182
5	40	85	165
15	61	90	150
25	90	95	139
35	139	105	107
45	173	115	69
55	191	125	38
65	191	135	6

ZONAL CAVITY METHOD

% EFFECTIVE Ceiling Cavity Reflectance 1cc	80	70	50	30	10	0
% Wall Reflectance 1w	70 50 30 10	70 50 30 10	50 30 10	50 30 10	50 30 10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance					
0	.60 .60 .60 .60	.57 .57 .57 .57	.51 .51 .51	.46 .46 .46	.41 .41 .41	.39
1	.52 .48 .44 .41	.49 .45 .42 .39	.40 .38 .35	.36 .34 .32	.31 .30 .28	.26
2	.45 .40 .35 .31	.43 .37 .33 .29	.33 .29 .26	.29 .26 .24	.25 .23 .21	.19
3	.40 .33 .28 .24	.38 .31 .26 .22	.28 .24 .20	.24 .21 .18	.21 .18 .16	.14
4	.37 .29 .23 .19	.34 .27 .22 .18	.24 .20 .16	.21 .17 .14	.18 .15 .13	.11
5	.33 .25 .19 .15	.31 .23 .18 .14	.21 .16 .13	.18 .14 .11	.16 .12 .10	.08
6	.30 .22 .16 .12	.28 .20 .15 .12	.18 .14 .10	.16 .12 .09	.13 .10 .08	.06
7	.27 .19 .14 .10	.25 .18 .13 .10	.16 .12 .08	.14 .10 .07	.12 .09 .06	.05
8	.25 .17 .12 .08	.23 .16 .11 .08	.14 .10 .07	.12 .09 .06	.11 .08 .05	.04
9	.23 .15 .10 .07	.22 .14 .10 .07	.13 .09 .06	.11 .08 .05	.09 .06 .04	.03
10	.21 .14 .09 .06	.20 .13 .09 .06	.11 .08 .05	.10 .07 .04	.08 .06 .04	.02

• Fluorescent 30W (Reflector: Dome)

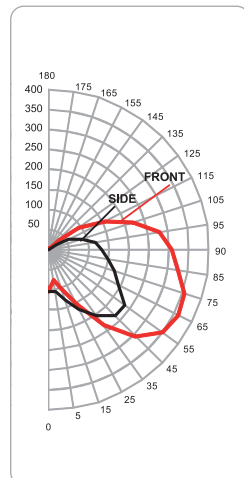


Angle	cd/1000 lm	Angle	cd/1000 lm
0	266	75	101
5	269	85	20
15	248	90	3
25	248	95	-
35	274	105	-
45	280	115	-
55	254	125	-
65	185	135	-

ZONAL CAVITY METHOD

% EFFECTIVE Ceiling Cavity Reflectance 1cc	80	70	50	30	10	0
% Wall Reflectance 1w	70 50 30 10	70 50 30 10	50 30 10	50 30 10	50 30 10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance					
0	.52 .52 .52 .52	.51 .51 .51 .51	.49 .49 .49	.47 .47 .47	.45 .45 .45	.44
1	.48 .45 .43 .42	.46 .44 .43 .41	.42 .41 .40	.41 .39 .38	.39 .38 .37	.36
2	.43 .39 .36 .33	.42 .38 .36 .33	.37 .34 .32	.35 .33 .32	.34 .32 .31	.30
3	.39 .34 .30 .27	.38 .33 .30 .27	.32 .29 .26	.31 .28 .26	.30 .27 .26	.25
4	.35 .30 .26 .23	.34 .29 .26 .23	.28 .25 .22	.27 .24 .22	.26 .24 .22	.21
5	.32 .26 .22 .19	.31 .26 .22 .19	.25 .21 .19	.24 .21 .18	.23 .20 .18	.17
6	.29 .23 .19 .16	.28 .23 .19 .16	.22 .18 .16	.21 .18 .15	.20 .18 .15	.14
7	.27 .20 .16 .13	.26 .20 .16 .13	.19 .16 .13	.19 .15 .13	.18 .15 .13	.12
8	.25 .18 .14 .11	.24 .18 .14 .11	.17 .14 .11	.17 .13 .11	.16 .13 .11	.10
9	.23 .16 .12 .10	.22 .16 .12 .10	.15 .12 .10	.15 .12 .10	.14 .12 .09	.09
10	.21 .15 .11 .08	.20 .14 .11 .08	.14 .11 .08	.13 .10 .08	.13 .10 .08	.07

• Fluorescent 30W (Reflector: Angle)



FRONT		SIDE	
Angle	cd/1000lm	cd/1000lm	cd/1000lm
0	104	0	104
5	78	5	107
15	101	15	133
25	153	25	168
35	234	35	202
45	306	45	234
55	350	55	234
65	364	65	196
75	355	75	173
85	326	85	150
90	306	90	133
95	280	95	118
105	222	105	87
115	156	115	55
125	92	125	23
135	35	135	-
145	3	145	-
155	-	155	-

ZONAL CAVITY METHOD

% EFFECTIVE Ceiling Cavity Reflectance 1cc	80	70	50	30	10	0
% Wall Reflectance 1w	70 50 30 10	70 50 30 10	50 30 10	50 30 10	50 30 10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance					
0	.88 .88 .88 .88	.83 .83 .83 .83	.73 .73 .73	.65 .65 .65	.57 .57 .57	.54
1	.76 .70 .65 .61	.71 .66 .61 .57	.58 .54 .51	.50 .48 .45	.44 .41 .39	.36
2	.67 .59 .52 .46	.62 .55 .49 .43	.48 .43 .39	.42 .38 .34	.36 .33 .30	.26
3	.60 .50 .42 .36	.56 .47 .40 .34	.41 .35 .30	.35 .31 .27	.30 .26 .23	.20
4	.54 .44 .36 .30	.51 .41 .34 .28	.36 .30 .25	.31 .26 .22	.26 .22 .19	.16
5	.49 .38 .30 .24	.46 .36 .28 .23	.31 .25 .21	.27 .22 .18	.23 .19 .16	.13
6	.45 .34 .26 .20	.42 .31 .24 .19	.27 .22 .17	.24 .19 .15	.20 .16 .13	.11
7	.41 .30 .22 .17	.38 .28 .21 .16	.24 .18 .14	.21 .16 .12	.18 .14 .11	.09
8	.38 .27 .20 .15	.35 .25 .18 .14	.22 .16 .12	.19 .14 .11	.16 .12 .09	.07
9	.35 .24 .17 .13	.33 .23 .16 .12	.20 .14 .11	.17 .13 .09	.15 .11 .08	.06
10	.33 .22 .15 .11	.31 .21 .15 .10	.18 .13 .09	.16 .11 .08	.14 .10 .07	.05

A

Lighting Fixtures

LES Series - Ex d II B IP54 Lighting Fixture

- Ex d II B IP54
- IEC 60079-0, 1
- IEC 60529



■ Applications

- LES Series Lighting Fixtures are designed for installations where moisture, dirt, dust, corrosion and vibration may be present, or IEC 60529 IP54 areas where wind, water, snow or high ambient can be expected.
- They can be used in locations made hazardous due to the presence of flammable or explosive gases, vapors and combustible dusts as defined by the IEC 60079-0,1.
- Applications include classified areas such as paint manufacturing plants, ammunition facilities, oil and gas producing and refining plants, off-shore and dockside installations, tank farms, pipeline pumping stations and marine loading and fuel transfer terminals.
- Hazardous areas, both indoors and outdoors where long life and low maintenance costs are desired.

■ Features

- Wide range of light sources and wattages to meet specific lighting needs – 30 and 85 Fluorescent; 100, 150, 200, 250 and 400W high pressure sodium (HPS); 250 and 400W mercury vapor (MV); 175, 250 and 400W metal halide (MH).
- Four light sources – Compact fluorescent, high pressure sodium, metal halide and mercury vapor.
- Mounting choice – Pendant, Ceiling, 25° Stanchion, 40° or 90° wall mount.
- Corrosion resistant – Copper-free aluminum die-cast construction. Baked powder epoxy finish, electro-statically applied. Exposed hardware is stainless steel.
- Pendant type is standard.

■ Standard Materials

- Copper-free Aluminium (Cast Aluminium Alloy)
- Globe : Heat Resistant Glass
- Reflector : High Purity Aluminium
- Guard & Accessory : Stainless Steel

■ Options

- Fuse – to protect ballast and capacitors against abnormal line conditions.
 - ⇒ One fuse required for 120 or 277VAC units
 - ⇒ Two fuses needed for 208,240 or 480VAC units
- Instant re-strike ballast – enables a hot HPS lamp to immediately re-strike after a momentary loss of arc due to voltage fluctuation or power outage. It has no effect on the warm-up period of cold lamps (Max 150W HPS only).
- Dome reflector or 30° angle reflector.
- Protect Guard.
- High power factor – Minimum P. F. 90%.

■ Standard Finishes

- Spray (Color : Munsel No. 7.5BG 6/1.5)

■ Compliances

- IEC 60079-0 Equipment – General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- ANSI /ASME B (1.20.1 Pipe threads, General purpose(Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- ISO 261 Metric screw thread

■ Certification

- Certified by KOGAS (Korea Gas Safety Corporation)

■ Weight

- 28 kg

■ Technical Data

- Voltage Range - AC 100V~480V
- Watts Range - 30~400W

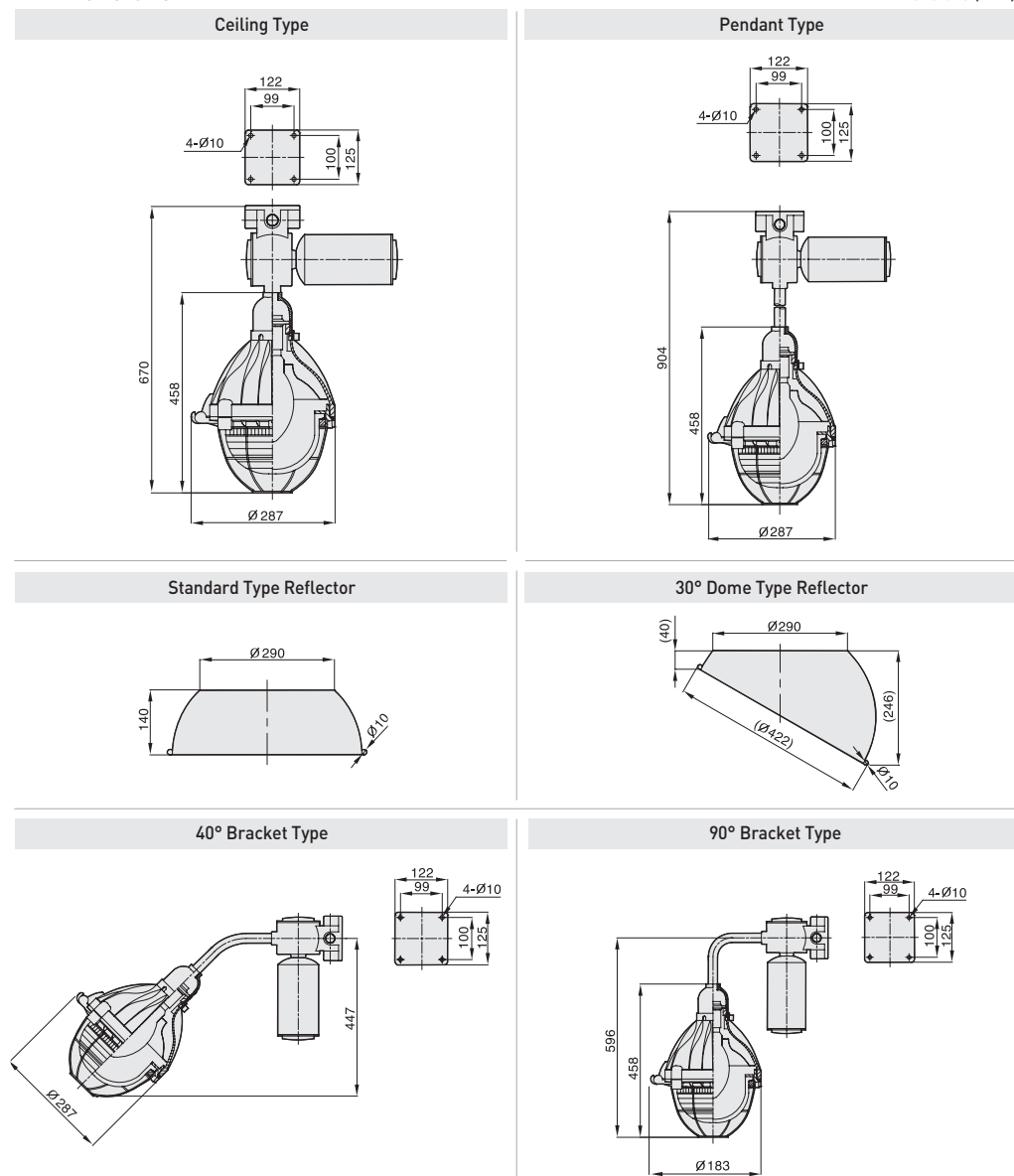
■ Model Number Logic

0	LES	00	00	00	0	0
Lamp Type C-Fluorescent S-HPS(High pressure sodium) M-Metal V-Mercury	Series Constant	Lamp Wattage 03- 30W-C 08- 85W-C 10-100W-S 15-150W-S 17-175W-M 25-250W-M.S.V 40-400W-M.S.V	Voltage@ 60Hz 12-AC120V 20-AC208V 22-AC220V 24-AC-240V 27-AC277V 48-AC480V	Mounting Type PT-Pendant CL-Ceiling ST-Stanchion 4B-40° Bracket 9B-90° Bracket	G-Omit G if guard is not required	P-Omit P if High powerfactor is not required

ex) Metal Halide High power factor type Stanchion Mounting, AC220V, 250W, Guard required MLES 25 22 ST G P

■ Dimensions

Dimensions (mm)





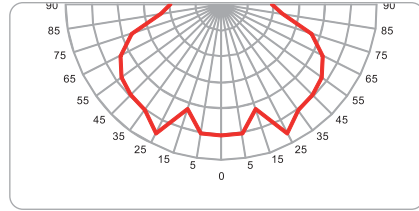
Lighting Fixtures

LES Series - Ex d II B IP54 Lighting Fixture

- Ex d II B IP54
- IEC 60079-0, 1
- IEC 60529

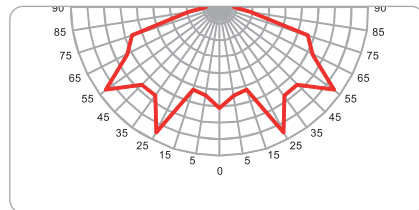
■ Photometric Data

• Fluorescent 30W



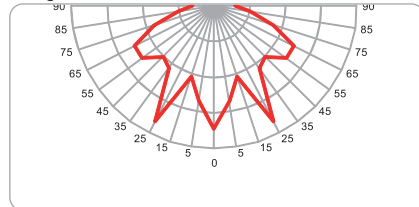
Angle	cd/1000 lm	Angle	cd/1000 lm
0	101	75	73
5	101	85	47
15	85	90	39
25	112	95	—
35	101	105	—
45	99	115	—
55	96	125	—
65	88	135	—

• Metal Halide 250W



Angle	cd/1000 lm	Angle	cd/1000 lm
0	122	75	112
5	108	85	38
15	105	90	17
25	170	95	—
35	133	105	—
45	133	115	—
55	171	125	—
65	126	135	—

• High Pressure Sodium 250W



Angle	cd/1000 lm	Angle	cd/1000 lm
0	172	75	88
5	135	85	51
15	105	90	30
25	182	95	—
35	108	105	—
45	101	115	—
55	125	125	—
65	125	135	—

ZONAL CAVITY METHOD

% Effective Ceiling Cavity Reflectance 1cc	80	70	50	30	10	0
% Wall Reflectance 1w	50 30 10	50 30 10	50 30 10	50 30 10	50 30 10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance					
0	.63 .63 .63	.61 .61 .61	.59 .59 .59	.56 .56 .56	.54 .54 .54	.53
1	.54 .52 .50	.53 .51 .49	.51 .49 .47	.49 .47 .46	.47 .46 .44	.43
2	.47 .43 .40	.46 .42 .39	.44 .41 .38	.42 .40 .38	.41 .39 .37	.35
3	.41 .36 .33	.40 .36 .32	.38 .35 .32	.37 .34 .31	.36 .33 .31	.30
4	.36 .31 .28	.35 .31 .27	.34 .30 .27	.33 .29 .27	.32 .29 .26	.25
5	.32 .27 .24	.32 .27 .24	.30 .26 .23	.29 .26 .23	.28 .25 .23	.22
6	.29 .24 .21	.29 .24 .21	.28 .23 .20	.27 .23 .20	.26 .23 .20	.19
7	.26 .22 .18	.26 .21 .18	.25 .21 .18	.24 .21 .18	.24 .20 .18	.17
8	.24 .20 .16	.24 .19 .16	.23 .19 .16	.22 .19 .16	.22 .18 .16	.15
9	.22 .18 .15	.22 .18 .15	.21 .17 .15	.21 .17 .15	.20 .17 .15	.14
10	.21 .16 .14	.20 .16 .14	.20 .16 .13	.19 .16 .13	.19 .16 .13	.12

ZONAL CAVITY METHOD

% Effective Ceiling Cavity Reflectance 1cc	80	70	50	30	10	0
% Wall Reflectance 1w	50 30 10	50 30 10	50 30 10	50 30 10	50 30 10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance					
0	.89 .89 .89	.87 .87 .87	.83 .83 .83	.79 .79 .79	.76 .76 .76	.74
1	.77 .74 .71	.76 .73 .70	.72 .70 .68	.70 .68 .66	.67 .65 .64	.62
2	.67 .62 .58	.66 .61 .57	.63 .59 .56	.61 .57 .54	.58 .56 .53	.52
3	.59 .53 .48	.58 .52 .47	.55 .50 .46	.53 .49 .46	.51 .48 .45	.43
4	.52 .45 .40	.51 .45 .40	.49 .44 .39	.47 .42 .39	.46 .41 .38	.36
5	.46 .39 .34	.45 .39 .34	.44 .38 .34	.42 .37 .33	.41 .36 .33	.31
6	.41 .35 .30	.41 .34 .30	.39 .34 .29	.38 .33 .29	.37 .32 .29	.27
7	.38 .31 .26	.37 .31 .26	.36 .30 .26	.35 .30 .26	.34 .29 .26	.24
8	.34 .28 .23	.34 .28 .23	.33 .27 .23	.32 .27 .23	.31 .26 .23	.21
9	.31 .25 .21	.31 .25 .21	.30 .25 .21	.29 .24 .21	.29 .24 .21	.19
10	.29 .23 .19	.29 .23 .19	.28 .23 .19	.27 .22 .19	.27 .22 .19	.17

ZONAL CAVITY METHOD

% Effective Ceiling Cavity Reflectance 1cc	80	70	50	30	10	0
% Wall Reflectance 1w	50 30 10	50 30 10	50 30 10	50 30 10	50 30 10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance					
0	.89 .89 .89	.87 .87 .87	.83 .83 .83	.79 .79 .79	.76 .76 .76	.74
1	.77 .74 .71	.76 .73 .70	.72 .70 .68	.70 .68 .66	.67 .65 .64	.62
2	.67 .62 .58	.66 .61 .57	.63 .59 .56	.61 .57 .54	.58 .56 .53	.52
3	.59 .53 .48	.58 .52 .47	.55 .50 .46	.53 .49 .46	.51 .48 .45	.43
4	.52 .45 .40	.51 .45 .40	.49 .44 .39	.47 .42 .39	.46 .41 .38	.36
5	.46 .39 .34	.45 .39 .34	.44 .38 .34	.42 .37 .33	.41 .36 .33	.31
6	.41 .35 .30	.41 .34 .30	.39 .34 .29	.38 .33 .29	.37 .32 .29	.27
7	.38 .31 .26	.37 .31 .26	.36 .30 .26	.35 .30 .26	.34 .29 .26	.24
8	.34 .28 .23	.34 .28 .23	.33 .27 .23	.32 .27 .23	.31 .26 .23	.21
9	.31 .25 .21	.31 .25 .21	.30 .25 .21	.29 .24 .21	.29 .24 .21	.19
10	.29 .23 .19	.29 .23 .19	.28 .23 .19	.27 .22 .19	.27 .22 .19	.17

SEU Series - Ex d II C IP66 Lighting Fixture

- Ex d II C IP66
- IEC 60079-0, 1
- IEC 60529



■ Applications

- SEU Series Lighting Fixtures are designed for installations where moisture, dirt, dust, corrosion and vibration may be present, or IEC 60529 IP66 areas where wind, water, snow or high ambient can be expected.
- They can be used in locations made hazardous due to the presence of flammable or explosive gases, vapors and combustible dusts as defined by the IEC 60079-0,1.
- Applications include classified areas such as paint manufacturing plants, ammunition facilities, oil and gas producing and refining plants, off-shore and dockside installations, tank farms, pipeline pumping stations and marine loading and fuel transfer terminals.
- Hazardous areas, both indoors and outdoors where long life and low maintenance costs are desired.

■ Features

- Fixture is factory wired; power is fed through "wireless" connection block which serves as a mechanical seal between conduit and mogul compartments, eliminating the need for a field installed seal. The result is fast, easy installation.
- Wide range of light sources and wattages to meet specific lighting needs – 20W Fluorescent; 100, 200 and 300W incandescent.
- Two light sources – Compact fluorescent, Incandescent.
- Mounting choice – Pendant, Ceiling, 25° Stanchion, 40° or 90° wall mount, all with "wireless" design that allows fast, easy fixture installation.
- Corrosion resistant – Copper-free aluminum die-cast construction. Baked powder epoxy finish, electro statically applied. Exposed hardware is stainless steel.
- Pendant type is standard.

■ Standard Materials

- Copper-free Aluminium (Cast Aluminium Alloy)
- Globe : Heat Resistant Glass
- Reflector : High Purity Aluminium
- Guard & Accessory : Stainless Steel

■ Options

- Dome reflector or 30° angle reflector.
- Protect Guard.

■ Compliances

- IEC 60079-0 Equipment – General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- ANSI /ASME B1.20.1 Pipe threads, General purpose(Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- ISO 261 Metric screw thread

■ Certification

- Certified by KOSHA
(Korea Occupational Safety & Health Agency)

■ Weight

- 10 kg

■ Technical Data

- Voltage Range - AC 120V~240V
- Watts Range - 20~300W

■ Standard Finishes

- Spray (Color : Munsel No. 7.5BG 6/1.5)

A

Lighting Fixtures

SEU Series - Ex d II C IP66 Lighting Fixture

- Ex d II C IP66
- IEC 60079-0, 1
- IEC 60529

Model Number Logic

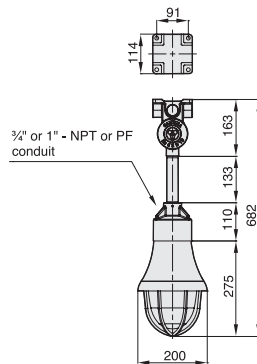
0	SEU	00	00	00	0
Lamp Type C - Fluorescent I - Incandescent	Series Constant	Lamp Wattage 02- 20W - C 10 -100W - I 20-200W - I 30-300W - I	Voltage @ 50/60Hz 12 - AC120V 22 - AC220V 24 - AC240V	Mounting Type PT-Pendant CL-Ceiling ST-Stanchion 4B-40° Bracket 9B-90° Bracket	G-Omit G if guard is not required

ex) Incandescent type Stanchion Mounting, AC220V, 200W, Guard required ISEU 20 22 ST G

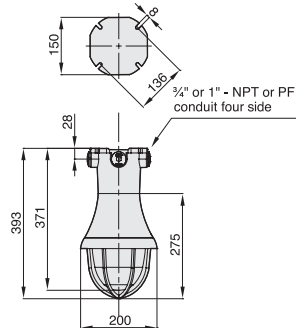
Dimensions

Dimensions (mm)

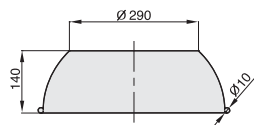
Pendant Type



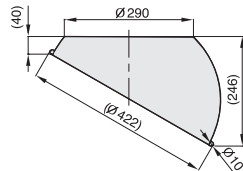
Ceiling Type



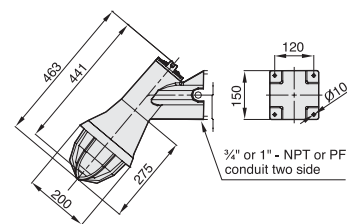
Standard Type Reflector



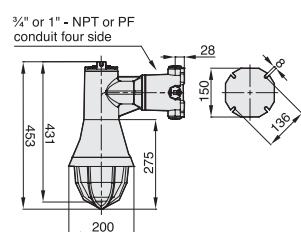
30° Dome Type Reflector



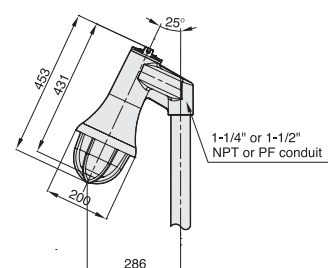
40° Bracket Type



90° Bracket Type

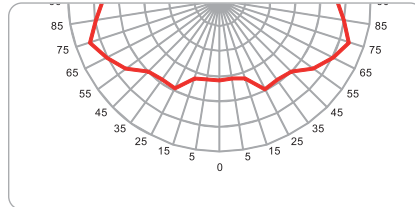


Stanchion Type



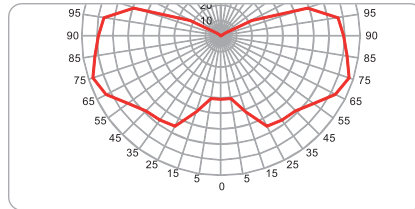
■ Photometric Data

• Fluorescent 20W



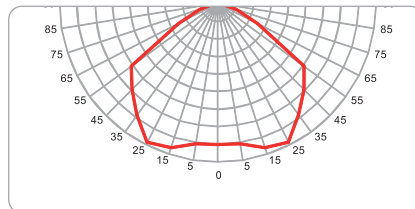
Angle	cd/1000 lm	Angle	cd/1000 lm
0	63	75	108
5	63	85	100
15	65	90	93
25	79	95	—
35	78	105	—
45	80	115	—
55	92	125	—
65	101	135	—

• Incandescent 300W



Angle	cd/1000 lm	Angle	cd/1000 lm
0	41	75	87
5	41	85	82
15	51	90	79
25	66	95	77
35	67	105	59
45	68	115	22
55	74	125	4
65	83	135	1

• Incandescent 300W (Reflector : Standard type)



Angle	cd/1000 lm	Angle	cd/1000 lm
0	161	75	22
5	161	85	7
15	172	90	3
25	177	95	6
35	157	105	5
45	138	115	1
55	121	125	—
65	50	135	—

ZONAL CAVITY METHOD

% Effective Ceiling Cavity Reflectance 1cc	80	70	50	30	10	0
% Wall Reflectance 1w	50 30 10	50 30 10	50 30 10	50 30 10	50 30 10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance					
0	.69 .69 .69	.67 .67 .67	.64 .64 .64	.62 .62 .62	.59 .59 .59	.58
1	.58 .55 .52	.57 .54 .51	.54 .52 .50	.52 .50 .48	.50 .48 .47	.45
2	.48 .44 .39	.47 .43 .39	.45 .41 .38	.43 .40 .37	.41 .39 .36	.35
3	.41 .35 .31	.40 .35 .31	.38 .34 .30	.37 .33 .29	.35 .32 .29	.27
4	.36 .30 .25	.35 .29 .25	.33 .28 .25	.32 .28 .24	.30 .27 .24	.22
5	.31 .25 .21	.31 .25 .21	.29 .24 .21	.28 .24 .20	.27 .23 .20	.19
6	.28 .22 .18	.27 .22 .18	.26 .21 .18	.25 .21 .17	.24 .20 .17	.16
7	.25 .20 .16	.25 .19 .15	.24 .19 .15	.23 .18 .15	.22 .18 .15	.14
8	.23 .17 .14	.22 .17 .14	.22 .17 .14	.21 .17 .13	.20 .16 .13	.12
9	.21 .16 .12	.21 .16 .12	.20 .15 .12	.19 .15 .12	.19 .15 .12	.11
10	.19 .14 .11	.19 .14 .11	.18 .14 .11	.18 .14 .11	.17 .14 .11	.10

ZONAL CAVITY METHOD

% Effective Ceiling Cavity Reflectance 1cc	80	70	50	30	10	0
% Wall Reflectance 1w	50 30 10	50 30 10	50 30 10	50 30 10	50 30 10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance					
1	.56 .52 .48	.53 .49 .46	.47 .44 .41	.41 .39 .37	.37 .35 .33	.30
2	.47 .41 .36	.44 .39 .34	.39 .34 .30	.34 .30 .28	.30 .27 .24	.22
3	.40 .33 .28	.37 .31 .27	.33 .28 .24	.29 .25 .21	.25 .22 .19	.17
4	.34 .28 .23	.32 .27 .22	.29 .24 .20	.25 .21 .18	.22 .18 .16	.13
5	.30 .24 .19	.28 .22 .18	.25 .20 .16	.22 .18 .14	.19 .16 .13	.10
6	.27 .20 .16	.25 .19 .15	.22 .17 .13	.19 .15 .12	.17 .13 .10	.09
7	.24 .17 .13	.22 .17 .13	.20 .15 .11	.17 .13 .10	.15 .11 .09	.07
8	.21 .15 .11	.20 .15 .11	.18 .13 .10	.16 .11 .09	.13 .10 .08	.06
9	.19 .14 .10	.18 .13 .09	.16 .12 .08	.14 .10 .07	.12 .09 .07	.05
10	.17 .12 .08	.16 .11 .08	.15 .10 .07	.13 .09 .06	.11 .08 .06	.04

ZONAL CAVITY METHOD

% Effective Ceiling Cavity Reflectance 1cc	80	70	50	30	10	0
% Wall Reflectance 1w	50 30 10	50 30 10	50 30 10	50 30 10	50 30 10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance					
1	.60 .58 .56	.58 .57 .55	.56 .54 .53	.53 .52 .51	.51 .50 .49	.48
2	.53 .50 .47	.52 .49 .46	.50 .47 .45	.48 .46 .44	.46 .44 .43	.41
3	.47 .43 .40	.46 .42 .40	.44 .41 .39	.43 .40 .38	.41 .39 .37	.36
4	.42 .38 .34	.42 .37 .34	.40 .36 .33	.38 .35 .33	.37 .34 .32	.31
5	.38 .33 .30	.37 .33 .29	.36 .32 .29	.34 .31 .28	.33 .30 .28	.27
6	.38 .29 .25	.33 .29 .25	.32 .28 .25	.31 .27 .25	.30 .27 .24	.23
7	.30 .25 .22	.29 .25 .22	.28 .24 .21	.28 .24 .21	.27 .23 .21	.20
8	.27 .22 .19	.27 .22 .19	.26 .21 .19	.25 .21 .19	.24 .21 .18	.17
9	.24 .20 .17	.24 .20 .17	.23 .19 .16	.23 .19 .16	.22 .19 .16	.15
10	.22 .18 .15	.22 .17 .14	.21 .17 .14	.21 .17 .14	.20 .16 .14	.13



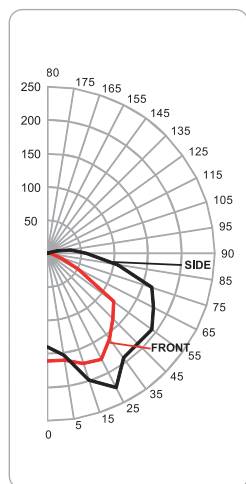
Lighting Fixtures

SEU Series - Ex d II C IP66 Lighting Fixture

- Ex d II C IP66
- IEC 60079-0, 1
- IEC 60529

■ Photometric Data

- Incandescent 300W (Reflector : Angle 30° type)



FRONT		SIDE	
Angle	cd/1000 lm	Angle	cd/1000 lm
0	161	0	140
5	161	5	154
15	172	15	199
25	177	25	225
35	157	35	193
45	138	45	190
55	121	55	193
65	50.3	65	177
75	22	75	163
85	7	85	106
90	3	90	57
95	6	95	35
105	5	105	15
115	1	115	4
125	0	125	0
135	0	135	0

SES Series - Ex d II B IP54 Lighting Fixture

- Ex d II B IP54
- IEC 60079-0, 1
- IEC 60529



■ Applications

- SES Series Lighting Fixtures are designed for installations where moisture, dirt, dust, corrosion and vibration may be present, or IEC 60529 IP54 areas where wind, water, snow or high ambient can be expected.
- They can be used in locations made hazardous due to the presence of flammable or explosive gases, vapors and combustible dusts as defined by the IEC 60079-0,1.
- Applications include classified areas such as paint manufacturing plants, ammunition facilities, oil and gas producing and refining plants, off-shore and dockside installations, tank farms, pipeline pumping stations and marine loading and fuel transfer terminals.
- Hazardous areas, both indoors and outdoors where long life and low maintenance costs are desired.

■ Features

- Wide range of light sources and wattages to meet specific lighting needs – 20W Fluorescent; 100, 200 and 300W incandescent.
- Two light sources – Compact fluorescent, Incandescent.
- Mounting choice – Pendant, Ceiling, 40° or 90° wall mount.
- Corrosion resistant – Copper-free aluminum die-cast construction. Baked powder epoxy finish, electro-statically applied. Exposed hardware is stainless steel.
- Pendant type is standard.

■ Standard Materials

- Copper-free Aluminium (Cast Aluminium Alloy)
- Globe : Heat Resistant Glass
- Reflector : High Purity Aluminium
- Guard & Accessory : Stainless Steel

■ Options

- Dome reflector or 30° angle reflector.
- Protect Guard.

■ Compliances

- IEC 60079-0 Equipment – General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures “d”
- ANSI /ASME B 1.20.1 Pipe threads, General purpose(Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- ISO 261 Metric screw thread

■ Certification

- Certified by KOGAS
(Korea Gas Safety Corporation)

■ Weight

- 10 kg

■ Technical Data

- Voltage Range - AC 120V~240V
- Watts Range - 20~300W

■ Standard Finishes

- Spray (Color : Munsel No. 7.5BG 6/1.5)



Lighting Fixtures

SES Series - Ex d II B IP54 Lighting Fixture

- Ex d II B IP54
- IEC 60079-0, 1
- IEC 60529

■ Model Number Logic

0

Lamp Type
C - Fluorescent
I - Incandescent

SES

Series
Constant

00

Lamp Wattage
02 - 20W - C
10 - 100W - I
20 - 200W - I
30 - 300W - I

00

Voltage @
50/60Hz
12 - AC120V
22 - AC220V
24 - AC240V

00

Mounting Type
PT-Pendant
CL-Ceiling
4B-40° Bracket
9B-90° Bracket

0

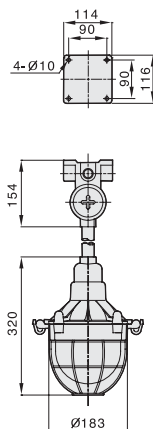
G-Omit G if guard
is not required

ex) Incandescent type Pendant, AC220V, 200W, Guard required ISES 20 22 PT G

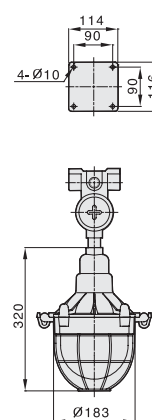
■ Dimensions

Dimensions (mm)

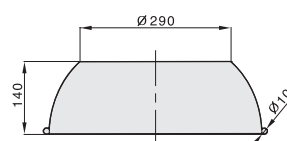
Pendant Type



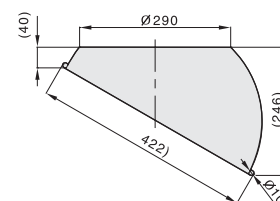
Ceiling Type



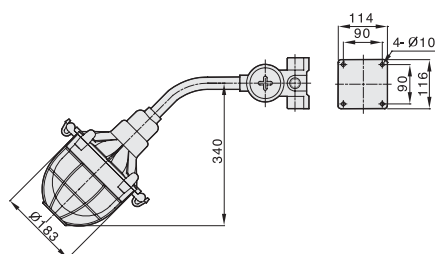
Standard Type Reflector



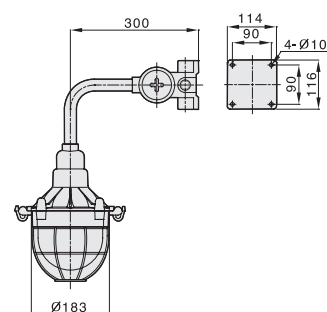
30° Dome Type Reflector



90° Bracket Type

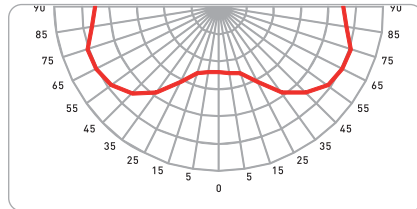


40° Bracket Type



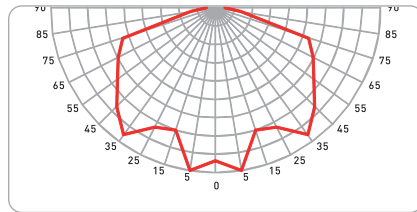
■ Photometric Data

• Fluorescent 20W



Angle	cd/1000 lm	Angle	cd/1000 lm
0	48	75	101
5	49	85	94
15	51	90	91
25	62	95	—
35	78	105	—
45	89	115	—
55	98	125	—
65	101	135	—

• Incandescent 100W



Angle	cd/1000 lm	Angle	cd/1000 lm
0	167	75	107
5	180	85	28
15	140	90	10
25	146	95	—
35	171	105	—
45	153	115	—
55	132	125	—
65	119	135	—

ZONAL CAVITY METHOD

%Effective Ceiling Cavity Reflectance 1cc	80	70	50	30	10	0
%Wall Reflectance 1w	50 30 10	50 30 10	50 30 10	50 30 10	50 30 10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance					
0	.67 .67 .67	.66 .66 .66	.63 .63 .63	.60 .60 .60	.57 .57 .57	.56
1	.56 .54 .51	.55 .52 .50	.53 .50 .48	.50 .49 .47	.48 .47 .45	.44
2	.47 .43 .39	.46 .42 .38	.44 .40 .37	.42 .39 .36	.40 .38 .35	.34
3	.40 .35 .30	.39 .34 .30	.37 .33 .29	.36 .32 .29	.34 .31 .28	.27
4	.35 .29 .24	.34 .29 .24	.32 .28 .24	.31 .27 .24	.30 .26 .23	.22
5	.30 .25 .20	.30 .24 .20	.29 .24 .20	.27 .23 .20	.26 .22 .19	.18
6	.27 .21 .17	.27 .21 .17	.25 .21 .17	.24 .20 .17	.23 .20 .17	.15
7	.24 .19 .15	.24 .19 .15	.23 .18 .15	.22 .18 .15	.21 .17 .14	.13
8	.22 .17 .13	.22 .17 .13	.21 .16 .13	.20 .16 .13	.19 .16 .13	.12
9	.20 .15 .12	.20 .15 .12	.19 .15 .11	.18 .14 .13	.18 .14 .11	.10
10	.18 .14 .10	.18 .13 .10	.18 .13 .10	.17 .13 .10	.16 .13 .10	.09

ZONAL CAVITY METHOD

%Effective Ceiling Cavity Reflectance 1cc	80	70	50	30	10	0
%Wall Reflectance 1w	50 30 10	50 30 10	50 30 10	50 30 10	50 30 10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance					
0	.87 .87 .87	.85 .85 .85	.81 .81 .81	.78 .78 .78	.75 .75 .75	.73
1	.76 .73 .70	.74 .71 .69	.71 .69 .67	.68 .66 .65	.66 .64 .63	.61
2	.67 .62 .57	.65 .61 .57	.63 .59 .55	.60 .57 .54	.58 .55 .53	.51
3	.59 .53 .48	.57 .52 .47	.55 .50 .47	.53 .49 .45	.51 .48 .45	.43
4	.52 .46 .41	.51 .45 .40	.49 .44 .40	.47 .43 .39	.46 .42 .39	.37
5	.46 .40 .35	.44 .39 .35	.44 .39 .35	.43 .38 .34	.41 .37 .37	.32
6	.42 .35 .31	.40 .34 .30	.40 .34 .30	.39 .34 .30	.38 .33 .30	.28
7	.38 .32 .27	.36 .31 .27	.36 .31 .27	.35 .30 .27	.34 .30 .07	.25
8	.35 .29 .25	.33 .28 .24	.33 .28 .24	.33 .28 .24	.32 .27 .24	.23
9	.32 .28 .22	.31 .26 .22	.31 .26 .22	.30 .25 .22	.29 .25 .22	.21
10	.30 .24 .20	.29 .24 .20	.29 .24 .20	.28 .23 .20	.27 .23 .20	.19

A

Lighting Fixtures

FLES Series - Ex d II B IP65 Fluorescent Lighting

- Ex d II B IP65
- IEC 60079-0, 1
- IEC 60529



■ Applications

- FLES Series Lighting Fixtures are designed for installations where moisture, dirt, dust, corrosion and vibration may be present, or IEC 60529 IP65 areas where wind, water, snow or high ambient can be expected.
- They can be used in locations made hazardous due to the presence of flammable or explosive gases, vapors and combustible dusts as defined by the IEC 60079-0,1.
- Applications include classified areas such as paint manufacturing plants, ammunition facilities, oil and gas producing and refining plants, off-shore and dockside installations, tank farms, pipeline pumping stations and marine loading and fuel transfer terminals.
- Hazardous areas, both indoors and outdoors where long life and low maintenance costs are desired.

■ Features

- Factory sealed unit – no external seals required. Installation is easy and fast.
- Available in 40~20watt instant and rapid start fixtures for operation on AC220V or AC110V.
- Two close-up plugs furnished for each end of fixture.
- Explosion-proof, impact- and heat resistant (HDT 155°C) poly carbonate tubes protect lamps.
- Reflectors can easily be removed for replacement or cleaning, using only a screwdriver.
- Electro-statically applied epoxy polyester finish is baked on for high density corrosion protection.

■ Standard Finishes

- Spray (Color : Munsel No. 7.5BG 6/1.5)

■ Standard Materials

- Copper-free Aluminium (Cast Aluminium Alloy)
- Globe : Poly Carbonate Tube
- Reflector : Steel
- Guard & Accessory : Stainless Steel

■ Options

- Protect Guard.
- Emergency Battery - 20min ~1hour

■ Technical Data

- Voltage Range - AC110V~240V
- Watts Range - Below 40W

■ Compliances

- IEC 60079-0 Equipment – General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures “d”
- ANSI /ASME B 1.20.1 Pipe threads, General purpose(Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- ISO 261 Metric screw thread

■ Certification

- Certified by KOSHA
(Korea Occupational Safety & Health Agency)

■ Weight

- 12 kg

■ Model Number Logic

FLES

Series
Constant

00

Lamp Wattage
02- 20W
03- 32W
04- 40W

00

Voltage@60Hz
11-AC110V
12-AC120V
20-AC208V
22-AC220V
24-AC-240V

00

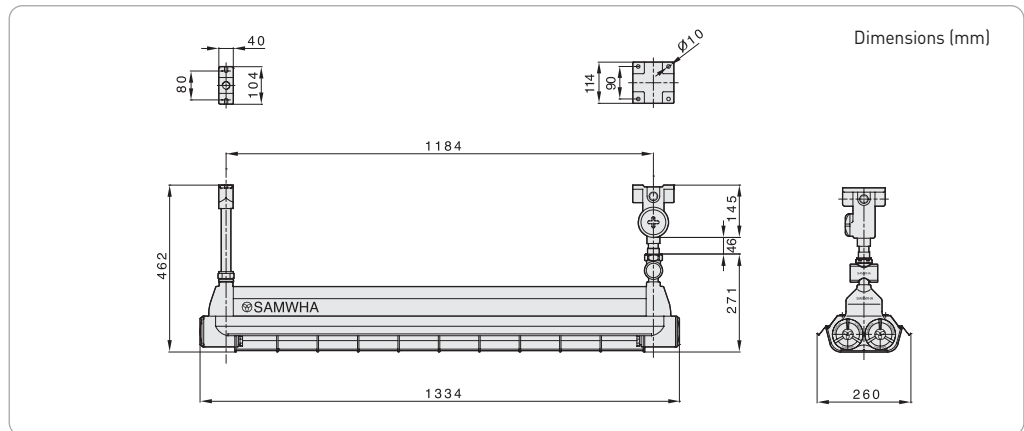
Mounting Type
PT-Pendant
CL-Ceiling

0

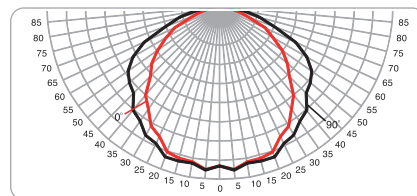
G-Omit G if guard
is not required

ex) Ceiling, AC110V, 40W, Guard required FLES 04 11 CL G

■ Dimension



■ Photometric Data



Candle power 40W Rapid start (cd/1000lm)					
Vertical angle	Horizontal angle		Vertical angle	Horizontal angle	
	0	90		0	90
0	414	414	50	230	307
5	425	427	55	198	293
10	410	414	60	162	261
15	409	417	65	129	218
20	403	417	70	82	152
25	374	393	75	54	107
30	358	386	80	25	70
35	324	363	85	8	26
40	300	352	90	2	7

ZONAL CAVITY METHOD

%Effective Ceiling Cavity Reflectance 1cc	80	70	50	30	10	0
%Wall Reflectance 1w	70 50 30 10	70 50 30 10	50 30 10	50 30 10	50 30 10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance					
0	.78 .78 .78 .78	.76 .76 .76 .76	.73 .73 .73	.70 .70 .70	.67 .67 .67	.65
1	.71 .68 .66 .63	.70 .67 .64 .62	.64 .62 .60	.62 .60 .58	.59 .58 .57	.55
2	.65 .60 .56 .52	.63 .56 .55 .51	.56 .53 .50	.54 .51 .49	.52 .50 .48	.46
3	.60 .53 .48 .43	.58 .52 .47 .43	.50 .46 .42	.48 .45 .42	.46 .43 .41	.39
4	.54 .47 .41 .37	.53 .46 .41 .36	.44 .40 .36	.43 .39 .35	.41 .38 .35	.34
5	.50 .41 .35 .31	.48 .40 .35 .31	.39 .34 .30	.38 .33 .30	.36 .33 .30	.28
6	.45 .37 .31 .26	.44 .36 .30 .26	.35 .30 .26	.34 .29 .26	.33 .29 .26	.24
7	.42 .33 .27 .23	.41 .32 .27 .23	.31 .26 .23	.30 .26 .22	.29 .25 .22	.21
8	.38 .29 .24 .20	.37 .29 .23 .20	.28 .23 .20	.27 .23 .19	.26 .22 .19	.18
9	.35 .26 .21 .17	.34 .26 .21 .17	.15 .25 .20	.17 .24 .20	.17 .24 .20	.17
10	.33 .24 .19 .15	.32 .24 .18 .15	.23 .18 .15	.22 .18 .15	.22 .18 .15	.14



Lighting Fixtures

FLNS Series - Ex nR II IP65 Fluorescent Lighting

- Ex nR II IP66
- IEC 60079-0, 15
- IEC 60529



■ Applications

- FLNS Series Lighting Fixtures are designed for installations where moisture, dirt, dust, corrosion and vibration may be present, or IEC 60529 IP66 areas where wind, water, snow or high ambient can be expected.
- They can be used in locations made hazardous due to the presence of flammable or explosive gases, vapors and combustible dusts as defined by the IEC 60079-0,15.
- Applications include classified areas such as paint manufacturing plants, ammunition facilities, oil and gas producing and refining plants, off-shore and dockside installations, tank farms, pipeline pumping stations and marine loading and fuel transfer terminals.
- Hazardous areas, both indoors and outdoors where long life and low maintenance costs are desired.

■ Features

- Installation is easy and fast.
- Available in 40~20 watt instant and rapid start fixtures for operation on AC220V or AC110V.
- Impact- and heat resistant (HDT 155°C) poly carbonate tubes protect lamps.
- Reflectors can easily be removed for replacement or cleaning, using only a screwdriver.
- Electro-statically applied epoxy polyester finish is baked on for high density corrosion protection.
- Mounting choice – Pendant, Ceiling.
- Integral ballasts – separate ballasts are not required. Lowest installed cost.
- Pendant type is standard.

■ Standard Materials

- Seamless Steel Sheet
- Globe : Poly Carbonate
- Reflector : Steel
- Guard & Accessory : Stainless Steel

■ Options

- Protect Guard.
- Emergency Battery – 20 min~1 hour

■ Standard Finishes

- Spray (Color : Munsel No. 7.5BG 6/1.5)

■ Technical Data

- Voltage Range - AC 110V~240V
- Watts Range - Below 40W

■ Compliances

- IEC 60079-0 Equipment – General requirements
- IEC 60079-15 Construction, test and marking of type of protection “n” electrical apparatus
- ANSI /ASME B1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- ISO 261 Metric screw thread

■ Certification

- Certified by KOSHA
[Korea Occupational Safety & Health Agency]

■ Weight

- 11.5 kg

■ Model Number Logic

FLNS

Series
Constant

00

Lamp Wattage
02- 20W
03- 32W
04- 40W

00

Voltage@60Hz
11-AC110V
12-AC120V
20-AC208V
22-AC220V
24-AC240V

00

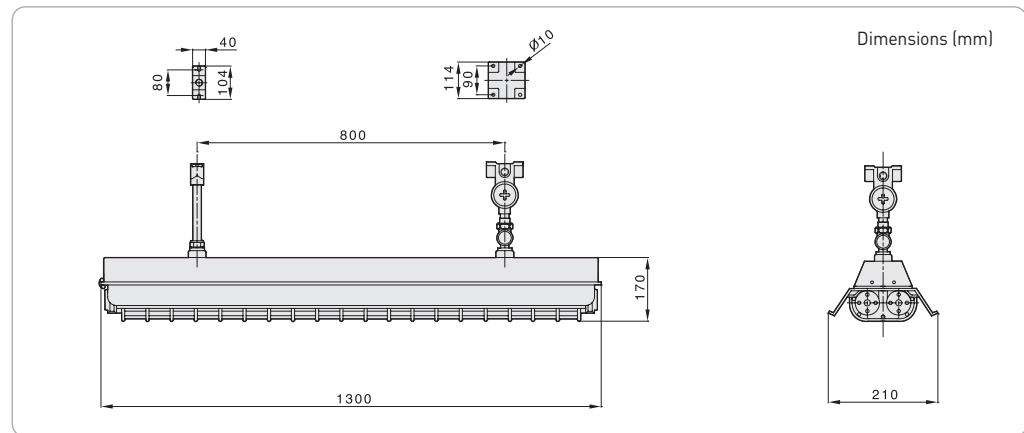
Mounting Type
PT-Pendant
CL-Ceiling

0

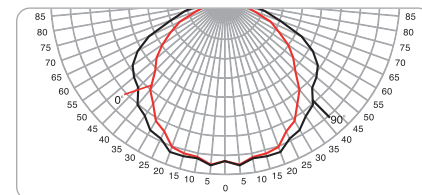
G-Omit G if guard
is not required

ex) AC220V ,20W, Pendant FLNS 02 22 PT

■ Dimensions



■ Photometric Data



Candle power 40W Rapid start (cd/1000lm)					
Vertical angle	Horizontal angle		Vertical angle	Horizontal angle	
	0	90		0	90
0	414	414	50	230	307
5	425	427	55	198	293
10	410	414	60	162	261
15	409	417	65	129	218
20	403	417	70	82	152
25	374	393	75	54	107
30	358	386	80	25	70
35	324	363	85	8	26
40	300	352	90	2	7

ZONAL CAVITY METHOD

%Effective Ceiling Cavity Reflectance 1cc	80	70	50	30	10	0
%Wall Reflectance 1w	70 50 30 10	70 50 30 10	50 30 10	50 30 10	50 30 10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance					
0	.78 .78 .78 .78	.76 .76 .76 .76	.73 .73 .73	.70 .70 .70	.67 .67 .67	.65
1	.71 .68 .66 .63	.70 .67 .64 .62	.64 .62 .60	.62 .60 .58	.59 .58 .57	.55
2	.65 .60 .56 .52	.63 .56 .55 .51	.56 .53 .50	.54 .51 .49	.52 .50 .48	.46
3	.60 .53 .48 .43	.58 .52 .47 .43	.50 .46 .42	.48 .45 .42	.46 .43 .41	.39
4	.54 .47 .41 .37	.53 .46 .41 .36	.44 .40 .36	.43 .39 .35	.41 .38 .35	.34
5	.50 .41 .35 .31	.48 .40 .35 .31	.39 .34 .30	.38 .33 .30	.36 .33 .30	.28
6	.45 .37 .31 .26	.44 .36 .30 .26	.35 .30 .26	.34 .29 .26	.33 .29 .26	.24
7	.42 .33 .27 .23	.41 .32 .27 .23	.31 .26 .23	.30 .26 .22	.29 .25 .22	.21
8	.38 .29 .24 .20	.37 .29 .23 .20	.28 .23 .20	.27 .23 .19	.26 .22 .19	.18
9	.35 .26 .21 .17	.34 .26 .21 .17	.15 .25 .20	.17 .24 .20	.17 .24 .20	.17
10	.33 .24 .19 .15	.32 .24 .18 .15	.23 .18 .15	.22 .18 .15	.22 .18 .15	.14



Lighting Fixtures

FLXS Series - For Non Hazard. IP66 Fluorescent Lighting

- Non hazardous area IP66
- IEC 60529



■ Applications

- FLXS Series Lighting Fixtures are designed for installations where moisture, dirt, dust, corrosion and vibration may be present, or IEC 60529 IP66 areas where wind, water, snow or high ambient can be expected.
- Both indoors and outdoors where long life and low maintenance costs are desired.

■ Features

- Installation is easy and fast.
- Available in 40~20 watt instant and rapid start fixtures for operation on AC220V or AC110V.
- Impact - and heat resistant glass plate protect lamps.
- Electro-statically applied epoxy polyester finish is baked on for high density corrosion protection.
- Choice of mountings; Flush mounting or Surface mounting (pendant, feed thru for wall or ceiling mounting).
- Integral ballasts - separate ballasts are not required. Lowest installed cost.

■ Standard Materials

- Seamless Steel Sheet
- Globe : Heat Resistant Glass
- Reflector : Tube Steel
- Guard & Accessory : Stainless Steel

■ Options

- Protect Guard.
- Emergency Battery - 20 min ~1 hour

■ Standard Finishes

- Spray (Color : Munsel No. 7.5BG 6/1.5)

■ Compliances

- IEC 60529 -Degrees of protection provided by enclosures
- ANSI /ASME B 1.20.1 Pipe threads, General purpose(Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- ISO 261 Metric screw thread

■ Weight

- 30 kg

■ Technical Data

- Voltage Range - AC 110V~240V
- Watts Range - Below 40W

■ Model Number Logic



Series
Constant



VS -Vapor proof
DS -Dust proof



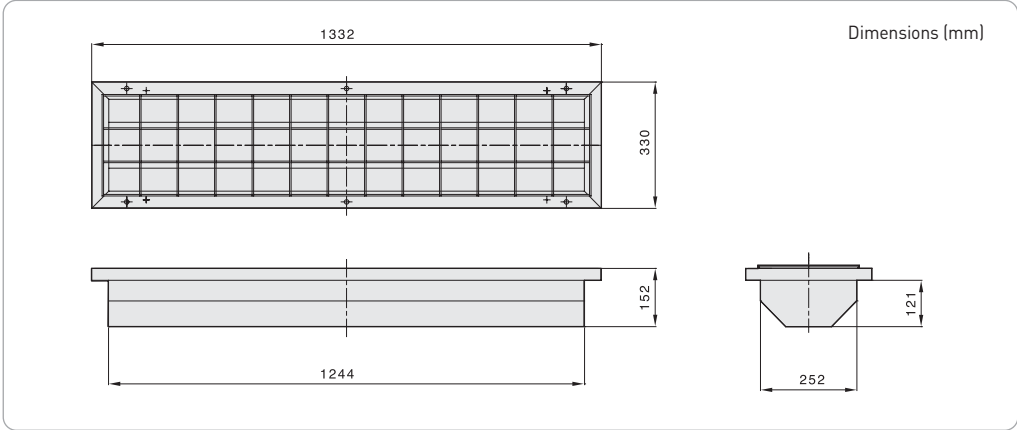
Lamp Wattage
02- 20W
03- 32W
04- 40W



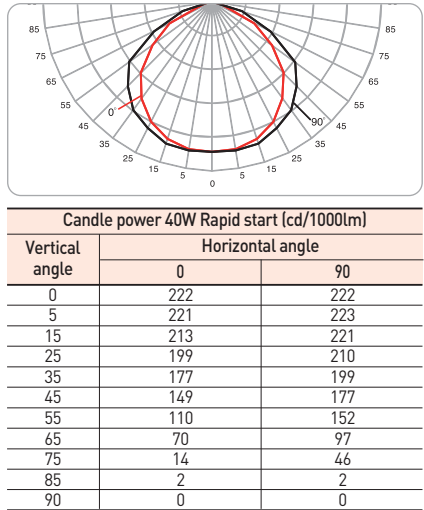
Voltage @60Hz
11-AC110V
12-AC120V
20-AC208V
22-AC220V
24-AC-240V

ex) Vapor proof 40W, AC220V FLVS 04 22

■ Dimensions



■ Photometric Data



ZONAL CAVITY METHOD

%Effective Ceiling Cavity Reflectance 1cc	80	70	50	30	10	0
%Wall Reflectance 1w	70 50 30 10	70 50 30 10	50 30 10	50 30 10	50 30 10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance					
0	.78 .78 .78 .78	.76 .76 .76 .76	.73 .73 .73	.70 .70 .70	.67 .67 .67	.65
1	.71 .68 .66 .63	.70 .67 .64 .62	.64 .62 .60	.62 .60 .58	.59 .58 .57	.55
2	.65 .60 .56 .52	.63 .56 .55 .51	.56 .53 .50	.54 .51 .49	.52 .50 .48	.46
3	.60 .53 .48 .43	.58 .52 .47 .43	.50 .46 .42	.48 .45 .42	.46 .43 .41	.39
4	.54 .47 .41 .37	.53 .46 .41 .36	.44 .40 .36	.43 .39 .35	.41 .38 .35	.34
5	.50 .41 .35 .31	.48 .40 .35 .31	.39 .34 .30	.38 .33 .30	.36 .33 .30	.28
6	.45 .37 .31 .26	.44 .36 .30 .26	.35 .30 .26	.34 .29 .26	.33 .29 .26	.24
7	.42 .33 .27 .23	.41 .32 .27 .23	.31 .26 .23	.30 .26 .22	.29 .25 .22	.21
8	.38 .29 .24 .20	.37 .29 .33 .20	.28 .23 .20	.27 .23 .19	.26 .22 .19	.18
9	.35 .26 .21 .17	.34 .26 .21 .17	.15 .25 .20	.17 .24 .20	.17 .24 .20	.17
10	.33 .24 .19 .15	.32 .24 .18 .15	.23 .18 .15	.22 .18 .15	.22 .18 .15	.14

A

Lighting Fixtures

LXS Series - For Non Hazard. Dust & Vapor Proof IP65 Lighting Fixture

- Dust & Vapor Proof IP65
- IEC 60529



■ Applications

- LXS Series Lighting Fixtures are designed for installations where moisture, dirt, dust, corrosion and vibration may be present, or IEC 60529 IP65 areas where wind, water, snow or high ambient can be expected.
- Applications include classified areas such as paint manufacturing plants, ammunition facilities, oil and gas producing and refining plants, off-shore and dockside installations, tank farms, pipeline pumping stations and marine loading and fuel transfer terminals.
- Non Hazardous areas, both indoors and outdoors where long life and low maintenance costs are desired.

■ Features

- Wide range of light sources and wattages to meet specific lighting needs 150, 200, 250 and 400W high pressure sodium (HPS); 200, 250 and 400W mercury vapor (MV); 175, 250 and 400W metal halide (MH).
- Three light sources – Compact fluorescent, high pressure sodium, metal halide and mercury vapor.
- Mounting choice – Pendant, Ceiling, 40° or 90° wall mount.
- Corrosion resistant – Copper-free aluminum die-cast construction. Baked powder epoxy finish, electro-statically applied. Exposed hardware is stainless steel.
- Pendant type is standard.

■ Standard Materials

- Seamless Steel Sheet
- Globe : Heat Resistant Glass
- Reflector : High Purity Aluminium
- Guard & Accessory : Stainless Steel

■ Options

- Fuse – to protect ballast and capacitors against abnormal line conditions.
 - ⇒ One fuse required for 120 or 277VAC units
 - ⇒ Two fuses needed for 208,240 or 480VAC units
- Instant re-strike ballast – enables a hot HPS lamp to immediately re-strike after a momentary loss of arc due to voltage fluctuation or power outage. It has no effect on the warm-up period of cold lamps (Max 150W HPS only).
- Dome reflector or 30° angle reflector.
- High power factor – Minimum P. F. 90%

■ Standard Finishes

- Spray (Color : Munsel No. 7.5BG 6/1.5)

■ Compliances

- IEC 60529 -Degrees of protection provided by enclosures
- ANSI /ASME B 1.20.1 Pipe threads, General purpose(Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- ISO 261 Metric screw thread

■ Certification

- Certified by KOSHA (Korea Occupational Safety & Health Agency)

■ Weight

- 19kg

■ Technical Data

- Voltage Range - AC 110V~240V
- Watts Range - 150W~400W

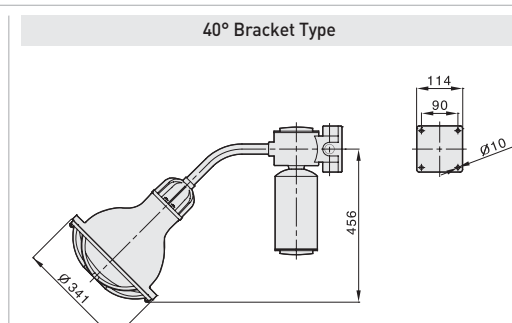
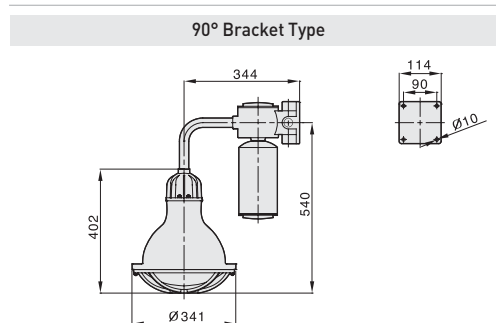
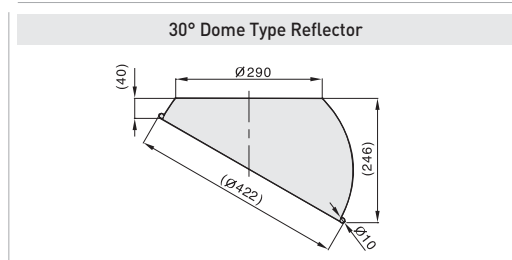
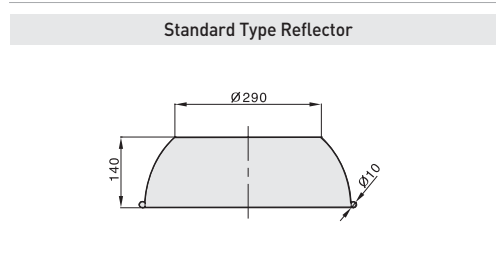
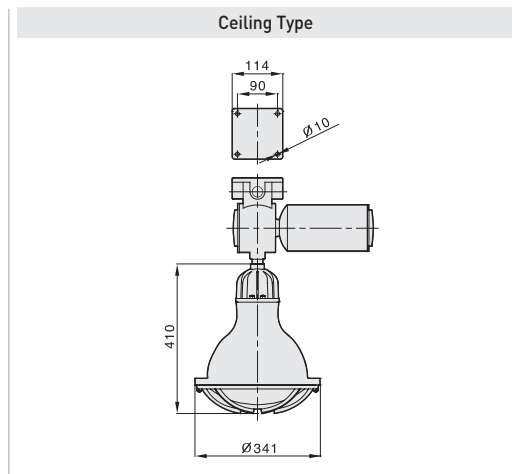
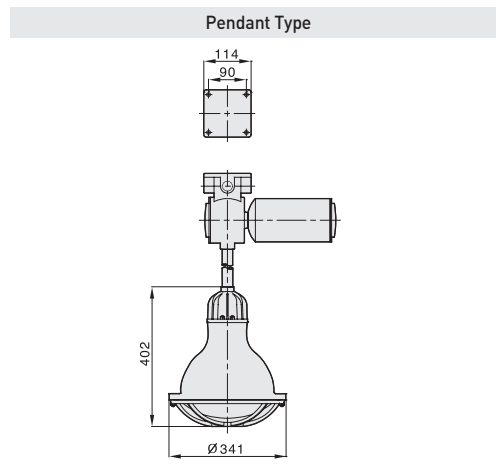
Model Number Logic

0	LXS	00	00	00	0
Lamp Type S-HPS (High pressure sodium) M-Metal V-Mercury	Series Constant VS -Vapor proof DS -Dust proof	Lamp Wattage 15-150W-S 17-175W-M 20-200W-S.V 25-250W-M.S.V 40-400W-M.S.V	Voltage@ 60Hz 11-AC110V 12-AC120V 20-AC208V 22-AC220V 24-AC-240V	Mounting Type PT-Pendant CL-Ceiling 4B-40° Bracket 9B-90° Bracket	P-Omit P if High powerfactor is not required

ex) High Pressure Sodium, Vapor proof 90° Bracket Mounting, AC220V, 400W SLVS 40 22 9B

Dimensions

Dimensions (mm)





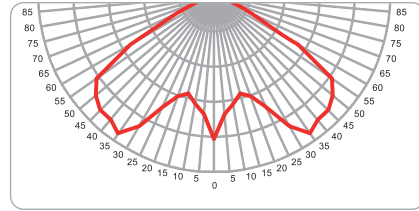
Lighting Fixtures

LXS Series - For Non Hazard. Dust & Vapor Proof IP65 Lighting Fixture

- Dust & Vapor Proof IP65
- IEC 60529

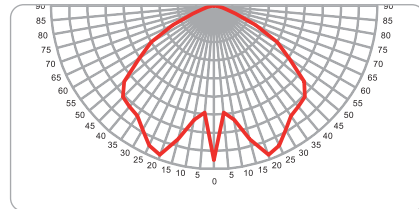
■ Photometric Data

• Metal Halide 250W



Angle	cd/1000 lm	Angle	cd/1000 lm
0	203	50	220
5	168	55	204
10	156	60	137
15	143	65	58
20	152	70	27
25	174	75	12
30	213	80	6
35	238	85	3
40	229	90	3
45	229	—	—

• Metal Halide 250W



Angle	cd/1000 lm	Angle	cd/1000 lm
0	170	50	130
5	118	55	102
10	128	60	80
15	152	65	50
20	175	70	25
25	170	75	13
30	158	80	8
35	148	85	5
40	145	90	3
45	142	—	—

ZONAL CAVITY METHOD

%Effective Ceiling Cavity Reflectance 1cc	80	70	50	30	10	0
%Wall Reflectance 1w	50 30 10	50 30 10	50 30 10	50 30 10	50 30 10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance					
0	.86 .86 .86	.84 .84 .84	.80 .80 .80	.77 .77 .77	.74 .74 .74	.72
1	.77 .75 .72	.76 .73 .71	.73 .71 .69	.70 .68 .67	.67 .66 .65	.64
2	.70 .66 .63	.69 .65 .62	.66 .63 .61	.64 .61 .59	.62 .60 .58	.57
3	.63 .58 .55	.62 .58 .54	.60 .56 .53	.58 .55 .52	.56 .54 .51	.50
4	.57 .52 .48	.56 .51 .48	.55 .50 .47	.53 .49 .46	.52 .48 .46	.45
5	.52 .46 .42	.51 .46 .42	.50 .45 .42	.48 .45 .41	.47 .44 .41	.40
6	.47 .42 .38	.47 .41 .38	.46 .41 .37	.44 .40 .37	.43 .40 .37	.35
7	.43 .38 .34	.43 .38 .34	.42 .37 .34	.41 .37 .33	.40 .36 .33	.32
8	.40 .34 .31	.39 .34 .31	.38 .34 .30	.38 .33 .30	.37 .33 .30	.29
9	.37 .31 .28	.36 .31 .28	.36 .31 .28	.35 .31 .27	.34 .30 .27	.26
10	.34 .29 .25	.34 .29 .25	.33 .28 .25	.32 .28 .25	.32 .28 .25	.24

ZONAL CAVITY METHOD

%Effective Ceiling Cavity Reflectance 1cc	80	70	50	30	10	0
%Wall Reflectance 1w	50 30 10	50 30 10	50 30 10	50 30 10	50 30 10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance					
0	.59 .59 .59	.58 .58 .58	.55 .55 .55	.53 .53 .53	.51 .51 .51	.50
1	.53 .52 .50	.52 .51 .49	.50 .49 .48	.48 .47 .46	.46 .46 .45	.44
2	.48 .46 .43	.47 .45 .43	.46 .44 .42	.44 .42 .41	.43 .41 .40	.39
3	.44 .41 .38	.43 .40 .38	.42 .39 .37	.40 .38 .36	.39 .37 .36	.35
4	.40 .36 .34	.39 .36 .34	.38 .35 .33	.37 .35 .33	.36 .34 .32	.31
5	.37 .33 .30	.36 .33 .30	.35 .32 .30	.34 .32 .29	.33 .31 .29	.28
6	.34 .30 .27	.33 .30 .27	.32 .29 .27	.32 .29 .27	.31 .28 .27	.26
7	.31 .27 .25	.31 .27 .25	.30 .27 .25	.29 .26 .24	.29 .26 .24	.23
8	.29 .25 .23	.28 .25 .23	.28 .25 .22	.27 .24 .22	.27 .24 .22	.21
9	.27 .23 .21	.26 .23 .21	.26 .23 .21	.25 .23 .21	.25 .22 .21	.20
10	.25 .22 .19	.25 .21 .19	.24 .21 .19	.24 .21 .19	.23 .21 .19	.18

SXS Series - For Non Hazard. Dust & Vapor Proof IP65 Lighting Fixture

- Dust & Vapor Proof IP65
- IEC 60529



■ Applications

- SXS Series Lighting Fixtures are designed for installations where moisture, dirt, dust, corrosion and vibration may be present, or IEC 60529 IP65 areas where wind, water, snow or high ambient can be expected.
- Applications include classified areas such as paint manufacturing plants, ammunition facilities, oil and gas producing and refining plants, off-shore and dockside installations, tank farms, pipeline pumping stations and marine loading and fuel transfer terminals.
- Non Hazardous areas, both indoors and outdoors where long life and low maintenance costs are desired.

■ Features

- Mounting choice – Pendant, Ceiling, 40° or 90° wall mount.
- Corrosion resistant – Copper-free aluminum die-cast construction. Baked powder epoxy finish, electro-statically applied. Exposed hardware is stainless steel.
- Pendant type is standard.

■ Standard Materials

- Seamless Steel Sheet
- Globe : Heat Resistant Glass
- Reflector : High Purity Aluminium
- Guard & Accessory : Stainless Steel

■ Compliances

- IEC 60529-Degrees of protection provided by enclosures
- ANSI /ASME B 1.20.1 Pipe threads, General purpose(Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- ISO 261 Metric screw thread

■ Weight

- 9 kg

■ Technical Data

- Voltage Range - AC 110V~240V
- Watts Range - Below 200W

■ Standard Finishes

- Spray (Color : Munsel No. 7.5BG 6/1.5)

■ Certification

- Certified by KOSHA
(Korea Occupational Safety & Health Agency)

■ Model Number Logic

ISXS		00	00	00
Series	VS	Lamp Wattage	Voltage@60Hz	Mounting Type
Constant	-Vapor proof	10-100W	11-AC110V	PT-Pendant
	DS	20-200W	12-AC120V	CL-Ceiling
	-Dust proof		20-AC208V	4B-40° Bracket
			22-AC220V	9B-90° Bracket
			24-AC-240V	

ex) Incandescent, Vapor proof 90° Bracket Mounting, AC240V, 200W ISVS 40 22 9B

A

Lighting Fixtures

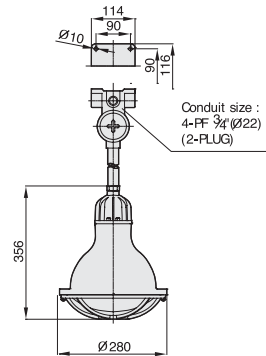
SXS Series - For Non Hazard. Dust & Vapor Proof IP65 Lighting Fixture

- Dust & Vapor Proof IP65
- IEC 60529

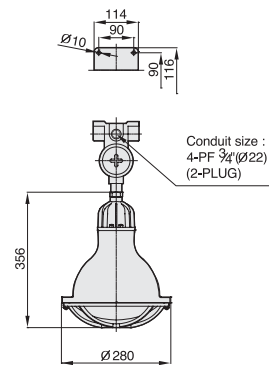
■ Dimensions

Dimensions (mm)

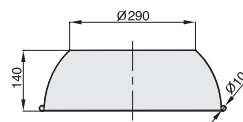
Pendant Type



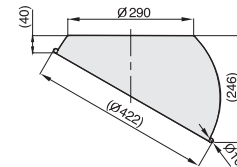
Ceiling Type



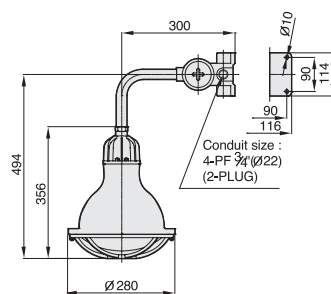
Standard Type Reflector



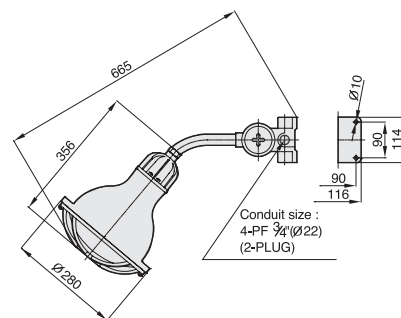
30° Dome Type Reflector



90° Bracket Type

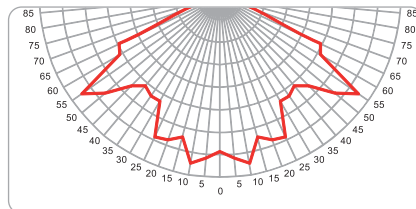


40° Bracket Type



■ Photometric Data

- Incandescent 200W



Angle	cd/1000 lm	Angle	cd/1000 lm
0	137	50	133
5	143	55	150
10	150	60	103
15	128	65	99
20	135	70	34
25	137	75	15
30	107	80	6
35	107	85	4
40	103	90	2
45	111	—	—

ZONAL CAVITY METHOD

%Effective Ceiling Cavity Reflectance 1cc	80	70	50	30	10	0
%Wall Reflectance 1w	50 30 10	50 30 10	50 30 10	50 30 10	50 30 10	0
Room Cavity Ratio RCR	20% Effective Floor Cavity Reflectance					
0	.62 .62 .62	.60 .60 .60	.58 .58 .58	.55 .55 .55	.53 .53 .53	.52
1	.55 .53 .51	.54 .52 .51	.52 .50 .49	.50 .49 .47	.48 .47 .46	.45
2	.49 .46 .44	.48 .45 .43	.46 .44 .42	.45 .43 .41	.43 .42 .40	.39
3	.44 .35 .32	.43 .40 .37	.42 .39 .36	.40 .38 .36	.39 .37 .35	.34
4	.40 .35 .32	.39 .35 .32	.38 .34 .32	.36 .34 .31	.35 .33 .31	.30
5	.36 .31 .28	.35 .31 .28	.34 .31 .28	.33 .30 .28	.32 .29 .27	.26
6	.32 .28 .25	.32 .28 .25	.31 .27 .25	.30 .27 .24	.29 .26 .24	.23
7	.29 .25 .22	.29 .25 .22	.28 .25 .21	.28 .24 .22	.27 .24 .22	.21
8	.27 .23 .20	.26 .22 .20	.26 .22 .20	.25 .22 .20	.25 .22 .20	.19
9	.25 .21 .18	.25 .21 .18	.24 .21 .18	.23 .20 .18	.23 .20 .18	.17
10	.23 .19 .17	.23 .19 .17	.22 .19 .17	.22 .19 .17	.21 .18 .16	.16

LEH Series - Ex d II C IP66 Hand Lamp Lighting

- Ex d IIC IP66
- IEC 60079-0,1
- IEC 60529



■ Applications

- LEH Series Hand lamp lighting Fixtures are used ; as portable Hand-lamp where moisture, dirt, dust, corrosion and vibration may be present, or IEC 60529 IP66 areas where wind, water, snow or high ambient can be expected.
- They can be used in locations made hazardous due to the presence of flammable or explosive gases, vapors and combustible dusts as defined by the IEC 60079-0,1.
- Applications include classified areas such as paint manufacturing plants, ammunition facilities, oil and gas producing and refining plants, off-shore and dockside installations, tank farms, pipeline pumping stations and marine loading and fuel transfer terminals.
- Hazardous areas, both indoors and outdoors where long life and low maintenance costs are desired.

■ Features

- Light sources and wattages to meet specific lighting needs – 20W compact fluorescent and 100W incandescent.
- Two light sources – Compact fluorescent, incandescent.
- Corrosion resistant – Copper-free aluminum die-cast construction. Baked powder epoxy finish, electro-statically applied. Exposed hardware is stainless steel.

■ Standard Materials

- Copper-free Aluminium (Cast Aluminium Alloy)
- Globe : Heat Resistant Glass
- Reflector : High Purity Aluminium
- Guard & Accessory : Stainless Steel

■ Compliances

- IEC 60079-0 Equipment – General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures “d”
- ANSI /ASME B 1.20.1 Pipe threads, General purpose(Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- ISO 261 Metric screw thread

■ Certification

- Certified by KOSHA
(Korea Occupational Safety & Health Agency)

■ Weight

- 2.7 kg

■ Technical Data

- Voltage Range - AC 110V~240V
- Watts Range - 20~100W

■ Standard Finishes

- Spray (Color : Munsel No. 7.5BG 6/1.5)



Lighting Fixtures

LEH Series - Ex d II C IP66 Hand Lamp Lighting

- Ex d IIC IP66
- IEC 60079-0,1
- IEC 60529

■ Model Number Logic

0

Lamp Type
I - Incandescent
C- Compact
fluorescent

LEH

Series
Constant

00

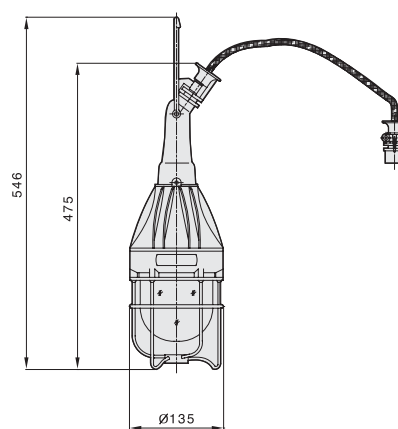
Lamp
Wattage
02- 20W-C
10-100W-I

00

Voltage@60Hz
11-AC110V
12-AC120V
20-AC208V
22-AC220V
24-AC-240V

ex) Compact Fluorescent, AC220V, 20W CLEH 20 22

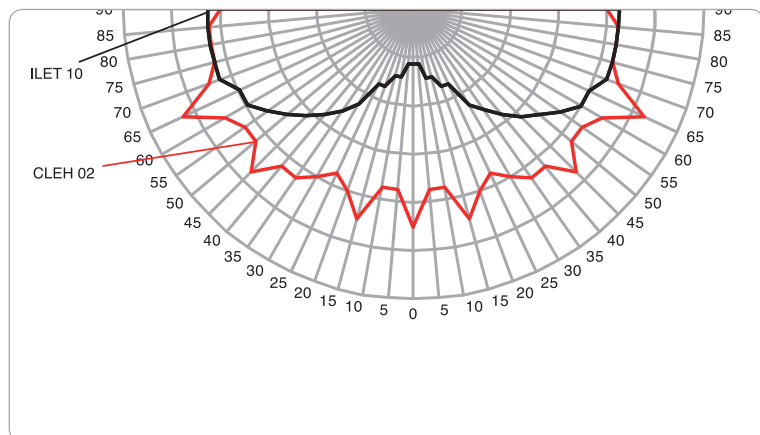
■ Dimensions



Dimensions (mm)

■ Photometric Data

ANGLE	cd/1000 lm	
	ILEH 10	CLEH 20
0	90	23
5	75	23
10	75	29
15	90	29
20	80	34
25	75	34
30	80	46
35	85	51
40	85	57
45	95	63
50	85	68
55	85	74
60	90	80
65	105	80
70	90	85
75	85	85
80	85	85
85	85	85
90	80	85



LET Series - Ex d II B IP66 Tank Lighting

- Ex d IIB IP66
- IEC 60079-0,1
- IEC 60529



■ Applications

- LET Series Tank lighting Fixtures are designed for installations where an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapor or mist is not likely to occur in normal operation but, if it does occur, will persist for a short period only.
- Applications include classified areas such as illuminating stirred tank or storage tank, reactors, distillation columns, pipeline flow indicator etc

■ Features

- Wide range of light sources and wattages to meet specific lighting needs –100, 200W incandescent, 25, 40 and 60W halogen.
- Two light sources –Incandescent, Halogen.
- Corrosion resistant – Copper-free aluminum die-cast construction. Baked powder epoxy finish, electro statically applied. Exposed hardware is stainless steel.
- Fixing of the fittings are to be done by suitable mounting hard-wares utilizing the mounting base on the front frame.
- Easy maintenance and installation.

■ Standard Materials

- Copper-free Aluminium (Cast Aluminium Alloy)
- Globe : Heat Resistant Glass
- Reflector : High Purity Aluminium
- Guard & Accessory : Stainless Steel

■ Compliances

- IEC 60079-0 Equipment – General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures “d”
- ANSI /ASME B 1.20.1 Pipe threads, General purpose(Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- ISO 261 Metric screw thread

■ Model Number Logic

0
Lamp Type
I - Incandescent
H- Halogen

LET
Series
Constant

00
Lamp Wattage
02- 25W-H
04-40W -H
06-60W -H
10-100W-I
20-200W-I

00
Voltage@60Hz
11-AC110V
12-AC120V
20-AC208V
22-AC220V
24-AC-240V

ex) Incandescent, AC220V, 200W ILET 20 22

■ Certification

- Certified by KOSHA
(Korea Occupational Safety & Health Agency)

■ Weight

- 3 kg

■ Technical Data

- Voltage Range - AC 110V~240V
- Watts Range - 25~200W

■ Standard Finishes

- Spray (Color : Munsel No. 7.5BG 6/1.5)

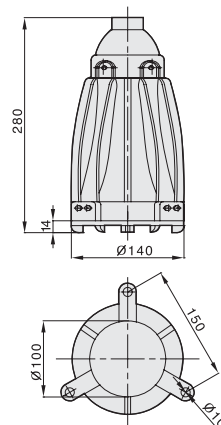


Lighting Fixtures

LET Series - Ex d IIB IP66 Tank Lighting

- Ex d IIB IP66
- IEC 60079-0,1
- IEC 60529

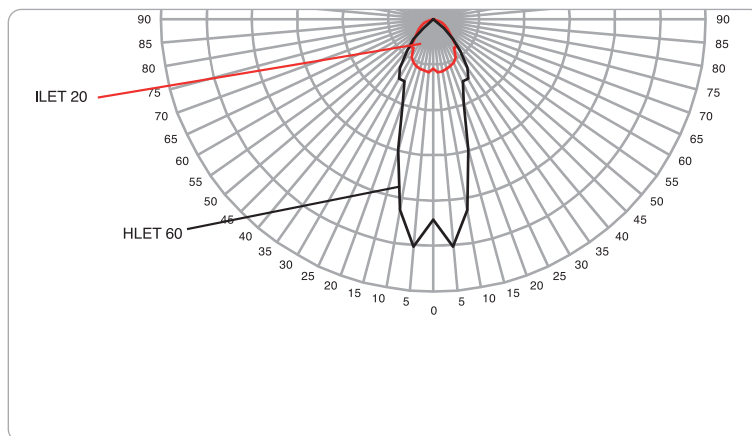
■ Dimensions



Dimensions (mm)

■ Photometric Data

ANGLE	cd/1000 lm	
	ILEH 20	CLEH 60
0	109	442.1
5	118	503
10	116	427
15	114	297
20	109	198
25	105	152
30	96	152
35	77	130
40	79	91
45	58	61
50	47	30
55	39	0
60	30	0
65	21	0
70	13	0
75	6	0
80	2	0
85	0	0
90	0	0



LEF Series - Ex d II B T3 IP66 Flood Lighting

- Ex d IIB T3 IP66
- IEC 60079-0,1
- IEC 60529



■ Applications

- LEF Series Flood-lighting Fixtures are designed for installations where moisture, dirt, dust, corrosion and vibration may be present, or IEC 60529 IP66 areas where wind, water, snow or high ambient can be expected.
- They can be used in locations made hazardous due to the presence of flammable or explosive gases, vapors and combustible dusts as defined by the IEC 60079-0,1.
- Applications include classified areas such as paint manufacturing plants, ammunition facilities, oil and gas producing and refining plants, off-shore and dockside installations, tank farms, pipeline pumping stations and marine loading and fuel transfer terminals.
- Hazardous areas, both indoors and outdoors where long life and low maintenance costs are desired.

■ Features

- Wide range of light sources and wattages to meet specific lighting needs –150, 200, 250 and 400W high pressure sodium (HPS) ; 200, 250 and 400W mercury vapor (MV);175, 250 and 400W metal halide (MH).
- Three light sources –High pressure sodium, metal halide and mercury vapor.
- Corrosion resistant – Copper-free aluminum die-cast construction. Baked powder epoxy finish, electro-statically applied. Exposed hardware is stainless steel.
- The body and mounting box are wired with Flame proof (Ex d II C) type EPF flexible coupling.
- The mounting box has a turning base plate on the top and a large access cover for wiring on the side

■ Standard Materials

- Copper-free Aluminium (Cast Aluminium Alloy)
- Globe : Heat Resistant Glass
- Reflector : High Purity Aluminium
- Guard & Accessory : Stainless Steel

■ Options

- Fuse – to protect ballast and capacitors against abnormal line conditions.
⇒ One fuse required for 120 or 277VAC units
⇒ Two fuses needed for 208,240 or 480VAC units
- Instant re-strike ballast – enables a hot HPS lamp to immediately re-strike after a momentary loss of arc due to voltage fluctuation or power outage. It has no effect on the warm-up period of cold lamps (Max 150W HPS only).

■ Standard Finishes

- Spray (Color : Munsel No. 7.5BG 6/1.5)

■ Compliances

- IEC 60079-0 Equipment – General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures “d”
- ANSI /ASME B 1.20.1 Pipe threads, General purpose(Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- ISO 261 Metric screw thread

■ Certification

- Certified by KOSHA
(Korea Occupational Safety & Health Agency)

■ Weight

- 45 kg

■ Technical Data

- Voltage Range – AC 110V~480V
- Watts Range – 150~400W



Lighting Fixtures

LEF Series - Ex d IIB T3 IP66 Flood Lighting

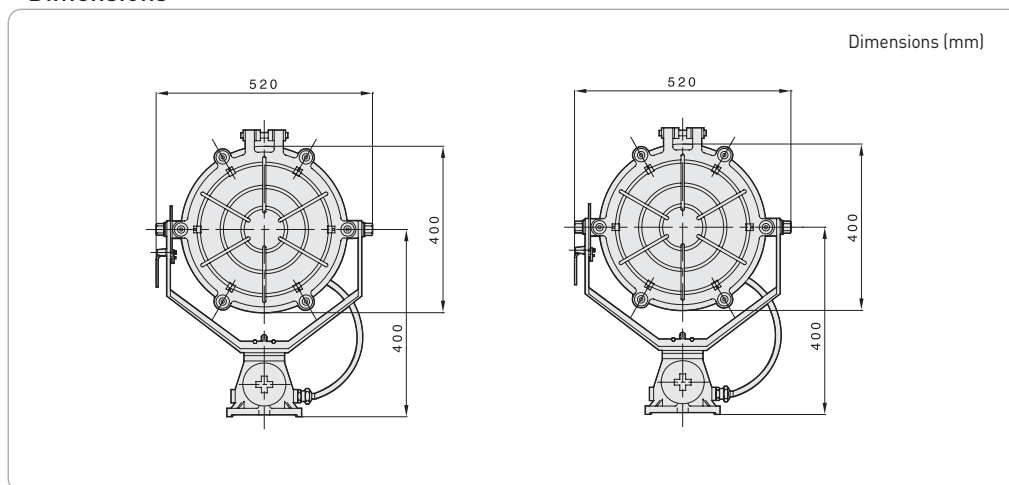
- Ex d IIB T3 IP66
- IEC 60079-0,1
- IEC 60529

Model Number Logic

0	LEF	00	00	0
Lamp Type S-HPS (High pressure sodium) M- Metal halide V- Mercury vapor	Series Constant	Lamp Wattage 15-150W-S 17-175W-M 20-200W-S.V 25-250W -M.S.V 40-400W -M.S.V	Voltage@60Hz 11-AC110V 12-AC120V 20-AC208V 22-AC220V 24-AC-240V 27-AC277V 48-AC480V	P-Omit P if High power factor is not required

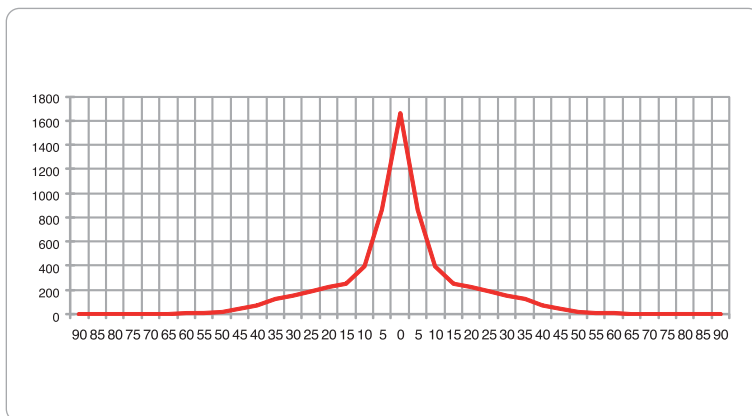
ex) Metal Halide high power factor type, AC220V, 250W MLEF 25 22 P

Dimensions



Photometric Data

ANGLE	cd/1000 lm
0	1658
5	863
10	390
15	253
20	225
25	188
30	153
35	125
40	73
45	43
50	15
55	5
60	5
65	3
70	3
75	3
80	0
85	0
90	0



LNF Series - Ex nR II T3 IP66 Flood Lighting

- Ex nR II T3 IP66
- IEC 60079-0,15
- IEC 60529



■ Applications

- LNF Series Flood-lighting Fixtures are designed for installations where moisture, dirt, dust, corrosion and vibration may be present, or IEC 60529 IP66 areas where wind, water, snow or high ambient can be expected.
- They can be used in locations made hazardous due to the presence of flammable or explosive gases, vapors and combustible dusts as defined by the IEC 60079-0,15.
- Applications include classified areas such as paint manufacturing plants, ammunition facilities, oil and gas producing and refining plants, off-shore and dockside installations, tank farms, pipeline pumping stations and marine loading and fuel transfer terminals.
- Hazardous areas, both indoors and outdoors where long life and low maintenance costs are desired.

■ Features

- Wide range of light sources and wattages to meet specific lighting needs –150, 200, 250 and 400W high pressure sodium (HPS) ; 200, 250 and 400W mercury vapor (MV); 175, 250 and 400W metal halide (MH).
- Three light sources –High pressure sodium, metal halide and mercury vapor.
- Corrosion resistant – Copper-free aluminum die-cast construction. Baked powder epoxy finish, electro-statically applied. Exposed hardware is stainless steel.
- The body and mounting box are wired with Increased Safety (Ex e II) type PVF flexible coupling.
- The mounting box has a turning base plate on the top and a large access cover for wiring on the side

■ Standard Materials

- Copper-free Aluminium (Cast Aluminium Alloy)
- Globe : Heat Resistant Glass
- Reflector : High Purity Aluminium
- Guard & Accessory : Stainless Steel

■ Options

- Fuse – to protect ballast and capacitors against abnormal line conditions.
⇒ One fuse required for 120 or 277VAC units
⇒ Two fuses needed for 208, 240 or 480VAC units
- Instant re-strike ballast – enables a hot HPS lamp to immediately re-strike after a momentary loss of arc due to voltage fluctuation or power outage. It has no effect on the warm-up period of cold lamps (Max 150W HPS only).

■ Standard Finishes

- Spray (Color : Munsel No. 7.5BG 6/1.5)

■ Compliances

- IEC 60079-0 Equipment – General requirements
- IEC 60079-15 Construction, test and marking of type of protection “n” electrical apparatus
- ANSI/ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- ISO 261 Metric screw thread

■ Certification

- Certified by KOSHA (Korea Occupational Safety & Health Agency)

■ Weight

- 31 kg

■ Technical Data

- Voltage Range - AC 110V~480V
- Watts Range - 150~400W



Lighting Fixtures

LNF Series - Ex nR II T3 IP66 Flood Lighting

- Ex nR II T3 IP66
- IEC 60079-0,15
- IEC 60529

■ Model Number Logic

0

Lamp Type
S-HPS (High pressure sodium)
M- Metal halide
V- Mercury vapor

LNF

Series
Constant

00

Lamp Wattage
15-150W-S
17-175W-M
20-200W-S.V
25-250W -M.S.V
40-400W -M.S.V

00

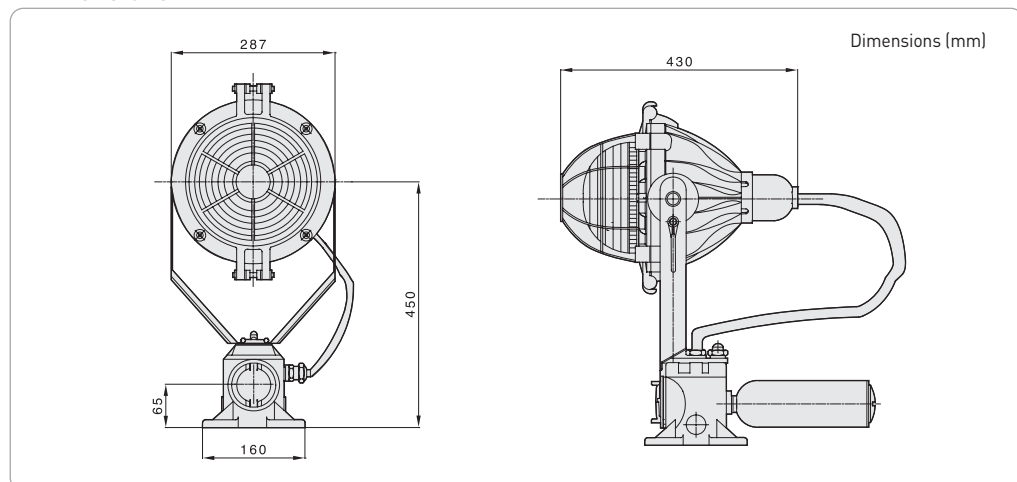
Voltage@60Hz
11-AC110V
12-AC120V
20-AC208V
22-AC220V
24-AC-240V
27-AC277V
48-AC480V

0

P-Omit P if High power factor is not required

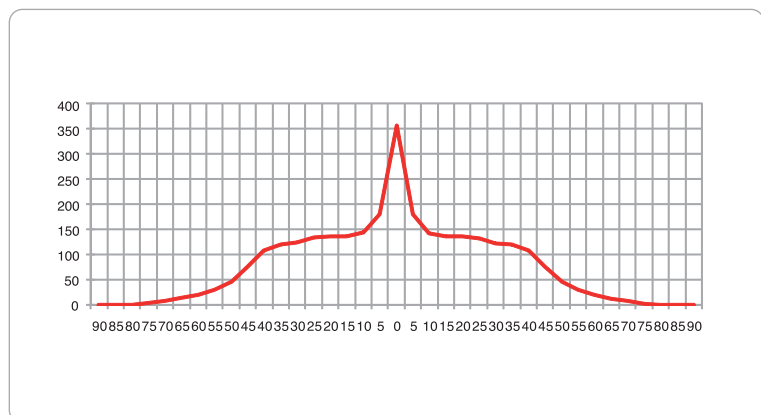
ex) High Pressure Sodium, Normal type, AC277V, 400W SLNF 40 27

■ Dimensions



■ Photometric Data

ANGLE	cd/1000 lm
0	355
5	180
10	143
15	135
20	135
25	133
30	123
35	120
40	108
45	75
50	45
55	30
60	20
65	13
70	8
75	3
80	0
85	0
90	0



■ MEMO

High Stability and Easy Construction by Advanced Technology

Designed and manufactured by advanced structural analysis, Samwha's boxes are globally standardized products that guarantee high stability. They are easy to install and construct, providing a high cost benefit.



B Enclosures/ Controls/Panels



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Enclosures / Controls / Panels

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Panels(Circuit Breaker Panels)

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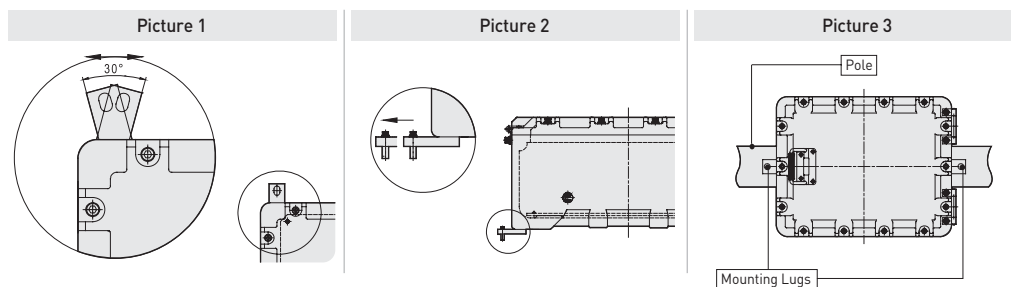
Enclosures / Controls / Panels

Junction Boxes

Flame-proof Type Enclosure General Technical Descriptions

■ Flexible Foot Installation

- Detachable mounting feet provide mounting flexibility. (Picture 1,2)
- No need to replace enclosure if mounting feet are broken.
- Four separate mounting lugs furnished, bolted to the body casting.
- Two lugs may be used, at top and bottom center, for pole mounting. (Picture 3)



■ Grounding

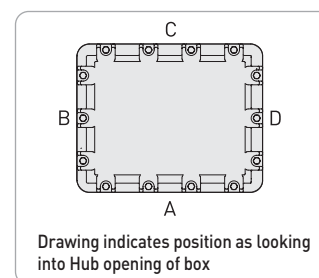
- Internal and external ground terminations simplify grounding requirements
- Because of dangerous electrical shock to the equipment operator SAMWHA products are provided with means of grounding depends upon the particular style being used.

■ Maintenance & Caution Note

- This apparatus can be used in the hazardous areas indicated on the plate so that use in the other areas is prohibited. (A plate is attached on the exterior of the apparatus.)
- Power should be turned off to open the apparatus for Installation, inspection and Maintenance, and a proper security measures must be conducted to keep power off while it is open.
- It is requested to exercise an extra caution to prevent damages to the junction parts at openings and closings, and to tighten bolts completely with a tool to avoid sticking of things on them.
- An impact on or a dropping of the apparatus causes a lowering of quality so, a special handling is demanded.
- The rated voltage indicated on the apparatus should be observed.
- Please inform SAMWHA if any problems related with the apparatus.

■ Hub Design

- Drilled and tapped conduit openings will be evenly spaced and located in the area indicated on the location chart. Critical conduit opening locations may be indicated by supplying a diagram similar to the one shown at below indicating critical dimensions and locations.
- Specific conduit openings must be located dimensionally from box centerlines to conduit centerlines and from outside back surface of box to conduit centerline.



■ Minimum Centers for Drilled and Tapped Openings and Hubs

	#16/M16	#22/M20	#28/M25	#36/M32	#42/M40	#54/M50	#70/M63	#82/M75	#104/M90
#16/M16	39								
#22/M20	44	49							
#28/M25	47.5	52.5	56						
#36/M32	56.5	61.5	65	72					
#42/M40	62.5	67.5	71	78	84				
#54/M50	71	76	79.5	86.5	92.5	99			
#70/M63	80.5	85.5	89	96	102	108.5	118		
#82/M75	87	92	95.5	102.5	108.5	115	124.5	129	
#104/M90	103.5	108.5	112	119	125	131.5	141	145.5	162

Flame-proof Type Junction Boxes EJB Series - Ex d II B+H2 T6 EJB-C Series-Ex d II C T6

- Copper Free Aluminum
- Flexible Foot Installation



EJB Series



EJB-C Series

■ Flame-proof Type Junction Boxes EJB Series – Ex d II B + H2 T6

- Cl. I, Div. 1 & 2, Groups B*, C, D
- NEMA 3, 3R, 4**, 4X**
- Zone 1, Zone 2
- II 2G Ex d II B+H2* IP66**
- Explosion-proof
- Rain-tight
- Dust-tight
- Water-tight**
- Corrosion Resistant**

■ Flame-proof Type Junction Boxes EJB-C Series – Ex d II C T6

- Cl. I, Div. 1 & 2, Groups A, B, C, D
- NEMA 3, 3R, 4*, 4X*
- Zone 1, Zone 2
- II 2G Ex d II C IP65*
- Explosion-proof
- Rain-tight
- Water-tight
- Corrosion Resistant

■ Specification of Junction Boxes

No.	Specification	Ex d II+H2 T6 type	Ex d II C T6 type
1	MODEL NO.	EJB Series	EJB -C Series
2	CERTIFICATED	KOSHA (Korea Occupational Safety & Health Agency)	
3	IP GRADE	IP65 or IP66	
4	TEMPERATURE	-20°C ~ 40°C	
5	HUMIDITY	95%	
6	ALTITUDE	1000 m	
7	BASIC FINISH	Spray (Color : Munsel No. 7.5BG 6/1.5)	



Enclosures / Controls / Panels

Junction Boxes

EJB Series - Ex d II B+H2 T6 Junction Boxes

Explosion-proof
Rain-tight
Dust-tight / Water-tight**
Corrosion Resistant**

CL I, Div. 1 & 2, Groups B*, C, D
NEMA 3, 3R, 4**, 4X**
Zone 1, Zone 2
II 2G Ex d II B+H2* IP66**

- Copper Free Aluminum
- Flexible Foot Installation



■ Applications

EJB Series junction boxes are used in threaded rigid conduit systems in hazardous areas :

- As a junction or pull box.
- To provide enclosures for splices and branch circuit taps.
- For housing terminal blocks, relays and other electrical devices.
- Indoors or outdoors in damp, wet, dusty, corrosive, hazardous locations.
- Where exposure to frequent or heavy rain, water, spray, moisture, and humidity is common, such as: offshore drilling facilities, cooling towers, coal preparation and handling facilities and sewage and waste water treatment plant.
- In areas which are hazardous due to the presence of hydrogen or gases and vapors of equivalent hazard such as found in process industries and gas manufacturing plants.

■ Features

- SAMWHA supplies explosion protected terminal enclosures in various sizes, as individual enclosures or as terminal box combinations.
- Series EJB terminal enclosures, made of ASTM B26 356 T6 as standard.
- Series EJB terminal enclosures are supplied as standard with series SH-STB terminals from SAMWHA.
- Terminals from other manufacturers, (e.g. Weidmuller, Phoenix or Wago) can be fitted if required.
- Special Silicon or Neoprene cover O-ring gasket provides a water seal to meet IP65 requirements, and provides superior protection for enclosed equipment against water/corrosion.
- Ground joint cover opening provides maximum opening for pulling wires or mounting equipment.
- Walls of bodies may be drilled and tapped for conduit entries as shown in listings.
- Stud bolts in diagonally opposite corners of body aid in aligning cover to body during installation. (not furnished with hinged covers)
- Square corners of enclosure body provide maximum interior space and area for conduit openings.
- Internal grounding lug provides a means to ground enclosed equipment.
- Enclosures are machined for field installed mounting plates.
- Detachable mounting feet provide mounting flexibility. No need to replace enclosure if mounting feet are broken.
- Optional stainless steel hinges provide convenient and easy access for inspection, maintenance and systems changes.

■ Standard Materials

- Copper-free Aluminum
- Accessory : Stainless Steel
- Gasket- Silicon or Rubber
- Hinges- Stainless Steel
- Middle plate- Bakelite plate

■ Standard Finishes

- Natural or Epoxy painted (Munsell No. 7.5BG 6/1.5)

■ Compliances

- IEC 60079-0 Equipment- General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- ANSI/ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure- tight joints are not made on the threads
- ISO 261 Metric screw threads
- NEC 500 / NEMA 4, 4X / IEC 60529

■ Certification

- Certified KOSHA (Korea Occupational Safety & Health Agency)

■ Options

- Diagram Pocket
- Hinged covers : Hinges mounted on left.
- Spring return cover bolts : Stainless steel spring.

■ Selection Table

CAT.NO.	DIMENSIONS (MM)		TEMPERATURE GRADE	IP GRADE
	WIDTH	HEIGHT		
EJB 1510	150	100	T6	—
EJB 2015	200	150	T6	—
EJB 2322	230	220	T6	—
EJB 3022	300	220	T6	—
EJB 3030H*	300	300	T6	IP65
EJB 4030	400	300	T6	—
EJB 4030H*	400	300	T6	—
EJB 5040	500	400	T6	—
EJB 5040H* **	500	400	T6	IP66
EJB 5050H*	500	500	T6	IP65
EJB 6040	600	400	T6	—
EJB 7060H*	700	600	T6	IP65

• * * - II B + Hydrogen gas

• * * * - IP grade-IP 66



Enclosures / Controls / Panels

Junction Boxes

EJB-C Series - Ex d II C T6 Junction Boxes

Explosion-proof
Rain-tight
Water-tight
Corrosion Resistant

Cl. I, Div. 1 & 2, Groups A, B, C, D
NEMA 3, 3R, 4*, 4X*
Zone 1, Zone 2
II 2G Ex d II C IP65*

- Copper Free Aluminum
- Flexible Foot Installation



■ Applications

EJB-C junction boxes are used in threaded rigid conduit systems in hazardous areas :

- As a junction or pull box.
- To provide enclosures for splices and branch circuit taps.
- For housing terminal blocks, relays and other electrical devices.
- Indoors or outdoors in damp, wet, dusty, corrosive, hazardous locations.
- Where exposure to frequent or heavy rain, water, spray, moisture, and humidity is common, such as: offshore drilling facilities, cooling towers, coal preparation and handling facilities and sewage and waste water treatment plant.

■ Features

- SAMWHA supplies explosion protected terminal enclosures in various sizes, as individual enclosures or as terminal box combinations.
- Series EJB-C terminal enclosures, made of ASTM B26 356 T6 as standard.
- Series EJB-C terminal enclosures are supplied as standard with series SH-STB terminals from SAMWHA.
- Terminals from other manufacturers, (e.g. Weidmuller, Phoenix or Wago) can be fitted if required.
- Special Silicon or Neoprene cover O-ring gasket provides a water seal to meet IP65 requirements, and provides superior protection for enclosed equipment against water/corrosion.
- Ground joint cover opening provides maximum opening for pulling wires or mounting equipment.
- Walls of bodies may be drilled and tapped for conduit entries as shown in listings.
- Square corners of enclosure body provide maximum interior space and area for conduit openings.
- Internal grounding lug provides a means to ground enclosed equipment.
- Enclosures are machined for field installed mounting plates.
- Detachable mounting feet provide mounting flexibility. No need to replace enclosure if mounting feet are broken.

■ Option

- Diagram Pocket

■ Standard Finishes

- Natural or Epoxy painted (Munsell No. 7.5BG 6/1.5)

■ Standard Materials

- Copper-free Aluminum
- Accessory : Stainless Steel
- Gasket-Silicon or Rubber
- Middle plate-Bakelite plate

■ Compliances

- IEC 60079-0 Equipment- General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- ANSI/ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure- tight joints are not made on the threads
- ISO 261 Metric screw threads
- NEC 500 / NEMA 4, 4X / IEC 60529

■ Certification

- Certified KOSHA (Korea Occupational Safety & Health Agency)

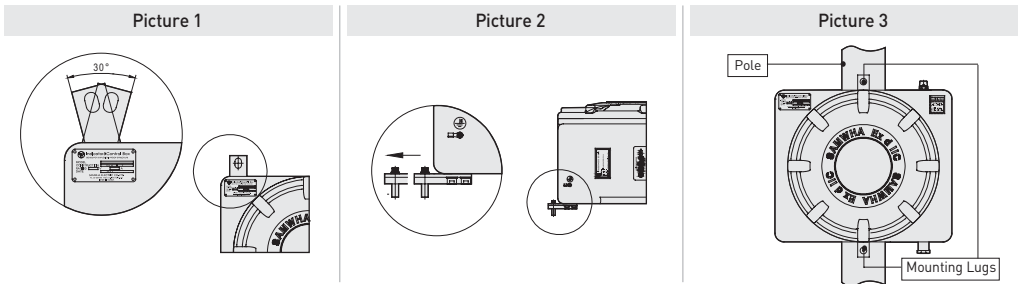
■ Selection Table

CAT.NO.	DIMENSIONS (MM)		TEMPERATURE GRADE	IP GRADE
	WIDTH	HEIGHT		
EJB-C 2019	200	190	T6	—
EJB-C 2520	250	200	T6	—
EJB-C 3530	350	300	T6	—
EJB-C 4035	400	350	T6	—
EJB-C 5040*	500	400	T6	IP65
EJB-C 5550	500	500	T6	—

• * ` ` IP grade-IP 65

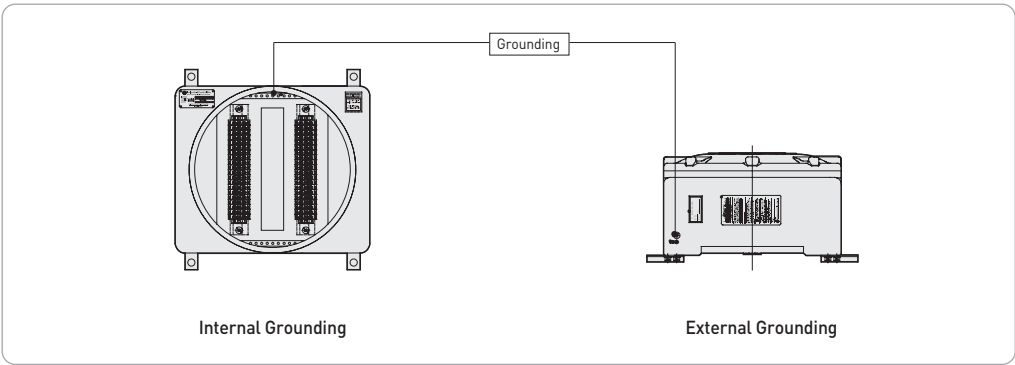
■ Flexible Foot Installation

- Detachable mounting feet provide mounting flexibility. (Picture 1,2)
- No need to replace enclosure if mounting feet art broken.
- Four separate mounting lugs furnished, bolted to the body casting.
- Two lugs may be used, at top and bottom center, for pole mounting. (Picture 3)



■ Grounding

- Internal and external ground terminations simplify grounding requirements
- Because of dangerous electrical shock to the equipment operator SAMWHA EJB-C Series are provided with means of grounding depends upon the particular style being used.





Enclosures / Controls / Panels

Junction Boxes

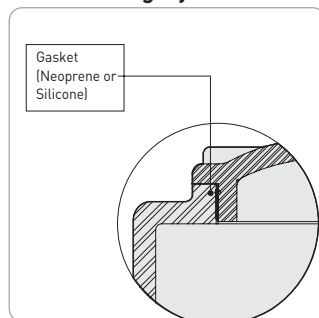
EJB-C Series - Ex d II C T6 Junction Boxes

Explosion-proof
Rain-tight
Water-tight
Corrosion Resistant

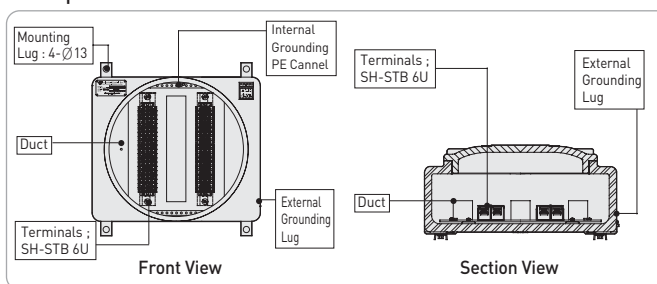
Cl. I, Div. 1 & 2, Groups A, B, C, D
NEMA 3, 3R, 4*, 4X*
Zone 1, Zone 2
II 2G Ex d II C IP65*

- Copper Free Aluminum
- Flexible Foot Installation

■ IP Packing System



■ Interior View Example EJB-C 5040



■ Hub Design

- Drilled and tapped conduit openings will be evenly spaced and located in the area indicated on the location chart. Critical conduit opening locations may be indicated by supplying a diagram similar to the one shown at below indicating critical dimensions and locations.
- Specific conduit openings must be located dimensionally from box centerlines to conduit centerlines and from outside back surface of box to conduit centerline.

■ Minimum Centers for Drilled and Tapped Openings and Hubs

	#16/M16	#22/M20	#28/M25	#36/M32	#42/M40	#54/M50	#70/M63	#82/M75	#104/M90
#16/M16	39								
#22/M20	44	49							
#28/M25	47.5	52.5	56						
#36/M32	56.5	61.5	65	72					
#42/M40	62.5	67.5	71	78	84				
#54/M50	71	76	79.5	86.5	92.5	99			
#70/M63	80.5	85.5	89	96	102	108.5	118		
#82/M75	87	92	95.5	102.5	108.5	115	124.5	129	
#104/M90	103.5	108.5	112	119	125	131.5	141	145.5	162

Increased Safety Type Junction Boxes SIJA Series (Copper Free Aluminum) – Ex e II SIJB Series (Stainless Steel) – Ex e II



SIJA Series

■ Increased Safety Type Junction Boxes SIJA Series (Copper Free Aluminum) – Ex e II

- CL I, Div. 1 & 2 Groups A, B, C, D
- NEMA 4, 4X
- Zone 1, Zone 2
- II 2G Ex e II IP65
- Increased safety type
- Rain-tight
- Water-tight
- Corrosion Resistant



SIJB Series

■ Increased Safety Type Junction Boxes SIJB Series (Stainless Steel) – Ex e II

- CL I, Div. 1 & 2 Groups A, B, C, D
- NEMA 4, 4X
- Zone 1, Zone 2
- II 2G Ex e II IP65
- Increased safety type
- Rain-tight
- Water-tight
- Corrosion Resistant

■ Specification of Junction Boxes

No.	Specification	Ex e II type	
		SIJA Series	SIJB Series
1	MODEL NO.	SIJA Series	SIJB Series
2	MATERIALS	Copper Free Aluminum	Stainless Steel
3	CERTIFICATED	KOSHA (Korea Occupational Safety & Health Agency)	
4	IP GRADE	IP 65	
5	TEMPERATURE	-20℃ ~ 40℃	
6	HUMIDITY	95%	
7	ALTITUDE	1000 m	
8	BASIC FINISH	Spray (Color : Munsel No. 7.5BG 6/1.5)	Natural



Enclosures / Controls / Panels

Junction Boxes

SIJA Series (Copper Free Aluminum) – Ex e II Junction Boxes

Increased safety type
Rain-tight
Water-tight
Corrosion Resistant

CL. I, Div. 1 & 2 Groups A, B, C, D
NEMA 4, 4X
Zone 1, Zone 2
II 2G Ex e II IP65

- Copper Free Aluminum
- Flexible Foot Installation
- With STB Terminal Block Series Standard



■ Applications

SIJA Series Terminal Enclosures are used with Increased Safety type Terminals.

- As a junction or pull box.
- For Zone 1 & 2, Increased Safety type (Ex e II)
- Indoors or outdoors in damp, wet, dusty, corrosive, hazardous locations
- Where exposure to frequent or heavy rain, water, spray, moisture, and humidity is common; such as: offshore drilling facilities, cooling towers, coal preparation and handling facilities and sewage and waste water treatment plant.
- In areas which are hazardous due to the presence of hydrogen or gases and vapors of equivalent hazard such as found in process industries and gas manufacturing plants.

■ Features

- Series SIJA terminal enclosures are supplied as standard with series SH-STB terminals from SAMWHA (Increased Safety type).
- Terminals from other manufacturers, (e.g. Weidmuller, Phoenix or Wago) can be fitted if required.
- Special Silicon or Neoprene cover gasket provides a water seal to meet IP65 requirements, and provides superior protection for enclosed equipment against water/corrosion.
- Series SIJA terminal enclosures, made of ASTM B26 356 T6 as standard.
- Ground joint cover opening provides maximum opening for pulling wires or mounting equipment.
- Walls of bodies may be drilled and tapped for conduit entries as shown in listings.
- Square corners of enclosure body provide maximum interior space and area for conduit openings.
- Internal grounding lug provides a means to ground enclosed equipment.
- Enclosures are machined for field installed mounting plates.
- Detachable mounting feet provide mounting flexibility. No need to replace enclosure if mounting feet are broken.

■ Standard Materials

- Copper-free Aluminum
- Accessory : Stainless steel
- Gasket- Silicon or Rubber
- Hinges- Stainless steel
- Middle plate- Bakelite plate

■ Compliances

- IEC 60079-0 Equipment- General requirements
- IEC 60079-7 Equipment protection by Increased Safety "e"
- ANSI/ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure- tight joints are not made on the threads
- ISO 261 Metric screw threads
- NEC 500 / NEMA 4, 4X / IEC 60529

■ Options

- Drain & Breather
- Handle & Hinge (Standard or Heavy duty type)
- Diagram Pocket / Flexible foot
- Name plate - Stainless Steel or Acryl plate or Aluminum

■ Certification

- Certified KOSHA
(Korea Occupational Safety & Health Agency)

■ Terminals Arrangement

SIJA Series can be fitted with terminals 20A - 6SQ (SAMWHA STB-6U Standard) as follows;

TERMINAL SPEC.		SIJA 4030	SIJA 4040	SIJA 5040
STB 015L	2.5SQ	50	75	105
STB 4U	4SQ	60	60	90
STB 6U	6SQ	60	60	90

■ Selection Table

CAT.NO.	DIMENSIONS (MM)		TEMPERATURE GRADE	IP GRADE
	WIDTH	HEIGHT		
SIJA 4030	400	300	T6	IP65
SIJA 4040	400	400	T6	IP65
SIJA 5040	300	400	T6	IP65

SIJB Series (Stainless Steel) – Ex e II Junction Boxes

Increased safety type
Rain-tight
Water-tight
Corrosion Resistant

Cl. I, Div. 1 & 2 Groups A, B, C, D
NEMA 4, 4X
Zone 1, Zone 2
II 2G Ex e II IP65

- Stainless Steel
- With STB
Terminal Block
Series Standard



■ Applications

SIJB Series Terminal Enclosures are necessary if the length of a cable must be extended or the leads of various switching, signal and monitoring devices must be routed together in a common control cable to one controller or control room.

SIJB Series Terminal Enclosures are used with Increased Safety type Terminals.

- For Zone 1 & 2, Increased Safety type (Ex e II)
- Indoors or outdoors in damp, wet, dusty, corrosive, hazardous locations
- Where exposure to frequent or heavy rain, water, spray, moisture, and humidity is common;
- such as : offshore drilling facilities, cooling towers, coal preparation and handling facilities and sewage and waste water treatment plant.
- In areas which are hazardous due to the presence of hydrogen or gases and vapors of equivalent hazard such as found in process industries, gas manufacturing plants.

■ Features

- SAMWHA supplies explosion protected terminal enclosures in various sizes, as individual enclosures or as terminal box combinations.
- Series SIJB terminal enclosures, made of ASTM A240 Gr. 304 as standard, can be made of ASTM A240 Gr.316 or Gr.316L if required.
- Series SIJB terminal enclosures are supplied as standard with series SH-STB terminals from SAMWHA (Increased Safety type).
- Terminals from other manufacturers,(e.g. Weidmuller, Phoenix or Wago) can be fitted if required.
- Special Silicon or Neoprene cover gasket provides a water seal to meet IP65 requirements, and provides superior protection for enclosed equipment against water/corrosion.
- Optional stainless steel hinges provide convenient and easy access for inspection, maintenance and systems changes.
- Cable entries, are mounted according to order, are fitted to order with four types as follows:
Type 1 - Welding Conduit Hub / Type 2 - Cable Gland Opening / Type 3 - Metal Cable Entries (They are screwed into Stainless Steel plates.) / Type 4 - Conduit Hub Opening

■ Compliances

- IEC 60079-0 Equipment- General requirements
- IEC 60079-7 Equipment protection by Increased Safety “e”
- ANSI/ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure- tight joints are not made on the threads
- ISO 261 Metric screw threads
- NEC 500 / NEMA 4, 4X / IEC 60529

■ Options

- Drain & Breather
- Handle & Hinge (Standard or Heavy duty type)
- Diagram Pocket
- Name plate - Stainless Steel or Acryl plate or Aluminum
- Wall Mounting Bracket - Fork shaped type or Pearl shaped type or Std.
- Terminal mounting plate - Stainless Steel or Bakelite

■ Standard Materials

- Stainless Steel
- Accessory : Stainless Steel
- Gasket-Silicon or Rubber
- Hinges-Stainless Steel
- Middle plate-Bakelite plate

■ Certification

- Certified KOSHA (Korea Occupational Safety & Health Agency)

B

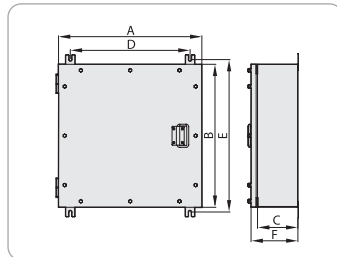
Enclosures / Controls / Panels Junction Boxes

SIJB Series (Stainless Steel) – Ex e II Junction Boxes

Increased safety type
Rain-tight
Water-tight
Corrosion Resistant

CL. I, Div. 1 & 2 Groups A, B, C, D
NEMA 4, 4X
Zone 1, Zone 2
II 2G Ex e II IP65

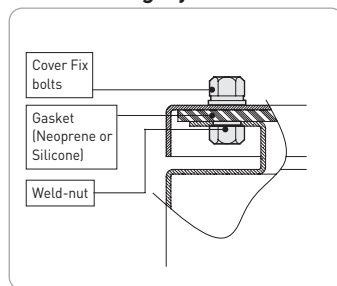
- Stainless Steel
- With STB Terminal Block Series Standard



■ Dimensions

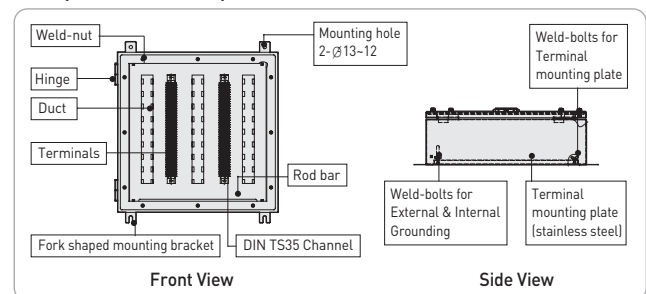
	A	B	C	D	E	F
SIJB 2525	250	250	174.5	200	290	200
SIJB3030	300	300	174.5	200	340	200
SIJB4040	400	400	174.5	300	440	200
SIJB 5050	500	500	174.5	400	540	200
SIJB6050	600	500	174.5	500	540	200
SIJB6161	610	610	174.5	510	650	200
SIJB7550	750	500	174.5	650	540	200
SIJB8060	800	600	174.5	800	640	200

■ IP Packing System



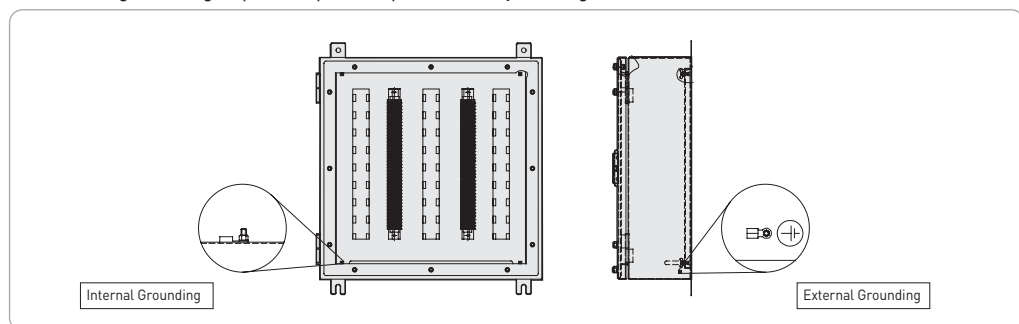
■ Interior Front View

Example SIJB 5050 60p terminals



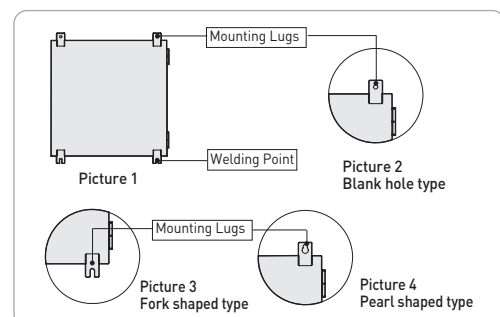
■ Grounding

- Internal and external ground terminations simplify grounding requirements.
- Because of dangerous electrical shock to the equipment operator SAMWHA SIJB Series are provided with means of grounding depends upon the particular style being used.



■ Installations

- Four separate mounting lugs, are welded to the body, provide firmly mounting. (Picture 1)
- Mounting lugs, are mounted according to order, are fitted to order with three types as follows ;
Type 1 – Blank hole type – Standard (Picture 2)
Type 2 – Fork shaped type – For Mounting flexibility (Picture 3)
Type 3 – Pearl shaped type – For convenience installation (Picture 4)



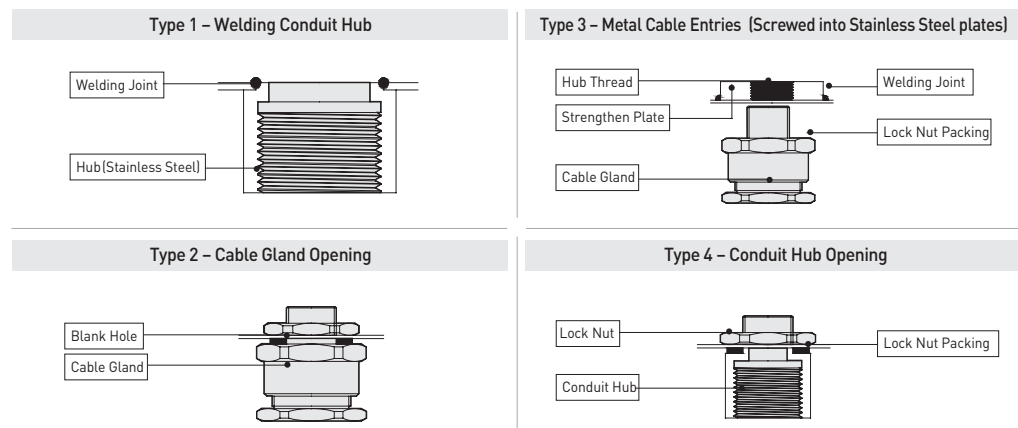
■ Terminals Arrangement

SIJB Series can be fitted with terminals 20A - 6SQ (SAMWHA STB-6U Standard) as follows ;

TERMINAL SPEC.		SIJB 2525	SIJB 3030	SIJB 4040	SIJB 5050	SIJB 6161	SIJB 6050	SIJB 7550	SIJB 8060
STB 015L	2.5SQ	10	30	75	105	150	150-140	195-175	210-250
STB 4U	4SQ	10	20	60	90	180	120-180	160-225	270-300
STB 6U	6SQ	10	20	60	90	180	120-180	160-225	270-300

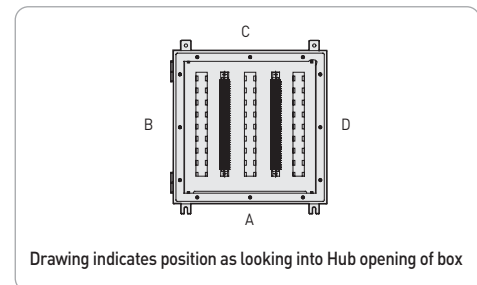
■ Cable Entries Design

Cable entries, are mounted according to order, are fitted to order with four types as follows :



■ Cable Entries Arrangement

- Cable entries will be evenly spaced and located in the area indicated on the location chart.
- Critical cable entries locations may be indicated by supplying a diagram similar to the one shown at right indicating critical dimensions and locations.
- Specific cable entries must be located dimensionally from box centerlines to conduit centerlines.



■ Maximum Quantity for Cable Entries

Model No.	NPT OR PF Metric thread	#16 M16	#22 M20	#28 M25	#36 M32	#42 M40	#54 M50	#70 M63	#82 M75	#104 M90
SIJB2525	All	18	14	11	5	5	2	2	1	1
SIJB3030	All	28	17	14	7	6	3	2	2	1
SIJB4040	All	38	23	20	9	8	3	3	3	2
SIJB5050	All	48	29	24	12	10	5	4	3	3
SIJB6161	All	58	35	30	15	13	6	5	4	3
SIJB6050	A or C	58	35	29	15	13	5	4	4	3
	B or D	48	29	24	12	10	5	4	3	3
SIJB7550	A or C	74	44	38	19	16	7	6	5	4
	B or D	48	29	24	12	10	5	4	3	3
SIJB8060	A or C	78	47	41	21	18	8	6	5	4
	B or D	58	35	29	15	13	5	4	4	3



Enclosures / Controls / Panels

Indicators

Flame-proof Type Indicators

EIB Series - Ex d II B+H2 T6

EIB-C Series - Ex d II C T6

- Flexible Foot Installation
- With ELC Lens Covers Series



EIB Series



EIB-C Series

■ Flame-proof Type Indicators EIB Series-with ELC Lens Cover Series

- Cl. I, Div. 1 & 2, Groups B, C, D
- NEMA 4, 4X
- II 2G Ex d II B+H2 IP 65
- Explosion-proof
- Rain-tight
- Water-tight
- Corrosion Resistant

■ Flame-proof Type Indicators EIB-C Series-with ELC Lens Cover Series

- Cl. I, Div. 1 & 2, Groups A, B, C, D
- NEMA 4, 4X
- II 2G Ex d II C IP 65
- Explosion-proof
- Rain-tight
- Water-tight
- Corrosion Resistant

■ Specification of Indicators

No.	Specification	Ex d IIB+H2 T6 type	Ex d II C T6 type
1	MODEL NO.	EIB Series	EIB -C Series
2	CERTIFICATED	KOSHA (Korea Occupational Safety & Health Agency)	
3	IP GRADE	IP 65	
4	TEMPERATURE	-20℃ ~ 40℃	
5	HUMIDITY	95%	
6	ALTITUDE	1000 m	
7	BASIC FINISH	Spray(Color : Munsel No. 7.5BG 6/1.5)	

EIB Series - Ex d II B+H2 T6 Indicators

Explosion-proof
Rain-tight
Water-tight
Corrosion resistant

Cl. I, Div. 1 & 2, Groups B, C, D
NEMA 4, 4X
Zone 1, Zone 2
II 2G Ex d II B+H2 IP65

- Copper Free Aluminum
- With ELC Lens Covers Series
- Silicon or Neoprene Gasket
- Flexible Foot Installation

■ Applications

EIB Series Indicators are used with ELC Series in hazardous areas:

- For use to display inside (ammeters, voltmeters, watt- meters, var-meters, power-factor meters, tachometer, indicators, pressure controls, temperature control etc.)
- Indoors or outdoors in damp, wet, dusty, corrosive, hazardous locations.
- In areas which are hazardous due to the presence of hydrogen or gases and vapors of equivalent hazard such as found in process industries and gas manufacturing plants.

■ Features

- EIB Indicators provides explosion protection and broad sight in three sizes.
- Series EIB terminal enclosures, made of ASTM B26 356 T6 as standard.
- Special Silicon or Neoprene cover O-ring gasket provides a water seal to meet IP65 requirements, and provides superior protection for enclosed equipment against water/corrosion.
- Ground joint cover opening provides maximum opening for pulling wires or mounting equipment.
- Walls of bodies may be drilled and tapped for conduit entries as shown in listings.
- Square corners of enclosure body provide maximum interior space and area for conduit openings.
- Internal grounding lug provides a means to ground enclosed equipment.
- Enclosures are machined for field installed mounting plates.
- Detachable mounting feet provide mounting flexibility. No need to replace enclosure if mounting feet are broken.

■ Standard Materials

- Copper-free Aluminum
- Accessory : Stainless Steel
- Heat Resistant Glass
- Gasket-Silicon or Rubber
- Middle plate-Bakelite plate

■ Standard Finishes

- Natural or Epoxy painted (Munsell No. 7.5BG 6/1.5)

■ Option

- Diagram Pocket

■ Compliances

- IEC 60079-0 Equipment- General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- ANSI/ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure- tight joints are not made on the threads
- ISO 261 Metric screw threads
- NEC 500
- NEMA 4, 4X
- IEC 60529

■ Selection Table

CAT.NO.	DIMENSIONS (MM)		GLASS COVERS	TEMPERATURE GRADE	IP GRADE
	WIDTH	HEIGHT			
EIB 4030	400	300	ELC 92	T6	IP65
EIB 5040A	500	400	ELC 92	T6	IP65
EIB 5040B	500	400	ELC 120	T6	IP65
EIB 6060A	600	600	ELC 92	T6	IP65
EIB 6060B	600	600	ELC 120	T6	IP65
EIB 6060C	600	600	ELC 200	T6	IP65



EIB 4030



EIB 5040B



EIB 6060A



EIB 6060C



Enclosures / Controls / Panels

Indicators

EIB-C Series - Ex d II C T6 Indicators

Explosion-proof
Rain-tight
Water-tight
Corrosion resistant

CL I, Div. 1 & 2, Groups A, B, C, D
NEMA 4, 4X
Zone 1, Zone 2
II 2G Ex d II C IP65

- Copper Free Aluminum
- With ELC Lens Covers Series
- Silicon or Neoprene Gasket
- Flexible Foot Installation

■ Applications

EIB-C Series Indicators are used with ELC Series in hazardous areas :

- For use to display inside (ammeters, voltmeters, watt- meters, var-meters, power-factor meters, tachometer , indicators, pressure controls, temperature control etc.)
- Indoors or outdoors in damp, wet, dusty, corrosive, hazardous locations.
- In areas which are hazardous due to the presence of hydrogen or gases and vapors of equivalent hazard such as found in process industries and gas manufacturing plants.

■ Features

- EIB-C Indicators provides explosion protection and broad sight in three sizes.
- Series EIB-C terminal enclosures, made of ASTM B26 356 T6 as standard.
- Special Silicon or Neoprene cover O-ring gasket provides a water seal to meet IP65 requirements, and provides superior protection for enclosed equipment against water/corrosion.
- Ground joint cover opening provides maximum opening for pulling wires or mounting equipment.
- Walls of bodies may be drilled and tapped for conduit entries as shown in listings.
- Square corners of enclosure body provide maximum interior space and area for conduit openings.
- Internal grounding lug provides a means to ground enclosed equipment.
- Enclosures are machined for field installed mounting plates.
- Detachable mounting feet provide mounting flexibility. No need to replace enclosure if mounting feet are broken.

■ Standard Materials

- Copper-free Aluminum
- Accessory : Stainless Steel
- Heat Resistant Glass
- Gasket- Silicon or Rubber
- Middle plate- Bakelite plate

■ Standard Finishes

- Natural or Epoxy painted (Munsell No. 7.5BG 6/1.5)

■ Compliances

- IEC 60079-0 Equipment- General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- ANSI/ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure- tight joints are not made on the threads
- ISO 261 Metric screw threads
- NEC 500
- NEMA 4, 4X / IEC 60529

■ Option

- Diagram Pocket

■ Selection Table

CAT.NO.	DIMENSIONS (MM)		GLASS COVERS	TEMPERATURE GRADE	IP GRADE
	WIDTH	HEIGHT			
EIB-C 2520	250	200	ELC 120	T6	IP65
EIB-C 3530A	350	300	ELC 92	T6	IP65
EIB-C 3530B	350	300	ELC 200	T6	IP65



EIB-C 2520



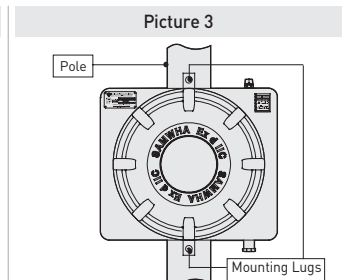
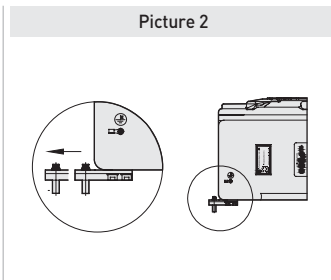
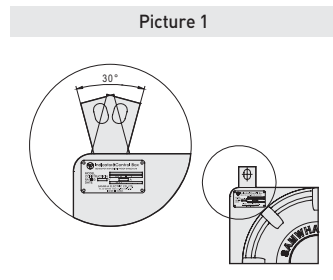
EIB-C 3530A



EIB-C 3530B

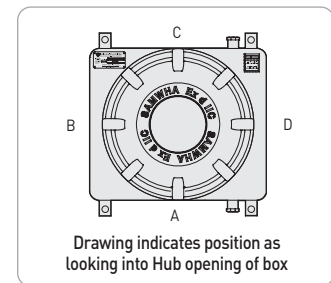
Flexible Foot Installation

- Detachable mounting feet provide mounting flexibility. (Picture 1,2)
- No need to replace enclosure if mounting feet are broken.
- Four separate mounting lugs furnished, bolted to the body casting.
- Two lugs may be used, at top and bottom center, for pole mounting. (Picture 3)

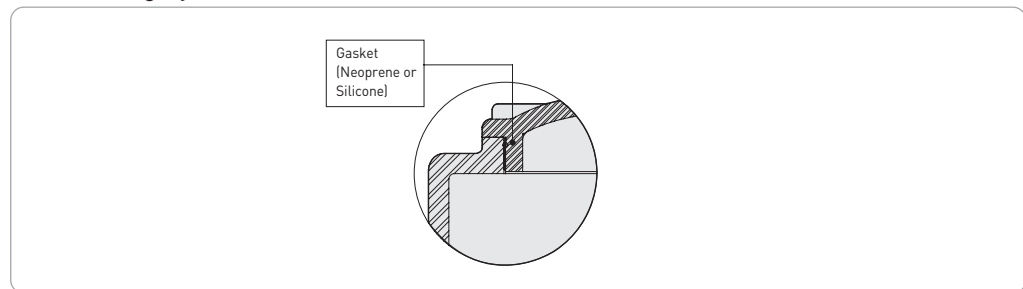


Hub Design

- Drilled and tapped conduit openings will be evenly spaced and located in the area indicated on the location chart. Critical conduit opening locations may be indicated by supplying a diagram similar to the one shown at below indicating critical dimensions and locations.
- Specific conduit openings must be located dimensionally from box centerlines to conduit centerlines and from outside back surface of box to conduit centerline.



IP Packing System



Minimum Centers for Drilled and Tapped Openings and Hubs

	#16/ M16	#22/ M20	#28/ M25	#36/ M32	#42/ M40	#54/ M50	#70/ M63	#82/ M75	#104/ M90
#16/M16	39								
#22/M20	44	49							
#28/M25	47.5	52.5	56						
#36/M32	56.5	61.5	65	72					
#42/M40	62.5	67.5	71	78	84				
#54/M50	71	76	79.5	86.5	92.5	99			
#70/M63	80.5	85.5	89	96	102	108.5	118		
#82/M75	87	92	95.5	102.5	108.5	115	124.5	129	
#104/M90	103.5	108.5	112	119	125	131.5	141	145.5	162



Enclosures / Controls / Panels Indicators

ELC Series Lens Covers

Explosion-proof
Rain-tight
Water-tight
Corrosion resistant

CL I, Div. 1 & 2, Groups A, B, C, D
NEMA 4, 4X
Zone 1, Zone 2
II 2G Ex d II C IP65

- Copper Free Aluminum
- Heat Resistant Glass
- Silicon or Neoprene Gasket

■ Applications

ELC Series Lens Covers are used in hazardous areas :

- To display ammeters, voltmeters, watt-meters, var-meters, power-factor meters, tachometer, indicators, pressure controls, temperature control etc.
- Indoors or outdoors in damp, wet, dusty, corrosive, hazardous locations.
- In areas which are hazardous due to the presence of hydrogen or gases and vapors of equivalent hazard such as found in process industries and gas manufacturing plants.

■ Features

- ELC lens covers provides explosion protection and broad sight in three sizes.
- ELC lens covers series are made of ASTM B26 356 T6 as standard.
- Special Silicon or Neoprene cover O-ring gasket provides a water seal to meet IP65 requirements, and provides superior protection for enclosed equipment against water/corrosion.

■ Standard Materials

- Copper-free Aluminum
- Heat Resistant Glass
- Gasket-Silicon or Neoprene

■ Standard Finishes

- Natural or Epoxy painted (Munsell No. 7.5BG 6/1.5)

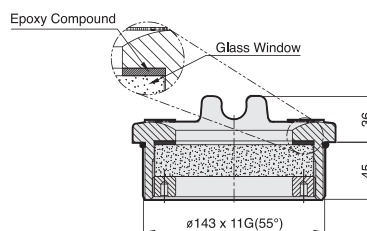
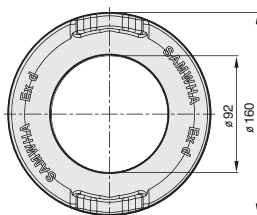
■ Compliances

- IEC 60079-0 Equipment- General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- NEC 500 / NEMA 4, 4X / IEC 60529

■ Certification

- Certified KOSHA (Korea Occupational Safety & Health Agency)

■ Dimensions



DIMENSIONS (MM)	CAT. NO.		
	ELC 92	ELC 120	ELC 200
GLASS DIAMETER	92	120	190
OUTDIAMETER	160	200	300
THREADS LENGTH	45	45	45
THREADS SIZE	Ø143*11G	Ø183*11G	Ø270*11G
PROTRUTION	36	41	50

Enclosures / Controls / Panels

Circuit Breaker Boxes

Flame-Proof Type Circuit Breaker Boxes

SFCB 5040 & 4030 Series - Ex d II B+H2 T6

SFCB-C 6529 Series - Ex d II C T6

- Flexible Foot Installation



SFCB Series

■ Flame-proof Type Circuit Breaker Box SFCB 4030 Series – 60AF or 100AF, 100A Max

SFCB 5040 Series – 225AF or 400AF, 255A Max

- Cl. I, Div. 1 & 2, Groups B, C, D
- NEMA 4, 4X
- II 2G Ex d II B+H2 IP 65
- Explosion-proof
- Rain-tight
- Water-tight
- Corrosion Resistant



SFCB-C 6529 Series

■ Flame-proof Type Circuit Breaker Box SFCB – C 6529 -225AF or 400AF, 255A Max

- Explosion-proof
- Rain-tight
- Water-tight
- Corrosion Resistant
- Cl. I, Div. 1 & 2, Groups A, B, C, D
- NEMA 4, 4X
- II 2G Ex d II C IP 65

■ Specification of Circuit Breaker Boxes

No.	Specification	Ex d II B+H2 T6 type		Ex d II C T6 type
1	MODEL NO.	SFCB 4030	SFCB 5040	SFCB – C 6529
2	CERTIFICATED	KOSHA (Korea Occupational Safety & Health Agency)		
3	MAX CURRENT	100A	255A	
4	IP GRADE	IP 65		
5	TEMPERATURE	-20℃ ~ 40℃		
6	HUMIDITY	95%		
7	ALTITUDE	1000 m		
8	BASIC FINISH	Spray(Color : Munsel No. 7.5BG 6/1.5)		



Enclosures / Controls / Panels

Circuit Breaker Boxes

SFCB 4030 Series - Ex d II B+H2 T6

Explosion-proof
Rain-tight
Water-tight
Corrosion Resistant

Cl. I, Div. 1 & 2, Groups B, C, D
NEMA 4, 4X
II 2G Ex d II B+H2 IP 65

- Circuit Breaker Box
- 60AF or 100AF, 100A Max
- Flexible Foot Installation



■ Applications

SFCB 4030 hinged cover circuit breaker box used :

- For general motor control and circuit protection without the need for a protective shelter.
- to provide the necessary push-buttons, pilot lights, selector switches and tumbler switches
- For Zone 1 & 2, Flame Proof type (Ex d II B T6+ H2)
- Indoors or outdoors in damp, wet, dusty, corrosive, hazardous locations
- Where exposure to frequent or heavy rain, water, spray, moisture, and humidity is common ; such as : offshore drilling facilities, cooling towers, coal preparation and handling facilities and sewage and waste water treatment plant. In areas which are hazardous due to the presence of hydrogen or gases and vapors of equivalent hazard such as found in process industries, gas manufacturing plants.

■ Features

- Rugged, corrosion resistant, cast copper-free aluminum construction. (Less than 0.4 of 1%)
- Special Silicon cover gasket provides a water seal to meet IP65 requirements, and provides superior protection for enclosed equipment against water/corrosion.
- Detachable mounting feet provide mounting flexibility. No need to replace enclosure if mounting feet are broken.
- Optional stainless steel hinges provide convenient and easy access for inspection, maintenance and systems changes

■ Standard Materials

- Copper-free Aluminum
- Accessory : Stainless Steel
- Gasket - Silicon or Rubber
- Hinges - Stainless Steel
- Middle plate - Bakelite plate

■ Standard Finishes

- Natural or Epoxy painted (Munsell No. 7.5BG 6/1.5)

■ Technical Data

- Current Range : Max 100A

■ Compliances

- IEC 60079-0 Equipment- General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- ANSI/ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure- tight joints are not made on the threads
- ISO 261 Metric screw threads
- NEC 500
- NEMA 4, 4X / IEC 60529

■ Certification

- Certified KOSHA (Korea Occupational Safety & Health Agency)

■ Model Number Logic

SFCB 4030	000	00	000		
Series Constant	Frame Selections	Poles	Current Rating	20A : 20 Amp	60A : 60 Amp
	06F : 60AF	2P : 2 Poles	5A : 5 Amp	30A : 30 Amp	75A : 75 Amp
	10F : 100AF	3P : 3 Poles	10A : 10 Amp	40A : 40 Amp	100A : 100 Amp
		4P : 4 Poles	15A : 15 Amp	50A : 50 Amp	

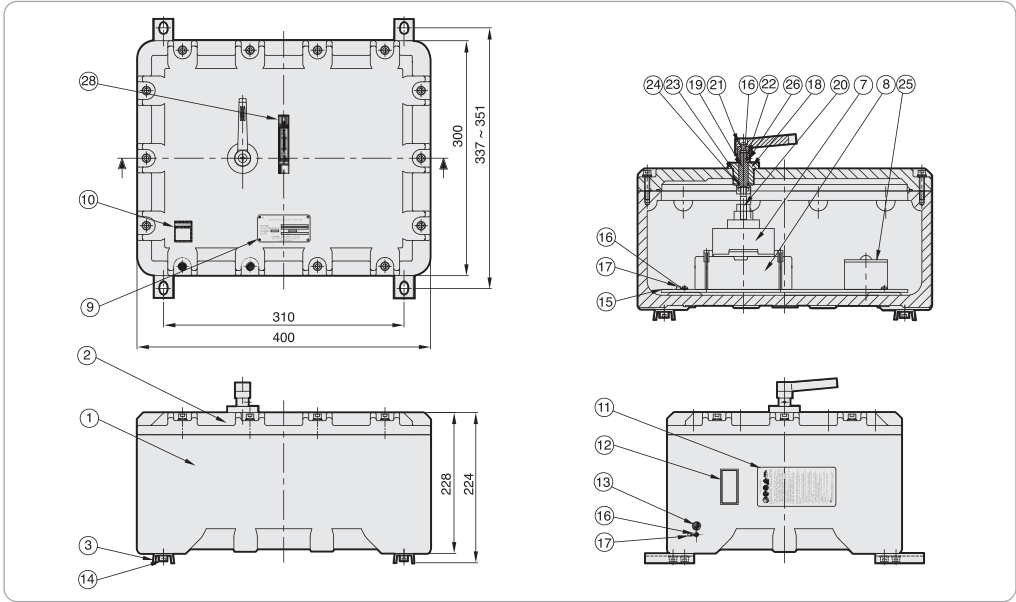
Example 1) Ex d II B+H2 Circuit Breaker Box 277Vac 75 Ampere 100AF 3 Poles ⇒ SFCB 4030 10AF3P75A

Example 2) Ex d II B+H2 Circuit Breaker Box 480Vac 60 Ampere 60AF 2 Poles ⇒ SFCB 4030 06AF2P60A

Circuit Breakers

CAT.NO.	CIRCUIT BREAKER FRAME SIZE	POLES	VOLTAGE RATING	CURRENT RATING	CAT.NO.	CIRCUIT BREAKER FRAME SIZE	POLES	VOLTAGE RATING	CURRENT RATING
06F2P60A	60AF	2	600Vac or 250Vdc	60 Amp	10F3P30A	100AF	3	600Vac or 250Vdc	30 Amp
06F3P60A		3		60 Amp	10F3P40A				40 Amp
06F4P60A		4		60 Amp	10F3P50A				50 Amp
10F2P05A	100AF	2	600Vac or 250Vdc	5 Amp	10F3P60A				60 Amp
10F2P10A				10 Amp	10F3P75A				75 Amp
10F2P15A				15 Amp	10F3P100A				100 Amp
10F2P20A				20 Amp	10F4P05A		4	600Vac	5 Amp
10F2P30A				30 Amp	10F4P10A				10 Amp
10F2P40A				40 Amp	10F4P15A				15 Amp
10F2P50A				50 Amp	10F4P20A				20 Amp
10F2P60A				60 Amp	10F4P30A				30 Amp
10F2P75A				75 Amp	10F4P40A				40 Amp
10F2P100A				100 Amp	10F4P50A				50 Amp
10F3P05A		3	600Vac or 250Vdc	5 Amp	10F4P60A				60 Amp
10F3P10A				10 Amp	10F4P75A				75 Amp
10F3P15A				15 Amp	10F4P100A				100 Amp
10F3P20A				20 Amp					

Dimensions



NO.	PART NAME	MATERIALS	REMARKS
1	BODY	AC4C	
2	COVER	AC4C	
3	MOUNT PLATE	SPCC	
4	BODY BOLT	STS304	
5	FLAT WASHER	STS304	Ø15XØ8.5X1.6t
6	Spring Washer	STS304	M8
7	MCCB Operating Handle	—	LS E-35S
8	MCCB	—	
9	NAME PLATE	STS304	
10	Warning Sticker	Art Paper	
11	Caution Sticker		
12	CERTI. Sticker		
13	BOLT		
14	Fix Plate	STS304	M8XP 1.25X15L

NO.	PART NAME	MATERIALS	REMARKS
15	Fix Plate	BAKELITE	430X330
16	Fix Screw	STS304	4SQ
17	Terminal Lug	Copper	
18	Main MCCB Switch Bushing	C3604BE-F	
19	Main MCCB Switch Shaft	C3604BE-F	
20	Main MCCB Switch Linker	Al6061	
21	Switch Handle	ALDC12	(B-CLN-C-M10)
22	Handle Bushing	SS400	(B-CLN-C-M10)
23	O-Ring	Silicons	AN-125
24	O-Ring	Silicons	AN-113
25	Terminal Block	—	
26	Set Screw	STS304	M4 X5L
27	O-Ring	Silicons	Ø5X1.488L
28	ON/OFF Name plate	STS304	



Enclosures / Controls / Panels

Circuit Breaker Boxes

SFCB 5040 Series - Ex d II B+H2 T6

Explosion-proof
Rain-tight
Water-tight
Corrosion Resistant

CL. I, Div. 1 & 2, Groups B, C, D
NEMA 4, 4X
II 2G Ex d II B+H2 IP 65

- Circuit Breaker Box
- 225AF or 400AF, 255A Max
- Flexible Foot Installation



■ Applications

SFCB 5040 hinged cover circuit breaker box used :

- For general motor control and circuit protection without the need for a protective shelter.
- to provide the necessary push-buttons, pilot lights, selector switches and tumbler switches
- For Zone 1 & 2, Flame Proof type (Ex d II B T6+ H2)
- Indoors or outdoors in damp, wet, dusty, corrosive, hazardous locations
- Where exposure to frequent or heavy rain, water, spray, moisture, and humidity is common ; such as : offshore drilling facilities, cooling towers, coal preparation and handling facilities and sewage and waste water treatment plant. In areas which are hazardous due to the presence of hydrogen or gases and vapors of equivalent hazard such as found in process industries, gas manufacturing plants.

■ Features

- Rugged, corrosion resistant, cast copper-free aluminum construction. (Less than 0.4 of 1%)
- Special Silicon cover gasket provides a water seal to meet IP65 requirements, and provides superior protection for enclosed equipment against water/corrosion.
- Detachable mounting feet provide mounting flexibility. No need to replace enclosure if mounting feet are broken.
- Optional stainless steel hinges provide convenient and easy access for inspection, maintenance and systems changes

■ Standard Materials

- Copper-free Aluminum
- Accessory : Stainless Steel
- Gasket - Silicon or Rubber
- Hinges - Stainless Steel
- Middle plate - Bakelite plate

■ Standard Finishes

- Natural or Epoxy painted (Munsell No. 7.5BG 6/1.5)

■ Technical Data

- Current Range : Max 255A

■ Compliances

- IEC 60079-0 Equipment-General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- ANSI/ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- ISO 261 Metric screw threads
- NEC 500 / NEMA 4, 4X / IEC 60529

■ Certification

- Certified KOSHA (Korea Occupational Safety & Health Agency)

■ Model Number Logic

SFCB 5040	000	00	0000	
Series Constant	Frame Selections	Poles	Current Rating	
	22F : 225AF 40F : 400AF	2P : 2 Poles 3P : 3 Poles 4P : 4 Poles	100A : 100 Amp 125A : 125 Amp 150A : 150 Amp	175A : 175 Amp 200A : 200 Amp 225A : 225 Amp 250A : 250 Amp

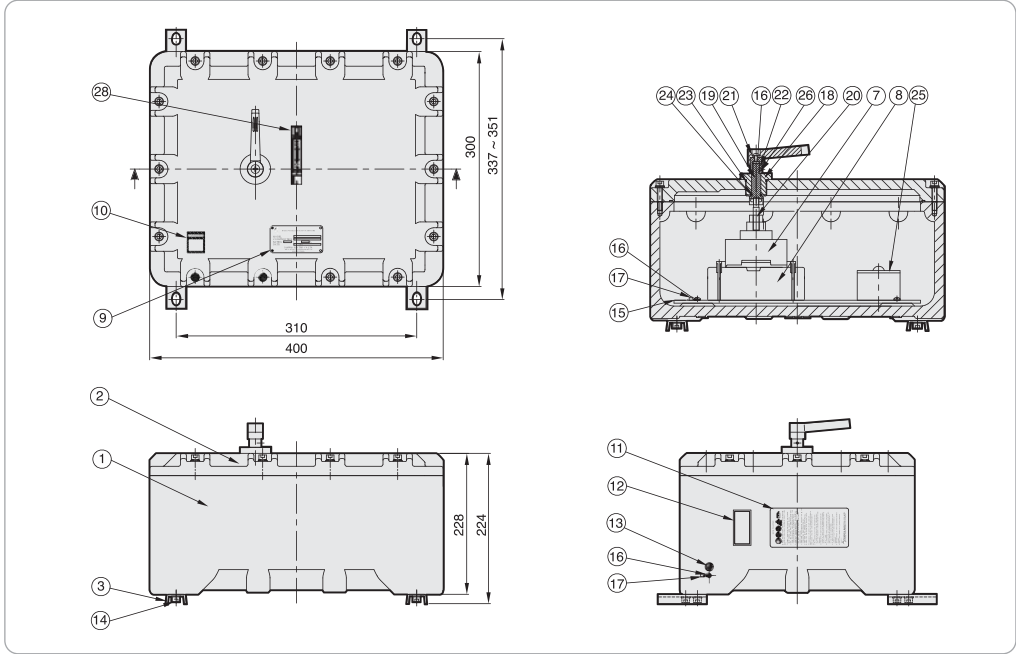
Example 1) Ex d II B+H2 Circuit Breaker Box 277Vac 200 Ampere 225AF 3 Poles ⇒ SFCB 5040 22AF3P200A

Example 2) Ex d II B+H2 Circuit Breaker Box 480Vac 150 Ampere 225AF 2 Poles ⇒ SFCB 5040 22AF2P150A

Circuit Breakers

CAT.NO.	CIRCUIT BREAKER FRAME SIZE	POLES	VOLTAGE RATING	CURRENT RATING	CAT.NO.	CIRCUIT BREAKER FRAME SIZE	POLES	VOLTAGE RATING	CURRENT RATING
22F2P100A	225AF	2	600Vac or 250Vdc	100 Amp	22F3P200A	225AF	3	600Vac or 250Vdc	200 Amp
22F2P125A				125 Amp	22F3P225A			225 Amp	
22F2P150A				150 Amp	22F4P100A		4	600Vac or 250Vdc	100 Amp
22F2P175A				175 Amp	22F4P125A				125 Amp
22F2P200A				200 Amp	22F4P150A				150 Amp
22F2P225A				225 Amp	22F4P175A				175 Amp
22F3P100A		2	600Vac or 250Vdc	100 Amp	22F4P200A				200 Amp
22F3P125A				125 Amp	22F4P225A				225 Amp
22F3P150A				150 Amp	40F2P250A		400AF	2	600Vac or 250Vdc
22F3P175A			175 Amp	40F3P250A	400AF	3	600Vac or 250Vdc	250A	

Dimensions



NO.	PART NAME	MATERIALS	REMARKS
1	BODY	AC4C	—
2	COVER	AC4C	—
3	MOUNT PLATE	SPCC	—
4	BODY BOLT	STS304	—
5	FLAT WASHER	STS304	Ø15XØ8.5X1.6t
6	Spring Washer	STS304	M8
7	MCCB Operating Handle	—	LS E-35S
8	MCCB	—	—
9	NAME PLATE	STS304	—
10	Warning Sticker	Art Paper	—
11	Caution Sticker	—	—
12	CERTI. Sticker	—	—
13	GROUNDING Sticker	—	—
14	BOLT	STS304	M8XP 1.25X15L

NO.	PART NAME	MATERIALS	REMARKS
15	Fix Plate	BAKELITE	430 X330
16	Fix Screw	STS304	4SQ
17	Terminal Lug	Copper	—
18	Main MCCB Switch Bushing	C3604BE-F	—
19	Main MCCB Switch Shaft	C3604BE-F	—
20	Main MCCB Switch Linker	Al6061	—
21	Switch Handle	ALDC12	[B-CLN-C-M10]
22	Handle Bushing	SS400	[B-CLN-C-M10]
23	O-Ring	Silicons	AN-125
24	O-Ring	Silicons	AN-113
25	Terminal Block	—	—
26	Set Screw	STS304	M4 X5L
27	O-Ring	Silicons	Ø5X 1.488L
28	ON/OFF Name plate	STS304	—



Enclosures / Controls / Panels

Circuit Breaker Boxes

SFCB-C 6529 Series - Ex d II C T6

Explosion-proof
Rain-tight
Water-tight
Corrosion Resistant

CL I, Div. 1 & 2, Groups A, B, C, D
NEMA 4, 4X
II 2G Ex d II C IP 65

- Circuit Breaker Box
- 225AF or 400AF, 255A Max



■ Applications

SFCB-C 6529 hinged cover circuit breaker box used :

- For general motor control and circuit protection without the need for a protective shelter.
- to provide the necessary push buttons, pilot lights, selector switches and tumbler switches
- For Zone 1 & 2, Flame Proof type (Ex d II C T6)
- Indoors or outdoors in damp, wet, dusty, corrosive, hazardous locations
- Where exposure to frequent or heavy rain, water, spray, moisture, and humidity is common ; such as : offshore drilling facilities, cooling towers, coal preparation and handling facilities and sewage and waste water treatment plant. In areas which are hazardous due to the presence of hydrogen or gases and vapors of equivalent hazard such as found in process industries, gas manufacturing plants.
- In areas which are hazardous due to the presence of hydrogen or gases and vapors of equivalent hazard such as found in process industries, gas manufacturing plants.

■ Features

- Rugged, corrosion resistant, cast copper-free aluminum construction. (Less than 0.4 of 1%)
- Special Silicon cover gasket provides a water seal to meet IP65 requirements, and provides superior protection for enclosed equipment against water/corrosion.
- Detachable mounting feet provide mounting flexibility. No need to replace enclosure if mounting feet are broken.
- Optional stainless steel hinges provide convenient and easy access for inspection, maintenance and systems changes

■ Standard Materials

- Copper-free Aluminum
- Accessory : Stainless Steel
- Gasket-Silicon or Rubber
- Middle plate-Bakelite plate

■ Standard Finishes

- Natural or Epoxy painted (Munsell No. 7.5BG 6/1.5)

■ Technical Data

- Current Range : Max 255A

■ Compliances

- IEC 60079-0 Equipment-General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- ANSI/ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure- tight joints are not made on the threads
- ISO 261 Metric screw threads
- NEC 500 / NEMA 4, 4X / IEC 60529

■ Certification

- Certified KOSHA (Korea Occupational Safety & Health Agency)

■ Model Number Logic

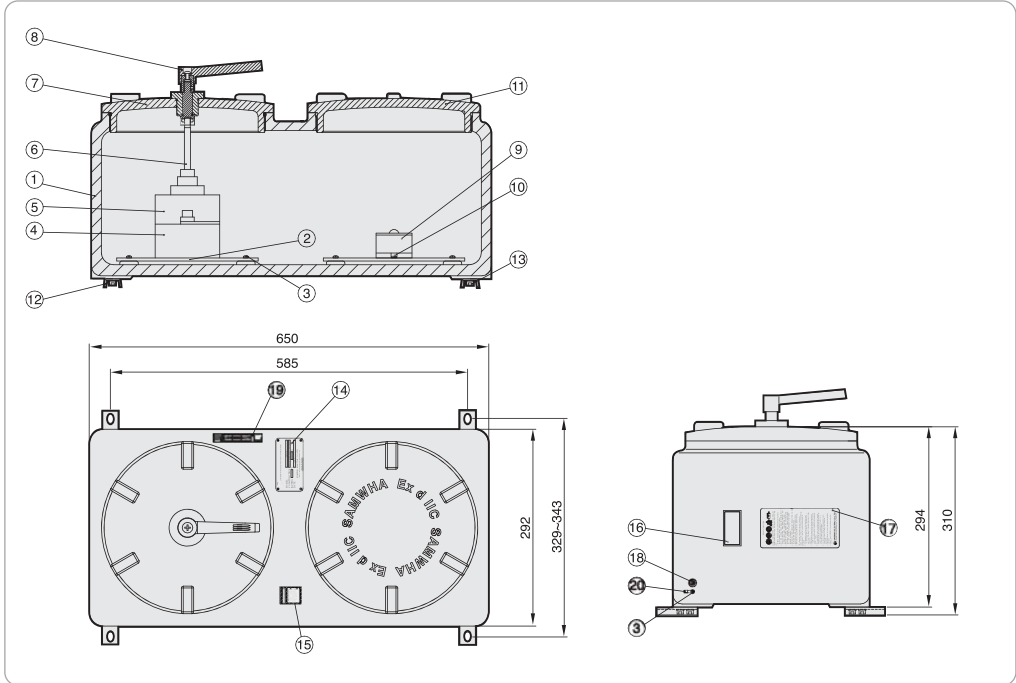
SFCB-C 6529	000	00	0000	
Series Constant	Frame Selections 22F : 225AF 40F : 400AF	Poles 2P : 2 Poles 3P : 3 Poles 4P : 4 Poles	Current Rating 100A : 100 Amp 125A : 125 Amp 150A : 150 Amp	175A : 175 Amp 200A : 200 Amp 225A : 225 Amp 250A : 250 Amp

Example 1) Ex d II B+H2 Circuit Breaker Box 277Vac 200 Ampere 225AF 3 Poles ⇒ SFCB-C 6529 22AF3P200A
Example 2) Ex d II B+H2 Circuit Breaker Box 480Vac 150 Ampere 225AF 2 Poles ⇒ SFCB-C 6529 22AF2P150A

Circuit Breakers

CAT.NO.	CIRCUIT BREAKER FRAME SIZE	POLES	VOLTAGE RATING	CURRENT RATING	CAT.NO.	CIRCUIT BREAKER FRAME SIZE	POLES	VOLTAGE RATING	CURRENT RATING
22F2P100A	225AF	2	600Vac or 250Vdc	100 Amp	22F3P200A	225AF	3	600Vac or 250Vdc	200 Amp
22F2P125A				125 Amp	22F3P225A		4		225 Amp
22F2P150A				150 Amp	22F4P100A		600Vac or 250Vdc	100 Amp	
22F2P175A				175 Amp	22F4P125A			125 Amp	
22F2P200A				200 Amp	22F4P150A			150 Amp	
22F2P225A				225 Amp	22F4P175A			175 Amp	
22F3P100A		3	600Vac or 250Vdc	100 Amp	22F4P200A			200 Amp	
22F3P125A				125 Amp	22F4P225A			225 Amp	
22F3P150A				150 Amp	40F2P250A	400AF	2	600Vac or 250Vdc	250A
22F3P175A				175 Amp	40F3P250A	400AF	3	600Vac or 250Vdc	250A

Dimensions



NO.	PART NAME	MATERIALS	REMARKS
1	Circuit Breaker Box Body	AC3A	—
2	Fix Plate	Bakelite	240X240
3	Fix Screw	STS304	Th M5X12L
4	MCCB	—	—
5	MCCB Operating Handle	—	—
6	Main MCCB Switch Linker	Al6061	—
7	Circuit Breaker Box Cover Ass'y	—	—
8	Main MCCB Switch Handle	ADC12	[B-CLN-C-M10]
9	Terminal Block	—	—
10	Fix Bolt	STS304	M5X30L

NO.	PART NAME	MATERIALS	REMARKS
11	I C Panel board Cover	AC3A	—
12	Mount Plate	SPCC	—
13	Bolt	STS304	—
14	Name Plate	STS304	—
15	Warning Sucker	Art Paper	—
16	Ceri, Sucker	—	—
17	Caution Sucker	—	—
18	Grounding Sucker	—	—
19	ON/OFF Name plate	STS304	—
20	Terminal Lug	Copper	4SQ



Enclosures / Controls / Panels

Circuit Breaker Boxes

SFCB-C 6529 Series - Ex d II C T6

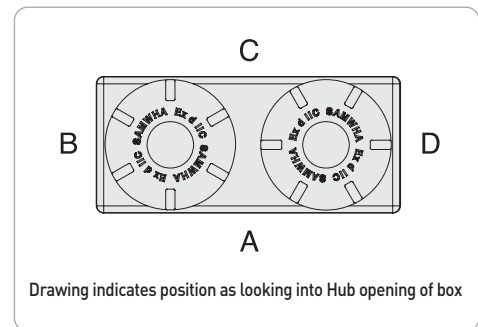
Explosion-proof
Rain-tight
Water-tight
Corrosion Resistant

CL I, Div. 1 & 2, Groups A, B, C, D
NEMA 4, 4X
II 2G Ex d II C IP 65

- Circuit Breaker Box
- 225AF or 400AF, 255A Max

■ Hub Design

- Drilled and tapped conduit openings will be evenly spaced and located in the area indicated on the location chart. Critical conduit opening locations may be indicated by supplying a diagram similar to the one shown at below indicating critical dimensions and locations.
- Specific conduit openings must be located dimensionally from box centerlines to conduit centerlines and from outside back surface of box to conduit centerline.



■ Minimum Centers for Drilled and Tapped Openings and Hubs

	#16/M16	#22/M20	#28/M25	#36/M32	#42/M40	#54/M50	#70/M63	#82/M75	#104/M90
#16/M16	39								
#22/M20	44	49							
#28/M25	47.5	52.5	56						
#36/M32	56.5	61.5	65	72					
#42/M40	62.5	67.5	71	78	84				
#54/M50	71	76	79.5	86.5	92.5	99			
#70/M63	80.5	85.5	89	96	102	108.5	118		
#82/M75	87	92	95.5	102.5	108.5	115	124.5	129	
#104/M90	103.5	108.5	112	119	125	131.5	141	145.5	162

■ Maximum Quantity for Drilled and Tapped Openings

Model No.	NPT or PF	#16	#22	#28	#36	#42	#54	#70	#82	#104
	Metric thread	M16	M22	M25	M32	M40	M50	M63	M75	M90
SFCB-C 6529	A or C	120	69	50	28	26	17	9	7	5
	B or D	49	30	23	14	9	7	3	3	2

Enclosures / Controls / Panels

Controls**Flame-proof Type Controls****SEPB Series Combination Operating Switches – Ex d II C T6****SETS Series General Use Snap Switches – Ex d II B T6****SEC Series Control Stations – Ex d II B T6****SECB Series Custom-built Indicator & Control Boxes – Ex d II B+H2 T6**

SEPB Series

■ **Flame-proof Type Combination Operating Switches – SEPB Series 1 Gang ~ 3 Gangs**

- Cl. I, Div. 1 & 2, Groups A, B, C, D
- NEMA 4, 4X
- II 2G Ex d II C IP 65
- Explosion-proof
- Rain-tight / Water-tight
- Corrosion Resistant



SETS Series

■ **Flame-proof Type General Use Snap Switches – SETS Series 1 Gang ~ 3 Gangs**

- Cl. I, Div. 1 & 2, Groups C, D
- NEMA 4, 4X
- II 2G Ex d II B IP 65
- Explosion-proof
- Rain-tight / Water-tight
- Corrosion Resistant



SEC Series

■ **Flame-proof Type Control Stations – SEC Series 1 Device ~ 5 Devices With UE Control Devices Series**

- Cl. I, Div. 1 & 2, Groups C, D
- NEMA 4, 4X
- II 2G Ex d II B IP 65
- Explosion-proof
- Rain-tight / Water-tight
- Corrosion Resistant



SECB Series

■ **Flame-proof Type Custom-built Indicator & Control Boxes - SECB Series With ELC Lens Covers Series With UE Control Devices Series**

- Cl. I, Div. 1 & 2, Groups B, C, D
- NEMA 4, 4X
- II 2G Ex d II B+H2 IP 65
- Explosion-proof
- Rain-tight / Water-tight
- Corrosion Resistant



Enclosures / Controls / Panels

Controls

SEPB Series Combination Operating Switches – Ex d II C T6

Explosion-proof
Rain-tight
Water-tight
Corrosion Resistant

Cl. I, Div. 1 & 2, Groups A, B, C, D
NEMA 4, 4X
Zone 1, Zone 2
II 2G Ex d II C IP65

- Copper Free Aluminum
- 1 Gang ~ 3 Gangs

■ Applications

SEPB Series Combination operating switches are used for operating instruments & equipment, in hazardous area.

- For use indoors or outdoors, in areas which are hazardous due to the presence of flammable gases and vapors.
- For installation in petroleum refineries, chemical, petrochemical, and other industrial process facilities; grain processing and storage facilities; and other heavy industrial applications where Class I hazards are present.

■ Features

- Mounting type - Surface mounting.
- 1 Gang ~ 3 Gang.
- Bodies, with extra room for wire pulling and termination.
- Bodies have 1/2", 3/4" dead-end or through-feed conduit hubs with integral bushing for protection of wire insulation.
- Covers and bodies are available in copper-free aluminum for light weight and corrosion resistance.
- Legend plates have large lettering to give clear indication of device function.
- Special Silicon or Neoprene cover O-ring gasket provides a water seal to meet IP65 requirements, and provides superior protection for enclosed equipment against water/corrosion.

■ Standard Materials

- Copper-free Aluminum
- Accessory : Stainless Steel
- Gasket-Silicon or Rubber

■ Standard Finishes

- Epoxy painted (Munsell No. 7.5BG 6/1.5).

■ Certification

- Certified KOGAS (Korea Gas Safety Corporation).

■ Options

- Extra room for wire pulling and termination.

■ Compliances

- IEC 60079-0 Equipment-General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- ANSI/ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- NEC 500
- NEMA 4, 4X
- IEC 60529



1 Gang



2 Gang



3 Gang

■ Model Number Logic

SEP	00	00	00	0	00
Series Constant	Gang type 1G : 1 gang 2G : 2 gang 3G : 3 gang	Switch type PB : Push button SW : Selector S/W PL : Pilot light	Hub type DE : Dead end FT : Feed Thru.	Hub Threads type P : BSPP threads N : NPT threads	Hub threads 16 : 1/2" 22 : 3/4"

Example 1) Combination operating switches 1 gang Push button, NPT 1/2" 2 Hub SEP 1G PB FT N16

Example 2) Combination operating switches 3 gang Push button & Selector & Pilot light, PF 3/4" 1 Hub SEP 3G PB SW PL DE P22

■ Selection Table

GANGS	SWITCH CONSTRUCTION	CAT.NO.			
		DEAD END		FEED THRU.	
		1/2"	3/4"	1/2"	3/4"
1 gang	Push Button	SEP 1G PB DE 16	SEP 1G PB DE 22	SEP 1G PB FT 16	SEP 1G PB FT 22
	Selector Switch	SEP 1G SW DE 16	SEP 1G SW DE 22	SEP 1G SW FT 16	SEP 1G SW FT 22
	Pilot Light	SEP 1G PL DE 16	SEP 1G PL DE 22	SEP 1G PL FT 16	SEP 1G PL FT 22
2 gangs	Push Button & Selector Switch	SEP 2G PB SW DE 16	SEP 2G PB SW DE 22	SEP 2G PB SW FT 16	SEP 2G PB SW FT 22
	Push Button & Pilot Light	SEP 2G PB PL DE 16	SEP 2G PB PL DE 22	SEP 2G PB PL FT 16	SEP 2G PB PL FT 22
	Selector Switch & Pilot Light	SEP 2G SW PL DE 16	SEP 2G SW PL DE 22	SEP 2G SW PL FT 16	SEP 2G SW PL FT 22
3 gangs	PB & SW & PL	SEP 3G PB SW PL DE 16	SEP 3G PB SW PL DE 22	SEP 3G PB SW PL FT 16	SEP 3G PB SW PL FT 22
	PB & PL & PL	SEP 3G PB PL PL DE 16	SEP 3G PB PL PL DE 22	SEP 3G PB PL PL FT 16	SEP 3G PB PL PL FT 22
	SW & PL & PL	SEP 3G SW PL PL DE 16	SEP 3G SW PL PL DE 22	SEP 3G SW PL PL FT 16	SEP 3G SW PL PL FT 22



Enclosures / Controls / Panels

Controls

SETS Series General Use Snap Switches – Ex d II B T6

Explosion-proof
Rain-tight
Water-tight
Corrosion Resistant

Cl. I, Div. 1 & 2, Groups C, D
NEMA 4, 4X
Zone 1, Zone 2
II 2G Ex d II B IP65

- Tumbler Switches
- Copper Free Aluminum
- 1 Gang ~ 3 Gangs

■ Applications

SETS Series Combination circuit operating switches are used for operating 1Ø motors, 1Ø pumps, lighting fixtures, etc

- For use indoors or outdoors, in areas which are hazardous due to the presence of flammable gases and vapors.
- For installation in petroleum refineries, chemical, petrochemical, and other industrial process facilities; grain processing and storage facilities; and other heavy industrial applications where Class I hazards are present.

■ Features

- Mounting type - Surface mounting.
- 1 Gang ~ 3 Gang.
- Bodies, with extra room for wire pulling and termination.
- Bodies have 1/2", 3/4" dead-end or through-feed conduit hubs with integral bushing for protection of wire insulation.
- Covers and bodies are available in copper-free aluminum for light weight and corrosion resistance.
- Legend plates have large lettering to give clear indication of device function.
- Special Silicon or Neoprene cover O-ring gasket provides a water seal to meet IP65 requirements, and provides superior protection for enclosed equipment against water/corrosion.

■ Standard Materials

- Copper-free Aluminum
- Accessory : Stainless Steel
- Gasket-Silicon or Rubber

■ Standard Finishes

- Epoxy painted (Munsell No. 7.5BG 6/1.5).

■ Compliances

- Certified KOGAS (Korea Gas Safety Corporation).

■ Options

- Extra room for wire pulling and termination.

■ Compliances

- IEC 60079-0 Equipment- General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- ANSI/ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- NEC 500
- NEMA 4, 4X
- IEC 60529

■ Model Number Logic

SETS	00	000	00	00	0	00
Series Constant	Gang type 1G : 1 gang 2G : 2 gang 3G : 3 gang	Rating current 10A 20A	Poles 1G : 1 pole 2G : 2 poles 3G : 3 poles	Hub type DE : Dead End FT : Feed Thru.	Hub Threads type P : BSPP threads N : NPT threads	Hub threads 16 : 1/2" 22 : 3/4"

Example 1) General use snap switches 1 gang, NPT 1/2" 2 hub, 2Poles 10A SETS 1G 10A 2P FT N16

Example 2) General use snap switches 3 gang, PF 3/4" 1 hub, 3Poles 20A SETS 3G 20A 3P DE P22



1 Gang



2 Gang



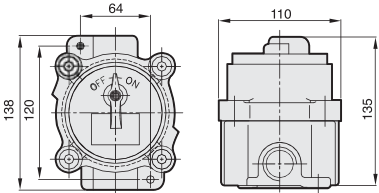
3 Gang

■ Selection Table

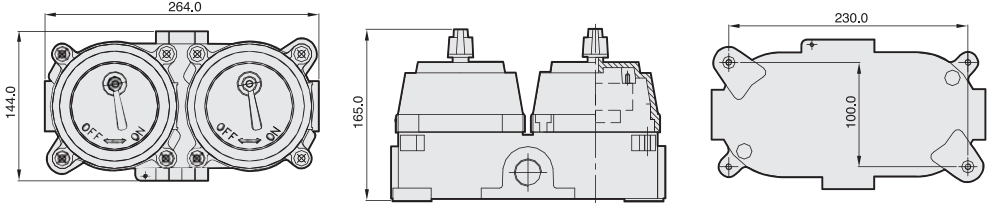
GANGS	RATING CURRENT	POLES	CAT.NO.			
			DEAD END		FEED THRU.	
			1/2"	3/4"	1/2"	3/4"
1 gang	10A	1 pole	SETS 1G 10A 1P DE 16	SETS 1G 10A 1P DE 22	SETS 1G 10A 1P FT 16	SETS 1G 10A 1P FT 22
		2 poles	SETS 1G 10A 2P DE 16	SETS 1G 10A 2P DE 22	SETS 1G 10A 2P FT 16	SETS 1G 10A 2P FT 22
		3 poles	SETS 1G 10A 3P DE 16	SETS 1G 10A 3P DE 22	SETS 1G 10A 3P FT 16	SETS 1G 10A 3P FT 22
	20A	1 pole	SETS 1G 20A 1P DE 16	SETS 1G 20A 1P DE 22	SETS 1G 20A 1P FT 16	SETS 1G 20A 1P FT 22
		2 poles	SETS 1G 20A 2P DE 16	SETS 1G 20A 2P DE 22	SETS 1G 20A 2P FT 16	SETS 1G 20A 2P FT 22
		3 poles	SETS 1G 20A 3P DE 16	SETS 1G 20A 3P DE 22	SETS 1G 20A 3P FT 16	SETS 1G 20A 3P FT 22
2 gangs	10A	1 pole	SETS 2G 10A 1P DE 16	SETS 2G 10A 1P DE 22	SETS 2G 10A 1P FT 16	SETS 2G 10A 1P FT 22
		2 poles	SETS 2G 10A 2P DE 16	SETS 2G 10A 2P DE 22	SETS 2G 10A 2P FT 16	SETS 2G 10A 2P FT 22
		3 poles	SETS 2G 10A 3P DE 16	SETS 2G 10A 3P DE 22	SETS 2G 10A 3P FT 16	SETS 2G 10A 3P FT 22
	20A	1 pole	SETS 2G 20A 1P DE 16	SETS 2G 20A 1P DE 22	SETS 2G 20A 1P FT 16	SETS 2G 20A 1P FT 22
		2 poles	SETS 2G 20A 2P DE 16	SETS 2G 20A 2P DE 22	SETS 2G 20A 2P FT 16	SETS 2G 20A 2P FT 22
		3 poles	SETS 2G 20A 3P DE 16	SETS 2G 20A 3P DE 22	SETS 2G 20A 3P FT 16	SETS 2G 20A 3P FT 22
3 gangs	10A	1 pole	SETS 3G 10A 1P DE 16	SETS 3G 10A 1P DE 22	SETS 3G 10A 1P FT 16	SETS 3G 10A 1P FT 22
		2 poles	SETS 3G 10A 2P DE 16	SETS 3G 10A 2P DE 22	SETS 3G 10A 2P FT 16	SETS 3G 10A 2P FT 22
		3 poles	SETS 3G 10A 3P DE 16	SETS 3G 10A 3P DE 22	SETS 3G 10A 3P FT 16	SETS 3G 10A 3P FT 22
	20A	1 pole	SETS 3G 20A 1P DE 16	SETS 3G 20A 1P DE 22	SETS 3G 20A 1P FT 16	SETS 3G 20A 1P FT 22
		2 poles	SETS 3G 20A 2P DE 16	SETS 3G 20A 2P DE 22	SETS 3G 20A 2P FT 16	SETS 3G 20A 2P FT 22
		3 poles	SETS 3G 20A 3P DE 16	SETS 3G 20A 3P DE 22	SETS 3G 20A 3P FT 16	SETS 3G 20A 3P FT 22

■ Dimensions

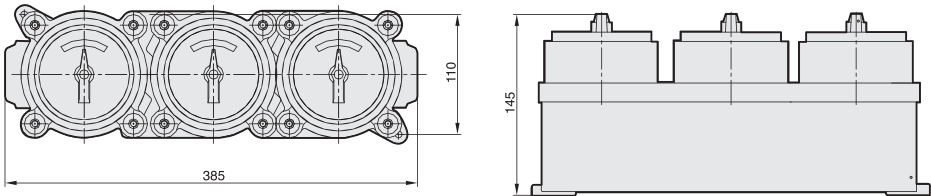
SETS 1 Gang – Mounting hole 2-Ø7.0



SETS 2 Gang – Mounting hole 4-Ø10.0



SETS 3 Gang – Mounting hole 4-Ø10.0





Enclosures / Controls / Panels

Controls

SEC Series Control Stations – Ex d II B T6

Explosion-proof
Rain-tight
Water-tight
Corrosion Resistant

CL. I, Div. 1 & 2, Groups C, D
NEMA 4, 4X
Zone 1, Zone 2
II 2G Ex d II B IP65

- Copper Free Aluminum
- 1 Device ~ 3 Device



Stanchion Mounting



Wall Mounting

■ Applications

Five modular components – operators, terminal blocks, covers, legend plates, and bodies – are combined to provide a variety of control stations which are:

- For use indoors or outdoors, in areas which are hazardous due to the presence of flammable gases and vapors, or combustible dust.
- Used in conjunction with magnetic starters or contactors for remote control of motors and other electrical apparatus.
- For installation in petroleum refineries, chemical, petrochemical, and other industrial process facilities; grain processing and storage facilities; and other heavy industrial applications where Class I hazards are present.
- In areas which are hazardous due to the presence of gases and vapors of equivalent hazard such as found in process industries and gas manufacturing plants.

■ Features

- Two mounting type - Surface mounting, Stanchion mounting
- Each covers for 1 ~ 5 devices respectively per station.
- Bodies, with extra room for wire pulling and termination, also include two integral mounting feet for fast, secure installation.
- Bodies have 1/2", 3/4", 1", 1-1/4" or 1-1/2" dead-end or through-feed conduit hubs with integral bushing for protection of wire insulation.
- Covers and bodies are available in copper-free aluminum for light weight and corrosion resistance.
- Legend plates have large lettering to give clear indication of device function.
- Space is available for field markings.
- Special Silicon or Neoprene cover O-ring gasket provides a water seal to meet IP65 requirements, and provides superior protection for enclosed equipment against water/corrosion.
- Ground joint cover opening provides maximum opening for pulling wires or mounting devices.

■ Standard Materials

- Copper-free Aluminum
- Accessory - Stainless Steel
- Gasket - Silicon or Rubber
- Sunshade - Stainless Steel

■ Standard Finishes

- Epoxy painted (Munsell No. 7.5BG 6/1.5).

■ Options

- Diagram Pocket
- Extra room for wire pulling and termination.

■ Compliances

- IEC 60079-0 Equipment- General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- ANSI/ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure- tight joints are not made on the threads
- ISO 261 Metric screw threads
- NEC 500
- NEMA 4, 4X
- IEC 60529

■ Certification

- Certified KOSHA (Korea Occupational Safety & Health Agency)

■ Model Number Logic

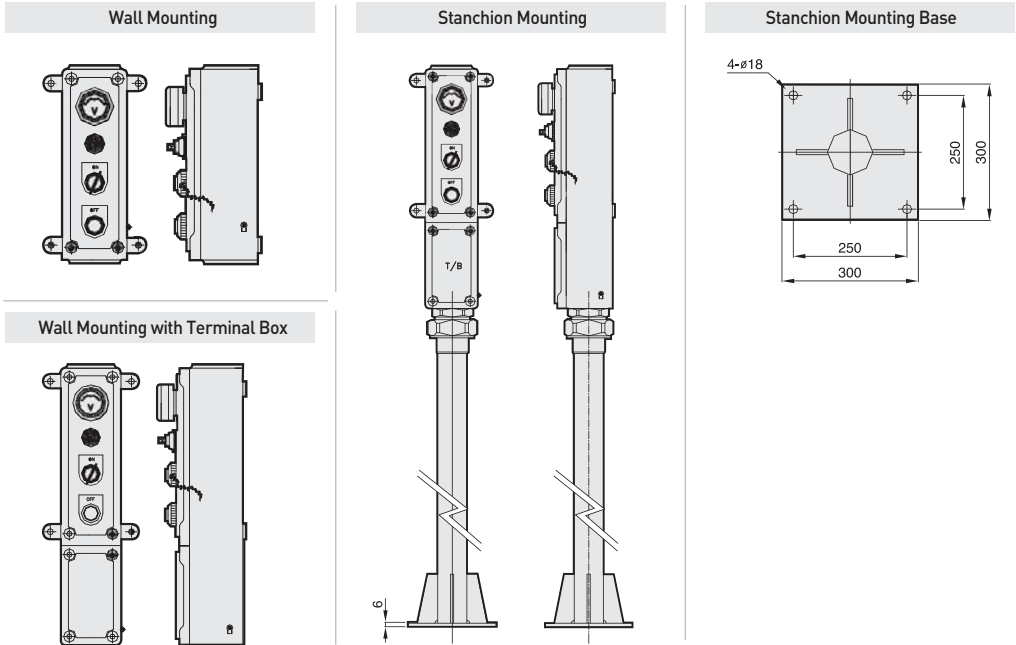
SEC	0	0	00	0	0	00
Series Constant	Mounting type W : Wall mounting S : Stanchion mounting	No. of Device 1 ~ 5	Hub type DE : Dead end FT : Feed Thru.	Hub Threads type P : BSPP threads N : NPT threads	Hub threads 16 : 1/2" 22 : 3/4" 28 : 1" 36 : 1-1/4" 42 : 1-1/2"	Options TB : With Terminal Box SH : With Sunshade

Example 1) Control Station 4 devices, #42 Stanchion mounting, with TB and Sunshade SEC S 4 DE P42 TB SH
Example 2) Control Station 3 devices, NPT #28 2 hub, Surface or Wall mounting SEC W 3 FT N28

■ Dimensions

CAT. NO.	DIMENSIONS WITH TERMINAL BOX (MM)						DIMENSIONS WITHOUT TERMINAL BOX (MM)						STANCHION MOUNTING DIMENSIONS (MM)	
	WIDTH	HEIGHT	DEPTH	MOUNTING HOLE CENTER		MOUNTING HOLE	WIDTH	HEIGHT	DEPTH	MOUNTING HOLE CENTER		MOUNTING HOLE	MOUNTING HOLE	MOUNTING HOLE CENTER
				X	Y					X	Y			
SEC 1	100	275	100	120	115	10	100	140	100	120	115	10	18	□250
SEC 2	100	315	115	120	190	10	100	180	115	120	115	10	18	□250
SEC 3	100	355	115	120	190	10	100	220	115	120	170	10	18	□250
SEC 4	100	395	115	135	210	10	100	260	115	135	210	10	18	□250
SEC 5	100	435	130	140	250	10	100	300	130	140	250	10	18	□250

■ Installation





Enclosures / Controls / Panels

Controls

SECB Series Custom-built indicator & Control Boxes – Ex d II B+H2 T6

Explosion-proof
Rain-tight
Water-tight
Corrosion Resistant

Cl. I, Div. 1 & 2, Groups B, C, D
NEMA 4, 4X
Zone 1, Zone 2
II 2G Ex d II B+H2 IP65

- Copper Free Aluminum
- With ELC Lens Covers Series
- With UE Control Devices Series
- Flexible Foot Installation



■ Applications

SECB custom-built control panels are used with ELC Lens covers series & UE Control devices series

- as a means of grouping control stations for centralized process control in hazardous areas in minimum space.
- Manufactured for hazardous environments, the SECB Custom-Built Indicator & Control Boxes are an explosion-proof enclosure built to customer specific requirements.
- Available in a variety of sizes with an unlimited combination of devices, windows, and markings, these boxes are designed to maximize the efficiency of each unique process.
- For Zone 1 & 2, Flame Proof type (Ex d II B T6+ H2)
- Indoors or outdoors in damp, wet, dusty, corrosive, hazardous locations.

■ Features

- To reduce installation costs, SECB series can be supplied with control components factory wired to terminal blocks mounted in the box. Relays and other control devices can also be mounted in the boxes for special control functions.
- Surface mounted control boxes have the components assembled in the hinged cover, readily accessible for circuit checking and trouble shooting.
- Flat cover provides additional space for mounting a greater number of control devices.
- Special Silicon cover gasket provides a water seal to meet IP65 requirements, and provides superior protection for enclosed equipment against water/corrosion.
- Detachable mounting feet provide mounting flexibility. No need to replace enclosure if mounting feet are broken.
- ELC Lens covers can be factory installed to enable viewing of digital read out meters and devices such as Volt meters, Flow meters, Gas analyzers, Process receivers, Transmitters and Controllers
- The foundation of the Custom-Built Control Boxes are our tried and tested copper-free aluminum EJB enclosure. This corrosion resistant, heavy-duty enclosure features bolted construction, stainless steel hinges, and flexible tap-in mounting feet.

■ Standard Materials

- Copper-free Aluminum
- Accessory-Stainless Steel
- Gasket – Silicon or Rubber
- Sunshade – Stainless Steel

■ Standard Finishes

- Natural or Epoxy painted (Munsell No. 7.5BG 6/1.5)

■ Certification

- Certified KOSHA (Korea Occupational Safety & Health Agency)

■ Options

- Diagram Pocket
- Ingress Protection : IP 65
- Cover Open : Handle, Hinge
- Cover Fix Bolt : Spring Return Type

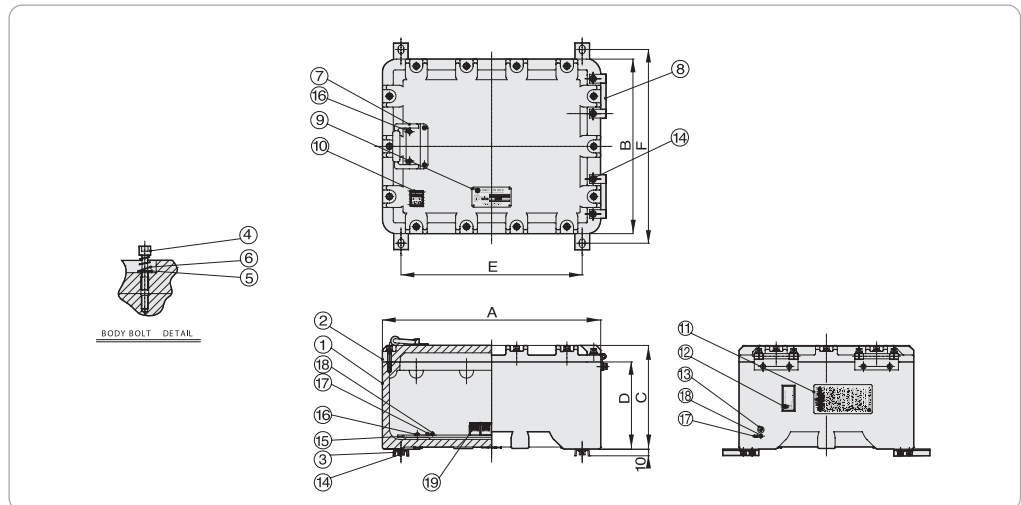
■ Compliances

- IEC 60079-0 Equipment-General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures “d”
- ANSI/ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure- tight joints are not made on the threads
- ISO 261 Metric screw threads
- NEC 500 / NEMA 4, 4X / IEC 60529

■ Selection Table

CAT.NO.	DIMENSIONS (MM)		ELC LENS COVER SPEC.	UE CONTROL DEVICES (EA)
	WIDTH	HEIGHT		
SECB 4030A	400	300	1 - ELC 92	6
SECB 4030B			—	12
SECB 5040A	500	400	1 - ELC 92	12
SECB 5040B			—	20
SECB 5050A	500	500	1 - ELC 92	15
SECB 5050B			2 - ELC 92	15
SECB 5050C			—	25
SECB 6060A	600	600	1 - ELC 92	24
SECB 6060B			2 - ELC 92	24
SECB 6060C			—	36
SECB 7060A	700	600	1 - ELC 92	30
SECB 7060B			2 - ELC 92	30
SECB 7060C			—	42

■ Dimensions



NO.	DWC No.	PART NAME	MATERIALS	Q'TY	REMARKS
1	SW-001141	BODY	AC3A [Al Alloy]	1	
2	SW-001147	COVER	AC3A [Al Alloy]	1	
3	SW-000645	MOUNT PLATE	SPCC	4	
4	SW-000638	BODY BOLT (EJB-4030)	SUS304	14	
5		P. WASHER	SUS304	14	
6	SW-000639	BOLT SPRING (EJB-4030)	SUS	14	
7		HANDLE	SUS304	1	
8	SW-000640	HINGE ASSEMBLY	SUS304	2	
9	SW-000641	NAME PLATE	SUS304	1	
10	SW-000642	Warning Sticker	Art Paper	1	
11	SW-000643	Caution Sticker	Dacron	1	
12	SW-000782	Certification Sticker	Dacron	1	
13	SW-000783	Earth Sticker	Dacron	2	
14		HEX HEAD BOLT	SUS	16	
15	SW-001628	FIX PLATE	BAKELITE	1	
16		BOLT	SUS	8	
17		TERMINAL LUG	Cu	2	
18		BOLT	SUS	2	
19		Terminal Block	PA66	1	



Enclosures / Controls / Panels

Controls

SECB Series Custom-built Indicator & Control Boxes – Ex d II B+H2 T6

Explosion-proof
Rain-tight
Water-tight
Corrosion Resistant

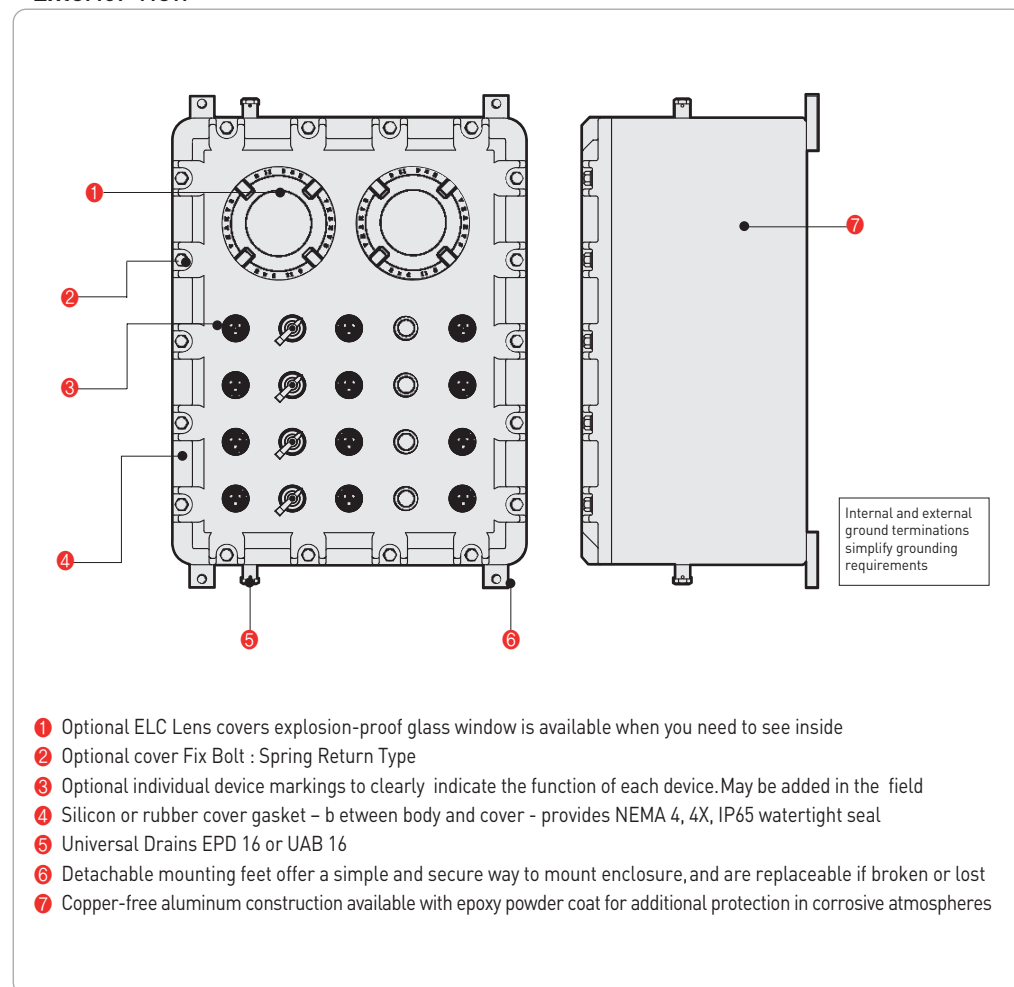
Cl. I, Div. 1 & 2, Groups B, C, D
NEMA 4, 4X
Zone 1, Zone 2
II 2G Ex d II B+H2 IP65

- Copper Free Aluminum
- With ELC Lens Covers Series
- With UE Control Devices Series
- Flexible Foot Installation

■ Dimensions

CAT.NO.	DIMENSIONS (MM)					
	A	B	C	D	E	F
SECB 4030	400	300	225	190	330	337~351
SECB 5040	500	400	235	200	415	437~451
SECB 5050	500	500	235	200	415	537~551
SECB 6060	600	600	235	200	515	637~651
SECB 7060	700	600	235	200	615	637~651

■ Exterior View



Enclosures / Controls / Panels

Electrical Products

Flame-proof Type Electrical Products

SLS Series Micro & Limit Switches– Ex d II B T6 / SEPR Series Receptacles & Plugs – Ex d II B+H2* T6 / SDPR Series Receptacles & Plugs– Non-hazardous Area

ELES Series Exit Sign– Ex d II B T6 / SEPR Series Receptacles & Plugs – Ex d II B+H2* T6

■ Flame-proof Type Micro & Limit Switches – SLS Series Five Type Limit Switches

- Cl. I, Div. 1 & 2, Groups C, D
- NEMA 4, 4X
- II 2G Ex d II B IP 65
- Explosion-proof
- Rain-tight / Water-tight
- Corrosion Resistant



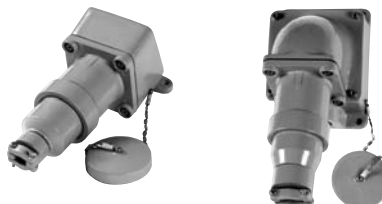
■ Flame-proof Type Receptacles & Plugs – SEPR Series Four Type (25A, 30A, 60A, 100A) 1 Gang ~ 3 Gangs (25A only)

- Cl. I, Div. 1 & 2, Groups C, D
- NEMA 4, 4X
- II 2G Ex d II B IP 65
- Explosion-proof
- Rain-tight
- Water-tight
- Corrosion Resistant



■ Non-hazardous Area Receptacles & Plugs – SDPR Series Four Type (30A, 60A, 75A, 100A)

- Wet locations
- Rain-tight
- Water-tight
- Corrosion Resistant



■ Flame-proof Type Exit Sign – ELES Series Halogen Lamps/Factory Sealed Heat Resistant Glass 220Vac 4W or 8W

- Cl. I, Div. 1 & 2, Groups C, D
- NEMA 4, 4X
- II 2G Ex d II B IP 65
- Explosion-proof
- Rain-tight
- Water-tight
- Corrosion Resistant

**B**Enclosures /
Controls / Panels



Enclosures / Controls / Panels

Electrical Products

SLS Series Micro & Limit Switches – Ex d II B T6

Explosion-proof
Rain-tight
Water-tight
Corrosion Resistant

Cl. I, Div. 1 & 2, Groups C, D
NEMA 4, 4X
Zone 1, Zone 2
II 2G Ex d II B IP65

- Copper Free Aluminum
- Five Type Limit Switches

■ Applications

SLS Series Limit switches are used in hazardous area

- For use indoors or outdoors, in areas which are hazardous due to the presence of flammable gases and vapors.

■ Features

- Five type limit switches – Roller lever, roller adjust lever, spring lever, roller push, roller 90° angle lever – provide a variety of limit switches which are :
- High mechanical intensity
- Built in 2 circuit double micro switch
- Structure of heat, oil/vibration resistance
- Various of lever structure such as roller lever type and etc
- Special Silicon cover gasket provides a water seal to meet IP65 requirements, and provides superior protection for enclosed equipment against water/corrosion.
- Diverse conduit selection for wide range of applications
- External and internal grounding screw

■ Standard Materials

- Copper-free Aluminum
- Accessory – Stainless Steel
- Gasket – Silicon or Rubber

■ Standard Finishes

- Epoxy painted (Munsell No. 7.5BG 6/1.5).

■ Compliances

- IEC 60079-0 Equipment- General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures “d”
- ANSI/ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure- tight joints are not made on the threads
- NEC 500 / NEMA 4, 4X / IEC 60529

■ Certification

- Certified KOSHA (Korea Occupational Safety & Health Agency)

■ Model Number Logic

SLS

Series
Constant

0

Mounting type

RL : Roller lever
AL : Roller adjust lever
RP : Roller push
SL : Spring lever
RA : Roller 90° angle lever

00

Elec. Spec.

Aac : 6A 110Vac
Bac : 5A 220Vac
Cac : 4A 440Vac
Dac : 3A 500Vac

Elec. Spec.

Adc : 8A 24Vdc
Bdc : 4A 48Vdc
Cdc : 2A 110Vdc
Ddc : 1A 220Vdc

0

Hub Threads type

P : BSPP
threads
N : NPT threads

00

Hub threads

16 : 1/2"
22 : 3/4"



Roller Lever



Roller
Adjust Lever



Roller Push



Roller 90°
Angle Lever



Spring Lever

Example 1) Limit switch roller adjust lever 5A 220Vac NPT 1/2" Hub SLC AL Bac N16

Example 2) Limit switch spring lever 2A 110Vdc PF 1/2" hub SLC SL Cdc P16

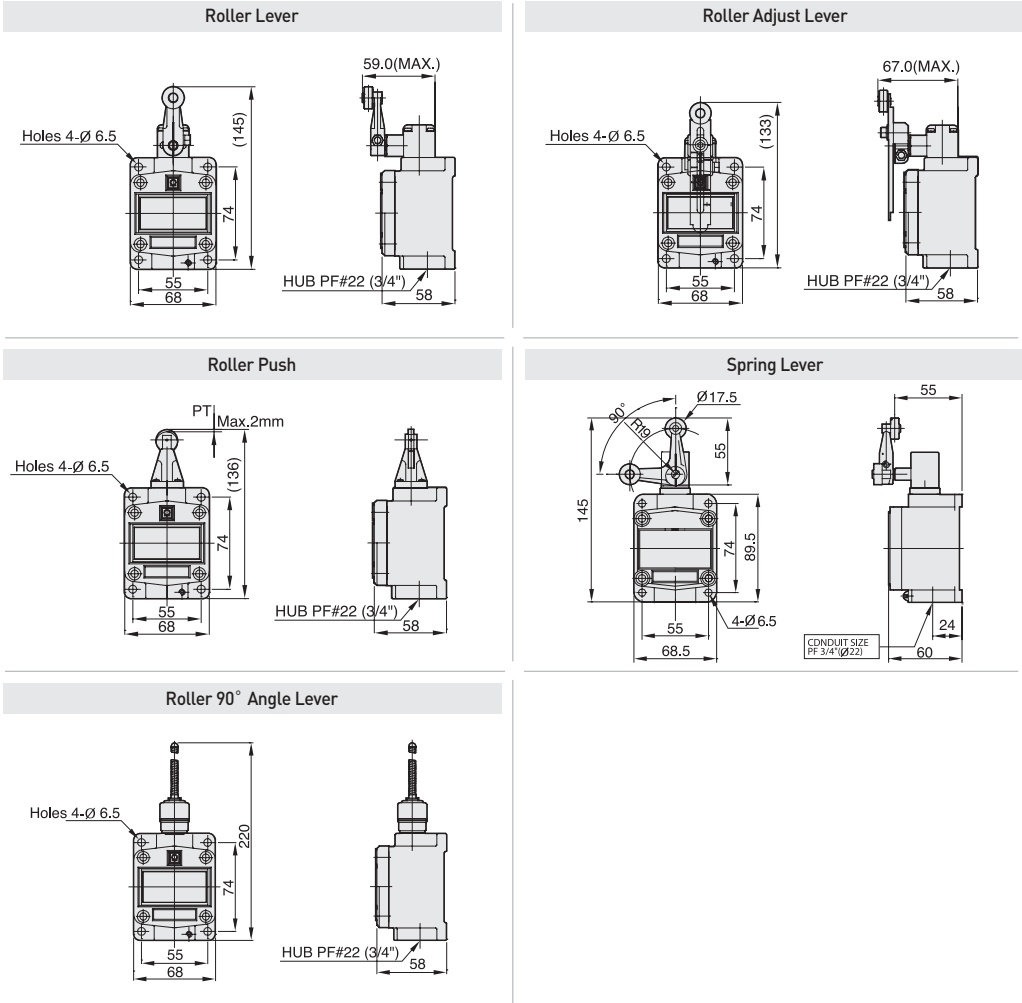
■ Selection Table

ELEC. SPEC.		CAT. NO.				
		ROLLER LEVER	ROLLER ADJUST LEVER	ROLLER PUSH	SPRING LEVER	ROLLER 90° ANGLE LE
AC	6A 110V	SLS RL Aac	SLS AL Aac	SLS RP Aac	SLS SL Aac	SLS RA Aac
	5A 220V	SLS RL Bac	SLS AL Bac	SLS RP Bac	SLS SL Bac	SLS RA Bac
	4A 440V	SLS RL Cac	SLS AL Cac	SLS RP Cac	SLS SL Cac	SLS RA Cac
	3A 500V	SLS RL Dac	SLS AL Dac	SLS RP Dac	SLS SL Dac	SLS RA Dac
DC	8A 24V	SLS RL Adc	SLS AL Adc	SLS RP Adc	SLS SL Adc	SLS RA Adc
	4A 48V	SLS RL Bdc	SLS AL Bdc	SLS RP Bdc	SLS SL Bdc	SLS RA Bdc
	2A 110V	SLS RL Cdc	SLS AL Cdc	SLS RP Cdc	SLS SL Cdc	SLS RA Cdc
	1A 220V	SLS RL Ddc	SLS AL Ddc	SLS RP Ddc	SLS SL Ddc	SLS RA Ddc

■ Technical Data

DESCRIPTION	DIMENSIONS (MM)				
	ROLLER LEVER	ROLLER ADJUST LEVER	ROLLER PUSH	SPRING LEVER	ROLLER 90° ANGLE LE
MOUNTING DIM.	55*74				
MOUNTING HOLE	Ø6.0				
ROLLER SIZE	Ø19*6.4t	Ø19*6.4t	Ø19*6.4t	—	Ø19*6.4t
ROLLER MATERIAL	Stainless steel			—	Stainless steel

■ Dimensions





Enclosures / Controls / Panels

Electrical Products

SEPR Series Receptacles & Plugs – Ex d II B+H2* T6

Explosion-proof
Rain-tight
Water-tight
Corrosion Resistant

Cl. I, Div. 1 & 2, Groups C, D
NEMA 4, 4X
Zone 1, Zone 2
II 2G Ex d II B IP 65*

- Copper Free Aluminum
- Four Type
- 25A, 30A, 60A*, 100A
- 1 Gang ~ 3 Gangs (for 25A)

■ Applications

SEPR Series interlock receptacles are used:

- To supply power to portable electrical equipment such as hand lamps, lighting systems, power tools, conveyors, welders and similar equipment.
- In areas which are hazardous due to the presence of flammable vapors or gases.
- In damp, wet or corrosive locations.
- Indoors or outdoors at petroleum refineries, chemical and petrochemical plants and facilities for processing and handling grain, flour and starch.

■ Features

- Plug cannot be withdrawn under load.
- Cover must not be removed when switch is "ON"
- Smallest mounting footprint for interlocks

■ SEPR for USE with Magnetic Motor Starters or Contactors

- SEPR units listed below operate in the same way as standard units but are intended only for use with magnetic motor starters or contactors (see Wiring Diagram 1).
- Receptacles have leads for splicing to conductors from the load side of contactor. The switch actuated by the plug is wired into the starter or contactor coil circuit and controls only this circuit. The starter or contactor is energized only when the plug is fully inserted and rotated to close the switch. Since the plug is inserted or withdrawn only when the switch is open, the circuit cannot be made or broken under the load

■ Standard Finishes

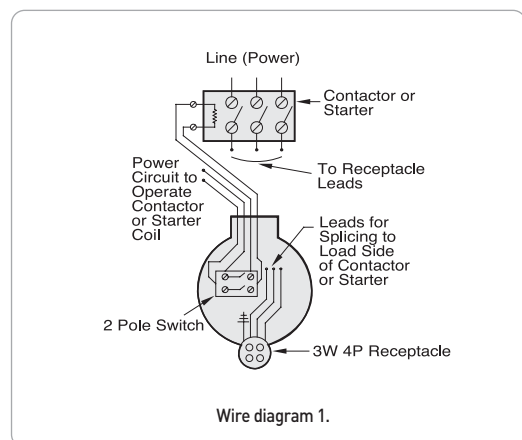
- Epoxy painted (Munsell No. 7.5BG 6/1.5).

■ Certification

- Certified KOSHA
(Korea Occupational Safety & Health Agency)

■ Compliances

- IEC 60079-0 Equipment- General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- ANSI/ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure- tight joints are not made on the threads
- ISO 261 Metric screw threads
- NEC 500 / NEMA 4, 4X / IEC 60529



■ Standard Materials

- Copper-free Aluminum
- Accessory – Stainless Steel
- Gasket – Silicon or Rubber



SEPR 25



SEPR 30



SEPR 60



SEPR 100

■ Model Number Logic

SEPR	00	00	00	000	00	0	00
Series Constant	Current rating max. 25 : 25A 30 : 30A 60 : 60A 100 : 100A	Gangs or Pins 1G : 1 gang 2G : 2 gangs 3G : 3 gangs 3P : 2P+1E 4P : 3P+1E	Rated voltage 22 : 220Vac 25 : 250Vac(SEPR 25) 25 : 250Vdc(SEPR 60 or 100) 46 : 460Vac	Rated current	Hub type DE : Dead end FT : Feed Thru.	Hub Threads type P : BSPP threads N : NPT threads	Hub threads 16 : 1/2" 22 : 3/4" 28 : 1"

Example 1) For Hazardous area Receptacle & plug 15A 250Vac 3gangs NPT 1/2" 2 Hub SEPR 25 3G 25 15A FT N16

Example 2) For Hazardous area Receptacle & plug 30A 460Vac 3P+1E PF 3/4" 1 Hub SEPR 30 4P 46 30A DE P22

■ Selection Table

MODEL	GANGS	RATED CURRENT	CAT.NO.			
			DEAD END		FEED THRU.	
			1/2"	3/4"	1/2"	3/4"
SEPR 25	1 gang	15A	SEPR 25 1G 25 15A DE 16	SEPR 25 1G 25 15A DE 22	SEPR 25 1G 25 15A FT 16	SEPR 25 1G 25 15A FT 22
		20A	SEPR 25 1G 25 20A DE 16	SEPR 25 1G 25 20A DE 22	SEPR 25 1G 25 20A FT 16	SEPR 25 1G 25 20A FT 22
		25A	SEPR 25 1G 25 25A DE 16	SEPR 25 1G 25 25A DE 22	SEPR 25 1G 25 25A FT 16	SEPR 25 1G 25 25A FT 22
	2 gangs	15A	SEPR 25 2G 25 15A DE 16	SEPR 25 2G 25 15A DE 22	SEPR 25 2G 25 15A FT 16	SEPR 25 2G 25 15A FT 22
		20A	SEPR 25 2G 25 20A DE 16	SEPR 25 2G 25 20A DE 22	SEPR 25 2G 25 20A FT 16	SEPR 25 2G 25 20A FT 22
		25A	SEPR 25 2G 25 25A DE 16	SEPR 25 2G 25 25A DE 22	SEPR 25 2G 25 25A FT 16	SEPR 25 2G 25 25A FT 22
	3 gang	15A	SEPR 25 3G 25 15A DE 16	SEPR 25 3G 25 15A DE 22	SEPR 25 3G 25 15A FT 16	SEPR 25 3G 25 15A FT 22
		20A	SEPR 25 3G 25 20A DE 16	SEPR 25 3G 25 20A DE 22	SEPR 25 3G 25 20A FT 16	SEPR 25 3G 25 20A FT 22
		25A	SEPR 25 3G 25 25A DE 16	SEPR 25 3G 25 25A DE 22	SEPR 25 3G 25 25A FT 16	SEPR 25 3G 25 25A FT 22

MODEL	PINS	RATED VOLTAGE	CAT.NO.			
			DEAD END		FEED THRU.	
			3/4"	1"	3/4"	1"
SEPR 30	2P+1E	220Vac	SEPR 30 3P 22 30A DE 22	SEPR 30 3P 22 30A DE 28	SEPR 30 3P 22 30A FT 22	SEPR 30 3P 22 30A FT 28
		220Vac	SEPR 30 4P 22 30A DE 22	SEPR 30 4P 22 30A DE 28	SEPR 30 4P 22 30A FT 22	SEPR 30 4P 22 30A FT 28
	3P+1E	460Vac	SEPR 30 4P 46 30A DE 22	SEPR 30 4P 46 30A DE 28	SEPR 30 4P 46 30A FT 22	SEPR 30 4P 46 30A FT 28
SEPR 60	3P+1E	220Vac	SEPR 60 4P 22 60A DE 22	SEPR 60 4P 22 60A DE 28	SEPR 60 4P 22 60A FT 22	SEPR 60 4P 22 60A FT 28
		460Vac	SEPR 60 4P 46 60A DE 22	SEPR 60 4P 46 60A DE 28	SEPR 60 4P 46 60A FT 22	SEPR 60 4P 46 60A FT 28
		250Vdc	SEPR 60 4P 25 60A DE 22	SEPR 60 4P 25 60A DE 28	SEPR 60 4P 25 60A FT 22	SEPR 60 4P 25 60A FT 28
SEPR 100	3P+1E	220Vac	SEPR 100 4P 22 100A DE 22	SEPR 100 4P 22 100A DE 28	SEPR 100 4P 22 100A FT 22	SEPR 100 4P 22 100A FT 28
		460Vac	SEPR 100 4P 46 100A DE 22	SEPR 100 4P 46 100A DE 28	SEPR 100 4P 46 100A FT 22	SEPR 100 4P 46 100A FT 28
		250Vdc	SEPR 100 4P 25 100A DE 22	SEPR 100 4P 25 100A DE 28	SEPR 100 4P 25 100A FT 22	SEPR 100 4P 25 100A FT 28

■ Technical Data

DESCRIPTION	CAT. NO.									
	SEPR 25	SEPR 30			SEPR 60			SEPR 100		
PINS	2P+1E	2P+1E	3P+1E		3P+1E			3P+1E		
RATED VOLTAGE	250Vac	220Vac	220Vac	460Vac	220Vac	460Vac	250Vdc	220Vac	460Vac	250Vdc
RETED INTERRUPTING CAPACITY	—	5KA	5KA	2.5KA	20KA	15KA	10KA	20KA	15KA	10KA

B

Enclosures / Controls / Panels

Electrical Products

SEPR Series Receptacles & Plugs – Ex d II B+H2* T6

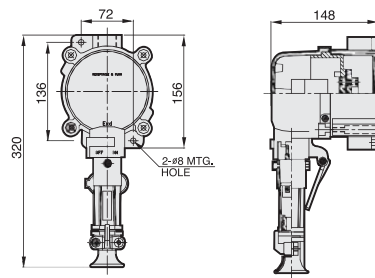
Explosion-proof
Rain-tight
Water-tight
Corrosion Resistant

CL I, Div. 1 & 2, Groups C, D
NEMA 4, 4X
Zone 1, Zone 2
II 2G Ex d II B IP 65*

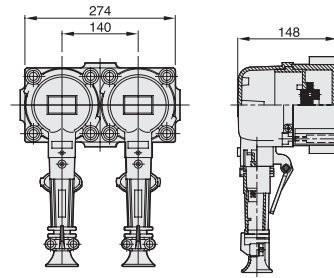
- Copper Free Aluminum
- Four Type
- 25A, 30A, 60A*, 100A
- 1 Gang ~ 3 Gangs (for 25A)

■ Dimensions

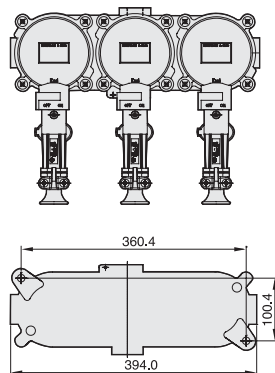
SEPR 25 1G



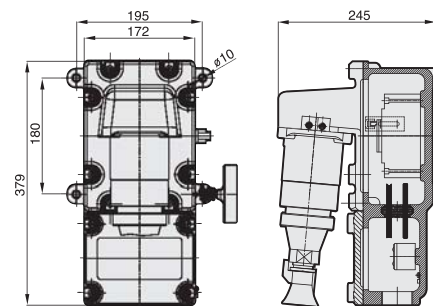
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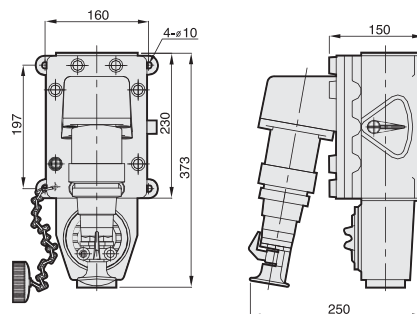
SEPR 25 3G



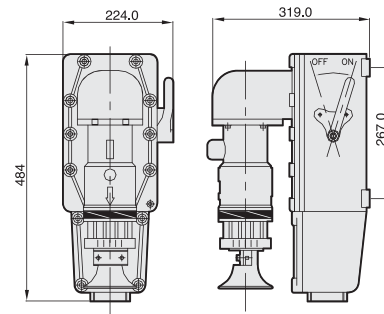
SEPR 30



SEPR 60



SEPR 100



SDPR Series Receptacles & Plugs– Non-hazardous Area Receptacles & Plugs (Non-hazardous.)

Wet locations
Rain-tight
Water-tight
Corrosion Resistant

- Copper Free Aluminum
- Four Type
- 30A, 60A, 75A, 100A



SDPR 30



SDPR 60, 75, 100

■ Applications

SDPR Series interlock receptacles are used:

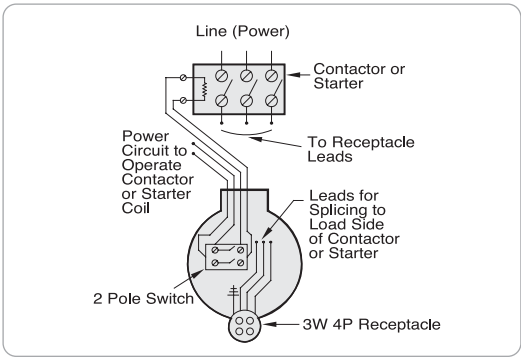
- To supply power to portable electrical equipment such as hand lamps, lighting systems, power tools, conveyors, welders and similar equipment.
- In damp, wet or corrosive locations.
- Indoors or outdoors at petroleum refineries, chemical and petrochemical plants and facilities for processing and handling grain, flour and starch.

■ Features

- Plug cannot be withdrawn under load.
- Smallest mounting footprint for interlocks

■ SDPR for USE with Magnetic Motor Starters or Contactors

- SDPR units listed below operate in the same way as standard units but are intended only for use with magnetic motor starters or contactors (see Wiring Diagram 1).
- Receptacles have leads for splicing to conductors from the load side of contactor. The switch actuated by the plug is wired into the starter or contactor coil circuit and controls only this circuit. The starter or contactor is energized only when the plug is fully inserted and rotated to close the switch.



■ Standard Finishes

- Epoxy painted (Munsell No. 7.5BG 6/1.5).

■ Standard Materials

- Copper-free Aluminum
- Accessory - Stainless Steel
- Gasket – Silicon or Rubber

■ Compliances

- ANSI/ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure- tight joints are not made on the threads
- NEMA 4, 4X
- IEC 60529

■ Model Number Logic

SDPR	00	00	00	000	00	0	00
Series Constant	Current Rating Max. 30 : 30A 60 : 60A 75 : 75A 100 : 100A	Gangs or Pins 3P : 2P+1E 4P : 3P+1E	Rated Voltage 22 : 220Vac 25 : 250Vac 46 : 250Vdc	Rated Current	Hub Type DE : Dead end FT : Feed Thru.	Hub Threads Type P : BSPP threads N : NPT threads	Hub Threads 16 : 1/2" 22 : 3/4" 28 : 1"

Example 1) For non-hazardous area Receptacle & plug 75A 250Vdc 2P+1E NPT 1/2" 2 Hub SDPR 75 3P 25 75A FT N16
Example 2) For non-hazardous area Receptacle & plug 30A 460Vac 3P+1E PF 3/4" 1 Hub SDPR 30 4P 46 30A DE P22



Enclosures / Controls / Panels

Electrical Products

SDPR Series Receptacles & Plugs – Non-hazardous Area Receptacles & Plugs (Non-hazardous.)

Wet locations
Rain-tight
Water-tight
Corrosion Resistant

- Copper Free Aluminum
- Four Type
- 30A, 60A, 75A, 100A

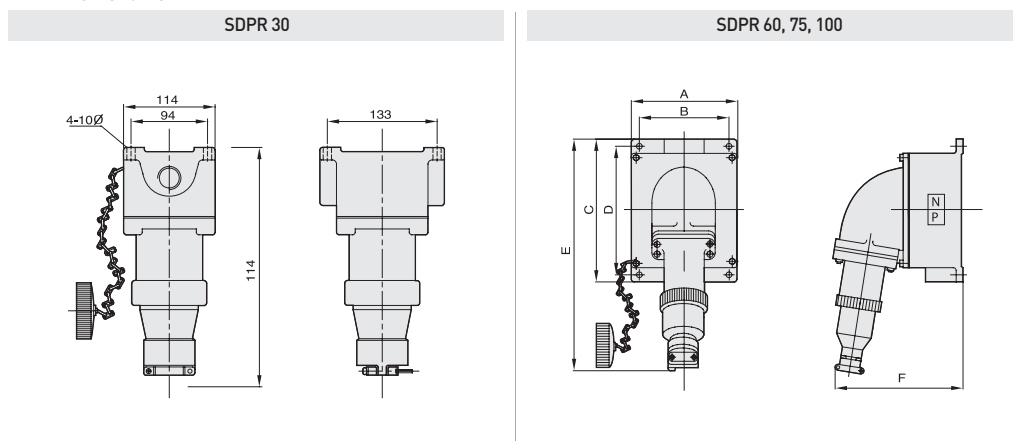
■ Selection Table

MODEL	PINS	RATED VOLTAGE	CAT.NO.			
			DEAD END		FEED THRU.	
			3/4"	1"	3/4"	1"
SDPR 30	2P+1E	220Vac	SDPR 30 3P 22 30A DE 22	SDPR 30 3P 22 30A DE 28	SDPR 30 3P 22 30A FT 22	SDPR 30 3P 22 30A FT 28
	3P+1E	220Vac	SDPR 30 4P 22 30A DE 22	SDPR 30 4P 22 30A DE 28	SDPR 30 4P 22 30A FT 22	SDPR 30 4P 22 30A FT 28
		460Vac	SDPR 30 4P 46 30A DE 22	SDPR 30 4P 46 30A DE 28	SDPR 30 4P 46 30A FT 22	SDPR30 4P 46 30A FT 28
SDPR 60	3P+1E	220Vac	SDPR 60 4P 22 60A DE 22	SDPR 60 4P 22 60A DE 28	SDPR 60 4P 22 60A FT 22	SDPR 60 4P 22 60A FT 28
		460Vac	SDPR 60 4P 46 60A DE 22	SDPR 60 4P 46 60A DE 28	SDPR 60 4P 46 60A FT 22	SDPR 60 4P 46 60A FT 28
		250Vdc	SDPR 60 4P 25 60A DE 22	SDPR 60 4P 25 60A DE 28	SDPR 60 4P 25 60A FT 22	SDPR 60 4P 25 60A FT 28
SDPR 75	3P+1E	220Vac	SDPR 75 4P 22 75A DE 22	SDPR75 4P 22 75A DE 28	SDPR 75 4P 22 75A FT 22	SDPR 75 4P 22 75A FT 28
		460Vac	SDPR 75 4P 46 75A DE 22	SDPR 75 4P 46 75A DE 28	SDPR 75 4P 46 75A FT 22	SDPR 75 4P 46 75A FT 28
		250Vdc	SDPR 75 4P 25 75A DE 22	SDPR75 4P 25 75A DE 28	SDPR 75 4P 25 75A FT 22	SDPR 75 4P 25 75A FT 28
SDPR 100	3P+1E	220Vac	SDPR 100 4P 22 100A DE 22	SDPR 100 4P 22 100A DE 28	SDPR 100 4P 22 100A FT 22	SDPR 100 4P 22 100A FT 28
		460Vac	SDPR 100 4P 46 100A DE 22	SDPR 100 4P 46 100A DE 28	SDPR 100 4P 46 100A FT 22	SDPR 100 4P 46 100A FT 28
		250Vdc	SDPR 100 4P 25 100A DE 22	SDPR 100 4P 25 100A DE 28	SDPR 100 4P 25 100A FT 22	SDPR 100 4P 25 100A FT 28

■ Technical Data

DESCRIPTION	CAT. NO.											
	SDPR 30			SDPR 60			SDPR 75			SDPR 100		
PINS	2P+1E	3P+1E		3P+1E			3P+1E			3P+1E		
RATED VOLTAGE	220Vac	220Vac	460Vdc	220Vac	460Vac	250Vdc	220Vac	460Vac	250Vdc	220Vac	460Vac	250Vdc
RETED INTERRUPTING CAPACITY	5KA	5KA	2.5KA	20KA	15KA	10KA	20KA	15KA	10KA	20KA	15KA	10KA

■ Dimensions



CAT.NO.	DIMENSIONS (MM)					
	A	B	C	D	E	F
SDPR 60	150	125	200	178	285	225
SDPR 75	252	226	276	252	360	225
SDPR 100	252	226	276	252	360	225

ELES Series Exit Sign

Explosion-proof
Rain-tight
Water-tight
Corrosion Resistant

CL I, Div. 1 & 2, Groups C, D
NEMA 4, 4X
Zone 1, Zone 2
II 2G Ex d II B IP 65

- Copper Free Aluminum
- 220Vac 4W or 8W
- Heat Resistant Glass
- Factory-Sealed
- Halogen Lamps



ELES

■ Applications

ELES Series Exit Signs are used:

- In locations deemed hazardous due to the presence of flammable vapors or gases.
- In any building or enclosed area where people work
- where illuminated exit signs are required.
- To provide distinct, highly visible exit marking.
- To indicate the direction of travel to exits.

■ Features

- One or two halogen lamps (included) wired in parallel-to provide extra margin of light source reliability.
- Solid state circuit for extended lamp life in AC units.
- Green letters or sign picture on white sign panel make word "exit" stand out boldly and clearly.
- Edge lighting characteristic of sign panel makes visibility excellent at all lighting levels.
- Factory-sealed flame-proof housing.
- Pendant, wall, and end bracket mounts provide universal installation options.
- Impact-resistant sign panel needs no guard – makes cleaning easy.
- Halogen lamps life time is three times higher than incandescent lamps. -reduces re-lamping cost

■ Standard Materials

- Copper-free Aluminum
- Accessory - Stainless Steel
- Gasket - Silicon or Rubber
- Heat and impact resistant glass

■ Standard Finishes

- Epoxy painted (Munsell No. 7.5BG 6/1.5)

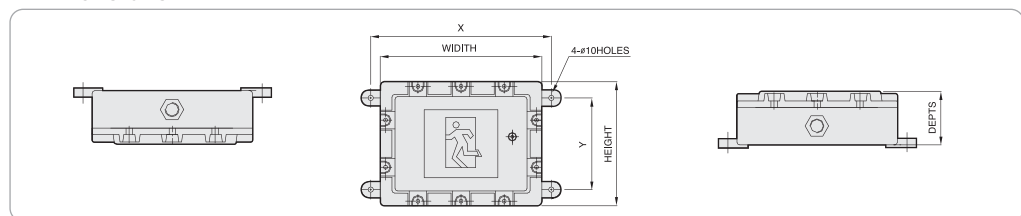
■ Certification

- Certified KOSHA
(Korea Occupational Safety & Health Agency)

■ Compliances

- IEC 60079-0 Equipment- General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- ANSI/ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- NEC 500 / NEMA 4, 4X / IEC 60529

■ Dimensions



CAT. NO.	DIMENSIONS (MM)				
	BOX SIZE			3/4"	
	WIDTH	HEIGHT	DEPTS	X	Y
ELES 4W	300	230	100	340	170
ELES 8W	352	312	84	392	252

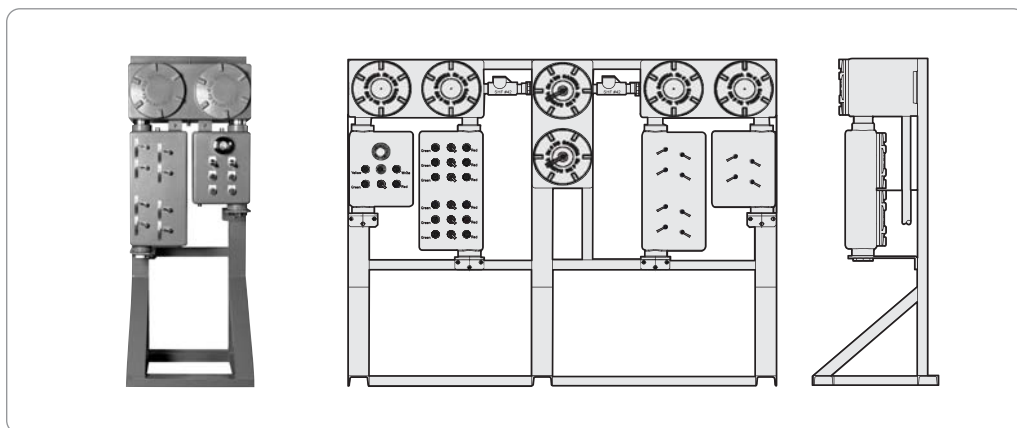
■ Technical Data

CAT. NO.	DIMENSIONS (MM)				
	ELEC.SPEC.			WEIGHT & EMERGENCY TIME	
	RATED VOLTAGE	RATED CURRENT	WATTS	EMERGENCY TIME	WEIGHT
ELES 4W	220Vac	62mA	4W	30min	13kg
ELES 8W	220Vac	100mA	8W	30min	30kg

Flame-proof Type Panel System : SEPD &-C or SECP &-C Series

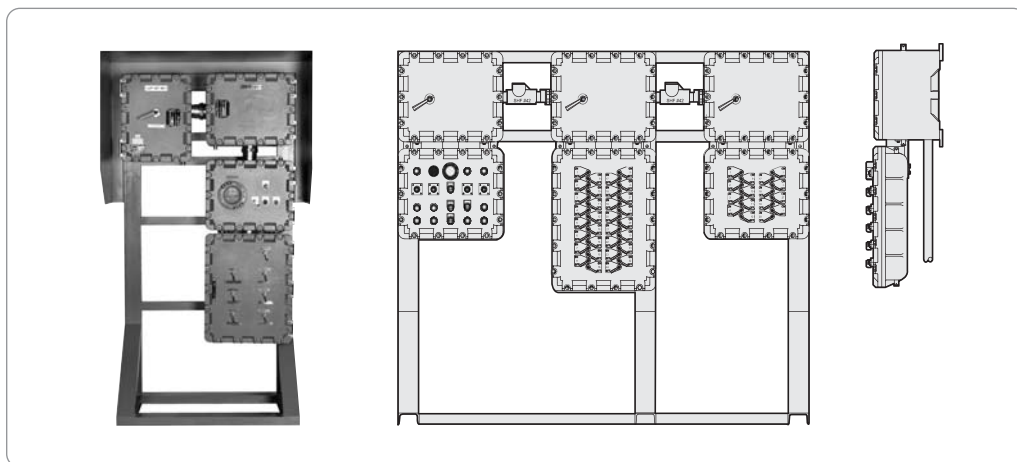
■ Flame-proof Type Panel System SEPD - C & SECP - C Series

- Explosion-proof / Rain-tight / Water-tight / Corrosion Resistant
- Cl. I, Div. 1 & 2, Groups A, B, C, D / NEMA 4, 4X / II 2G Ex d II C IP 65



■ Flame-proof Type Panel System SEPD & SECP Series

- Explosion-proof / Rain-tight / Water-tight / Corrosion Resistant
- Cl. I, Div. 1&2, Groups B, C, D / NEMA 4, 4X / II 2G Ex d II B + H2 IP 65



• Specification of Panel System

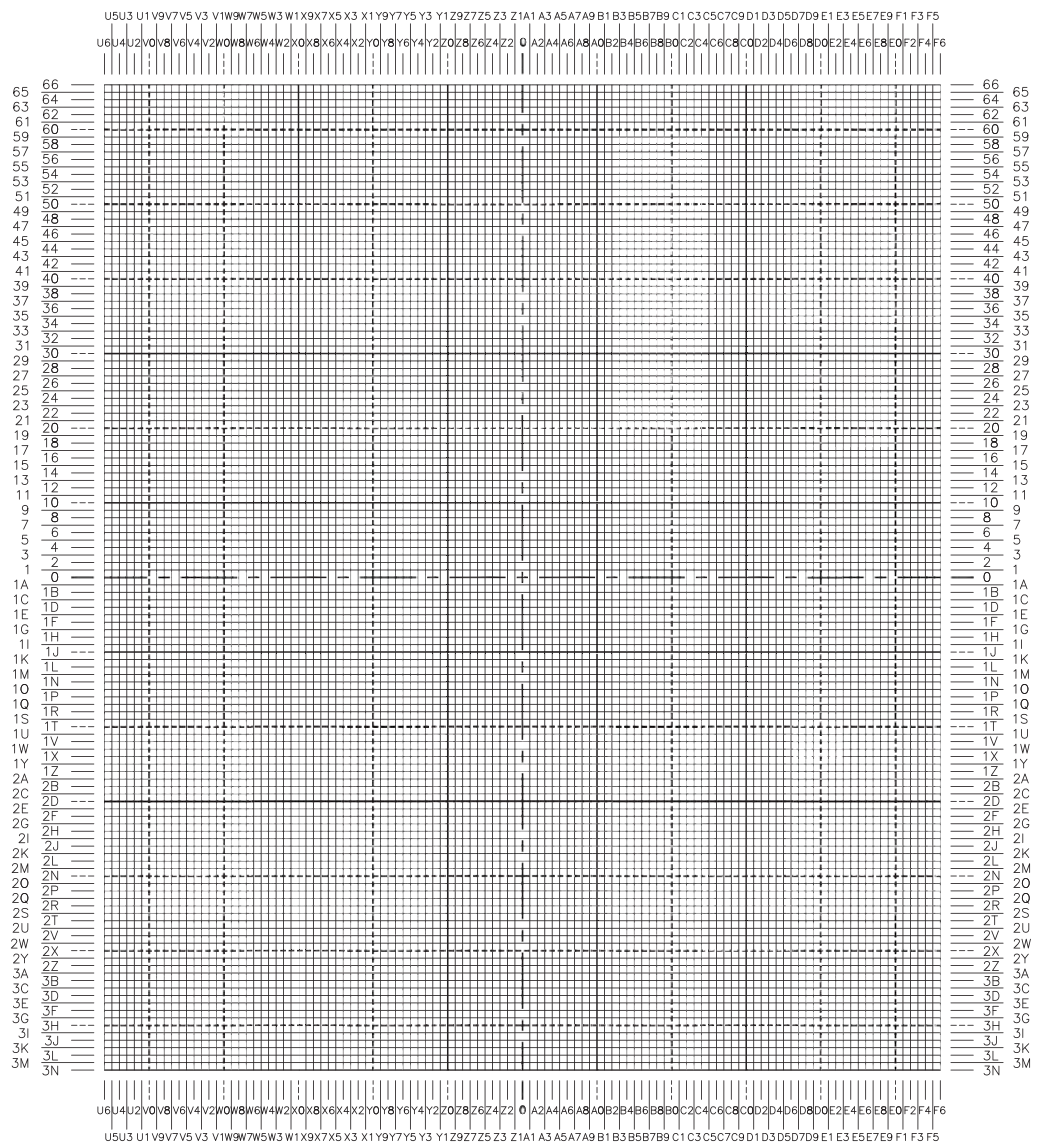
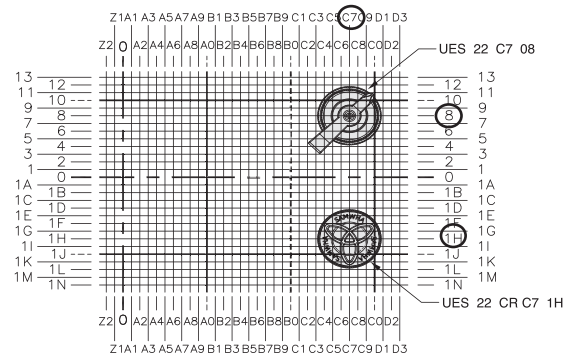
NO.	Specification	Ex d II B + H2 T6 type		Ex d II C T6 type	
		Circuit Breaker Panel Board	Control Panel Board	Circuit Breaker Panel Board	Control Panel Board
1	Model No.	SEPD 40	SECP 40	SEPD-C-SS	SECP-C-SS
				SEPD-C-SL	SECP-C-SL
		SEPD 63	SECP 63	SEPD-C-DSL	SECP-C-DSL
				SEPD-C-DLL	SECP-C-DLL
2	Certificated	KOSHA	KOSHA	KOSHA	KOSHA
3	Basic Construction	16-Circuit	Large or Small	8 or 16 or 24 or 32-Circuit	9 or 18 or 27 or 36 -Device
4	Max Current	255A	5A	255A	5A
5	Max Voltage	AC 220V	AC 220V	AC 220V	AC 220V
6	IP Grade	IP 65	IP 65	IP 54	IP 65
7	Main Material	AC 4C-T6	AC 4C-T6	AC 4A	AC 4C-T6
8	Temperature	-20° C ~ 40° C			
9	Humidity	95%			
10	Altitude	1000 m			
11	Basic Finish	Spray (Color : Munsel No. 7.5BG 6/1.5)			

Flame-proof Type Custom-built Panels General Technical Descriptions

■ Control Position Diagram Usage

The diagram below is used to supply the positioning of control devices for all modular enclosures.

The center point is 0/0 which is consistent for all enclosures. The positions increase from the center outward and correlate with size of particular enclosures



Control Position Diagram

B

Enclosures/
Controls/Panels



Enclosures / Controls / Panels

Panels(Circuit Breaker Panels)

Flame-proof Type Custom-built Panels General Technical Descriptions

■ Grounding

Internal and external ground terminations simplify grounding requirements

Because of dangerous electrical shock to the equipment operator SAMWHA products are provided with means of grounding depends upon the particular style being used.

■ Maintenance & Caution Note

This apparatus can be used in the hazardous areas indicated on the plate so that use in the other areas is prohibited. (A plate is attached on the exterior of the apparatus.)

Power should be turned off to open the apparatus for Installation, inspection and Maintenance, and a proper security measures must be conducted to keep power off while it is open.

It is requested to exercise an extra caution to prevent damages to the junction parts at openings and closings, and to tighten bolts completely with a tool to avoid sticking of things on them.

An impact on or a dropping of the apparatus causes a lowering of quality so, a special handling is demanded.

The rated voltage indicated on the apparatus should be observed.

Please inform SAMWHA if any problems related with the apparatus.

SEPD Series - Ex d II B + H2 T6 Custom-built Panel Boards

Explosion-proof / Rain-tight / Water-tight /
Corrosion Resistant

Cl. I, Div. 1 & 2, Groups B, C, D / NEMA 4, 4X
II 2G Ex d II B+H2 IP 65

- Copper Free Aluminum

■ Applications

SEPD custom-built panel boards are used with EJB series Terminal Box:

- Protection and control of electrical equipments and circuits such as lighting in hazardous locations or in damp, wet or corrosive condition
- For Zone 1 & 2, Flame-proof type. (Ex d II B T6 + H2)
- Indoors or outdoors in damp, wet, dusty, corrosive and hazardous locations
- Where exposure to frequent or heavy rain, water, spray, moisture and humidity is common.
- In areas which are hazardous due to the presence of hydrogen, gases and vapors or equivalent hazard such as found in process industries, gas manufacturing plants.

■ Features

- Main feed conduit openings at both top and bottom of junction compartment – allow main feed entry at either end of enclosure
- To reduce installation costs, panels can be supplied with circuit breakers factory wired to terminal blocks mounted in the box.
- Special Silicon cover gasket provides a water seal to meet IP65 requirements, and provides superior protection for enclosed equipment against water/corrosion.
- Optional stainless steel hinges provide convenient and easy access for inspection, maintenance and systems changes
- Main terminal block positioned to provide ample wire bending space – eliminates need for excessive bending of wires.
- Permits selection of 1-, 2-, 3- pole breakers (10,000 amp AC interrupting capacity) with any number of Ground fault interrupters. (Single pole.)
- Breaker actuators – spring loaded, self-locating – Feature simplified design for actuating 1-, 2-, 3-pole breakers in any sequence.
- Breakers prewired to terminal block – provided with insulated neutral lug.

■ Standard Materials

- Copper-free Aluminum
- Accessory : Stainless Steel

■ Standard Finishes

- Spray (Color : Munsel No. 7.5BG 6/1.5)

■ Compliances

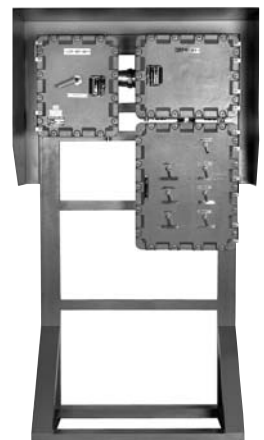
- IEC 60079-0 Equipment – General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures “d”
- ANSI/ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- ISO 261 Metric screw threads
- NEC 500
- NEMA 4, 4X
- IEC 60529

■ Certification

- Certified KOSHA (Korea Occupational Safety & Health Agency)

■ Technical Data

- Voltage Range : AC 120V~220V



B

Enclosures / Controls / Panels

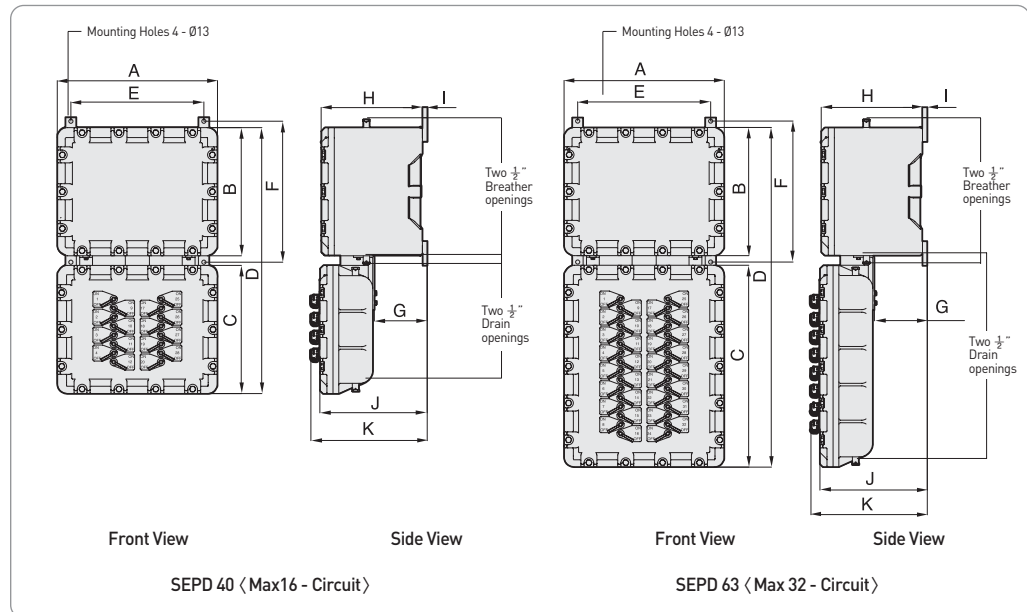
Panels(Circuit Breaker Panels)

SEPD Series - Ex d II B + H2 T6 Custom-built Panel Boards

Explosion-proof / Rain-tight / Water-tight /
Corrosion ResistantCl. I, Div. 1 & 2, Groups B, C, D / NEMA 4, 4X
II 2G Ex d II B+H2 IP 65

- Copper Free Aluminum

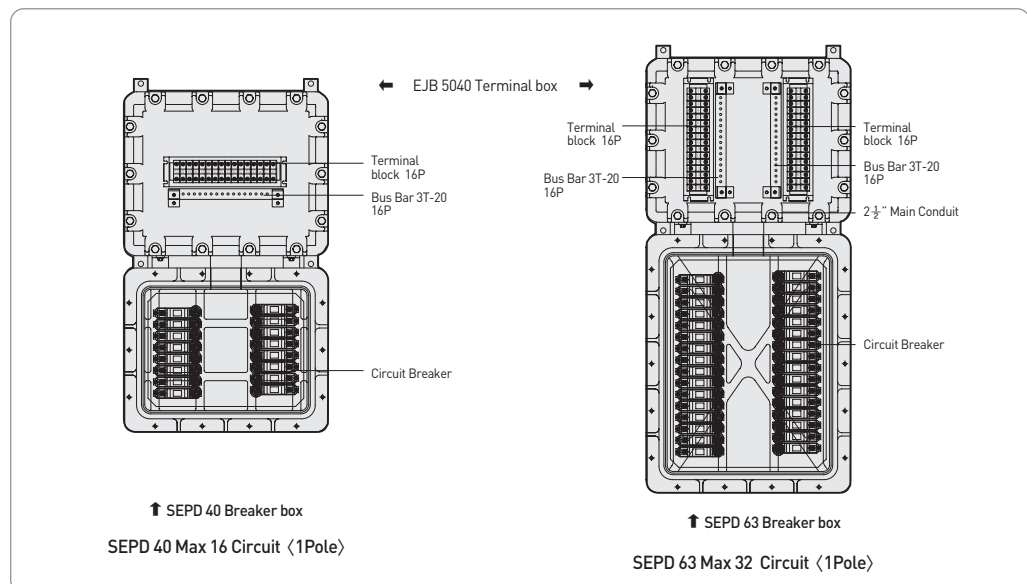
■ Dimensions



	A	B	C	D	E	F	G	H	I	J	K
SEPD 40	500	400	400	830	415	437-451	165	316	15	335	363
SEPD 63	500	400	630	1060	415	437-451	165	316	15	335	363

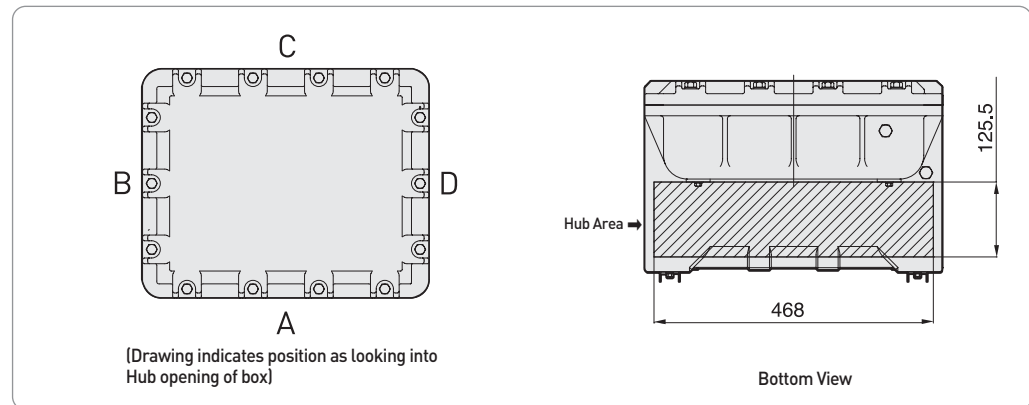
(Unit : mm)

■ Interior Front View



■ Hub Design

- Drilled and tapped conduit openings will be evenly spaced and located in the area indicated on the location chart. Critical conduit opening locations may be indicated by supplying a diagram similar to the one shown at below indicating critical dimensions and locations
- Specific conduit openings must be located dimensionally from box centerlines to conduit centerlines and from outside back surface of box to conduit centerline



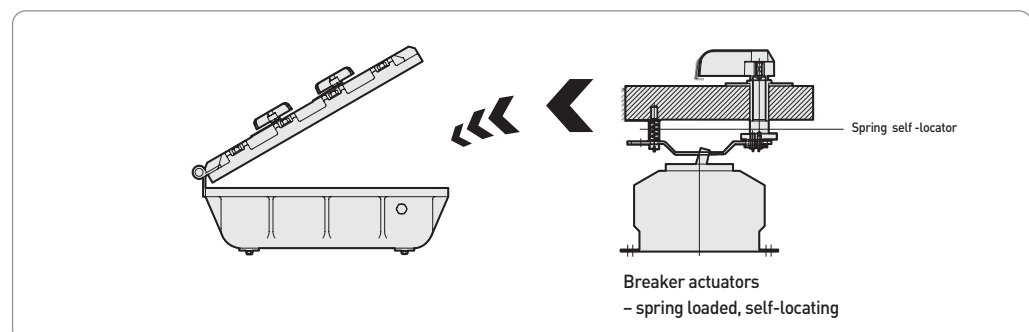
■ Maximum Quantity for Drilled and Tapped Openings

Model No.	NPT or PF	#16	#22	#28	#36	#42	#54	#70	#82	#104
	Metric thread	M16	M20	M25	M32	M40	M50	M63	M75	M90
5040	A (Bottom)	35	19	16	6	5	4	4	-	-
	C	46	29	24	12	10	9	4	3	3
	B or D	36	21	18	9	8	7	3	3	2

■ Minimum Centers for Drilled and Tapped Openings and Hubs

	#16/M16	#22/M20	#28/M25	#36/M32	#42/M40	#54/M50	#70/M63	#82/M75	#104/M90
#16/M16	39								
#22/M20	44	49							
#28/M25	47.5	52.5	56						
#36/M32	56.5	61.5	65	72					
#42/M40	62.5	67.5	71	78	84				
#54/M50	71	76	79.5	86.5	92.5	99			
#70/M63	80.5	85.5	89	96	102	108.5	118		
#82/M75	87	92	95.5	102.5	108.5	115	124.5	129	
#104/M90	103.5	108.5	112	119	125	131.5	141	145.5	162

■ Auto Position Slide Actuator Handle





Enclosures / Controls / Panels

Panels (Control Panels)

SECP Series - Ex d II B + H2 T6 Custom-built Control Panels

Explosion-proof / Rain-tight / Water-tight /
Corrosion Resistant

Cl. I, Div. 1 & 2, Groups B, C, D / NEMA 4, 4X
II 2G Ex d II B+H2 IP 65

- Copper Free Aluminum
- With ELC Lens Covers Series
- With UE Control Devices Series

■ Applications

SECP custom-built control panels are used with Control unit:

- as a means of grouping control stations for centralized process control in hazardous areas in minimum space
- to provide the necessary push-buttons, pilot lights, selector switches and emergency switches
- For Zone 1&2, Flame Proof type (Ex d II B T6+ H2)
- Indoors or outdoors in damp, wet, dusty, corrosive, hazardous locations
- Where exposure to frequent or heavy rain, water, spray, moisture, and humidity is common ; such as : offshore drilling facilities, cooling towers, coal preparation and handling facilities and sewage and waste water treatment plant.
- In areas which are hazardous due to the presence of hydrogen or gases and vapors of equivalent hazard such as; found in process industries, gas manufacturing plants.

■ Features

- To reduce installation costs, panels can be supplied with control components factory wired to terminal blocks mounted in the box. Relays and other control devices can also be mounted in the boxes for special control functions.
- Surface mounted control panels have the components assembled in the hinged cover, readily accessible for circuit checking and trouble shooting
- Flat cover provides additional space for mounting a greater number of control devices.
- Special Silicon cover gasket provides a water seal to meet IP65 requirements, and provides superior protection for enclosed equipment against water/corrosion.
- Detachable mounting feet provide mounting flexibility. No need to replace enclosure if mounting feet are broken.
- Optional stainless steel hinges provide convenient and easy access for inspection, maintenance and systems changes
- Glass cover can be factory installed to enable viewing of digital read out meters and devices such as Volt meters, Flow meters, Gas analyzers, Process receivers, Transmitters and Controllers

■ Standard Materials

- Copper-free Aluminum
- Accessory : Stainless Steel

■ Standard Finishes

- Spray (Color : Munsel No. 7.5BG 6/1.5)

■ Compliances

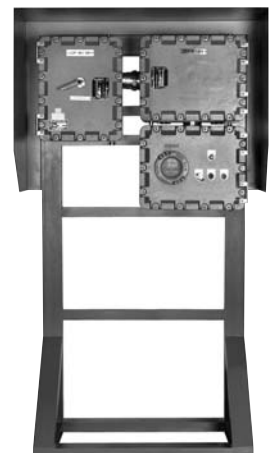
- IEC 60079-0 Equipment - General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- ANSI/ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- ISO 261 Metric screw threads
- NEC 500
- NEMA 4, 4X
- IEC 60529

■ Certification

- Certified KOSHA (Korea Occupational Safety & Health Agency)

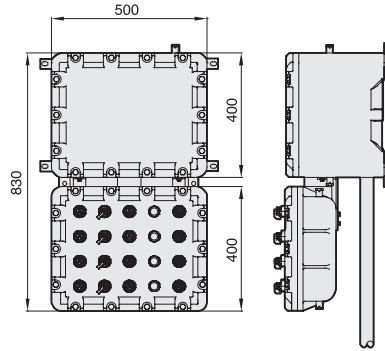
■ Technical Data

- Voltage Range : AC 120V~220V

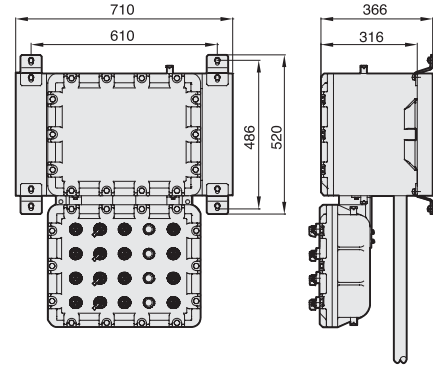


■ Dimension & Installation Type

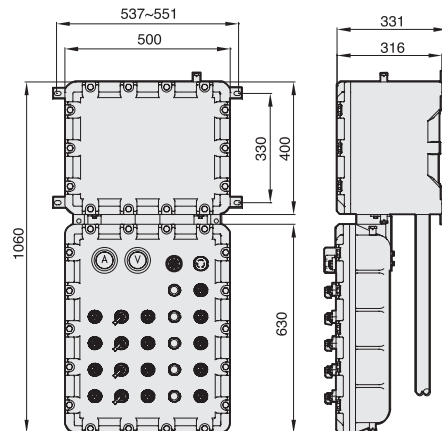
SECP 40-F Flexible foot type



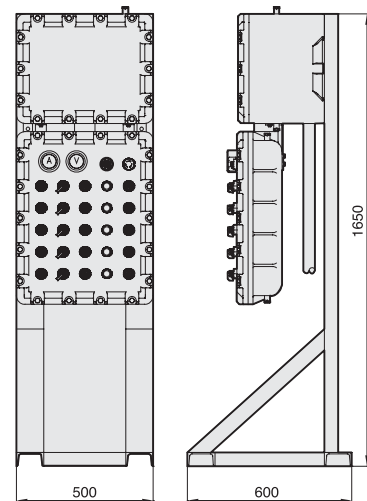
SECP 40-H Hanger type



SECP 63-F Flexible foot type

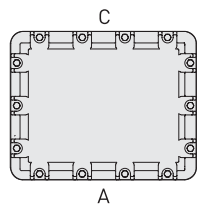


SECP 63-S Stand type

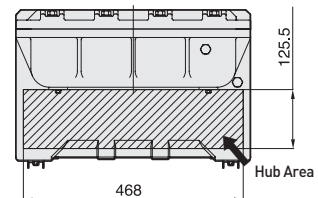


■ Hub Design

- Drilled and tapped conduit openings will be evenly spaced and located in the area indicated on the location chart. Critical conduit opening locations may be indicated by supplying a diagram similar to the one shown at below indicating critical dimensions and locations.
- Specific conduit openings must be located dimensionally from box centerlines to conduit centerlines and from outside back surface of box to conduit centerline.



(Drawing indicates position as looking into Hub opening of box)



Bottom View



Enclosures / Controls / Panels

Panels (Control Panels & Circuit Breaker Panels)

SECP Series - Ex d II B + H2 T6 Custom-built Control Panels

Explosion-proof / Rain-tight / Water-tight /
Corrosion Resistant

Cl. I, Div. 1 & 2, Groups B, C, D / NEMA 4, 4X
II 2G Ex d II B+H2 IP 65

- Copper Free Aluminum
- With ELC Lens Covers Series
- With UE Control Devices Series

■ Maximum Quantity for Drilled and Tapped Openings

Model No.	NPT or PF	#16	#22	#28	#36	#42	#54	#70	#82	#104
	Metric thread	M16	M20	M25	M32	M40	M50	M63	M75	M90
5040	A (Bottom)	35	19	16	6	5	4	4	-	-
	C	46	29	24	12	10	9	4	3	3
	B or D	36	21	18	9	8	7	3	3	2

■ Minimum Centers for Drilled and Tapped Openings and Hubs

	#16/M16	#22/M20	#28/M25	#36/M32	#42/M40	#54/M50	#70/M63	#82/M75	#104/M90
#16/M16	39								
#22/M20	44	49							
#28/M25	47.5	52.5	56						
#36/M32	56.5	61.5	65	72					
#42/M40	62.5	67.5	71	78	84				
#54/M50	71	76	79.5	86.5	92.5	99			
#70/M63	80.5	85.5	89	96	102	108.5	118		
#82/M75	87	92	95.5	102.5	108.5	115	124.5	129	
#104/M90	103.5	108.5	112	119	125	131.5	141	145.5	162

SEPD-C Series - Ex d II C T6 Custom-built Panel Boards

Explosion-proof / Weather-tight /
Weather-resistant / Wet location

CL I, Div. 1 & 2, Groups A, B, C, D / NEMA 3, 3R /
II 2G Ex d II C IP 54

- Copper Free Aluminum

■ Applications

SEPD-C custom-built panel boards are used with Mounting Construction (Used Section shape Steel).

- Protection and control of electrical equipments and circuits such as lighting in hazardous locations or in damp, wet or corrosive condition.
- For Zone 1 & 2, Flame-proof type. (Ex d II C T6)
- Indoors or outdoors in damp, wet, dusty, corrosive and hazardous locations.
- Where exposure to frequent or heavy rain, water, spray, moisture and humidity is common.
- In areas which are hazardous due to the presence of hydrogen, gases and vapors or equivalent hazard such as found in process industries, gas manufacturing plants.

■ Features

- Main feed conduit openings at both top and bottom of junction compartment - allow main feed entry at either end of enclosure.
- To reduce installation costs, panels can be supplied with circuit breakers factory wired to terminal blocks mounted in the box.
- Special Silicon cover gasket provides a water seal to meet IP65 requirements, and provides superior protection for enclosed equipment against water/corrosion.
- Main terminal block positioned to provide ample wire bending space - eliminates need for excessive bending of wires.
- Permits selection of 1-, 2-, 3- pole breakers (10,000 amp AC interrupting capacity) with any number of Ground fault interrupters. (Single pole)
- Breaker actuators - Rotate selector type - Feature simplified design for actuating 1-, 2-, 3- pole breakers in any sequence.
- Breakers prewired to terminal block - provided with insulated neutral lug.

■ Standard Materials

- Copper-free Aluminum
- Accessory : Stainless Steel

■ Standard Finishes

- Spray (Color : Munsel No. 7.5BG 6/1.5)

■ Compliance

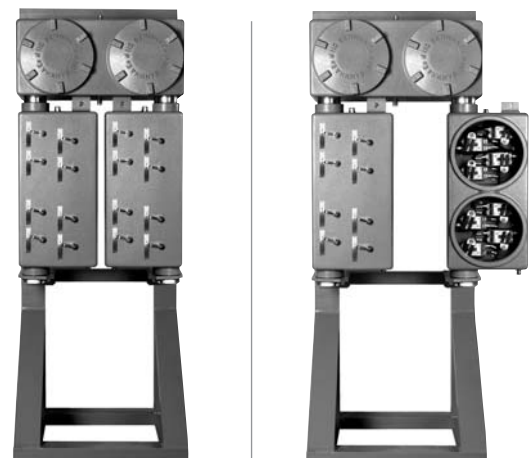
- IEC 60079-0 Equipment – General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures “d”
- ANSI/ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- ISO 261 Metric screw thread
- NEC 500
- NEMA 4, 4X
- IEC 60529

■ Certification

- Certified KOSHA (Korea Occupational Safety & Health Agency)

■ Technical Data

- Voltage Range : AC 120V~220V



B

Enclosures / Controls / Panels

Panels(Circuit Breaker Panels)

SEPD-C Series - Ex d II C T6 Custom-built Panel Boards

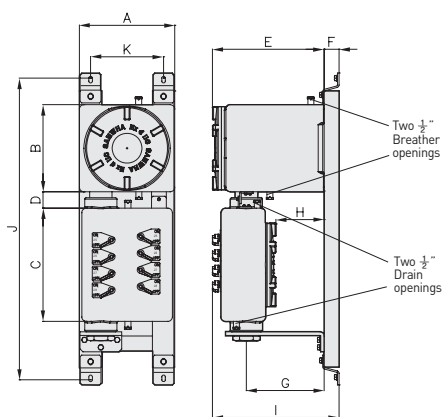
Explosion-proof / Weather-tight /
Weather-resistant / Wet location

CL I, Div. 1 & 2, Groups A, B, C, D / NEMA 3, 3R /
II 2G Ex d II C IP 54

- Copper Free Aluminum

■ Dimension & Installation Type

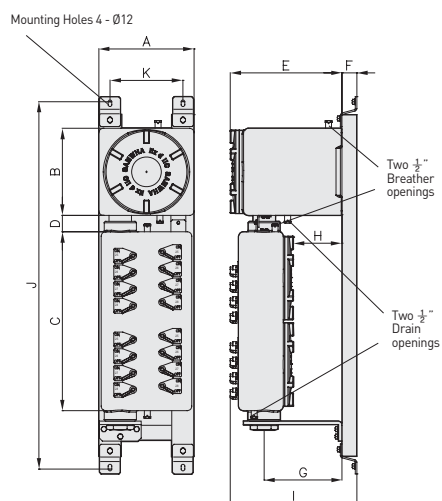
SECP-C-SS (Max 8 - Circuit)



Front View

Side View

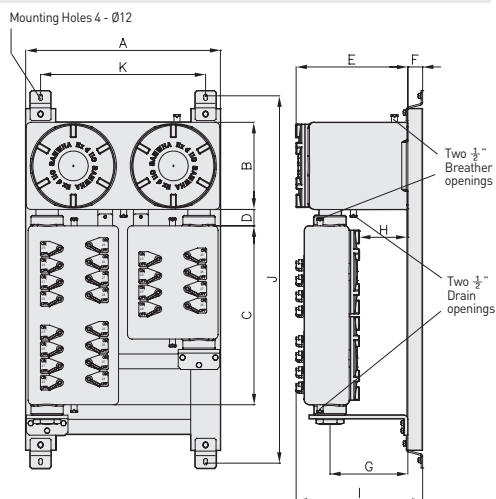
SECP 40-H Hanger type



Front View

Side View

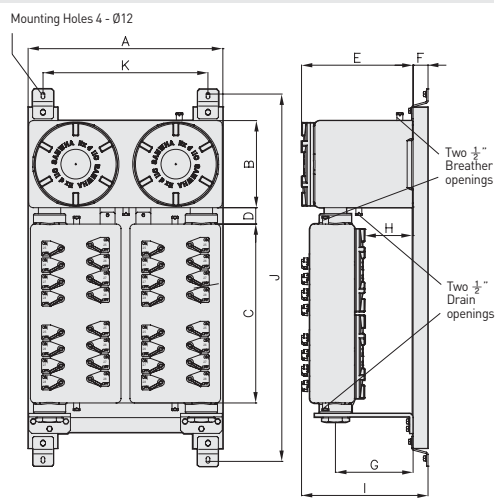
SECP-C-DLS (Max 24-Circuit)



Front View

Side View

SECP-C-DLL (Max 32-Circuit)



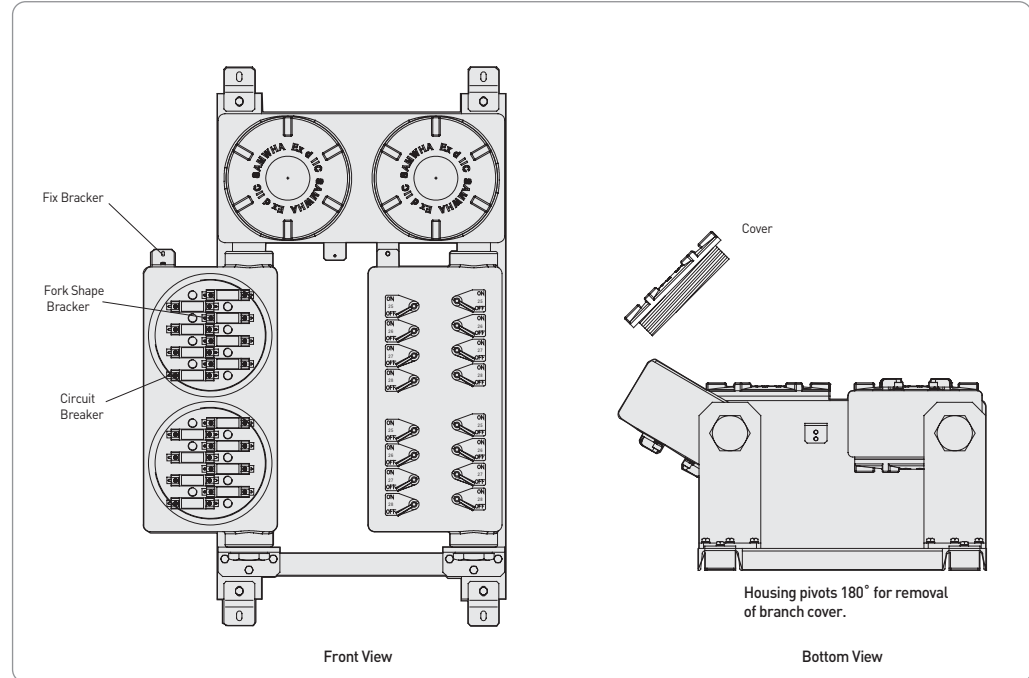
Front View

Side View

(Unit : mm)

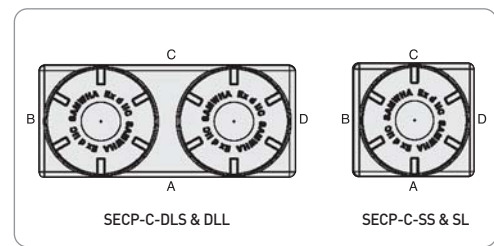
	A	B	C	D	E	F	G	H	I	J	K
SEPD-C-SS	320	292	380	55	375	50	261	162	425	992-1022	245
SEPD-C-SL	320	292	600	55	375	50	261	162	425	1212-1242	245
SEPD-C-DLS	654	292	600	55	375	50	261	162	425	1212-1242	554
SEPD-C-DLL	654	292	600	55	375	50	261	162	425	1212-1242	554

■ Interior Front View



■ Hub Design

- Drilled and tapped conduit openings will be evenly spaced and located in the area indicated on the location chart. Critical conduit opening locations may be indicated by supplying a diagram similar to the one shown at below indicating critical dimensions and locations.
- Specific conduit openings must be located dimensionally from box centerlines to conduit centerlines and from outside back surface of box to conduit centerline.



(Drawing indicates position as looking into Hub opening of box)

■ Minimum Centers for Drilled and Tapped Openings and Hubs

	#16/M16	#22/M20	#28/M25	#36/M32	#42/M40	#54/M50	#70/M63	#82/M75	#104/M90
#16/M16	39								
#22/M20	44	49							
#28/M25	47.5	52.5	56						
#36/M32	56.5	61.5	65	72					
#42/M40	62.5	67.5	71	78	84				
#54/M50	71	76	79.5	86.5	92.5	99			
#70/M63	80.5	85.5	89	96	102	108.5	118		
#82/M75	87	92	95.5	102.5	108.5	115	124.5	129	
#104/M90	103.5	108.5	112	119	125	131.5	141	145.5	162



Enclosures / Controls / Panels

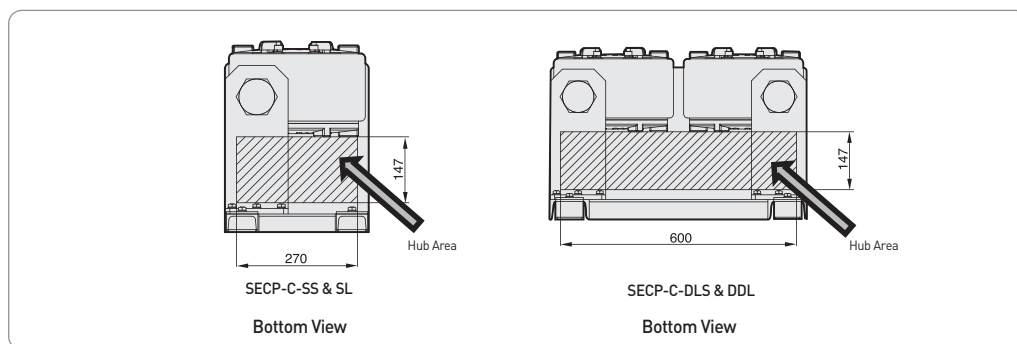
Panels (Circuit Breaker Panels) / (Control Panels)

SEPD-C Series - Ex d II C T6 Custom-built Panel Boards

Explosion-proof / Weather-tight /
Weather-resistant / Wet location

Cl. I, Div. 1 & 2, Groups A, B, C, D / NEMA 3, 3R /
II 2G Ex d II C IP 54

- Copper Free Aluminum



■ Maximum Quantity for Drilled and Tapped Openings

Model No.	NPT or PF	#16	#22	#28	#36	#42	#54	#70	#82	#104
	Metric thread	M16	M20	M25	M32	M40	M50	M63	M75	M90
SECP-C-SS & SL	A (Bottom)	26	15	8	7	5	3	2	2	2
	B or D	49	30	23	14	9	7	3	3	2
	C	52	30	20	14	10	7	3	3	2
SECP-C-DLS & DLL	A (Bottom)	58	35	20	14	13	6	5	4	3
	B or D	49	30	23	14	9	7	3	3	2
	C	120	69	50	28	26	17	9	7	5

SECP-C Series - Ex d II B + H2 T6 Custom-built Control Panels

Explosion-proof / Rain-tight / Water-tight /
Corrosion Resistant

Cl. I, Div. 1 & 2, Groups B, C, D / NEMA 4, 4X
II 2G Ex d II C IP 65

- Copper Free Aluminum
- With ELC Lens Covers Series
- With UE Control Devices Series

■ Applications

SECP-C custom-built control panels are used with Control unit :

- as a means of grouping control stations for centralized process control in hazardous areas in minimum space
- to provide the necessary pilot lights, selector switches and ampere meter, volt meter, buzzer
- For Zone 1 & 2, Flame Proof type (Ex d II C)
- Indoors or outdoors in damp, wet, dusty, corrosive, hazardous locations
- Where exposure to frequent or heavy rain, water, spray, moisture, and humidity is common ; such as : offshore drilling facilities, cooling towers, coal preparation and handling facilities and sewage and waste water treatment plant.
- In areas which are hazardous due to the presence of hydrogen or gases and vapors of equivalent hazard such as ; found in process industries, gas manufacturing plants.

■ Features

- To reduce installation costs, panels can be supplied with control components factory wired to terminal blocks mounted in the box. Relays and other control devices can also be mounted in the boxes for special control functions.
- Surface mounted control panels have the components assembled in the hinged cover, readily accessible for circuit checking and trouble shooting.
- Special Silicon cover gasket provides a water seal to meet IP65 requirements, and provides superior protection for enclosed equipment against water/corrosion.
- Detachable mounting feet provide mounting flexibility. No need to replace enclosure if mounting feet are broken.
- Glass cover can be factory installed to enable viewing of digital read out meters and devices such as Volt meters, Flow meters, Gas analyzers, Process receivers, Transmitters and Controllers

■ Standard Materials

- Copper-free Aluminum
- Accessory : Stainless Steel

■ Standard Finishes

- Spray (Color : Munsel No. 7.5BG 6/1.5)

■ Compliance

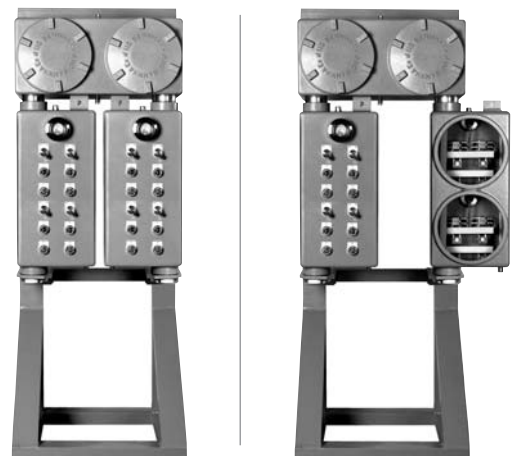
- IEC 60079-0 Equipment – General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures “d”
- ANSI/ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- ISO 261 Metric screw thread
- NEC 500
- NEMA 4, 4X
- IEC 60529

■ Certification

- Certified KOSHA (Korea Occupational Safety & Health Agency)

■ Technical Data

- Voltage Range : AC 120V~220V





Enclosures / Controls / Panels

Panels(Control Panels)

SECP-C Series - Ex d II B + H2 T6 Custom-built Control Panels

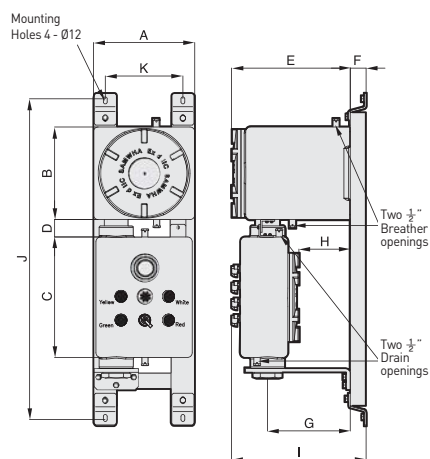
Explosion-proof / Rain-tight / Water-tight /
Corrosion Resistant

Cl. I, Div. 1 & 2, Groups A, B, C, D / NEMA 4, 4X
II 2G Ex d II C IP 65

- Copper Free Aluminum
- With ELC Lens Covers Series
- With UE Control Devices Series

■ Dimension & Installation Type

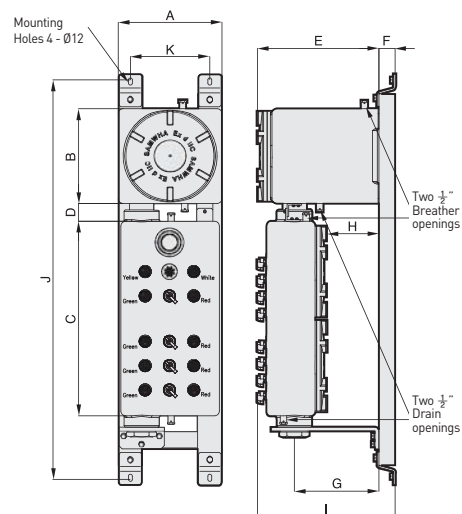
SECP-C-SS (Max 9-Device)



Front View

Side View

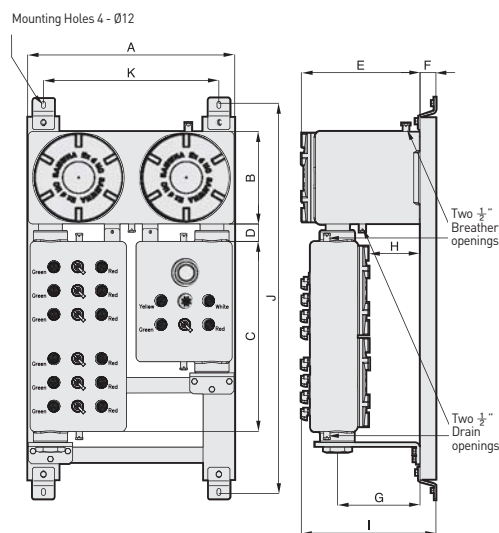
SECP-C-SL (Max 18-Device)



Front View

Side View

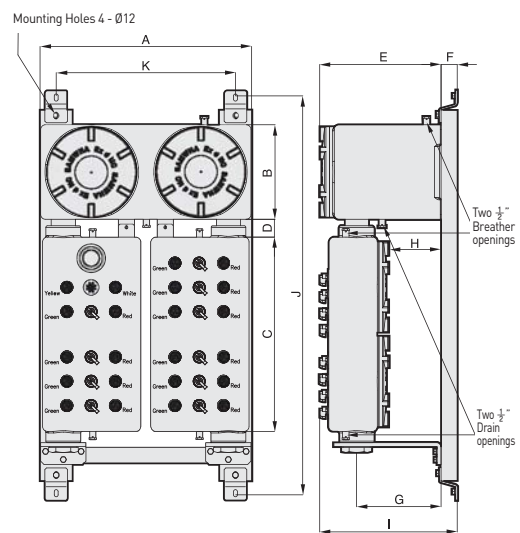
SECP-C-DLS (Max 27-Device)



Front View

Side View

SECP-C-DLL (Max 36-Device)



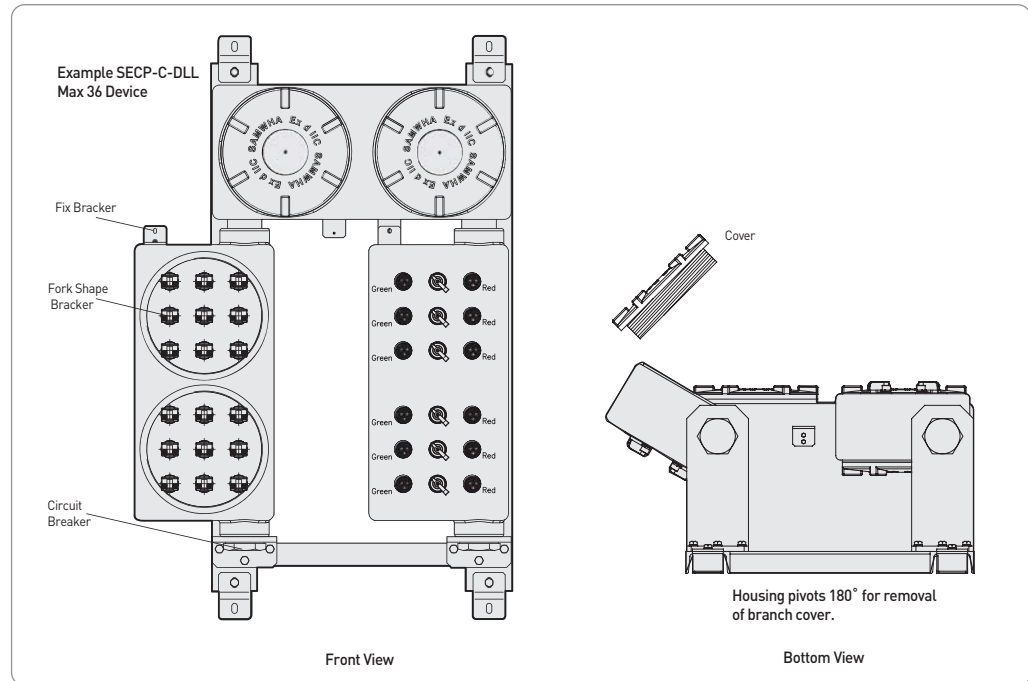
Front View

Side View

(Unit : mm)

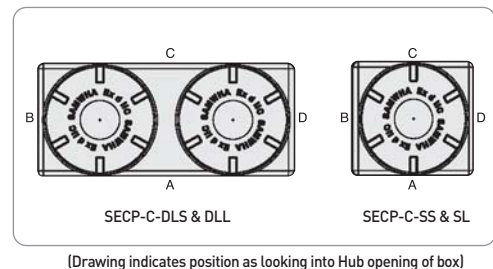
	A	B	C	D	E	F	G	H	I	J	K
SECP-C-SS	320	292	380	55	375	50	261	162	425	992-1022	245
SECP-C-SL	320	292	600	55	375	50	261	162	425	1212-1242	245
SECP-C-DLS	654	292	600	55	375	50	261	162	425	1212-1242	554
SECP-C-DLL	654	292	600	55	375	50	261	162	425	1212-1242	554

■ Interior Front View



■ Hub Design

- Drilled and tapped conduit openings will be evenly spaced and located in the area indicated on the location chart. Critical conduit opening locations may be indicated by supplying a diagram similar to the one shown at below indicating critical dimensions and locations.
- Specific conduit openings must be located dimensionally from box centerlines to conduit centerlines and from outside back surface of box to conduit centerline.



■ Minimum Centers for Drilled and Tapped Openings and Hubs

	#16/M16	#22/M20	#28/M25	#36/M32	#42/M40	#54/M50	#70/M63	#82/M75	#104/M90
#16/M16	39								
#22/M20	44	49							
#28/M25	47.5	52.5	56						
#36/M32	56.5	61.5	65	72					
#42/M40	62.5	67.5	71	78	84				
#54/M50	71	76	79.5	86.5	92.5	99			
#70/M63	80.5	85.5	89	96	102	108.5	118		
#82/M75	87	92	95.5	102.5	108.5	115	124.5	129	
#104/M90	103.5	108.5	112	119	125	131.5	141	145.5	162



Enclosures / Controls / Panels

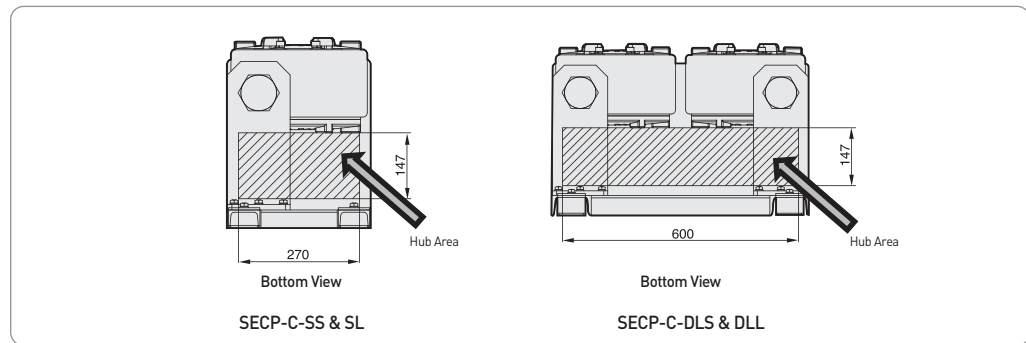
Panels(Control Panels / Switch Rack)

SECP-C Series - Ex d II C T6 Custom-built Control Panels

Explosion-proof / Rain-tight / Water-tight /
Corrosion Resistant

Cl. I, Div. 1 & 2, Groups A, B, C, D / NEMA 4, 4R /
II 2G Ex d II C IP 65

- Copper Free Aluminum



■ Maximum Quantity for Drilled and Tapped Openings

Model No.	NPT or PF	#16	#22	#28	#36	#42	#54	#70	#82	#104
	Metric thread	M16	M20	M25	M32	M40	M50	M63	M75	M90
SECP-C-SS & SL	A (Bottom)	26	15	8	7	5	3	2	2	2
	B or D	49	30	23	14	9	7	3	3	2
	C	52	30	20	14	10	7	3	3	2
SECP-C-DLS & DLL	A (Bottom)	58	35	20	14	13	6	5	4	3
	B or D	49	30	23	14	9	7	3	3	2
	C	120	69	50	28	26	17	9	7	5

Switch Rack Assemblies

- Custom Build Type

■ Applications

Free-standing switch rack assemblies are used:

- To provide a complete motor control center in one integrated package.
- Outdoors and indoors
- In damp, wet or corrosive locations such as sewage treatment plants, lumber mills, marine installations, and food preparation areas.
- In areas made hazardous due to the presence of flammable vapors or gases, such as petroleum refineries, chemical and petrochemical plants, gas gathering plants, pipeline compressor stations, and drilling rigs, both onshore and offshore.
- In areas where hazardous dusts are present, such as coal handling facilities, grain processing and handling plants, and certain food process industries.

■ Features

- Complete factory assembled and wired switch racks.
- Pre-drilled bus boxes allow for quick and easy changing or adding of components.
- Complete assembly covered under one order, eliminates engineering costs, additional costs of placing separate orders with several vendors for various components, and assembly and scheduling problems at job site.
- Wiring is simple. After switch rack is in place, feeders are connected to the main bus and connections made from starters motors. No other field wiring is necessary.
- Maintenance time and costs are reduced by having controls grouped. Work is performed in one location instead of moving from one control to another in various locations.
- Custom built racks to meet your exact requirements are a SAMWHA specialty. Complete quotations will be supplied for any job, large or small.

■ Construction

All hazardous area enclosures for motor starters, combination motor starters, circuit breakers, motor circuit protectors, instrument enclosures, panel-boards, main bus, fittings, receptacles, and lighting fixtures shall be made and supplied by the manufacturer.

- Manufacturer shall retain permanent records of all motor control racks and shall have the capability of duplicating, or replacing, any fully-assembled rack or rack component.
- Manufacturer to assume responsibility for construction, purchase/manufacturer of components, complete circuit continuity testing, and testing of mechanical functions of components.

■ Standard Materials

- Rack frames - Structural steel, bolted and welded.
- Components - Copper free aluminum.

■ Standard Finishes

- Rack frame - Hot Dip Galvanized Steel or Spray (Color : Munsell No. 7.5BG 6/1.5)
- Components - Spray (Color : Munsell No. 7.5BG 6/1.5)

■ Options

- Rack frame finish - Custom ordering colors
- Options listed for individual components can be incorporated in complete switch racks.



■ Rack Frame Design

- Switch rack, either single or double face as required, shall be rigid, free-standing structures. Racks shall be factory-welded, assembled and fabricated.
- Mounting feet shall be 100mm X 50mm shape steel.
- End mounting feet will be welded to the upright.
- Mounting feet shall be anchored at the job site with Ø16 diameter bolts.
- Anchor bolts and mounting pads will be the responsibility of the user.
- Maximum horizontal spacing between mounting legs shall not exceed 4 meter. (Specific dimensions to be determined by the manufacturer.)

■ Grounding

- Grounding lug with appropriate wire capacity will be provided at each end of frame.

B

Enclosures / Controls / Panels

Panels(Switch Rack)

Switch Rack Assemblies

- Custom Build Type

- **Canopy (Sun-Shade)**

Canopy(Sun-shade) shall be factory-welded, assembled. Roofing material shall be Stainless Steel or Epoxy painted steel. Canopy roof trusses, cross channels, roof material, and mounting hardware shall be shipped assembled for quick installation at the job site.

- **Fittings**

All fittings shall be made and provided by the manufacturer.

- Seals and unions will be provided for each incoming and outgoing conduit as required.
- All interconnections between components shall be done by the manufacturer with galvanized rigid conduit, and conduit fittings as required to meet the hazardous classification.
- Interconnecting conduits to be provided with conduit seals as required.
- All incoming and outgoing rack conduit entrances shall include conduit seals as required by the hazardous location specified.
- Such seals will be provided by the manufacturer and will not be filled where field wiring is to be introduced.

- **Conduit Boxes, Outlet Boxes, Device Boxes**

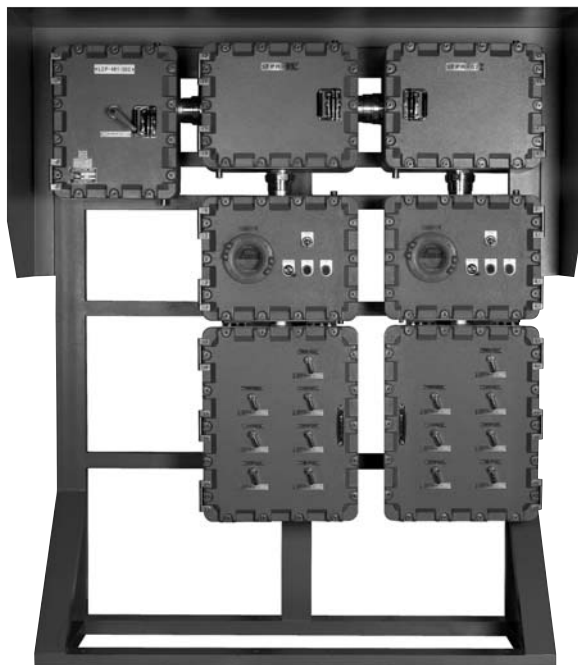
- Conduit boxes, outlet boxes, and device boxes shall be SAMWHA Conduit fittings.
- Seals will be standard SAMWHA sealing fittings. (SVD drain type or SHF universal type, SVF vertical type)
- Unions will be SAMWHA union couplings EU series.
- Breathers and Drains shall be SAMWHA products.

- **Wiring**

- Standard wire shall be copper only, 600 volt, 75° C minimum rating.
- No power wire less than 4 SQ shall be used.
- Control wire shall be 1.5 SQ or 2.5 SQ minimum.

- **Drawings**

Standard drawings supplied for customer approval shall include complete rack wiring diagram, component data, nominal weight of the rack, and overall rack dimensions.



■ MEMO

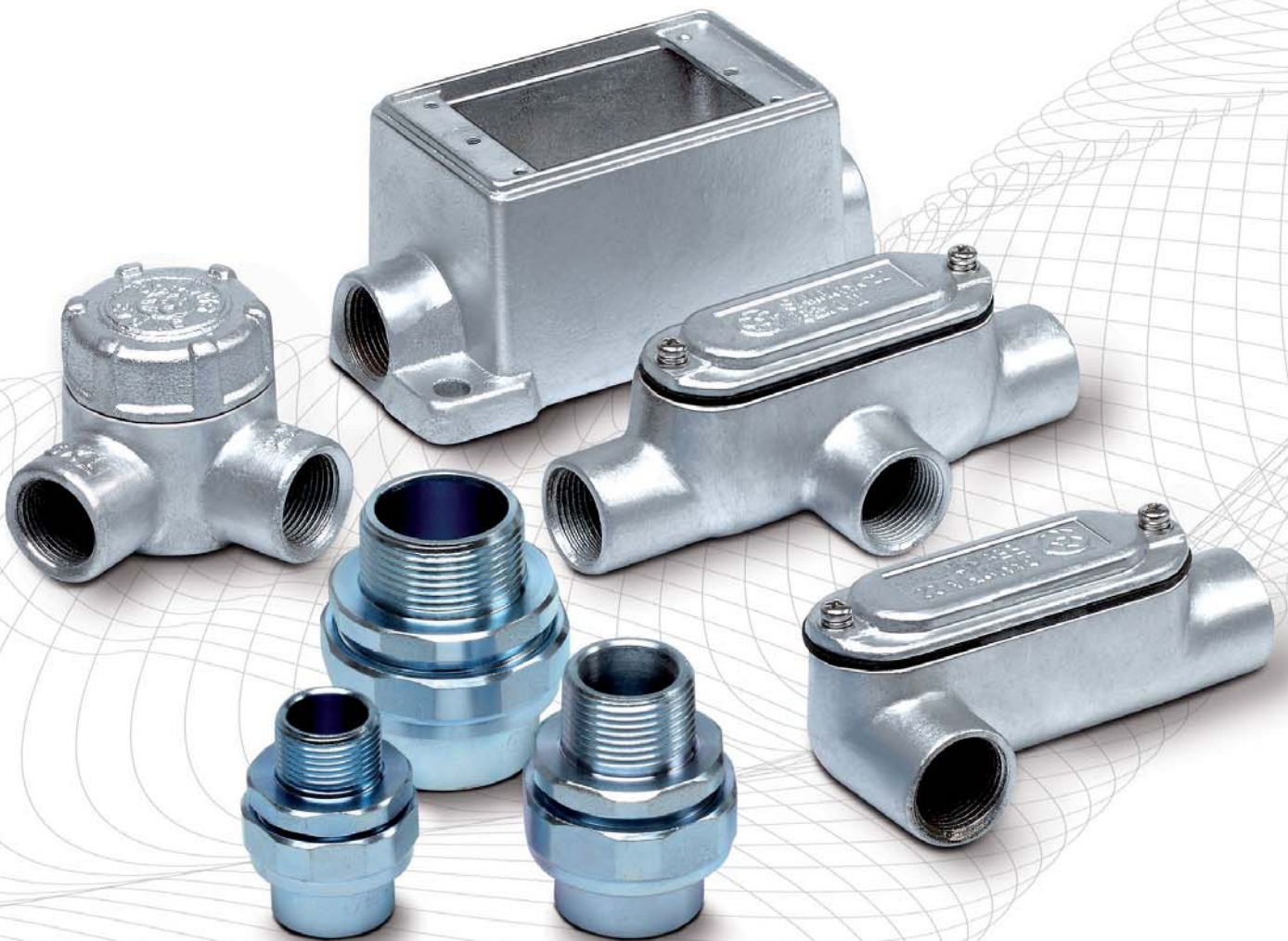
B

Enclosures/
Controls/Panels

Optimized Products With Long-Term Experience

Mainly used for plant construction, buildings and housing construction, Samwha's industrial fittings are the result of our long-term development.

With our exceptional quality and services, these optimized products enable a remarkable cost reduction.





C Industrial Fittings



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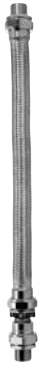
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Industrial Fittings

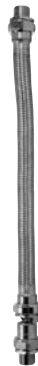
Composition Connector

SWCC-CP Series Ex d II C / SWCC-CB Series Ex d II C / SWCC-CD Series Ex d II C



■ **Flame-proof Type Composition Connector (Single Packing Type)**
SWCC-CP Series - Ex d II C T6

- Cl. I, Div. 1 & 2, Groups A, B, C, D
- NEMA 4, 4X
- Zone 1, Zone 2
- II 2G Ex d II C IP65
- Explosion-proof
- Rain-tight
- Water-tight
- Corrosion Resistant



■ **Flame-proof Type Composition Connector (Compound Barrier Type)**
SWCC-CB Series - Ex d II C T6

- Cl. I, Div. 1 & 2, Groups A, B, C, D
- NEMA 4, 4X
- Zone 1, Zone 2
- II 2G Ex d II C IP65
- Explosion-proof
- Rain-tight
- Water-tight
- Corrosion Resistant



■ **Flame-proof Type Composition Connector (Double Packing Type)**
SWCC-CD Series - Ex d II C T6

- Cl. I, Div. 1 & 2, Groups A, B, C, D
- NEMA 4, 4X
- Zone 1, Zone 2
- II 2G Ex d II C IP65
- Explosion-proof
- Rain-tight
- Water-tight
- Corrosion Resistant

SWCC-CP Series
Flame-proof Ex d Composition Connector

Explosion-proof /
Rain-tight /
Water-tight /
Corrosion Resistant

Cl. I, Div. 1 & 2, Groups A, B, C, D /
NEMA 4, 4X /
II 2G Ex d II C IP65

- For Un-armoured Cables
- Auto Drain Type with a Flexible Fitting
- High Flexibility Flexible Fitting
- Quick Installation
- Single Packing Cable Gland with Cable Clamps

■ Applications

SWCC-CP Type indoor and outdoor composition connector with a flexible fitting for use in Zone1, Zone2 hazardous areas with all types of Un-armoured cable, providing mechanical cable retention and an environmental seal on the cable outer sheath.

■ Features

The SWCC-CP type range is designed and tested to IEC 60079-0 & 1. All metallic composition connector components are manufactured from the same grade of material. Brass locknuts are produced in the same CU Zn39PB3 grade as the composition connector.

- Auto drain type with a flexible fitting
- For use with conduit
- High flexible conduit
- Quick installation
- Single packing cable gland with cable clamps

■ Standard Materials

- Brass Extruded bar ⇒ EN12168: 1998 Grade CuZn39Pb (CW614N) (Previously BS2874: 1986)
- Seal Packing ⇒ Silicon or Rubber

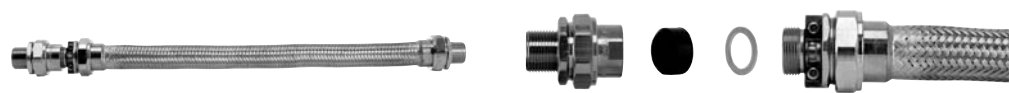
■ Standard Finishes

Brass ⇒ Natural or Nickel Plated

■ Compliances / Approvals

- IEC 60079-0 Equipment - General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures “d”
- IEC 60529 Degree of protection provided by enclosures (IP Code)
- NPT ⇒ ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- BSPP ⇒ ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- Metric ⇒ ISO 965-1, ISO 965-3 medium fit (6g) for external threads

TECHNICAL DATA			
Model	SWCC-CP	Cable Type	Un-armoured
Design Specification	IEC 60079-0 & 1	Sealing Technique	Displacement Seal - Single Packing
IEC Ex Code of Protection Category	Ex d II C		
EN 50262 Mechanical Classifications	Retention = Class B, Impact = Level 6	Sealing Area(s)	Outer Sheath
Continuous Operating Temperature	-20°C to +80°C	Optional Accessories	Adaptor/Reducer
Ingress Protection Rating	IP65		





Industrial Fittings Composition Connector

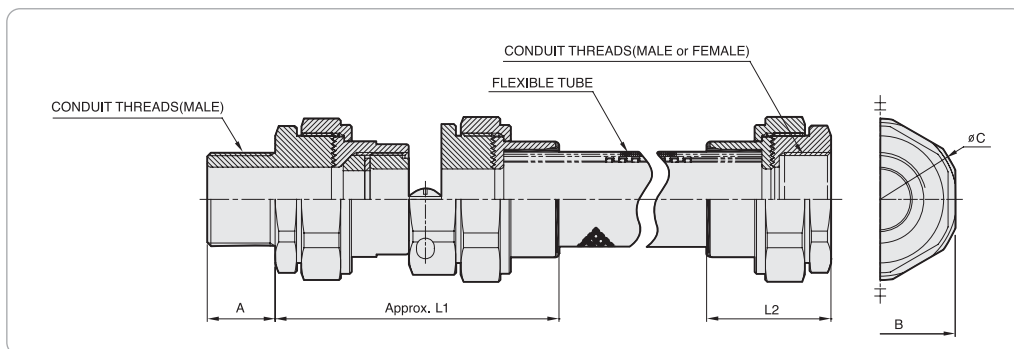
SWCC-CP Series Flame-proof Ex d Composition Connector

Explosion-proof /
Rain-tight /
Water-tight /
Corrosion Resistant

Cl. I, Div. 1 & 2, Groups A, B, C, D /
NEMA 4, 4X /
II 2G Ex d II C IP65

- For Un-armoured Cables
- Auto Drain Type with a Flexible Fitting
- High Flexibility Flexible Fitting
- Quick Installation
- Single Packing Cable Gland with Cable Clamps

■ Cable Gland Selection Table (Dimensions & Construction)



CAT.NO.	Available Entry Threads		Minimum Thread Length (A)	Cable Out Diameter			Max. of Approx. Length		Across Flats	Across Corners
	Standard			No	Min	Max	Gland (L1)	Coupling (L2)	Max	Max
	Metric	NPT or BSPP								
SWCC - CP 16	M20	1/2"	15.0	T	4.0	8.0	90.0	34.0	34.0	38.0
				-	7.0	11.0				
SWCC - CP 22	M25	3/4"	15.0	T2	3.5	8.0	94.5	34.0	42.0	45.0
				T	6.5	11.0				
				-	10.5	15.0				
SWCC - CP 28	M32	1"	15.0	T2	6.2	11.0	95.0	34.0	48.0	51.5
				T	12.7	17.5				
				-	16.5	21.3				
SWCC - CP 36	M40	1 1/4"	15.0	T2	10.6	17.0	104.0	47.0	60.0	66.0
				T	15.6	22.0				
				-	20.6	27.0				
SWCC - CP 42	M50	1 1/2"	15.0	T2	13.7	19.0	104.0	40.0	62.0	65.0
				T	18.7	24.0				
				-	23.7	29.0				
SWCC - CP 54	M50	2"	15.0	T2	19.9	28.0	121.0	45.0	75.0	79.0
				T	25.9	34.0				
				-	30.9	39.0				
SWCC - CP 70	M63	2 1/2"	15.0	T2	28.3	39.0	137.5	67.5	105	110.0
				T	36.3	47.0				
				-	40.3	51.0				
SWCC - CP 82	M75	3"	15.0	35	23.6	34.0	151.0	81.0	114.0	119.0
				40	28.6	39.0				
				44	32.6	43.0				
				T2	37.6	48.0				
				T	47.6	58.0				
				-	52.6	63.0				
SWCC-CP 104	M100	4"	15.0	T2	48.2	59.0	165.0	86.0	142.0	152.0
				63	51.2	62.0				
				T	56.2	67.0				
				-	64.2	75.0				

SWCC-CB Series
Flame-proof Ex d Composition Connector

Explosion-proof /
Rain-tight /
Water-tight /
Corrosion Resistant

Cl. I, Div. 1 & 2, Groups A, B, C, D /
NEMA 4, 4X /
II 2G Ex d II C IP65

- For Un-armoured Cables
- Auto Drain Type with a Flexible Fitting
- Quick Installation
- Compound Barrier Type

■ Applications

SWCC-CB Type indoor and outdoor composition connector with a flexible fitting for use in Zone1, Zone2 hazardous areas with all types of Un-armoured cable, providing mechanical cable retention and an environmental seal on the cable outer sheath.

■ Features

The SWCC-CB type range is designed and tested to IEC 60079-0 & 1.
All metallic composition connector components are manufactured from the same grade of material.
Brass locknuts are produced in the same CU Zn39PB3 grade as the composition connector.

- Auto drain type with a flexible fitting
- For use with conduit
- High flexible conduit
- Quick installation
- Compound barrier type
- For use multi pair cable.

■ Standard Materials

- Brass Extruded bar ⇒ EN12168: 1998 Grade CuZn39Pb (CW614N) (Previously BS2874: 1986)
- Seal Packing ⇒ Silicon or Rubber

■ Standard Finishes

Brass ⇒ Natural or Nickel Plated

■ Compliances / Approvals

- IEC 60079-0 Equipment - General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures “d”
- IEC 60529 Degree of protection provided by enclosures (IP Code)
- NPT ⇒ ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- BSPP ⇒ ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- Metric ⇒ ISO 965-1, ISO 965-3 medium fit (6g) for external threads

TECHNICAL DATA			
Model	SWCC-CB	Cable Type	Un-armoured
Design Specification	IEC 60079-0 & 1	Sealing Technique	Compound barrier type
IEC Ex Code of Protection Category	Ex d II C		
EN 50262 Mechanical Classifications	Retention = Class B, Impact = Level 6	Sealing Area(s)	Outer Sheath
Continuous Operating Temperature	-20°C to +80°C	Optional Accessories	Adaptor/Reducer
Ingress Protection Rating	IP65		





Industrial Fittings Composition Connector

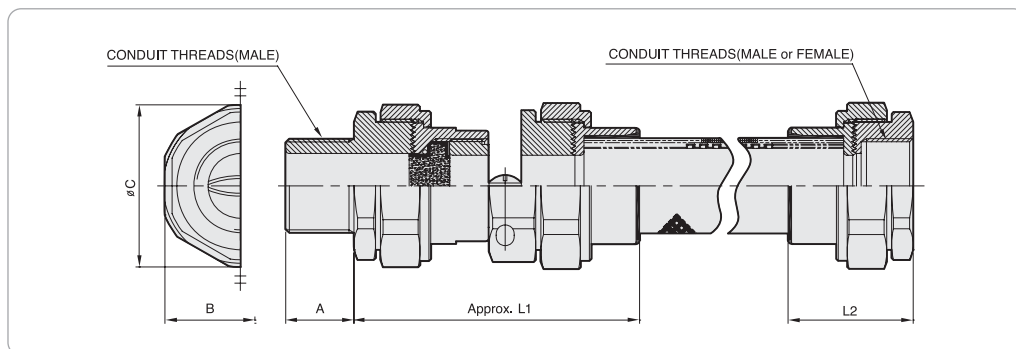
SWCC-CB Series Flame-proof Ex d Composition Connector

Explosion-proof /
Rain-tight /
Water-tight /
Corrosion Resistant

Cl. I, Div. 1 & 2, Groups A, B, C, D /
NEMA 4, 4X /
II 2G Ex d II C IP65

- For Un-armoured Cables
- Auto Drain Type with a Flexible Fitting
- Quick Installation
- Compound Barrier Type

■ Cable Gland Selection Table (Dimensions & Construction)



CAT.NO.	Available Entry Threads		Minimum Thread Length (A)	Bore Capacity		Max. of Approx. Length		Across Flats	Across Corners
	Standard			Min	Max	Gland (L1)	Coupling (L2)	Max	Max
	Metric	NPT or BSPP							
SWCC - CB 16	M20	1/2"	15.0	1.0	8.5		34.0	34.0	38.0
SWCC - CB 22	M25	3/4"	15.0	1.0	13.0		34.0	42.0	45.0
SWCC - CB 28	M32	1"	15.0	1.0	19.0		34.0	48.0	51.5
SWCC - CB 36	M40	1 1/4"	15.0	1.0	26.0		47.0	60.0	66.0
SWCC - CB 42	M50	1 1/2"	15.0	1.0	32.0		40.0	62.0	65.0
SWCC - CB 54	M50	2"	15.0	1.0	40.0		45.0	75.0	79.0
SWCC - CB 70	M63	2 1/2"	15.0	1.0	50.0		67.5	105	110.0
SWCC - CB 82	M75	3"	15.0	1.0	62.0		81.0	114.0	119.0
SWCC - CB 104	M100	4"	15.0	1.0	74.0		86.0	142.0	152.0

SWCC-CD Series Flame-proof Ex d Composition Connector

Explosion-proof / Rain-tight / Water-tight / Corrosion / Resistant

CL I, Div. 1 & 2, Groups A, B, C, D / NEMA 4, 4X / II 2G Ex d II C IP65

- For Un-armoured Cables
- Auto Drain Type with a Flexible Fitting
- High Flexibility Flexible Fitting
- Quick Installation
- Double Packing Cable Gland

■ Applications

SWCC-CD Type indoor and outdoor composition connector with a flexible fitting for use in Zone1, Zone2 hazardous areas with all types of Un-armoured cable, providing mechanical cable retention and an environmental seal on the cable outer sheath.

■ Features

The SWCC-CD type range is designed and tested to IEC 60079-0 & 1.

All metallic composition connector components are manufactured from the same grade of material. Brass locknuts are produced in the same CU Zn39PB3 grade as the composition connector.

- Auto drain type with a flexible fitting
- For use with conduit
- High flexible conduit
- Quick installation
- Double packing cable gland

■ Standard Materials

- Brass Extruded bar ⇒ EN12168: 1998 Grade CuZn39Pb (CW614N) (Previously BS2874: 1986)
- Seal Packing ⇒ Silicon or Rubber

■ Standard Finishes

Brass ⇒ Natural or Nickel Plated

■ Compliances / Approvals

- IEC 60079-0 Equipment - General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- IEC 60529 Degree of protection provided by enclosures (IP Code)
- NPT ⇒ ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- BSPP ⇒ ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- Metric ⇒ ISO 965-1, ISO 965-3 medium fit (6g) for external threads

TECHNICAL DATA			
Model	SWCC-CD	Cable Type	Un-armoured
Design Specification	IEC 60079-0 & 1	Sealing Technique	Displacement Seal - Single Packing
IEC Ex Code of Protection Category	Ex d II C		
EN 50262 Mechanical Classifications	Retention = Class B, Impact = Level 6	Sealing Area(s)	Outer Sheath
Continuous Operating Temperature	-20°C to +80°C	Optional Accessories	Adaptor/Reducer
Ingress Protection Rating	IP65		





Industrial Fittings Composition Connector

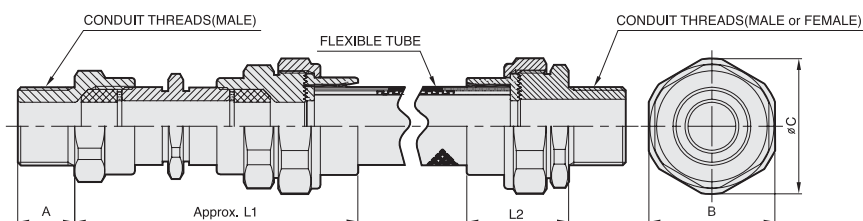
SWCC-CD Series Flame-proof Ex d Composition Connector

Explosion-proof /
Rain-tight /
Water-tight /
Corrosion Resistant

Cl. I, Div. 1 & 2, Groups A, B, C, D /
NEMA 4, 4X /
II 2G Ex d II C IP65

- For Un-armoured Cables
- Auto Drain Type with a Flexible Fitting
- High Flexibility Flexible Fitting
- Quick Installation
- Double Packing Cable Gland

■ Cable Gland Selection Table (Dimensions & Construction)



CAT.NO.	Available Entry Threads		Minimum Thread Length (A)	Cable Out Diameter			Max. of Approx. Length		Across Flats	Across Corners
	Standard			No	Min	Max	Gland (L1)	Coupling (L2)	Max	Max
	Metric	NPT or BSPP								
SWCC - CD 16	M20	1/2"	15.0	T	4.0	8.0	90.0	34.0	34.0	38.0
				-	7.0	11.0				
SWCC - CD 22	M25	3/4"	15.0	T2	3.5	8.0	94.5	34.0	42.0	45.0
				T	6.5	11.0				
				-	10.5	15.0				
SWCC - CD 28	M32	1"	15.0	T2	6.2	11.0	95.0	34.0	48.0	51.5
				T	12.7	17.5				
				-	16.5	21.3				
SWCC - CD 36	M40	1 1/4"	15.0	T2	10.6	17.0	104.0	47.0	60.0	66.0
				T	15.6	22.0				
				-	20.6	27.0				
SWCC - CD 42	M50	1 1/2"	15.0	T2	13.7	19.0	104.0	40.0	62.0	65.0
				T	18.7	24.0				
				-	23.7	29.0				
SWCC - CD 54	M50	2"	15.0	T2	19.9	28.0	121.0	45.0	75.0	79.0
				T	25.9	34.0				
				-	30.9	39.0				
SWCC - CD 70	M63	2 1/2"	15.0	T2	28.3	39.0	137.5	67.5	105	110.0
				T	36.3	47.0				
				-	40.3	51.0				
SWCC - CD 82	M75	3"	15.0	35	23.6	34.0	151.0	81.0	114.0	119.0
				40	28.6	39.0				
				44	32.6	43.0				
				T2	37.6	48.0				
				T	47.6	58.0				
				-	52.6	63.0				
SWCC - CD 104	M100	4"	15.0	T2	48.2	59.0	165.0	86.0	142.0	152.0
				63	51.2	62.0				
				T	56.2	67.0				
				-	64.2	75.0				

Industrial Fittings

Outlet Boxes

Hazardous Area Type & Non Hazardous Area Type

	Hazardous area type	Non Hazardous area type
Outlet Boxes	SERB Series - Ex d II C SIRB Series - Ex e II	SNRB Series
Device Boxes		SXDB Series
Elbows	SX Series - Ex d II C SL Series - Ex d II C	
Flexible Fittings	EPF Series - Ex d II C PVF Series - Ex e II	EDF Series
Sealing Fittings	SVF Series - Ex d II C SHF Series - Ex d II C SVD Series - Ex d II C	
Compound & Fiber	SEACOM A - Compound SEACOM X - Fiber	
Conduit Outlet Bodies	F7 Series - Ex e II F8 Series - Ex e II	MOGUL Series
Union Couplings	EU Series - Ex d II C	
Plug & Adaptor, Socket	EAG Series - Ex d II C ESG Series - Ex d II C FPG Series - Ex d II C	
Nipples & Couplings & Normal Bends	FNG & FNGC Series - Ex d II C SVC Series - Ex d II C	FNGS Series SNB Series
Bushing		BP Series FB Series ZB Series
Drains & Breathers	EPD 16 - Ex d II C UAB 16 - Ex d II C UPD 12 - Ex d II C EAB 16 - Ex d II C	
Junction Boxes		SJB Series
Steel Utility Boxes & Covers Water-tight Surface Mounting Switches & Receptacles Boxes Surface Mounting Box Water-tight Surface Mounting General Use Snap Switches		

■ Wire Inserting Instructions

Maximum number and size of conductors allowed in trade sizes of SAMWHA Conduit outlet elbow

IEC(SQ)	1.5	2.5	4	6	10	16	25	35	50	70	95	120	150	185	240	300	400	500	630
16 [1/2"]	3	2	2	2	1	1	1												
22 [3/4"]	5	4	4	3	2	2	1	1	1										
28 [1"]	9	7	6	6	4	4	3	2	2	1	1	1							
36 [1-1/4"]	15	13	11	10	8	7	5	4	3	2	2	1	1	1					
42 [1-1/2"]	20	17	15	13	10	9	7	6	4	3	3	2	1	1	1	1			
54 [2"]	33	28	24	21	17	15	11	9	7	5	4	3	3	2	2	1	1	1	
70 [2-1/2"]	55	47	41	36	28	25	19	16	12	9	8	6	5	4	3	2	2	1	1
82 [3"]	76	66	57	50	40	36	26	22	17	13	11	9	7	6	4	4	3	2	1
104 [4"]	128	110	96	84	67	60	44	37	29	22	18	15	12	10	8	6	5	4	3
AWG & MCM	14	12	10	8	6	4	2	1	1/0	2/0	4/0	250	300	400	500	600	800		



Industrial Fittings Outlet Boxes

SERB Series - Ex d II C Outlet Boxes

Explosion-proof / Rain-tight / Water-tight /
Corrosion Resistant

CL. I, Div. 1 & 2, Groups A, B, C, D / NEMA 4, 4X /
Zone 1, Zone 2 / II 2G Ex d II C IP 65

- 3-Way or 4-Way

Conduit Outlet Boxes With Covers SERB Series



■ Applications

SERB series conduit outlet boxes are installed in conduit systems within hazardous areas to: Provide protection against exterior explosion where acetylene, hydrogen and other hazardous gases are present Protect conductors in threaded rigid conduit Act as pull and splice boxes Interconnect lengths of conduit Change conduit direction Provide access to conductors for maintenance and future system changes

■ Features

SERB series conduit outlet boxes have: Taper threaded hubs to provide ground continuity Smooth integral hub bushing to protect conductor insulation when pulling Threaded cover openings Surface covers furnished with boxes Neoprene "o"-ring gasket and green ground screw are both standard.

■ Standard Materials

- Bodies & Covers - Cast Iron or Ductile

■ Standard Finishes

- Bodies & Covers - Hot Dip Galvanized or Electro Zinc Plate & Epoxy Painted
- Threads - Oil touch up or Electro Zinc Plated

■ Size Ranges

- SERB - 1/2" to 2"
- SERB 01 - 1/2" to 1"

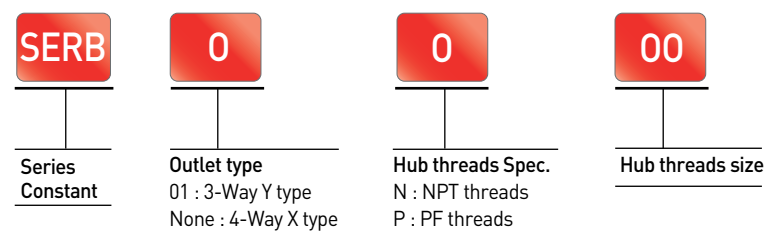
■ Compliances / Approvals

- IEC 60079-0 Equipment - General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- IEC 60529 Degree of protection provided by enclosures (IP Code)
- ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- UL Standard : 886

■ Certification

- Certified KOSHA
(Korea Occupational Safety & Health Agency)

■ Model Number Logic



Example 1) Outlet Box Flame proof type 3-Way Y type NPT 36 SERB 01 N36

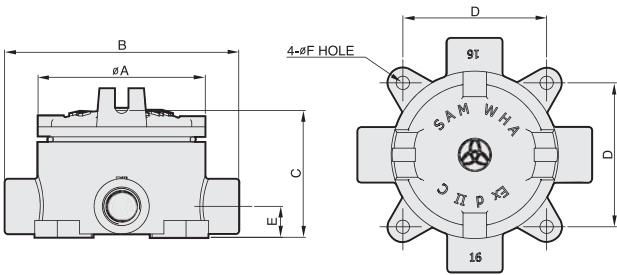
Example 2) Outlet Box Flame proof type 4-Way X type PF 28 SERB P28

■ Option Table

SERB Series	SERB 16~54				SERB 01 16~28		
	4Way	3Way	2Way	1Way	3Way	2Way	1Way
Option	None	With 1 Plug	With 2 Plug	With 3 Plug	None	With 1 Plug	With 2 Plug

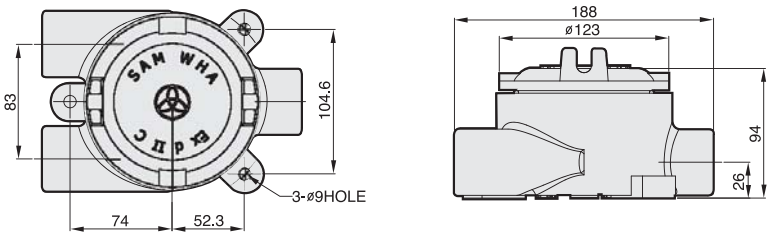
■ Dimensions

SERB - 4-Way

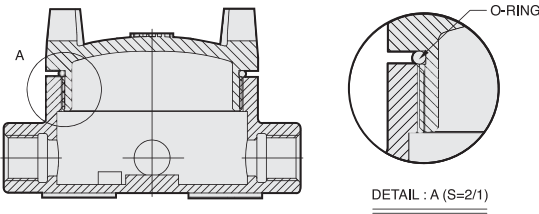


SERB - Hub Size	Dimension(MM)					
	ØA	B	C	D	E	ØF
#16 (1/2")	100	140	75	86	13.5	8
#22 (3/4")	100	140	75	86	21	8
#28 (1")	100	140	75	86	24	8
#36 (1-1/4")	126	174	87	106.5	32.5	8
#42 (1-1/2")	126	174	95	106.5	35	8
#54 (2")	160	222	127	143	42.5	8

SERB 01 - 3-Way



■ IP Construction





Industrial Fittings Outlet Boxes

SIRB Series - Ex e II Outlet Boxes

Increased safety type / Rain-tight /
Water-tight / Corrosion Resistant

CL. I, Div. 1 & 2, Groups A, B, C, D / NEMA 4, 4X /
Zone 1, Zone 2 / II 2G Ex d II C IP 65

• 4-Way

Conduit Outlet Boxes With Covers SERB Series



■ Applications

SIRB series conduit outlet boxes are installed in conduit systems within hazardous areas to: Provide protection against exterior explosion where acetylene, hydrogen and other hazardous gases are present. Protect conductors in threaded rigid conduit. Act as pull and splice boxes. Interconnect lengths of conduit. Change conduit direction. Provide access to conductors for maintenance and future system changes

■ Features

SIRB series conduit outlet boxes have: Taper threaded hubs to provide ground continuity. Smooth integral hub bushing to protect conductor insulation when pulling 4 Cover fix bolts. Surface covers furnished with boxes. Neoprene gasket and green ground screw are both standard.

■ Standard Materials

- Bodies & Covers - Cast Iron or Ductile
- Gaskets-Neoprene or Rubber

■ Certification

- Certified KOSHA
(Korea Occupational Safety & Health Agency)

■ Standard Finishes

- Bodies & Covers - Hot Dip Galvanized or
Electro Zinc Plate & Epoxy Painted
- Threads - Oil touch up or Electro Zinc Plated

■ Size Ranges

- Hub - 1/2" to 2"

■ Compliances / Approvals

- IEC 60079-0 Equipment - General requirements
- IEC 60079-7 Equipment protection by increased safety "e"
- IEC 60529 Degree of protection provided by enclosures (IP Code)
- ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- UL Standard: UL886

■ Model Number Logic

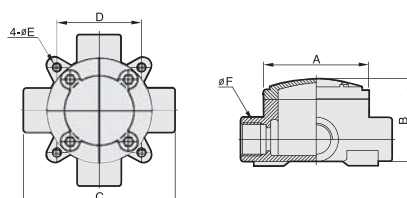
SIRB	0	00
Select Constant	Hub threads Spec. N : NPT threads P : PF threads	Hub threads size

Example 1) Outlet Box Increased safety type NPT 36 SIRB N36
Example 2) Outlet Box Increased safety type PF 28 SIRB P28

■ Option

SIRB Series	SIRB 16-54			
	4Way	3Way	2Way	1Way
Option	None	With 1 Plug	With 2 Plug	With 3 Plug

■ Dimensions



SERB - Hub Size	Dimension(MM)					
	ØA	B	C	D	E	ØF
#16 (1/2")	95	59	134	85	7	1/2"
#22 (3/4")	95	63	134	85	7	3/4"
#28 (1")	95	76	138	85	7	1"
#36 (1-1/4")	125	85	170	106	9	1-1/4"
#42 (1-1/2")	125	95	170	106	9	1-1/2"
#54 (2")	160	118	228	143	10	2"

SNRB Series - Non Hazard. Outlet Boxes 4-Way

Weather-tight / Weather-resistant
Wet location / NEMA 3, 3R

- Covers and Gaskets
- Non-hazardous area type
- KEPIC-EN Certificate

■ Applications

SNRB Series are installed in threaded rigid conduit systems to:

- Act as junction boxes
- Act as pull outlets

■ Features

Compact, shallow design

- Multiple tapped conduit openings and pipe plugs for versatility
- Surface mounting can be obtained by nailing box to concrete form through mounting lug.
- Drilled mounting lugs
- Four conduit bosses spaced 90° apart on sides and one boss on back.
- Blank or drilled and tapped bodies (with 4 side bosses tapped and plugged, plus blank back boss)

■ Standard Materials

- Bodies & Covers - Cast Iron or Ductile
- Gaskets-Neoprene or Rubber

■ Standard Finishes

- Bodies & Covers - Hot Dip Galvanized or Electro Zinc Plate & Epoxy Painted
- Threads - Oil touch up or Electro Zinc Plated

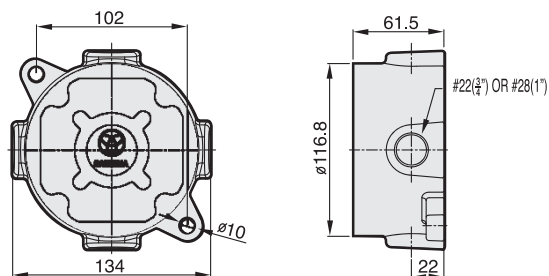
■ Certification

- UL Standard: UL 514A
- KEPIC-EN Certi. No. : EN - 335

■ Size Ranges

- Hub -1/2" (with 1/2" adaptor) to 1"

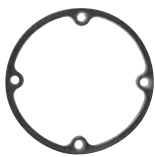
■ Dimensions



Hub type cover



Blank type cover



Gaskets : Neoprene

■ Option

SNRB Series	SIRB 16~54			
	4Way	3Way	2Way	1Way
Option	None	With 1Plug	With 2 Plug	With 3 Plug

■ Model Number Logic

SNRB	0	00	00
Select Constant	Hub threads Spec. N : NPT threads P : PF threads	Hub threads size	Cover type ST : Standard type HB : 3/4" Hub type BK : Blank type

Example 1) Outlet Box Non-haza. NPT 36 #22 Hub type Cover SNRB N36 22HB

Example 2) Outlet Box Non-haza. PF 28 Blank type Cover SNRB P28 BK



Industrial Fittings Device Boxes

SXDB Series - Non Hazard. Single Gang Device Boxes

- Cover & Gasket
- KEPIC-EN Certificate

- Hub type



Dead End type (1 Hub)



Feed Thru type (2 Hub)

■ Applications

Cast device boxes are installed to:

- Accommodate wiring devices.
- Act as pull boxes for conductors in a conduit system.
- Provide openings to make splices and taps in conductors.
- Provide access to conductors for maintenance and future system changes
- Connect conduit sections
- SXDB Series for mounting surface devices on floor or bench (used with single gang covers)

■ Features

Internal green ground screw standard on boxes

- Suitable for use in wet locations when used with gasketed covers
- Mounting lugs standard on most boxes
- Tapered threaded hubs with integral bushing
- Available for surface mounting (with mounting lugs) as listed.

■ Standard Materials

- Bodies - Cast Iron or Ductile
- Covers - Steel
- Gaskets - Neoprene or Rubber

■ Standard Finishes

- Bodies & Covers - Hot Dip Galvanized or Electro Zinc Plate & Epoxy Painted
- Threads - Oil touch up or Electro Zinc Plated

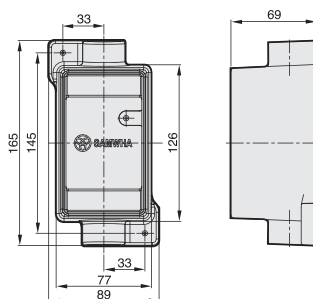
■ Size Ranges

- Hub - $\frac{3}{4}$ " or 1"

■ Certification

- KEPIC-EN Certi. No. : EN - 335

■ Dimensions



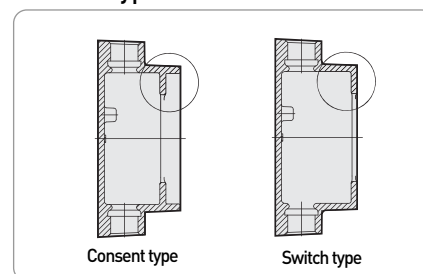
■ Model Number Logic

SXDB	00	0	00
Model type	Hub type	Hub threads Spec.	Hub threads size
SCDB :	DE : Dead End	N : NPT	
Consent type	(1 Hub)	threads	
SSDB :	FT : Feed Thru	P : PF	
Switch type	(2Hub)	threads	

Example 1) Single Gang Consent type Device Box Dead End type NPT 1" SCDB DE N28

Example 2) Single Gang Switch type Device Box Feed Thru type PF $\frac{3}{4}$ " SSDB FT P2

■ Model Type



■ Selection Table

SXDB Series	Consent type	Switch type
3/4"	Dead End	SCDB DE 22
	Feed Thru	SCDB FT 22
1"	Dead End	SCDB DE 28
	Feed Thru	SCDB FT 28

Industrial Fittings

Elbows

SX Series - Ex d II C Elbows

Explosion-proof / Weather-tight /
Weather-resistant / Wet location

Cl. I, Div. 1 & 2, Groups A, B, C, D / NEMA 3, 3X /
Zone 1, Zone 2 / II 2G Ex d II C IP 54

• 2-Way or 3-Way



■ Applications

SX elbow Series are installed in conduit systems within hazardous areas to:

- Serve as pulling fittings.
- Make bends in conduit system.
- Provide openings for splicing.
- Connect and change direction of conduit run.
- Allow connections for branch runs.
- Permit access to conductors for maintenance.

■ Materials

Maximum volume for bends within a compact overall size.

Screw on cover for ease of installation and removal.

Cover opening on an angle, permitting conductors to be pulled straight through either hub.

Taper threaded hubs and integral bushing for rigid threaded conduit.

■ Standard Materials

- Bodies & Covers - Cast Iron or Ductile

■ Standard Finishes

- Bodies & Covers - Hot Dip Galvanized or Electro Zinc Plate & Epoxy Painted
- Threads - Oil touch up or Electro Zinc Plated

■ Size Ranges

- Hub - 1/2" to 2"

■ Compliances / Approvals

- IEC 60079-0 Equipment - General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- IEC 60529 Degree of protection provided by enclosures (IP Code)
- ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- UL Standard : 886

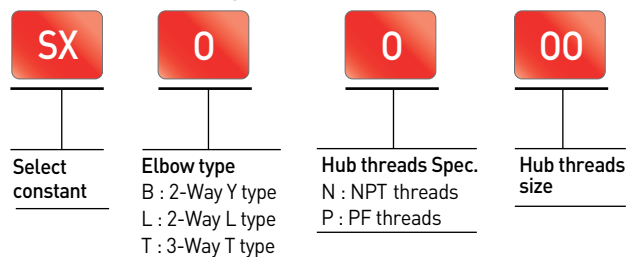
■ Certification

- Certified KOSHA (Korea Occupational Safety & Health Agency)

■ Selection Table

SX Series	2Way		3Way
	Below type	Elbow type	T type
#16 (1/2")	SXB 16	SXL 16	SXT 16
#22 (3/4")	SXB 22	SXL 22	SXT 22
#28 (1")	SXB 28	SXL 28	SXT 28
#36 (1-1/4")	SXB 36	SXL 36	SXT 36
#42 (1-1/2")	SXB 42	SXL 42	SXT 42
#54 (2")	SXB 54	SXL 54	SXT 54

■ Model Number Logic



Example 1) Elbow 2-Way Y type NPT 28 SXB N28
Example 2) Elbow 3-Way T type PF 42 SXT P42



Industrial Fittings Elbows

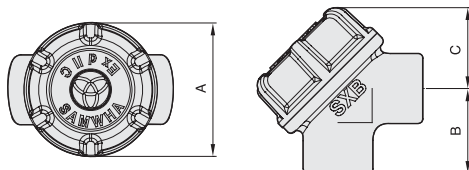
SX Series - Ex d II C Elbows

Explosion-proof / Weather-tight /
Weather-resistant / Wet location

Cl. I, Div. 1 & 2, Groups A, B, C, D / NEMA 3, 3X /
Zone 1, Zone 2 / II 2G Ex d II C IP 54

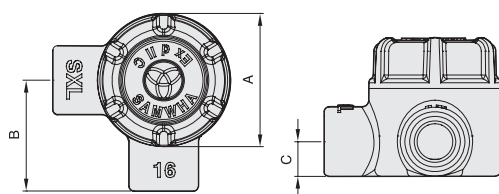
■ Dimensions

SXB - Size



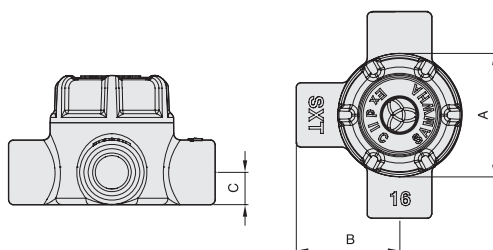
SXB - Size	Dimension(MM)		
	A	B	C
#16 (1/2")	57.5	36.5	35
#22 (3/4")	57.5	36.5	36.8
#28 (1")	67	44.5	40.3
#36 (1-1/4")	80	54	48
#42 (1-1/2")	90	57	53.5
#54 (2")	101	65	57.5

SXT - Size



SXT - Size	Dimension(MM)		
	A	B	C
#16 (1/2")	57.5	48	15
#22 (3/4")	57.5	50	17.5
#28 (1")	67	57.5	21
#36 (1-1/4")	80	69	25.5
#42 (1-1/2")	90	74.5	28.5
#54 (2")	101	81.5	34.3

SXL - Size



SXL - Size	Dimension(MM)		
	A	B	C
#16 (1/2")	57.5	48	15
#22 (3/4")	57.5	50	17.5
#28 (1")	67	57.5	21
#36 (1-1/4")	80	69	25.5
#42 (1-1/2")	90	74.5	28.5
#54 (2")	101	81.5	34.3

SL Series - Ex d II C Angle Elbows

Explosion-proof / Weather-tight
Weather-resistant / Wet location

Cl. I, Div. 1 & 2, Groups A, B, C, D / NEMA 3, 3R /
Zone 1, Zone 2 / II 2G Ex d II C IP 54



SLMM 45°



SLMM 90°



SLFM 45°



SLFM 90°



SLFF 45°



SLFF 90°

■ Applications

SL series elbows are installed in conduit systems within hazardous areas to: Provide protection against exterior explosion where acetylene, hydrogen, and other hazardous gases are present. Protect conductors in threaded rigid conduit. Change conduit direction.

■ Features

Smooth integral hub bushing to protect conductor insulation when pulling.

■ Size Ranges

- 1/2" to 4"

■ Standard Materials

- Cast Iron or Ductile

■ Standard Finishes

- Bodies - Hot Dip Galvanized or Electro Zinc Plate & Epoxy Painted
- Threads - Oil touch up or Electro Zinc Plated

■ Compliances / Approvals

- IEC 60079-0 Equipment - General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- IEC 60529 Degree of protection provided by enclosures (IP Code)
- ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- UL Standard : 886

■ Certification

- Certified KOSHA (Korea Occupational Safety & Health Agency)

■ Model Number Logic

SL	0	00	0	00
Select Constant	Thread type MM : Male to male FM : Female to male FF: Female to female	Angle 45 – 45 degree 90 – 90 degree	Hub threads Spec. N : NPT threads P : PF threads	Hub threads size

Example 1) Elbow Female to male 45 degree NPT 28 SLFM 45 N28

Example 2) Elbow male to male 90 degree PF 36 SLMM 90 P36

■ Selection Table

SL Series	Male to male		Female to male		Female to female	
	45degree	90degree	45degree	90degree	45degree	90degree
#16 (1/2")	SLMM45 16	SLMM90 16	SLFM45 16	SLFM90 16	SLFF45 16	SLFF90 16
#22 (3/4")	SLMM45 22	SLMM90 22	SLFM45 22	SLFM90 22	SLFF45 22	SLFF90 22
#28 (1")	SLMM45 28	SLMM90 28	SLFM45 28	SLFM90 28	SLFF45 28	SLFF90 28
#36 (1-1/4")	SLMM45 36	SLMM90 36	SLFM45 36	SLFM90 36	SLFF45 36	SLFF90 36
#42 (1-1/2")	SLMM45 42	SLMM90 42	SLFM45 42	SLFM90 42	SLFF45 42	SLFF90 42
#54 (2")	SLMM45 54	SLMM90 54	SLFM45 54	SLFM90 54	SLFF45 54	SLFF90 54



Industrial Fittings Elbows

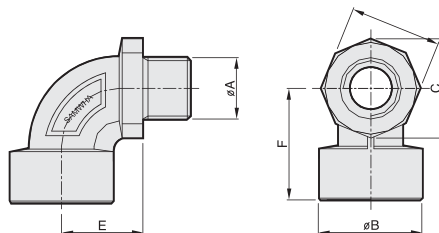
SL Series - Ex d II C Angle Elbows

Explosion-proof / Weather-tight
Weather-resistant / Wet location

Cl. I, Div. 1 & 2, Groups A, B, C, D / NEMA 3, 3R /
Zone 1, Zone 2 / II 2G Ex d II C IP 54

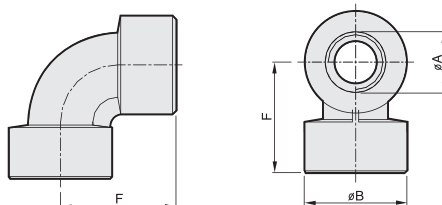
■ Dimensions

SLFM - Size



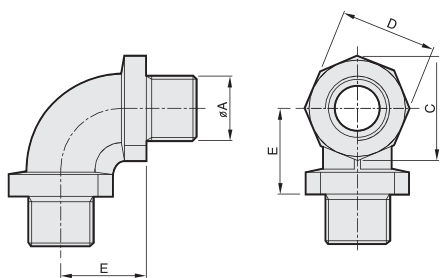
SLFM - Size	Dimension(MM)					
	A	B	C	D	E	F
#16 (1/2")	1/2"	33	35	31	27.0	41.5
#22 (3/4")	3/4"	38	41	38	30.5	46.5
#28 (1")	1"	47	48.5	45.5	34.5	52
#36 (1-1/4")	1-1/4"	58.5	58	55	39.5	57
#42 (1-1/2")	1-1/2"	67	65.5	61.5	45.5	63
#54 (2")	2"	75.3	80	75	52.5	72

SLFF - Size



SLFF - Size	Dimension(MM)		
	A	B	F
#16 (1/2")	1/2"	33	41.5
#22 (3/4")	3/4"	38	46.5
#28 (1")	1"	47	52
#36 (1-1/4")	1-1/4"	58.5	57
#42 (1-1/2")	1-1/2"	67	63
#54 (2")	2"	75.3	72

SLMM - Size



SLMM - Size	Dimension(MM)			
	A	C	D	E
#16 (1/2")	1/2"	35	31	27.0
#22 (3/4")	3/4"	41	38	30.5
#28 (1")	1"	48.5	45.5	34.5
#36 (1-1/4")	1-1/4"	58	55	39.5
#42 (1-1/2")	1-1/2"	65.5	61.5	45.5
#54 (2")	2"	80	75	52.5

Industrial Fittings

Flexible Fittings

EPF Series - Ex d II C Flexible Fittings

Explosion-proof / Weather-tight /
Weather-resistant / Wet location

Cl. I, Div. 1 & 2, Groups A, B, C, D / NEMA 3, 3R
Zone 1, Zone 2 / II 2G Ex d II C IP 54



■ Applications

EPF couplings are used: In hazardous areas where a flexible member is required in a conduit system to accomplish difficult bends, or to allow for movement or vibration of connected equipment or units

■ Features

Rugged design to withstand explosive pressure (Class I).
Mechanical abuse. Liquid-tight for wet locations.
For use where lack of space makes use of rigid conduit difficult.
Wire duct liner in sizes 1/2" to 4" insulates against grounds and burnthrough from short circuit.
No bonding jumpers required, metallic braid provides continuous electrical path.
EPF has two threaded male or female end union.

■ Standard Materials

End fittings:
1/2" to 4" – Brass or Stainless Steel
1/2" to 4" have a type Stainless Steel braid

■ Standard Finishes

- Brass natural - Electro Nickel Plated
- Stainless Steel - Natural

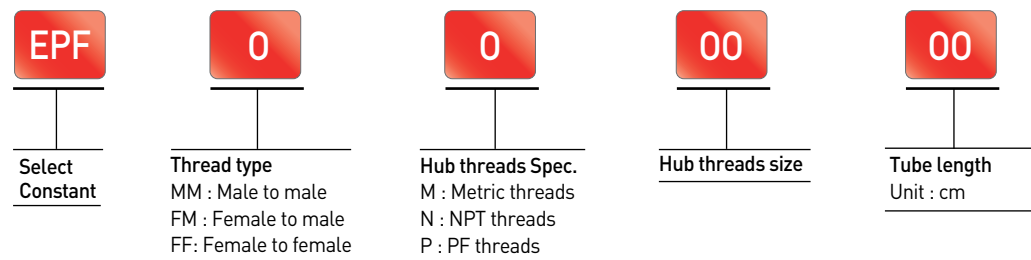
■ Compliances / Approvals

- IEC 60079-0 Equipment – General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- IEC 60529 Degree of protection provided by enclosures (IP Code)
- ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- BS 3643 ISO metric screw threads. Principles and basic data.
- UL Standard : 886

■ Certification

- Certified KOSHA (Korea Occupational Safety & Health Agency)

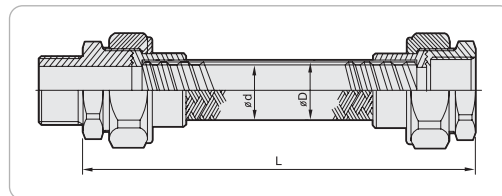
■ Model Number Logic



Example 1) Flexible fittings Female to male NPT 28 L=1.0M EPF FM N28 100

Example 2) Flexible fittings male to male PF 36 L=750mm EPF MM P36 75

■ Dimensions



EPF – Hub Size	Dimension(MM)		EPF – Hub Size	Dimension(MM)	
	ØD	Ød		ØD	Ød
#16 (1/2")	19	13.4	#54 (2")	64	51.8
#22 (3/4")	27	19.1	#70 (2-1/2")	79	65.2
#28 (1")	34	25.4	#82 (3")	93	76.5
#36 (1-1/4")	42	32.9	#104 (4")	120	101
#42 (1-1/2")	49	39.3			



Industrial Fittings Flexible Fittings

PVF Series - Ex e II PVC Jacketed Flexible Fittings

Increased safety type / Rain-tight
Water-tight / Corrosion Resistant

Cl. I, Div. 1 & 2, Groups A, B, C, D / NEMA 4, 4X
Zone 1, Zone 2 / II 2G Ex e II IP 65



■ Applications

PVF couplings are used: In hazardous areas where a flexible member is required in a conduit system to accomplish difficult bends, or to allow for movement or vibration of connected equipment or units.

■ Features

Mechanical abuse. Liquid-tight for wet locations.
For use where lack of space makes use of rigid conduit difficult.
Wire duct liner in sizes 1/2" to 4" insulates against grounds and burnthrough from short circuit.
No bonding jumpers required, metallic braid provides continuous electrical path.
PVF has two threaded male or female end union.

■ Standard Materials

End fittings:
1/2" to 4" – Brass or Stainless Steel
1/2" to 4" have a pliable conduits with PVC jackets

■ Standard Finishes

- Brass natural – Electro Nickel Plated
- Stainless Steel – Natural
- Tube jacket – PVC

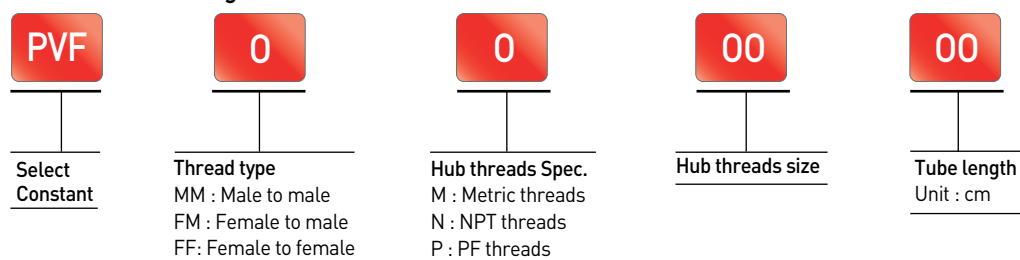
■ Compliances / Approvals

- IEC 60079-0 Equipment – General requirements
- IEC 60079-7 Equipment protection by increased safety "e"
- IEC 60529 Degree of protection provided by enclosures (IP Code)
- ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- BS 3643 ISO metric screw threads. Principles and basic data.
- UL Standard: 886

■ Certification

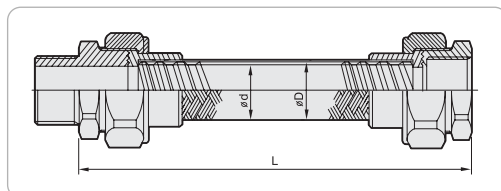
- Certified KOSHA (Korea Occupational Safety & Health Agency)

■ Model Number Logic



Example 1) Flexible fittings Female to male NPT 28 L=1.0M PVF FM N28 100
Example 2) Flexible fittings male to male PF 36 L=750mm PVF MM P36 75

■ Dimensions

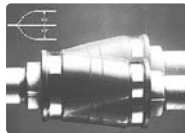


EPF – Hub Size	Dimension(MM)		EPF – Hub Size	Dimension(MM)	
	ØD	Ød		ØD	Ød
#17 (1/2")	23	16.6	#63 (2")	71.5	62.6
#25 (3/4")	30.5	23.8	#76 (2-1/2")	85	76
#30 (1")	36.5	29.3	#83 (3")	91	81
#38 (1-1/4")	45	37.1	#101 (4")	110	100.2
#50 (1-1/2")	57	49.1			

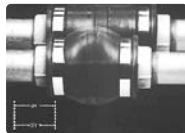
EDF Series - Non Hazard. Expansion/Deflection Fitting

Water-tight / Corrosion Resistant

• KEPIC-EN Certificate



1. Axial expansion / contraction



2. Angular misalignment.



3. Parallel misalignment.

■ Applications

EDF Series can be installed indoors, outdoors, buried underground, or embedded in concrete in non-hazardous areas. EDF's are used with standard rigid conduit or PVC rigid conduit. (PVC requires rigid metal conduit nipples and rigid metal-to-PVC conduit adapters.)

EDF's provide a flexible and watertight connection for protection of conduit wiring systems from damage due to movement.

Typical applications include:

- Underground conduit feeder runs
- Runs between sections of concrete subject to relative movement
- Runs between fixed structures
- Conduit entrances in high-rise buildings
- Bridges
- Marinas, docks, piers

■ Features

EDF Series accommodate the following movements without collapsing or fracturing the conduit, and damaging the wires it contains:

- Axial expansion or contraction up to 3/4"
- Angular misalignment of the axes of the coupled conduit runs in any direction to 30°
- Parallel misalignment of the axes of coupled conduit runs in any direction to 3/4"
- Watertight flexible neoprene outer jacket is corrosion resistant and protects the grounding strap and the attachment points of the hubs.
- Tinned copper flexible braid grounding straps as sure grounding continuity.
- Stainless steel jacket clamps for strength and corrosion resistance.
- Standard tapered electrical threads fit standard rigid conduit.

■ Certifications and Compliances

- UL Standard: 514B
- ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- KEPIC-EN Certi. No. : EN - 335

■ Standard Finishes

- Hub – Hot Dip Galvanized or Electro Zinc Plate & Epoxy Painted
- Neoprene – Natural (black)
- Threads – Oil touch up or Electro Zinc Plated

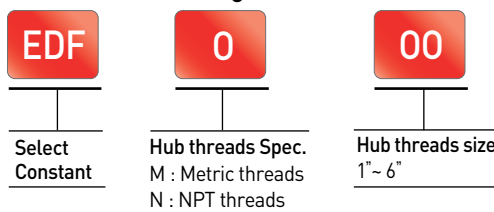
■ Standard Materials

- Hubs – Cast Iron or Ductile
- Outer jacket – Molded Neoprene
- Jacket clamps – Stainless Steel
- Grounding straps – Tinned copper flexible braid

■ Size Ranges

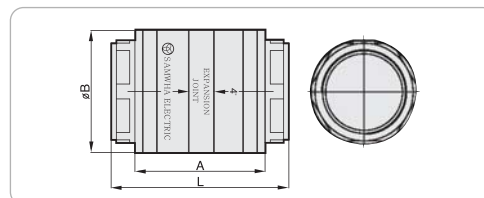
- 1" ~ 6"

■ Model Number Logic



Example 1) Expansion/Deflection Fitting NPT 4" EDF N104
Example 2) Expansion/Deflection Fitting PF 6" EDF P150

■ Dimensions



EDF-Size	Dimension(MM)		
	A	B	C
#28 (1")	140	90	190
#42 (1-1/2")	140	90	190
#54 (2")	160	105	208
#82 (3")	175	164	240
#104 (4")	175	164	240
#150 (6")	175	220	240



Industrial Fittings Sealing Fittings

SVF Series / SHF Series / SDF Series - Ex d II C Sealing Fittings

Explosion-proof / Weather-tight /
Weather-resistant / Wet location

Cl. I, Div. 1 & 2, Groups A, B, C, D / NEMA 3, 3R
Zone 1, Zone 2 / II 2G Ex d II C

- SVF (Vertical Type)
- SHF (Universal Type)
- SVD (Drain Type)

■ Applications

Sealing fittings are to: Restrict the passage of gases, vapors or flames from one portion of the electrical installation to another at atmospheric pressure and normal ambient temperatures. Limit explosions to the sealed-off enclosure. Limit pre-compression or "pressure piling" in conduit systems.

Sealing fittings are required: At each entrance to an enclosure housing an arcing or sparking device when used in Class 1, Division 1 and 2 hazardous locations, To be located as close as practicable and, in no case, more than 18" from such enclosures. At each entrance of 2" size or larger to an enclosure or fitting housing terminals, splices or taps when used in class Division 1 hazardous locations. To be located as close as practicable and, in no case, more than 18" from such enclosures. In conduit systems when leaving Class 1, Division 1 or Division 2 hazardous locations. In cable systems when the cables either do not have a gas/vapor tight continuous sheath or are capable of transmitting gases or vapors through the cable core when those cables leave the Class 1, Division 1 or Division 2 hazardous locations.

■ Features

Sealing fittings include: Minimum turning radius. Large openings with threaded closures to provide easy access to conduit hubs for making dams. Integral bushings in conduit hubs to protect conduct or insulation from damage. Taper-tapped hubs to insure ground continuity. Sealing fittings are available for installation in either vertical only or in both horizontal or vertical positions. Sealing fittings for installation at any angle; the covers with opening for sealing compound can be properly.

■ Standard Materials

- Bodies – Cast Iron or Ductile

■ Size Ranges

- Hub – 1/2" to 4"

■ Standard Finishes

- Bodies -Hot Dip Galvanized or Electro
- Zinc Plate & Epoxy Painted
- Threads – Oil touch up or Electro Zinc Plated

■ Compliances / Approvals

- IEC 60079-0 Equipment – General requirements
- IEC 60079-1 Equipment protection by flame proof enclosures "d"
- ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- UL Standard: 886

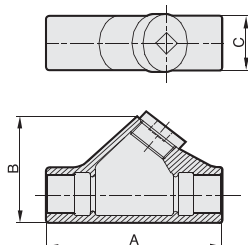
■ Certification

- Certified KOSHA (Korea Occupational Safety & Health Agency)



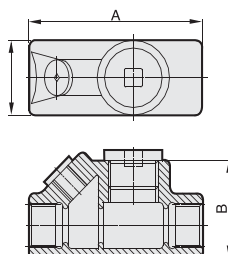
■ Dimensions

SVF - Size



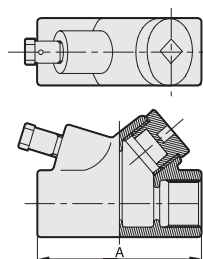
SVF - Size	Dimension(MM)		
	A	B	C
#16 (1/2")	83	60	33
#22 (3/4")	98	71	38
#28 (1")	106	81	44
#36 (1-1/4")	126	97	55
#42 (1-1/2")	142	114	61
#54 (2")	163	136	76
#70 (2-2/1")	185	157	96
#82 (3")	204	186	111
#104 (4")	230	238	135

SHF - Size



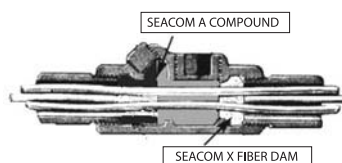
SHF - Size	Dimension(MM)		
	A	B	C
#16 (1/2")	98	44	32
#22 (3/4")	96	49	38
#28 (1")	120	60	44
#36 (1-1/4")	134	72	55
#42 (1-1/2")	146	79	62
#54 (2")	165	94	76
#70 (2-2/1")	190	117	96
#82 (3")	217	134	111
#104 (4")	245	156.5	135

SVD - Size

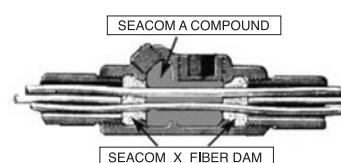


SHF - Size	Dimension(MM)		
	A	B	C
#16 (1/2")	82	42	32
#22 (3/4")	94	47	38
#28 (1")	109	59	44
#36 (1-1/4")	126	69	55
#42 (1-1/2")	143	83.5	61
#54 (2")	160	96.5	78
#70 (2-2/1")	185	116	96
#82 (3")	205	124	111
#104 (4")	233.5	173	136.5

SVF



SHF



Note

SAMWHA sealing fitting are approved for use in hazardous locations only when SEACOM X fiber and SEACOMA Sealing Compound are used to make the seal. Seals are installed in conduit runs to prevent the passage of gases, vapors or flames from one portion of the electrical installation to another through the conduit, limiting any explosion to the enclosure and preventing pre-compression or "pressure piling"

■ Model Number Logic

S	00	0	00
Select constant	Model VF : Vertical type HF : Universal type VD : Drain type	Hub threads Spec. N : NPT threads P : PF threads	Hub threads size

Example 1) Sealing Fitting Universal or horizontal type NPT 28 SHF N28

Example 2) Sealing Fitting Drain type PF 36 SVD P36



Industrial Fittings Compound & Fiber

SEACOM A - Compound / SEACOM X - Fiber

- For Sealing Fittings and Hubs

■ Applications

SEACOM A Sealing Compound: Forms a seal around each electrical conductor and between them and inside of the sealing fitting to restrict the passage of gases, vapors or flames through the sealing fitting at atmospheric pressure and at normal ambient temperatures.

SEACOM X fiber: Forms a dam between the integral bushing of the sealing fitting and the end of the conduit and around the electrical conductors entering the hub.

■ Features

SEACOM A Sealing compound is a water soluble powder, that can be easily mixed and poured. The compound, unusually dense, expands slightly when hardening and bonds to inner walls of sealing fittings.

SEACOM X fiber is a mineral wool that packs easily, forming around each conductor.

Compound hardens in 50~70 minutes.

The mixing ratio of compound to water is about two to one.

■ Standard Materials

- SEACOM A : Compound
- SEACOM X : Fiber

■ Size Ranges

- SEACOM A Compound 1kg or 5kg
- SEACOM X Fiber 120g or 600g



SEACOM A



SEACOM X

Note

SAMWHA sealing fitting are approved for use in hazardous locations only when SEACOM X fiber and SEACOM A Sealing Compound are used to make the seal.

Industrial Fittings

Conduit Outlet Bodies

Conduit Outlet Bodies & Cover

■ Wire Inserting Instructions

Maximum number and size of conductors allowed in trade sizes of SAMWHA conduit bodies

Conduit Trade Size	Model No.	Hub	Conductor Size SQ _(mm²) , AWG & MCM																		
			4	3	2	1	1/0	2/0	3/0	4/0	250	300	350	400	500	600	700	750	900	AWG	
			25		35	50		70	95	120	127	152	177	203	253	304	355	380	456	KS	IEC
#104 (4")	F7 : LL104, LR104	all	59	50	42	31	26	21	17	14	11	10	3								
	F7 : LT104, LTB104, LX104	thru	59	50	42	31	26	21	17	14	3										
		side	59	50	42	31	26	21	3												
	F7 : LB104	all	59	50	42	31	26	21	17	14	11	3									
#82 (3")	F7 : LC82	all	34	28	24	17	14	3													
	F7 : LB82	all	34	28	24	17	14	12	3												
	F7 : LL82, LR82	all	34	28	24	17	14	12	10	8	3										
	F7 : LT82, LX82	thru	34	28	24	17	14	3													
		side	34	28	24	17	3														
	F7 : LTB82	thru	34	28	24	17	14	3													
		side	34	28	24	3															
#70 (2-1/2")	F7 : LC70	all	21	18	15	11	9	3													
	F7 : LB70	all	21	18	15	11	9	7	3												
	F7 : LT70	thru	21	18	15	11	9	3													
		side	21	18	15	11	3														
	F7 : LL70, LR70	all	21	18	15	11	9	7	6	5	3										
#54 (2")	F7 : LC54, LB54	all	15	12	10	7	3														
	F7 : LT54, LTB54, LX54	thru	15	12	10	7	3														
		side	15	12	3																
	F7 : LL54, LR54	all	15	12	10	7	6	5	3												
#42 (1-1/2")	F7 : LC42, LT42, LTB42, LX42	all	8	7	3																
	F7 : LL42, LR42	all	8	7	6	4	3														
	F7 : LB42	all	8	7	6	3															
#36 (1-1/4")	F7 : LT36, LTB36, LX36	thru	6	3																	
		side	6	5	3																
	F7 : LC36, LB36	all	6	3																	
	F7 : LL36, LR36	all	6	5	3																
#28(1")	F7 : LC28, LB28, LL28, LR28, LT28, LTB28, LX28	all	3																		



Industrial Fittings

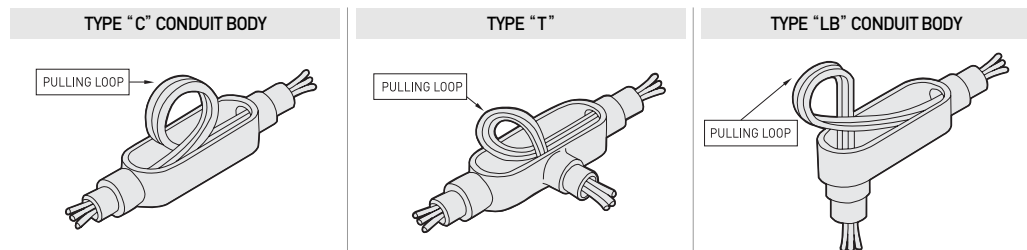
Conduit Outlet Bodies

Conduit Outlet Bodies & Cover

■ Installation

The following procedures should be used to insure the reliability of wiring pulled through conduit bodies.

- Use approved wire pulling compound that is compatible with wire insulation.
- Start by pulling all the wires through one hub and train the wires through the cover opening.
- Loop the wires in a large circle as shown on the attached sketch and feed through the other hub.
- Pull all the wires together until the loop is approximately 6" in diameter for 2" trade size or less and 10 times the O.D. of the largest wire for 2-1/2" trade size and larger.
- Flip the loop 180° into a training loop. (Make sure the wires are not crossed.) Pull out the loop one wire at a time. It is best to start pulling out the training loop using the wires closest to the inside to the loop.
- Do not pull the wires taut or any tighter than necessary to place the cover on the conduit body.
- Station a person at the "training loop" to safely guide the wires during pulling. To prevent insulation damage use a blunt tool, if necessary, to keep the wire from binding or jamming. The use of a well rounded tool, such as a length of conduit or a round dowel, will assist in turning the loop while preventing damage to the wire insulation



■ Conduit Outlet Bodies Construction

MODEL	SIZE	ELBOW TYPE						
		LB	LL	LR	LT	LTB	LX	LC
F7 Ex e II	#16(1/2")	◆	◆	◆	◆	◆	◆	◆
	#22(3/4")	◆	◆	◆	◆	◆	◆	◆
	#28(1")	◆	◆	◆	◆	◆	◆	◆
	#36(1-1/4")	◆	◆	◆	◆	◆	◆	◆
	#42(1-1/2")	◆	◆	◆	◆	◆	◆	◆
	#54(2")	◆	◆	◆	◆	◆	◆	◆
	#70(2-1/2")	◆	◆	◆	◆	◆	◆	◆
	#82(3")	◆	◆	◆	◆	◆	◆	◆
F8 Ex e II	#16(1/2")	◆	◆	◆	◆	◆	—	—
	#22(3/4")	◆	◆	◆	◆	◆	—	—
	#28(1")	◆	◆	◆	◆	◆	—	—
	#36(1-1/4")	◆	◆	◆	◆	◆	—	—
	#42(1-1/2")	◆	◆	◆	◆	◆	—	—
	#54(2")	◆	◆	◆	◆	◆	—	—
	#70(2-1/2")	◆	◆	◆	◆	◆	—	—
MOGUL Non. Haza.	#28(1")	◆	◆	◆	◆	—	—	◆
	#42(1-1/2")	◆	◆	◆	◆	—	—	◆
	#54(2")	◆	◆	◆	◆	—	—	◆
	#82(3")	◆	◆	◆	◆	—	—	◆
	#104(4")	◆	—	—	—	—	—	—

F7 Series - Ex e II Conduit Outlet Bodies Cover & Gasket

Increased safety type /
Rain-tight /
Water-tight

Cl. I, Div. 1 & 2, Groups A, B, C, D /
NEMA 3, 3X /
Zone 1, Zone 2 / II 2G Ex e II IP 44

- **KEPIC-EN Certificate**

- **Applications**

Serve as pulling fittings. Make bends in conduit system. Provide openings for splicing. Connect and change direction of conduit run. Allow connections for branch runs. Permit access to conductors for maintenance.

- **Features**

High tensile strength and ductility. High corrosion-resistance, high impact and shock resistance. Roomy interiors; more wiring space. No wire damage; smooth, rounded integral bushing in each hub protects conductor insulation. Accurately tapped, threads for tight, rigid joints and ground continuity. Completely interchangeable with Crouse-Hinds Form7 Series or Appleton FM7 Series. Applications and installation dimensions are also interchangeable.

- **Standard Materials**

- Bodies & Cover - Ductile or Cast Iron
- Gasket - Neoprene or Rubber

- **Size Ranges**

- 1/2" to 4"

- **Standard Finishes**

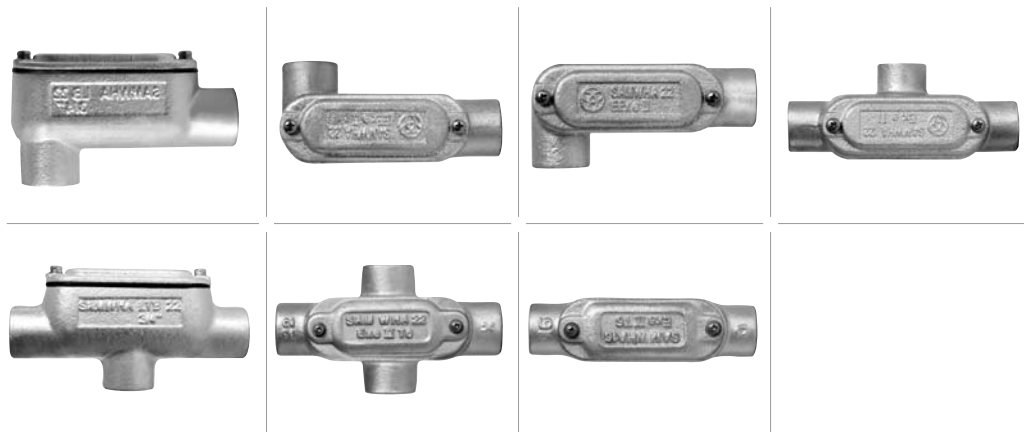
- Bodies & Covers - Hot Dip Galvanized or Electro Zinc Plate & Epoxy painted.
- Threads - Oil touch up or Electro Zinc Plated

- **Compliances / Approvals**

- IEC 60079-0 Equipment - General requirements
- IEC 60079-7 Equipment protection by increased safety "e"
- IEC 60529 Degree of protection provided by enclosures (IP Code)
- ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- UL Standard: 514B

- **Certification**

- Certified KOSHA (Korea Occupational Safety & Health Agency)
- KEPIC-EN Certi. No. : EN - 335





Industrial Fittings Conduit Outlet Bodies

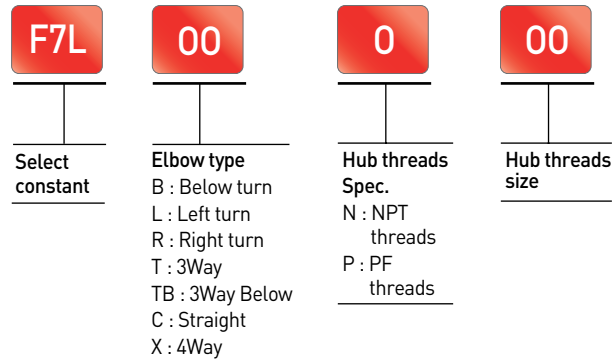
F7 Series - Ex e II Conduit Outlet Bodies Cover & Gasket

Increased safety type /
Rain-tight /
Water-tight

Cl. I, Div. 1 & 2, Groups A, B, C, D /
NEMA 3, 3X /
Zone 1, Zone 2 / II 2G Ex e II IP 44

- KEPIC-EN Certificate

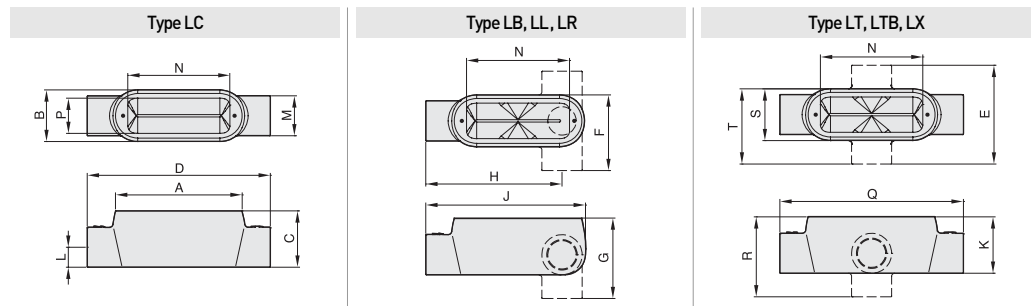
Model Number Logic



Example 1) Conduit Outlet Bodies F7 Below turn NPT 28 F7LTB N28

Example 2) Conduit Outlet Bodies F7 3Way below turn PF 36 F7LTB P36

Dimensions



(Dimensions in millimeters)

Hub Size	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T
1 / 2	97	35	38	137	75	55	58	102	117	35	15	29	81	24	140	55	35	55
3 / 4	111	40	42	151	80	60	62	114	131	42	17.5	35	97	29	156	62	40	60
1	127	45	48	173	84	68	71	129	150	52	21	42	114.5	35	172	72	44	64
1-1/4	142	56	60	190	104	80	84	141	166	60	25	50	127	45	190	84	56	80
1-1/2	154	62	66	204	112	87	91	150	179	66	29	58	138	49.5	204	91	62	87
2	180	76	81	230	126	101	106	170	205	81	35	70	162	62	230	106	76	101
2-1/2	229	108	92	293	172	140	124	218	261	92	43	86	213	90.5	293	124	108	140
3	235	108	118	299	172	140	150	216	267	118	51	102	213	90.5	299	150	108	140
4	279	133	138	351	247	169	174	298	316	226	65	130	260.5	114.5	382	263	175	211

Selection Table

Hub Size	2 Way				3 Way		4 Way
	Below	Right	Left	Continue	T type	T Below type	X type
1 / 2"	F7LB 16	F7LR 16	F7LL 16	F7LC 16	F7LT 16	F7LTB 16	F7LX 16
3 / 4"	F7LB 22	F7LR 22	F7LL 22	F7LC 22	F7LT 22	F7LTB 22	F7LX 22
1"	F7LB 28	F7LR 28	F7LL 28	F7LC 28	F7LT 28	F7LTB 28	F7LX 28
1-1/4"	F7LB 36	F7LR 36	F7LL 36	F7LC 36	F7LT 36	F7LTB 36	F7LX 36
1-1/2"	F7LB 42	F7LR 42	F7LL 42	F7LC 42	F7LT 42	F7LTB 42	F7LX 42
2"	F7LB 54	F7LR 54	F7LL 54	F7LC 54	F7LT 54	F7LTB 54	F7LX 54
2-1/2"	F7LB 70	F7LR 70	F7LL 70	F7LC 70	F7LT 70	F7LTB 70	F7LX 70
3"	F7LB 82	F7LR 82	F7LL 82	F7LC 82	F7LT 82	F7LTB 82	F7LX 82
4"	F7LB 104	F7LR 104	F7LL 104	F7LC 104	F7LT 104	F7LTB 104	F7LX 104

F8 Series - Ex e II Conduit Outlet Bodies Cover & Gasket

Increased safety type /
Rain-tight /
Water-tight

Cl. I, Div. 1 & 2, Groups A, B, C, D /
NEMA 3, 3X /
Zone 1, Zone 2 / II 2G Ex e II IP 44

• KEPIC-EN Certificate



■ Applications

Serve as pulling fittings. Make bends in conduit system. Provide openings for splicing. Connect and change direction of conduit run. Allow connections for branch runs. Permit access to conductors for maintenance.

■ Features

High tensile strength and ductility. High corrosion-resistance, high impact and shock resistance. Roomy interiors; more wiring space. No wire damage ; smooth, rounded integral bushing in each hub protects conductor insulation. Accurately tapped, threads for tight, rigid joints and ground continuity. Applications and installation dimensions are also interchangeable.

■ Standard Materials

- Bodies & Cover - Ductile or Cast Iron
- Gasket - Neoprene or Rubber

■ Size Ranges

- 1/2" to 2"

■ Standard Finishes

- Bodies & Covers - Hot Dip Galvanized or Electro Zinc Plate & Epoxy painted.
- Threads - Oil touch up or Electro Zinc Plated

■ Compliances / Approvals

- IEC 60079-0 Equipment - General requirements
- IEC 60079-7 Equipment protection by increased safety "e"
- IEC 60529 Degree of protection provided by enclosures (IP Code)
- ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- UL Standard: 514B

■ Certification

- Certified KOSHA (Korea Occupational Safety & Health Agency)
- KEPIC-EN Certi. No. : EN - 335

■ Model Number Logic

F8L	00	0	00
Select constant	Elbow type B : Below turn L : Left turn R : Right turn T : 3Way TB : 3Way Below	Hub threads Spec. N : NPT threads P : PF threads	Hub threads size

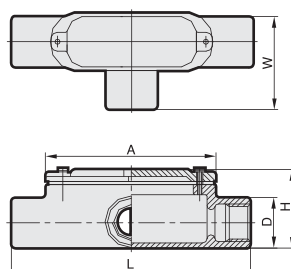
Example 1) Conduit Outlet Bodies F8 Below turn
NPT 28 F8LB N28

Example 2) Conduit Outlet Bodies F8 3Way below turn
PF 36 F8LTB P36

■ Dimensions

LT - Size

(Dimensions in millimeters)



LT - Size	Dimension(MM)				
	L	W	H	A	D
#16 (1/2")	150	60	44	110	32
#22 (3/4")	165	65	46	130	38
#28 (1")	200	75	57	150	45
#36 (1-1/4")	220	85	66	170	54
#42 (1-1/2")	250	100	70	200	62
#54 (2")	305	130	90	255	75



Industrial Fittings Conduit Outlet Bodies

F8 Series - Ex e II Conduit Outlet Bodies Cover & Gasket

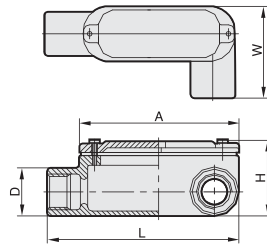
Increased safety type /
Rain-tight /
Water-tight

CL I, Div. 1 & 2, Groups A, B, C, D /
NEMA 3, 3X /
Zone 1, Zone 2 / II 2G Ex e II IP 44

- KEPIC-EN
Certificate

■ Dimensions

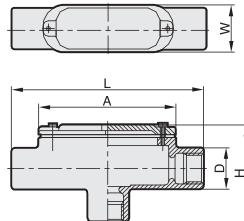
LL - Size



(Dimensions in millimeters)

LL - Size	Dimension(MM)				
	L	W	H	A	D
#16 (1/2")	130	60	36	110	32
#22 (3/4")	150	65	46	130	46
#28 (1")	175	50	57	150	45
#36 (1-1/4")	195	60	60	170	54
#42 (1-1/2")	225	70	70	200	62
#54 (2")	280	95	90	255	75

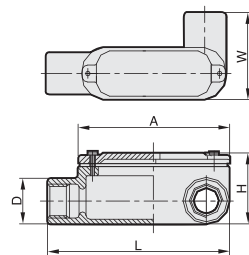
LTB - Size



(Dimensions in millimeters)

LTB - Size	Dimension(MM)				
	L	W	H	A	D
#16 (1/2")	150	40	63	110	32
#22 (3/4")	165	45	66	130	38
#28 (1")	200	50	80	150	45
#36 (1-1/4")	220	60	66	170	54
#42 (1-1/2")	250	70	70	200	62
#54 (2")	305	95	90	225	75

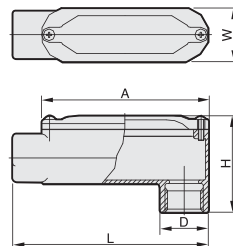
LR - Size



(Dimensions in millimeters)

LR - Size	Dimension(MM)				
	L	W	H	A	D
#16 (1/2")	130	60	36	110	32
#22 (3/4")	150	65	46	130	38
#28 (1")	175	75	57	150	45
#36 (1-1/4")	195	85	60	170	54
#42 (1-1/2")	225	100	70	200	62
#54 (2")	280	130	90	255	75

LB - Size



(Dimensions in millimeters)

LB - Size	Dimension(MM)				
	L	W	H	A	D
#16 (1/2")	130	40	55	110	32
#22 (3/4")	150	45	66	130	38
#28 (1")	175	50	83	150	45
#36 (1-1/4")	195	60	84	170	54
#42 (1-1/2")	225	70	102	200	62
#54 (2")	280	95	130	255	75

■ Selection Table

Hub Size	2 Way			3 Way	
	Below	Right	Left	T type	T Below type
1 / 2"	F8LB 16	F8LR 16	F8LL 16	F8LT 16	F8LTB 16
3 / 4"	F8LB 22	F8LR 22	F8LL 22	F8LT 22	F8LTB 22
1"	F8LB 28	F8LR 28	F8LL 28	F8LT 28	F8LTB 28
1-1/4"	F8LB 36	F8LR 36	F8LL 36	F8LT 36	F8LTB 36
1-1/2"	F8LB 42	F8LR 42	F8LL 42	F8LT 42	F8LTB 42
2"	F8LB 54	F8LR 54	F8LL 54	F8LT 54	F8LTB 54

MOGUL Series - Non Hazard. Conduit Outlet Bodies Cover & Gasket

- NEC 6X, 8X
- KEPIC-EN Certificate



■ Applications

Serve as pulling fittings. Make bends in conduit system. Provide openings for splicing. Connect and change direction of conduit run. Allow connections for branch runs. Permit access to conductors for maintenance. Large body size facilitates pulling of large and heavy conductors. Specially designed raised cast covers provide additional wiring area. Mogul for pulling straight, 45° or 90° angle turns and/or making taps and splices.

■ Features

High tensile strength and ductility. High corrosion-resistance, high impact and shock resistance. Roomy interiors; more wiring space. No wire damage; smooth, rounded integral bushing in each hub protects conductor insulation. Accurately tapped, threads for tight, rigid joints and ground continuity. Completely interchangeable with Appleton Mogul Unilet Series. Applications and installation dimensions are also interchangeable.

■ Standard Materials

- Bodies & Cover - Ductile or Cast Iron
- Gasket - Neoprene or Rubber

■ Size Ranges

- 1" to 4"

■ Standard Finishes

- Bodies & Covers - Hot Dip Galvanized or Electro Zinc Plate & Epoxy painted.
- Threads - Oil touch up or Electro Zinc Plated

■ Compliances / Approvals

- ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- UL Standard: 514B
- NEC 6X - LB, LL, LR, NEC 8X - LT, LC

■ Certification

- KEPIC-EN Certi. No. : EN - 335

■ Model Number Logic

MOGUL	00	0	00
Select constant	Elbow type B : Below turn L : Left turn R : Right turn T : 3Way TB : 3Way Below	Hub threads Spec. N : NPT threads P : PF threads	Hub threads size

Example 1) Conduit Outlet Bodies Mogul Below turn NPT 28 MOGUL LB N28

Example 2) Conduit Outlet Bodies Mogul 3Way PF 54 MOGUL LT P54



Industrial Fittings Conduit Outlet Bodies

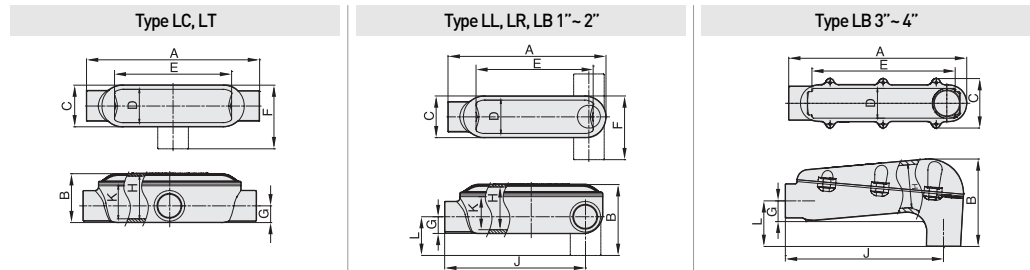
MOGUL Series - Non Hazard. Conduit Outlet Bodies Cover & Gasket

- NEC 6X, 8X
- KEPIC-EN Certificate

■ Selection Table

Hub Size	2 Way				3 Way
	Below	Right	Left	Continue	T type
1 / 2"	MOGUL LB 28	MOGUL LR 28	MOGUL LL 28	MOGUL LC 28	MOGUL LT 28
1-1 / 2"	MOGUL LB 42	MOGUL LR 42	MOGUL LL 42	MOGUL LC 42	MOGUL LT 42
2"	MOGUL LB 54	MOGUL LR 54	MOGUL LL 54	MOGUL LC 54	MOGUL LT 54
3"	MOGUL LB 82	MOGUL LR 82	MOGUL LL 82	MOGUL LC 82	MOGUL LT 82
4"	MOGUL LB 104	—	—	—	—

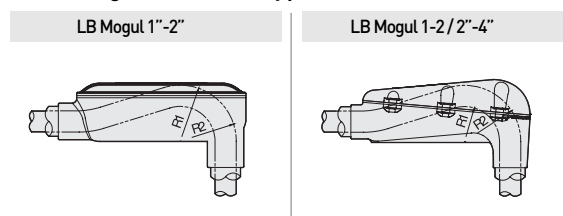
■ Dimensions



(Dimensions in millimeters)

Type	Hub Size	A	B	C	D	E	F	G	H	J	K	L
LC	1	249	70	60	48	168	—	24	62	—	48	—
	1-1/2	354	95	79	64	237	—	35	86	—	65	—
	2	456	113	79	64	330	—	41	102	—	81	—
	3	682	151	117	92	533	—	5	138	—	111	—
LT	1	249	70	60	48	168	83	24	62	—	48	—
	1-1/2	354	95	79	64	264	105	35	86	—	65	—
	2	456	113	79	64	359	105	41	102	—	81	—
	3	682	151	117	92	564	152	55	138	83	111	—
LL,LR	1	227	70	60	48	168	82	24	62	200	48	—
	1-1/2	330	95	79	64	264	105	34	86	295	65	—
	2	371	152	79	64	300	105	41	116	328	87	—
	3	570	153	125	97	419	164	55	134	475	111	—
LB	1	227	92	60	48	168	—	24	62	200	48	48
	1-1/2	330	133	79	64	237	—	35	100	295	78	60
	2	371	160	79	64	273	—	41	124	329	87	68
	3	535	254	149	89	432	—	64	130	470	—	137
	4	699	318	178	117	584	—	83	162	619	—	178

■ Bending Radius – LB type



Bending Radius of Type LB (Dimensions in millimeters)

Hub Size	R1	R2
1"	41	67
1-1/2"	67	105
2"	76	127
3"	127	203
4"	159	260

Industrial Fittings

Union Couplings

EU Series - Ex d II C Union Couplings

Explosion-proof /
Weather-tight
Weather-resistant /
Wet location

CL I, Div. 1 & 2, Groups A, B, C, D /
NEMA 3, 3R
Zone 1, Zone 2 /
II 2G Ex d II C

- Male or Female
- Straight & 45 degree & 90 degree
- KEPIC-EN Certificate



EUM



EUAG



EUF

■ Applications

EU Series union couplings are installed in threaded thick-wall conduit systems:

- EUM – to connect conduit to a conduit fitting, junction box or device enclosure
- EUF – to connect conduit to conduit, or to provide a means for future modification of the conduit system
- EUAG 90 angle union couplings are installed in conduit run or in box or fitting hub:
 - To change direction in threaded rigid conduit run by 90°, or when terminating at a box or fitting.

■ Features

EUM, EUF and EUAG 90 union couplings have:

- Compact design which permits assembly with a minimum of clearance to other adjacent conduit and / or equipment.
- Strong and durable construction.

■ Standard Materials

- EUM, EUF union couplings – Steel
- EUAG 90 degrees – *Ductile or Cast Iron

■ Size Ranges

- 1/2" to 4" – EUM & EUF
- 1/2" to 2" – EUAG 90

■ Standard Finishes

- Steel – Electro-galvanized with chromate treatment
- Cast iron, Ductile – Hot Dip Galvanized or Electro Zinc Plate & Epoxy Painted
- Thread – Oil touch up or Electro Zinc Plated

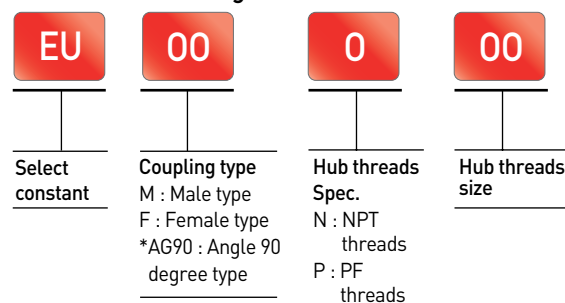
■ Compliances / Approvals

- IEC 60079-0 Equipment – General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- IEC 60529 Degree of protection provided by enclosures (IP Code)
- ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- UL Standard: 886

■ Certification

- Certified KOSHA (Korea Occupational Safety & Health Agency)
- KEPIC-EN Certi. No. : EN - 335

■ Model Number Logic



Example 1) Union Coupling Male type NPT 28 EUM N28

Example 2) Union Coupling Angle 90 type PF 54 EUAG90 P54



Industrial Fittings Union Couplings

EU Series - Ex d II C Union Couplings

Explosion-proof /
Weather-tight
Weather-resistant /
Wet location

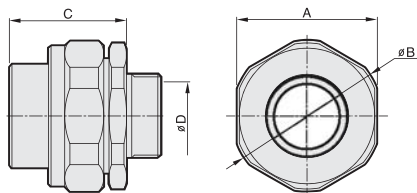
CL I, Div. 1 & 2, Groups A, B, C, D /
NEMA 3, 3R
Zone 1, Zone 2 /
II 2G Ex d II C

■ Selection Table

Hub Size	Male type	Female type	Angle 90 degree type
1 / 2"	EUM 16	EUFG 16	EUAG90 16
3 / 4"	EUM 22	EUFG 22	EUAG90 22
1"	EUM 28	EUFG 28	EUAG90 28
1-1/4"	EUM 36	EUFG 36	EUAG90 36
1-1/2"	EUM 42	EUFG 42	EUAG90 42
2"	EUM 54	EUFG 54	EUAG90 54
2-1/2"	EUM 70	EUFG 70	-
3"	EUM 82	EUFG 82	-
4"	EUM 104	EUFG 104	-

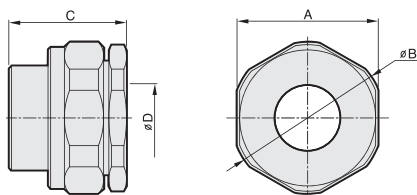
■ Dimensions

EUM - Size



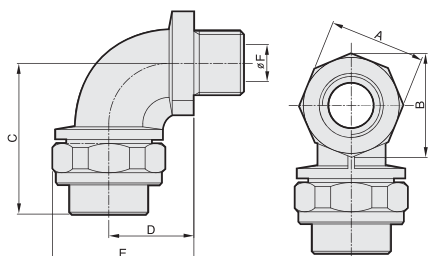
EUM - Size	Dimension(MM)			
	A	ØB	C	ØD
#16 (1/2")	35	38	36.5	14.5
#22 (3/4")	41	44	41.5	19.5
#28 (1")	51	54	46	25
#36 (1-1/4")	61	64	47	33
#42 (1-1/2")	67	70	53	39
#54 (2")	79	82	56	51
#70 (2-1/2")	95	99	67	62
#82 (3")	110	113	70	77
#90 (3-1/2")	121	125	73	89
#104 (4")	136	139	76	102
#130 (5")	170	161	77.2	127
#150 (6")	197	186	74.7	153

EUFG - Size



EUFG - Size	Dimension(MM)			
	A	ØB	C	ØD
#16 (1/2")	35	38	37.5	14.5
#22 (3/4")	41	44	41.5	19.5
#28 (1")	51	54	46	25
#36 (1-1/4")	61	64	48	33
#42 (1-1/2")	67	70	54	39
#54 (2")	79	82	58	51
#70 (2-1/2")	95	99	67	62
#82 (3")	110	113	70	77
#90 (3-1/2")	121	125	73	89
#104 (4")	136	139	76	102
#130 (5")	170	161	82	127
#150 (6")	197	186	82	153

EUAG90 - Size



EUAG90 - Size	Dimension(MM)					
	A	B	C	D	E	ØF
#16 (1/2")	31	35	61.5	27.5	46.5	16
#22 (3/4")	38	41	67.5	32.5	54.5	19.5
#28 (1")	45.5	48.5	76	37	64	25
#36 (1-1/4")	55	58	81	41	73	33
#42 (1-1/2")	61.5	65.5	93	47	81.5	39
#54 (2")	75	80	103	52	91.5	51

Industrial Fittings

Plugs & Adapters, Sockets

EAG Series - Ex d II C EAG Adapters
 ESG Series - Ex d II C ESG Sockets
 FPG Series - Ex d II C FPG Stopping Plugs

Explosion-proof / Rain-tight /
 Water-tight / Corrosion Resistant /
 Submersible*

CL I, Div. 1 & 2, Groups A, B, C, D
 NEMA 4, 4X / II 2G Ex d II C &
 Ex e II IP 66

■ Safety Instructions

The most important safety instructions are summarized in the section.

They supplement the corresponding regulations which the personnel in charge must study.

When working in hazardous areas, safety of the personnel and plant depends on complying with all relevant safety regulations. Assembly and maintenance staff working on installations therefore have particular responsibility. Precise knowledge of the applicable standards and regulations is required.

As the user, please note:

- National safety and accident prevention regulations
- National assembly and installation regulations
- Generally recognized technical regulations
- Safety instructions and information in these operating instructions
- Characteristic values of the type labels and instruction plates
- That any damage of the components may render the Ex-protection null and void. Use the component in accordance with its designated use and for its intended purpose only.

Incorrect or impermissible use or non-compliance with these instructions invalidates our warranty provision.

Any alterations and modifications to the component impairing its explosion protection are not permitted. Install the component only if it is clean and undamaged.

■ Selection Table

Adapters & Sockets

Stopping plugs

Male Thread				Female Thread																											
Threads Per Inch	Pitch	Major Dia. (mm)	Size	M16	M20	M25	M32	M40	M50	M63	M75	1/2" NPT	3/4" NPT	1" NPT	1-1/4" NPT	1-1/2" NPT	2" NPT	2-1/2" NPT	3" NPT	3-1/3" NPT	4" NPT	1/2" PF	3/4" PF	1" PF	1-1/4" PF	1-1/2" PF	2" PF	2-1/2" PF	3" PF	3 1/2" PF	
16.93	1.5	16	M16																												
16.93	1.5	20	M20																												
16.93	1.5	25	M25																												
16.93	1.5	32	M32																												
16.93	1.5	40	M40																												
16.93	1.5	50	M50																												
16.93	1.5	63	M63																												
16.93	1.5	75	M75																												
14	1.81	21.34	1/2" NPT																												
14	1.81	26.67	3/4" NPT																												
11 1/2	2.2	33.4	1" NPT																												
11 1/2	2.2	42.16	1-1/4" NPT																												
11 1/2	2.2	48.26	1-1/2" NPT																												
11 1/2	2.2	60.33	2" NPT																												
8	3.175	73.03	2-1/2" NPT																												
8	3.175	88.9	3" NPT																												
8	3.175	101.6	3-1/2" NPT																												
8	3.175	114.3	4" NPT																												
14	1.81	20.95	1/2" PF																												
14	1.81	22.91	3/4" PF																												
14	1.81	26.44	1" PF																												
11	2.31	33.25	1-1/4" PF																												
11	2.31	41.91	1-1/2" PF																												
11	2.31	47.8	2" PF																												
11	2.31	59.61	2-1/2" PF																												
11	2.31	75.18	3" PF																												
11	2.31	87.88	3-1/2" PF																												
11	2.31	113.03	4" PF																												
Sockets				Adapters																											

■ Sockets ■ Adapters

Code	Thread Size		
	Metric	NPT	PF
1	M20	1/2"	1/2"
2	M25	3/4"	3/4"
3	M32	1"	1"
4	M40	1 1/4"	1 1/4"
5	M50	1 1/2"	1 1/2"
6	M63	2"	2"
7	M75	2 1/2"	2 1/2"
8	M90	3"	3"
9	M100	4"	4"



Industrial Fittings Plugs & Adapters, Sockets

EAG Series - Ex d II C EAG Adapters
ESG Series - Ex d II C ESG Sockets

Explosion-proof / Rain-tight /
Water-tight / Corrosion Resistant /
Submersible*

Cl. I, Div. 1 & 2, Groups A, B, C, D
NEMA 4, 4X / II 2G Ex d II C &
Ex e II IP 66



ESG (Socket)



EAG (Adapter)

■ Application

A wide range of Thread Conversion Adapters and reducers for hazardous area applications. Used to connect cable entry devices and equipment having dissimilar threads.

Care should be taken to ensure that a suitable sealing gasket is also selected and installed where applicable, to ensure that an effective seal is made at the entry.

■ Materials

Adapter and Socket: Available in a variety of materials and finishes including Brass, Carbon Steel, Stainless Steel with optional nickel plating of brass components.
IP66 – Silicon "O" ring

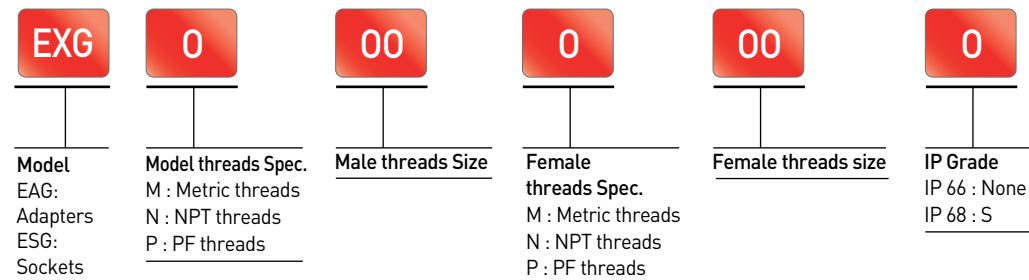
■ Compliances / Approvals

- IEC 60079-0 Equipment – General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- IEC 60079-7 Equipment protection by increased safety "e"
- IEC 60529 Degree of protection provided by enclosures (IP Code)
- ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- BS 3643 ISO metric screw threads. Principles and basic data.

■ Certification

- Certified KOSHA (Korea Occupational Safety & Health Agency)

■ Model Number Logic

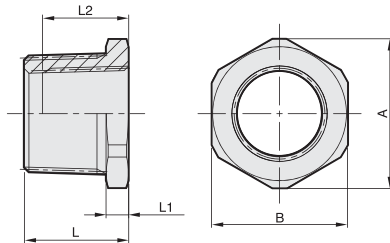


Example 1) Adapter Male NPT 28 Female NPT16 EAG N28 N16

Example 2) Socket Male PF 36 Female NPT 22 IP68 ESG P36 N22 S

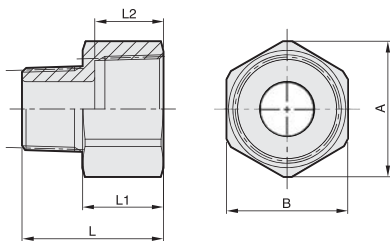
■ Dimensions

EAG (NPT) - Size



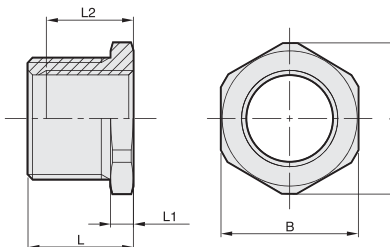
EAG (NPT) - Size	Dimension(MM)				
	A	B	L	L1	L2
#22 (3/4") ~ #16 (1/2")	33	30	18.9	5.0	13.6
#28 (1") ~ #22 (3/4")	40	36	22.4	5.0	13.9
#36 (1-1/4") ~ #28 (1")	51	46	24.0	6.0	17.4
#42 (1-1/2") ~ #36 (1-1/4")	61	55	24.4	6.0	18.0
#54 (2") ~ #42 (1-1/2")	72	65	25.3	6.0	18.4
#70 (2-1/2") ~ #54 (2")	89	80	34.9	6.0	19.3
#82 (3") ~ #70 (2-1/2")	105	95	40.5	10.0	28.9
#104 (4") ~ #82 (3")	140	127	43.0	10.0	30.5

ESG (NPT) - Size



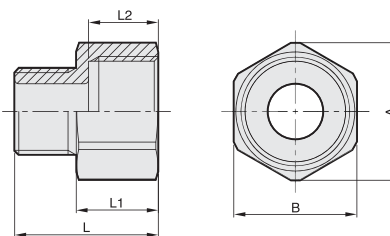
ESG (NPT) - Size		Dimension(MM)				
FEMALE	MALE	A	B	L	L1	L2
#22 (3/4")	#16 (1/2")	33	30	31.1	17.5	13.9
#28 (1")	#22 (3/4")	40	36	34.9	21.0	17.4
#36 (1-1/4")	#28 (1")	51	46	38.4	21.0	18.0
#42 (1-1/2")	#36 (1-1/4")	61	55	39.5	21.5	18.4
#54 (2")	#42 (1-1/2")	72	65	40.9	22.5	19.3
#70 (2-1/2")	#54 (2")	89	80	51.8	32.5	28.9
#82 (3")	#70 (2-1/2")	105	95	62.9	34.0	30.5
#104 (4")	#82 (3")	140	127	67.0	36.5	33.0

EAG (PF & Metric)-Size



EAG (PF & Metric)-Size		Dimension(MM)				
Metric thread	PF thread	A	B	L	L1	L2
M25 ~ M20	#22 (3/4") ~ #16 (1/2")	33	30	23.0	5.0	19.0
M32 ~ M25	#28 (1") ~ #22 (3/4")	40	36	28.0	5.0	24.0
M40 ~ M32	#36 (1-1/4") ~ #28 (1")	51	46	29.0	6.0	24.0
M50 ~ M40	#42 (1-1/2") ~ #36 (1-1/4")	61	55	29.0	6.0	24.0
M63 ~ M50	#54 (2") ~ #42 (1-1/2")	72	65	29.0	6.0	24.0
M75 ~ M63	#70 (2-1/2") ~ #54 (2")	89	80	29.0	6.0	24.0
M90 ~ M75	#82 (3") ~ #70 (2-1/2")	105	95	35.0	10.0	28.0
M100 ~ M90	#104 (4") ~ #82 (3")	140	127	46.0	10.0	38.0

ESG (PF & Metric)-Size



ESG (PF & Metric)-Size				Dimension(MM)				
Metric thread		PF thread		A	B	L	L1	L2
FEMALE	MALE	FEMALE	MALE					
M25	M20	#22 (3/4")	#16 (1/2")	33	30	39.0	21.0	18.0
M32	M25	#28 (1")	#22 (3/4")	40	36	39.0	21.0	18.0
M40	M32	#36 (1-1/4")	#28 (1")	51	46	49.0	26.0	23.0
M50	M40	#42 (1-1/2")	#36 (1-1/4")	61	55	49.0	26.0	23.0
M63	M50	#54 (2")	#42 (1-1/2")	72	65	49.0	26.0	23.0
M75	M63	#70 (2-1/2")	#54 (2")	89	80	50.0	26.0	24.0
M90	M75	#82 (3")	#70 (2-1/2")	105	95	55.0	30.0	27.0
M100	M90	#104 (4")	#82 (3")	140	127	75.0	39.0	35.0



Industrial Fittings Plugs & Adapters, Sockets

FPG Series Stopping Plug

Explosion-proof / Rain-tight / Water-tight /
Corrosion Resistant / Submersible*

CL I, Div. 1 & 2, Groups A, B, C, D
NEMA 4, 4X / II 2G Ex d II C &
Ex e II IP 66



FPG (Stopper Plug)



FPGa (Stopper Plug)

■ Application

A comprehensive range of stopper plugs which are designed to close any unused entries in electrical equipment. In general care should be taken to ensure that a suitable entry thread sealing washer is also selected and installed, where applicable maintaining the integrity of the enclosure or equipment I.P. rating.

■ Materials

Stopper Plug: Available in a Brass, *Aluminum, Carbon Steel, Stainless Steel.
Optional nickel plating of brass components also available.
IP66 – Silicon "O" ring

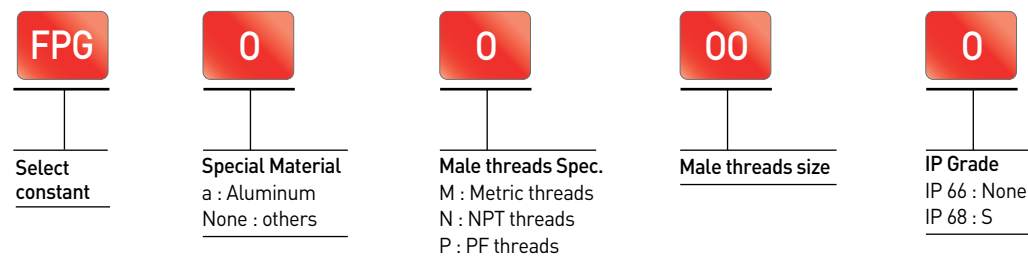
■ Compliances / Approvals

- IEC 60079-0 Equipment – General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- IEC 60079-7 Equipment protection by increased safety "e"
- IEC 60529 Degree of protection provided by enclosures (IP Code)
- ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- BS 3643 ISO metric screw threads. Principles and basic data.

■ Certification

- Certified KOSHA (Korea Occupational Safety & Health Agency)

■ Model Number Logic



Example 1) Stopping plugs NPT 28 FPG N28

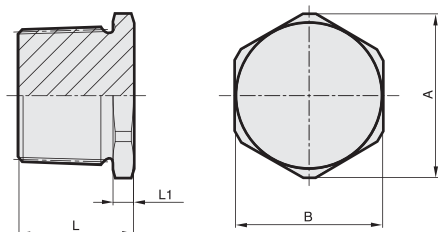
Example 2) Stopping plugs PF 36 IP68 FPG P36 S

■ Selection Table

Hub Size	Normal	Aluminum
#16 (1 / 2")	FPG 16	FPGa 16
#22 (3 / 4")	FPG 22	FPGa 22
#28 (1")	FPG 28	FPGa 28
#36 (1-1/4")	FPG 36	FPGa 36
#42 (1-1/2")	FPG 42	FPGa 42
#54 (2")	FPG 54	FPGa 54
#70 (2-1/2")	FPG 70	-
#82 (3")	FPG 82	-
#104 (4")	FPG 104	-

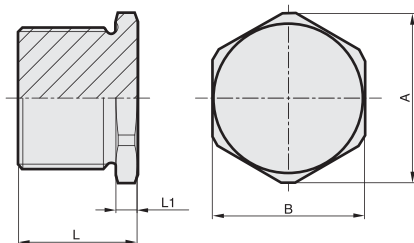
■ Dimensions

FPG (NPT)-Size



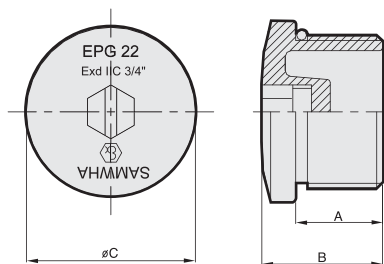
FPG (NPT)-Size	Dimension(MM)				
	A	B	L	L1	O-ring
#16 (1 / 2")	26	24	20.6	5.0	AN 018
#22 (3 / 4")	33	30	20.9	5.0	AN 021
#28 (1")	40	36	25.4	5.0	AN 123
#36 (1-1/4")	51	46	26.0	5.0	AN 128
#42 (1-1/2")	61	55	27.4	6.0	AN 132
#54 (2")	78	70	29.3	6.0	AN 228
#70 (2-1/2")	89	80	38.9	6.0	AN 232
#82 (3")	100	100	42.5	8.0	AN 237
#104 (4")	132	120	45.0	8.0	AN 245

FPG (PF & *Metric)-Size



FPG (PF & *Metric)-Size	Dimension(MM)				
	A	B	L	L1	O-ring
#16 (1 / 2")	26	24	25.0	5.0	AN 018
#22 (3 / 4")	33	30	25.0	5.0	AN 021
#28 (1")	40	36	30.0	5.0	AN 123
#36 (1-1/4")	51	46	30.0	5.0	AN 128
#42 (1-1/2")	61	55	31.0	6.0	AN 132, *AN 134
#54 (2")	78	70	31.0	6.0	AN 228, *AN 229
#70 (2-1/2")	89	80	32.0	6.0	AN 232, *AN 233
#82 (3")	110	100	34.0	8.0	AN 237
#104 (4")	132	120	34.0	8.0	*AN 240, AN 244

EPGa (PF & NPT) - Size



EPGa (PF & NPT) - Size	Dimension(MM)		
	A	B	C
#16 (1 / 2")	15	20	29
#22 (3 / 4")	15	22	31
#28 (1")	19.5	26.5	39
#36 (1-1/4")	19	27.5	50
#42 (1-1/2")	19.5	26.5	59
#54 (2")	19	25.5	67.5



Industrial Fittings Nipples & Couplings, Normal Bends

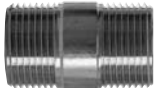
FNG Series Nipples

FNG & FNGC Series - Ex d II C Hazardous Area Type

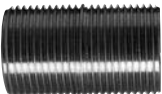
FNGS Series - Non Hazard. Non- hazardous Area Type

Weather-tight /
Weather-resistant /
Wet location

CL I, Div. 1 & 2, Groups A, B, C, D /
NEMA 3.3RX / II 2G Ex d II C & Ex e II



FNG



FNGC



FNGS

■ Application

FNG Series nipples are threaded by PF or NPT. FNG Series are used with rigid conduit for fittings, steel or aluminum. Outdoors or indoors use rain-boot fittings for :

- Conduit systems expansion and alterations.
- Maintenance and repair operations.
- New, altered or damaged stub-ups.
- Connections at panels and boxes.
- Embedment in concrete. Installations in tight quarters :
near corners, walls, ceilings, overhangs, obstacles or adjacent raceways.
- Situations where threading equipment or heavy pipe wrenches are impractical.
- Conduit systems in locations

■ Features

- May be installed in any position.
- Tough and durable, long lasting, trouble free in stallations.
- Full line – $\frac{3}{4}$ " to 6"
- Faster, easier method to install rain-tight rigid / raceway systems.

■ Materials

FNG Series nipples : Available in a variety of materials and finishes including Brass, Carbon Steel, Stainless Steel with optional nickel plating of brass compnents.

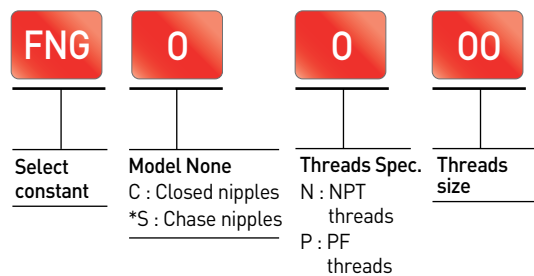
■ Compliances / Approvals

- IEC 60079-0 Equipment – General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- IEC 60079-7 Equipment protection by increased safety "e"
- IEC 60529 Degree of protection provided by enclosures (IP Code)
- ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- BS 3643 ISO metric screw threads. Principles and basic data.

■ Certification

- Certified KOSHA (Korea Occupational Safety & Health Agency)

■ Model Number Logic



Example 1) Nipple NPT 28 FNG N28

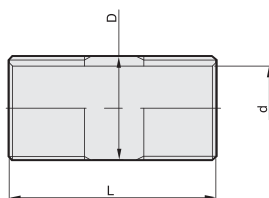
Example 2) Chase nipples PF 36 FNGS P36

■ Selection Table

Hub Size	Normal	Closed nipples	Chase nipples
#16 (1/2")	FNG 16	—	FNGS 16
#22 (3/4")	FNG 22	FNGC 22	FNGS 22
#28 (1")	FNG 28	FNGC 28	FNGS 28
#36 (1-1/4")	FNG 36	—	FNGS 36
#42 (1-1/2")	FNG 42	FNGC 42	FNGS 42
#54 (2")	FNG 54	FNGC 54	FNGS 54
#70 (2-1/2")	FNG 70	FNGC 70	FNGS 70
#82 (3")	FNG 82	FNGC 82	FNGS 82
#104 (4")	FNG 104	FNGC 104	FNGS 104
#130 (5")	—	FNGC 130	—
#150 (6")	—	FNGC 150	—

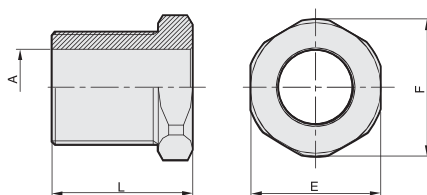
■ Dimensions

FNG - Size



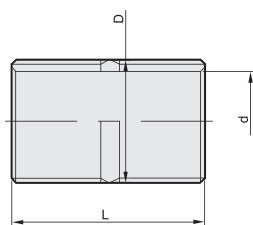
FNG - Size	Dimension(MM)		
	D	d	L
#16 (1/2")	21.0	16.4	44
#22 (3/4")	26.5	21.9	44
#28 (1")	33.3	28.3	55
#36 (1-1/4")	41.9	36.9	55
#42 (1-1/2")	47.8	42.8	55
#54 (2")	59.6	54	65
#70 (1-1/2")	75.2	69.6	65
#82 (3")	87.9	82.3	80
#104 (4")	113.4	106.4	90

FNGS - Size



FNGS - Size	Dimension(MM)			
	A	E	F	L
#16 (1/2")	14	24	26	23
#22 (3/4")	19	30	33	23
#28 (1")	25	35	38	27
#36 (1-1/4")	33	46	49	28
#42 (1-1/2")	39	50	53	33
#54 (2")	51	62	64.5	35
#70 (1-1/2")	62	78	82	38
#82 (3")	77	90	94	41
#104 (4")	102	115.5	119.5	41

FNGC - Size



FNGC - Size	Dimension(MM)		
	D	d	L
#22 (3/4")	26.5	21.9	43.2
#28 (1")	33.3	28.3	50.8
#42 (1-1/2")	47.8	42.8	56.0
#54 (2")	59.6	54.0	56.0
#82 (3")	87.9	82.3	88.4
#104 (4")	113.4	106.4	91.0
#130 (5")	141.3	128.9	96.5
#150 (6")	168.3	154.8	102.0



Industrial Fittings Nipples & Couplings, Normal Bends

SVC Series – Ex d II C SVC Couplings

Weather-tight /
Weather-resistant /
Wet location

Cl. I, Div. 1 & 2, Groups A, B, C, D /
NEMA 3.3RX / II 2G Ex d II C & Ex e II



■ Application

SVC couplings are threaded by PF or NPT. SVC couplings are used with rigid conduit for fittings, steel or aluminum. Outdoors or indoors use rain-boot fittings for:

- Conduit systems expansion and alterations.
- Maintenance and repair operations.
- New, altered or damaged stub-ups.
- Connections at panels and boxes.
- Embedment in concrete. Installations in tight quarters: near corners, walls, ceilings, overhangs, obstacles or adjacent raceways.
- Situations where threading equipment or heavy pipe wrenches are impractical.
- Conduit systems in locations.

■ Features

- May be installed in any position.
- Tough and durable, long lasting, trouble free in stallations.
- Full line – 1 / 2" to 6"
- Faster, easier method to install rain-tight rigid/raceway systems.

■ Materials

SVC couplings : Available in a variety of materials and finishes including Carbon Steel, Stainless Steel .

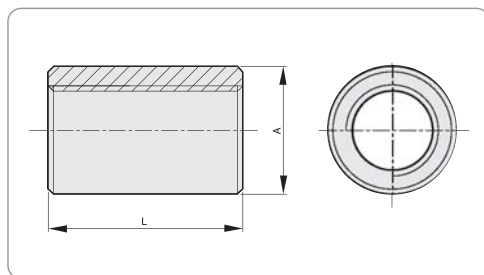
■ Compliances / Approvals

- IEC 60079-0 Equipment – General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- IEC 60079-7 Equipment protection by increased safety "e"
- IEC 60529 Degree of protection provided by enclosures (IP Code)
- ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- BS 3643 ISO metric screw threads. Principles and basic data.

■ Certification

- Certified KOSHA (Korea occupational Safety & Health Agency)

■ Dimensions



SVC - Size	Dimension(MM)	
	ØA	L
#16 (1/2")	24.0	38.0
#22 (3/4")	31.0	44.0
#28 (1")	37.5	50.0
#36 (1-1/4")	47.0	56.0
#42 (1-1/2")	54.0	56.0
#54 (2")	66.0	64.0
#70 (2-1/2")	83.0	72.0
#82 (3")	95.0	80.0
#104 (4")	119.0	90.0
#130 (5")	153.0	100.0
#150 (6")	180.0	100.0

■ Model Number Logic

SVC	0	00
Series Constant	Hub threads Spec. N : Metric threads P : NPT threads	Hub threads size

Example 1) Coupling PF 36 SVC P36

SNB Series – Non Hazard. Rigid Elbows



■ Application

SNB Series are used in conjunction with rigid couplings to make a 45° or 90° bend between two lengths of threaded rigid conduit.

■ Features

- Curvature of the conduit is used to fit specific locations and/or make turns or change directions in the installation.
- Can be used in both indoor and outdoor applications, offering the customer increased flexibility.
- Made of steel and galvanized for corrosion resistance.

■ Standard Materials

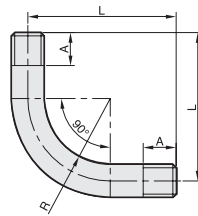
- Steel

■ Standard Finishes

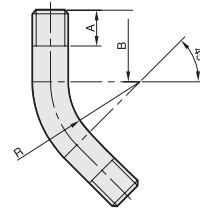
- Hot Dip Galvanized

■ Dimensions

SNB90



SNB45



SNB45 & 90 - Size	Dimension(MM)			
	A	B	L	R
#16 (1/2")	19	49	150	90
#22 (3/4")	22	57	180	110
#28 (1")	25	59	215	140
#36 (1-1/4")	28	59	250	170
#42 (1-1/2")	28	61	295	210
#54 (2")	32	80	345	235
#70 (2-1/2")	36	112	425	275
#82 (3")	40	156	510	310
#104 (4")	45	193	645	395
#130 (5")	45	230	800	500
#150 (6")	50	246	930	600



Industrial Fittings Bushings

FB Series – Non Hazard. Bushings (Malleable Iron)

- 250°C Rated Insulator
- KEPIC EN Certificate
- UL514B & KS C 8460



FB



FBI



FBIE

■ Application

FB Series are used with rigid conduit for fittings.

- Conduit systems expansion and alterations.
- Maintenance and repair operations.
- New, altered or damaged stubups.
- Connections at panels and boxes.
- Embedment in concrete.
- Installations in tight quarters:
 - near corners, walls, ceilings, overhangs, obstacles or adjacent raceways.
- Situations where threading equipment or heavy pipe wrenches are impractical.
- Conduit systems in locations.

■ Features

- May be installed in any position.
- Tough and durable, long lasting, trouble free in stallations.
- Faster, easier method to install rain-tight rigid / raceway systems.

■ Finishes

- Bodies -Hot Dip Galvanized or Electro Zinc Plate & Epoxy Painted
- Threads – Oil touch up or Electro Zinc Plated

■ Standard Materials

- Body – Malleable iron
- Insulator – Polyamide PA
- Grounding lug – Copper
- Bolt – Stainless Steel

■ Size Ranges

- Hub – 1/2" to 4"

■ Compliances / Approvals

- ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- UL Standard: 514B
- KS C 8460

■ Certification

- KEPIC-EN Certi. No. : EN-335

■ Model Number Logic

FB	0	0	0	00
Select constant	Elbow Type None : normal I : insulated	Grounding Spec. Non : normal E : Grounding	Threads Spec. N : NPT threads P : PF threads	Threads Spec.

Example 1) Bushing Non-insulated normal NPT 28 FB N28

Example 2) Bushing Insulated Grounding type PF 36 FBIE P36

ZB Series – Non Hazard. Bushings (Zinc Die Casting)

- 250°C Rated Insulator
- KS C 8460



■ Application

- ZB Series are used with rigid conduit for fittings.
- Conduit systems expansion and alterations.
 - Maintenance and repair operations.
 - New, altered or damaged stubups.
 - Connections at panels and boxes.
 - Embedment in concrete.
 - Installations in tight quarters:
near corners, walls, ceilings, overhangs, obstacles or adjacent raceways.
 - Situations where threading equipment or heavy pipe wrenches are impractical.
 - Conduit systems in locations.

■ Features

- May be installed in any position.
- Tough and durable, long lasting, trouble free in stallations.
- Faster, easier method to install rain-tight rigid / raceway systems.

■ Standard Materials

- Body – Zinc Die Casting
- Insulator – Polyamide PA

■ Finishes

- Bodies – Natural or Electro Zinc Plate

■ Size Ranges

- Hub – 1/2" to 4"

■ Compliances / Approvals

- ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- KS C 8460

■ Model Number Logic

ZB	0	0	00
Select constant	Elbow type None : normal I : insulated	Threads Spec. N : NPT threads P : PF threads	Threads size

Example 1) Bushing Non-insulated NPT 28 ZB N28
Example 2) Bushing Insulated type PF 36 ZBI P36



Industrial Fittings Bushings

EPD16 / UAE 16 - Ex d II C

For Automatic Water Drainage and Continuous Ventilation.

Explosion-proof /
Rain-tight /
Water-tight /
Corrosion Resistant

Cl. I, Div. 1 & 2 /
Groups A, B, C, D /
NEMA 4, 4X /
II 2G Ex d II C IP 65 /

- EPD 16
- Drains & Breather



■ Application

EPD 16 drain and breather are installed in enclosures or conduit systems to:

- At least one breather should be used with each drain.
- EPD 16 as a breather function is installed in top of enclosure or upper section of conduit system.
- EPD 16 as a drain function is installed in bottom of enclosure or in lower section of Conduit system.
- "Universal" is function as a breather when mounted at the top of an enclosure, or as a drain when mounted in the bottom of an enclosure.
- Drains and breathers are installed in hubs or drilled and tapped openings.

■ Standard Materials

- Stainless Steel with brass flots

■ Size Ranges

- BSPP Threads #16 (1/2")

■ Features

EPD 16 "Universal" drains and breathers have:

- Capability to pass 50 cc of water per minute and 0.2 cubic feet or air per minute at atmospheric pressure.
- EPD 16 each have a well inside the inner, threaded end to provide for accumulation of sediment without clogging when used as a drain.

■ Notes

Typical installation of drain and breather

- At least 5 full threads of drain or breather must be engaged in matching female thread.
- EPD 16 can be factory installed on various explosion-proof equipment.

■ Compliances

- IEC 60079-0 Equipment – General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- NEC 500
- NEMA 4, 4X
- IEC 60529

- UAB16
- Drains & Breather



■ Application

UAB 16 drain and breather are installed in enclosures or conduit systems to:

- At least one breather should be used with each drain.
- UAB 16 as a breather function is installed in top of enclosure or upper section of conduit system.
- UAB 16 as a drain function is installed in bottom of enclosure or in lower section of Conduit system.
- "Universal" is function as a breather when mounted at the top of an enclosure, or as a drain when mounted in the bottom of an enclosure.
- Drains and breathers are installed in hubs or drilled and tapped openings.

■ Standard Materials

- Stainless Steel

■ Size Ranges

- BSPP Threads #16 (1/2")

■ Features

UAB 16 "Universal" drains and breathers have:

- Show how water, which enters through end washer slots, spirals down the stud's single lead thread and flows out the bottom.
- Capability to pass 50 cc of water per minute and 0.2 cubic feet or air per minute at atmospheric pressure.
- UAB 16 each have a well inside the inner, threaded end to provide for accumulation of sediment without clogging when used as a drain.

■ Notes

Typical installation of drain and breather

- At least 5 full threads of drain or breather must be engaged in matching female thread
- UAB 16 can be factory installed on various explosion-proof equipment.

■ Compliances

- IEC 60079-0 Equipment – General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- NEC 500
- NEMA 4, 4X
- IEC 60529

Industrial Fittings

Junction Boxes

SJB Series – Non Hazard. Steel Junction Boxes

- Hot Dip Galvanized
- Heavy Duty
- Surface Mounting



■ Application

Where a heavy duty dustproof, weatherproof enclosure is desired, boxes are installed in conduit system to:

- Act as pull box for conductors
- Provide openings and space for making splices and taps in conductors
- Provide for branch conduit runs
- Provide access to conductors for maintenance and future system changes
- Enclose and protect electrical devices

■ Features

- Flat neoprene or rubber cover gasket.
- Wide range of drilled and tapped and slip hole conduit entrance sizes and locations permits extreme flexibility of use in conduit system.
- Internal equipment mounting pads available blind tapped mounting screws.
- Blind tapped into internal mounting pads.

■ Standard Materials

- Body – Steel
- Gasket – Neoprene or Rubber
- Bolt – Electro Zinc Plated Carbon Steel

■ Finishes

- Bodies -Hot Dip Galvanized

■ Dimensions

CAT.NO.	DIMENSIONS(MM)			CAT.NO.	DIMENSIONS(MM)		
	WIDTH	HEIGHT	DEPT		WIDTH	HEIGHT	DEPT
SJB – 1	100	100	50	SJB – 12	300	300	100
SJB – 2	100	100	75	SJB – 13	300	300	150
SJB – 3	100	100	100	SJB – 14	300	300	200
SJB – 4	150	150	100	SJB – 15	300	300	300
SJB – 5	150	150	150	SJB – 16	400	400	150
SJB – 6	200	200	100	SJB – 17	400	400	200
SJB – 7	200	200	150	SJB – 18	400	400	300
SJB – 8	200	200	200	SJB – 19	500	500	200
SJB – 9	250	250	100	SJB – 20	500	500	300
SJB – 10	250	250	150	SJB – 21	600	600	300
SJB – 11	250	250	200	SJB – 22	600	600	400



Industrial Fittings Junction Boxes

Steel Utility Boxes & Covers

- Commercial or Residential Ceiling Boxes
- For Use with Conduits

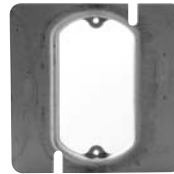
■ Gang Outlet Boxes & Covers



GANG



EXTENSION BOX



SURFACE COVER



FLAT COVER

■ Square Outlet Boxes & Covers



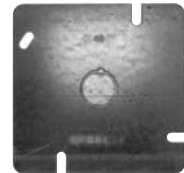
SQUARE BOX



EXTENSION BOX



SURFACE COVER



FLAT COVER

■ Octagon Outlet Boxes & Covers



OCTAGON BOX



EXTENSION BOX



SURFACE COVER



FLAT COVER

Water-Tight Surface Mounting Switches & Receptacles Boxes

Water-Tight Surface Mounting Receptacles Boxes

- Diecasting Aluminum Construction for Long Product Life
- For Use with Conduits

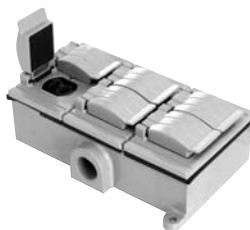
■ Receptacles Boxes



2P 15A 110Vac 2 GANGS



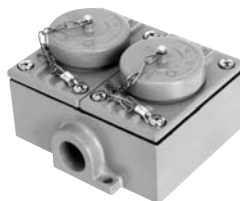
2P 15A 110Vac 4 GANGS



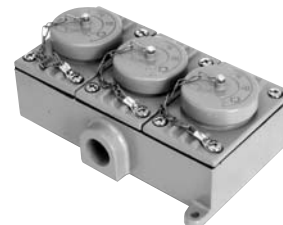
2P 15A 110Vac 6 GANGS



2P 15A 220Vac 1 GANG



2P 15A 220Vac 2 GANGS



2P 15A 220Vac 3 GANGS



2P 15A 300Vac



3P 30A 300Vac OR 3P 50A 300Vac



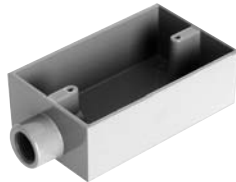
4P 30A 300Vac



Industrial Fittings Junction Boxes

Surface Mounting Box

- Die casting aluminum construction for long product life
- For use with conduits



DEAD END SURFACE
MOUNTING SWITCH BOX



4-WAY OUTLET BOX

Water-Tight Surface Mounting General Use Snap Switches

- Die casting aluminum construction for long product life
 - For use with conduits
- General Use Snap Switches



1P 3A 300Vac 1 GANG OR
3P 6A 300Vac



1P 3A 300Vac OR 2 GANG
3P 6A 300Vac

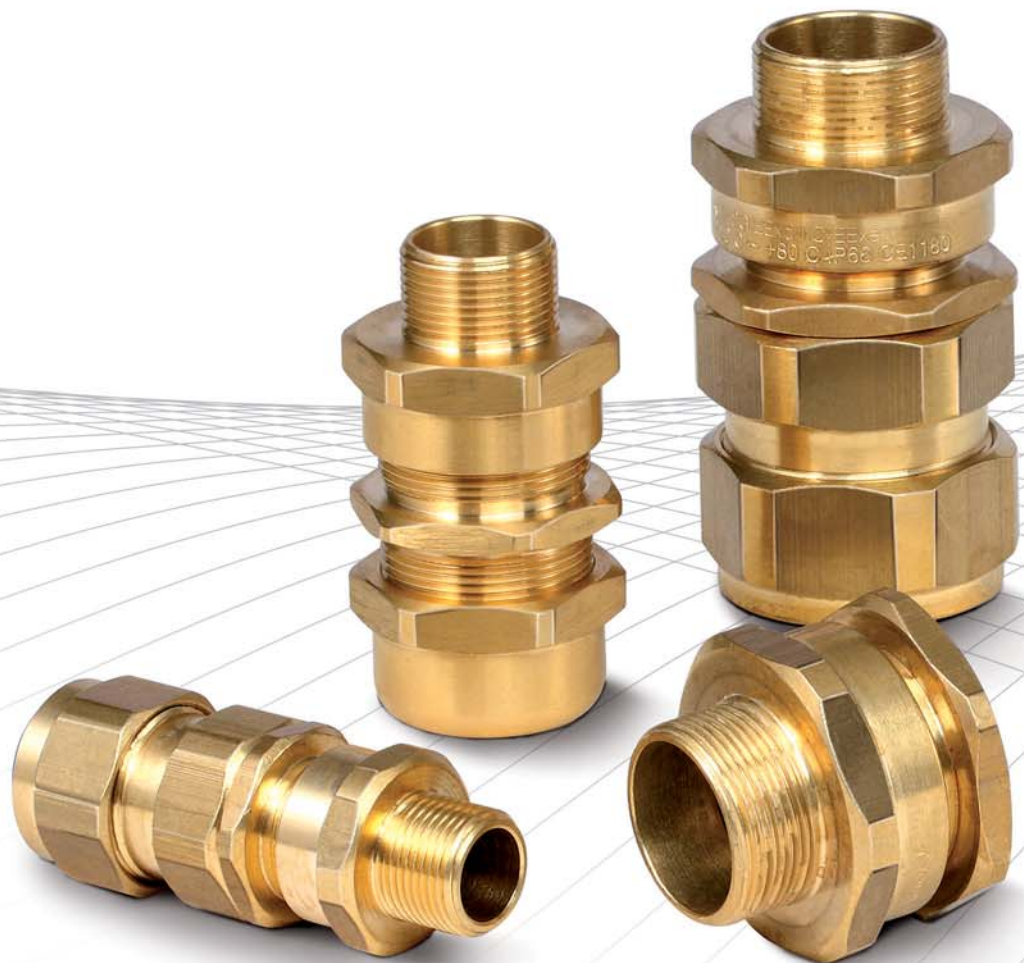


1P 6A 300Vac OR 3 GANG
3P 6A 300Vac

■ MEMO

Excellent Quality Verified by Global Standards

Samwha's cable glands, as qualified with the IECEx and ATEX scheme certificates, are the products verified for quality. Our products provide the advanced solution to install any type of electrical wire.





Cable Glands



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Cable Glands

Industrial Cable Gland

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Cable Glands

Industrial Cable Gland

Industrial & Hazardous Area Cable Gland Technical Description



■ Main Function of The Cable Gland

- Cable Glands may provide environmental protection by sealing on the outer cable sheath, excluding dust and moisture from the electrical or instrument enclosure.
- Cable Glands may facilitate earth continuity in the case of armoured cables, when the cable gland has a metallic construction.
- Cable Glands may provide a holding force on the cable to ensure adequate levels of cable pull out resistance.
- Cable Glands may provide additional sealing on the part of the cable entering the enclosure, when a high degree of ingress protection is required.
- Cable Glands may provide additional environmental sealing at the cable entry point, maintaining the ingress protection rating of the enclosure with the selection of applicable accessories dedicated to performing this function.
- When used in hazardous areas they are required to maintain the level of protection of the equipment to which they are attached

■ Construction & Performance Standards

The original goal was later met by the British Standard **BS 4121**, when the industry had developed further and with more sophistication. Latterly in the 1970's **BS 4121** was superseded by **BS 6121** with the introduction of the metric system of measurement across Europe.

Although it does not replace the full scope of the **BS 6121** construction requirements, today there is a European Standard **EN 50262**, which offers manufacturers the opportunity of meeting its requirements by degrees of performance. It should be noted that whilst products that have been designed to comply with **BS 6121** will quite comfortably meet the requirements of **EN 50262**, it does not automatically follow that cable glands designed to **EN 50262** would also be able to comply with the requirements of **BS 6121**.

• Materials

- Brass Extruded bar ⇒ EN12168:1998 Grade CuZn39Pb (CW614N) (Previously BS2874:1986)
- Stainless Steel ⇒ EN10088-2:2005 Grade 316L (Previously BS970 Part 1:1991)
- Mild Steel ⇒ BS970 Part 1:1996 Grade 220M07Pb

• Thread Construction Standards

- Metric ⇒ ISO 965-1, ISO 965-3 medium fit (6g) for external threads
- NPT ⇒ ANSI/ASME B1.20.1 - 1983 gauging to clause 8.1 for external threads
- BSPP ⇒ BS 2779:1986 (1973) class A full form for external threads
- PG ⇒ DIN 40430:1971

• ISO Metric IEC 60423

THREAD REFERENCE	16	20	25	32	40	50	63	75
THREAD SIZE	M16	M20	M25	M32	M40	M50	M63	M75
THREAD PITCH	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
THREAD PER INCH	16.93	16.93	16.93	16.93	16.93	16.93	16.93	16.93
MAJOR DIAMETER MAX	15.93	19.97	24.97	31.97	39.97	49.97	62.97	74.97
CLEARANCE HOLE Ø MAX	16.5	20.5	25.5	32.5	40.5	50.5	63.5	75.5

• NPT Ansi B1.20.1

THREAD REFERENCE	050	075	100	125	150	200	250	300
THREAD SIZE	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"
THREAD PITCH	1.81	1.81	2.20	2.20	2.20	2.20	3.18	3.18
THREAD PER INCH	14	14	11.5	11.5	11.5	11.5	8	8
MAJOR DIAMETER MAX	21.34	26.67	33.4	42.16	48.26	60.33	73.03	88.9
CLEARANCE HOLE Ø MAX	21.84	27.17	33.9	42.66	48.76	60.83	73.53	89.4

• PF BS2779

THREAD REFERENCE	050	075	100	125	150	200	250	300
THREAD SIZE	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"
THREAD PITCH	1.81	1.81	2.20	2.20	2.20	2.20	3.18	3.18
THREAD PER INCH	14	14	11	11	11	11	8	8
MAJOR DIAMETER MAX	20.96	26.44	33.25	41.91	47.8	59.61	75.18	87.88
CLEARANCE HOLE Ø MAX	21.46	26.94	33.75	42.41	48.3	60.11	75.68	88.39

• PG DIN 40430

THREAD REFERENCE	PG7	PG9	PG11	PG13.5	PG16	PG21	PG29	PG36
THREAD SIZE	PG7	PG9	PG11	PG13.5	PG16	PG21	PG29	PG36
THREAD PITCH	1.27	1.41	1.41	1.41	1.41	1.59	1.59	1.59
THREAD PER INCH	20	18	18	18	18	16	16	16
MAJOR DIAMETER MAX	12.5	15.2	18.6	20.4	22.5	28.3	37	47
CLEARANCE HOLE Ø MAX	13	15.7	19.1	20.9	23	28.8	37.5	47.5

■ Crucial Cable Care

Two factors which could affect the long term cable performance are the type and design of the cable gland sealing function, and the possibility of this being inadvertently, or otherwise, over tightened onto the cable sheath.

In some applications it may be necessary to provide some mechanical protection to prevent the cables from being damaged or completely severed by accidental encroachment of machinery or other major impact.

This mechanical protection may be provided in the shape of a metallic conduit that can house individual insulated cable conductors or a normal unarmoured sheathed cable. Alternatively a metallic sheath or armour included in the cable construction during its manufacturing process may be used.

When cables with a protective metallic sheath or armour are chosen, these may be constructed with or without an extruded inner bedding, underneath the layer of armouring. In some cases this extruded bedding may be substituted by a polymeric covering or tube that contains the insulated conductors.

Cable glands for armoured cables, with a single outer seal should be selected for cables without an inner bedding or covering under the armour. Cable glands for armoured cables, with a double, inner & outer, seal configuration would normally be selected for cables with an inner bedding or covering under the armour.

• Construction of Seal Types

In general there are three different types of sealing methods used on the cable inner bedding, which are
a. Compression Seal b. Displacement Seal c. Compound Barrier Seal.

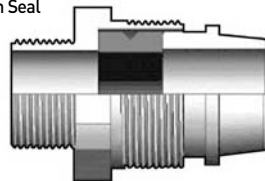
a. Compression Seal (Sealing Ring)

The Compression Seal is an elastomeric sealing ring that has a V groove or weak back in its design that is intended to be closed in order to create a downward seal on the cable inner bedding, when the same compressive force is equally applied to both sides of the seal.

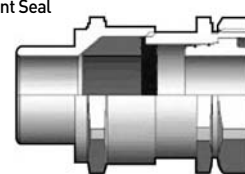
b. Displacement Seal (Sealing Ring)

The Displacement Seal does not employ a weak back design. Instead the Displacement Seal is gradually pushed down a taper until it makes an effective seal on the cable.

i. Compression Seal



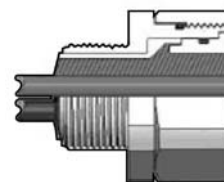
ii. Displacement Seal



c. Compound Barrier Seal (Epoxy Resin Compound)

The compound barrier seal is made on site by the technician completing the installation and is used primarily in hazardous areas where the inner cable bedding must be removed and a hard setting resin barrier seal that has been specially tested for use in potentially explosive atmospheres is applied around the conductors.

iii. Sealing Compound Flameproof Barrier





Cable Glands

Industrial Cable Gland

Industrial & Hazardous Area Cable Gland Technical Description

■ Selection of Cables Intended for Use in Hazardous Areas

Cables come in a wide variety of shapes and sizes and new designs, e.g. those with optical fibers, are regularly being introduced. The issue of correctly sealing these cables as they enter hazardous area electrical equipment is a worldwide problem, and not confined purely to local conditions in any one particular place.

Selection of Cable Glands for Hazardous Areas Under IEC and CENELEC standards three main types of cable glands exist for hazardous area applications for two different generic types of cables, these being armoured and non armoured cables. These are summarized as follows.

	ARMoured CABLES	NON-ARMoured CABLES
INCREASED SAFETY - Ex e	✓	✓
FLAMEPROOF - Ex d	✓	✓
FLAMEPROOF COMPOUND BARRIER - Ex d	✓	✓

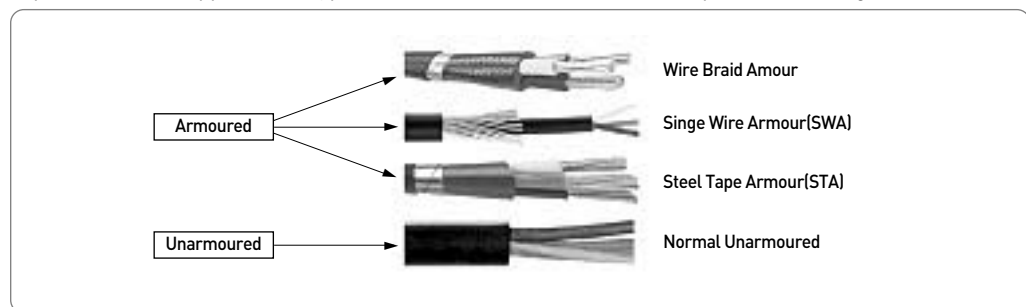
Although there are no IEC construction standards for the cables intended for use in flammable Atmospheres, according to IEC 60079- 14:2002, 10.4.2 (b), if a cable gland with an elastomeric flameproof sealing ring is to be used, when connecting cables to Ex d equipment enclosures, the cable should be :

- Substantially compact and circular (i.e. especially the part of the cable entering the enclosure),
- Have an extruded bedding (without any gaps),
- Have fillers, if any are used, which are Non-Hygroscopic ?

Effectively, the cable should be physically assessed, taking into account the protection method and configuration of the equipment, to verify its suitability, before any cable gland with an elastomeric sealing ring can be selected.

• Typical IEC Cable Types

Until such times when an IEC standard for cables for use in Hazardous Areas has been developed and implemented, this applies to all types of cables used in flammable atmospheres, including.



- Minimum Requirements for Ex e Cable Glands
 - Impact Strength - 7 Nm Minimum
 - Single (Outer) Seal as a Minimum
 - Minimum I.P. Rating - IP54 Gas / Vapour - IP64 Dust
 - Trend is to use Double (Inner/Outer) Seal

- Minimum Requirements for Ex e Cable Glands
 - Screwed Entry Threads Must Maintain FLP Path
 - Inner Seal Must Gas Tight and Maintain Explosion Protection category Ex d
 - Trend is to use Dual Certified Ex d & Ex e

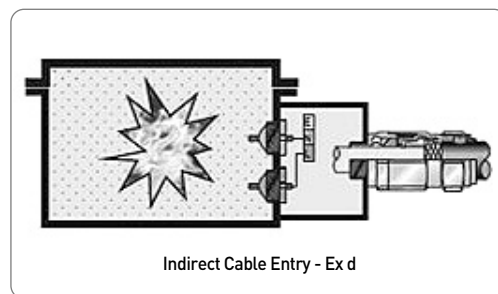
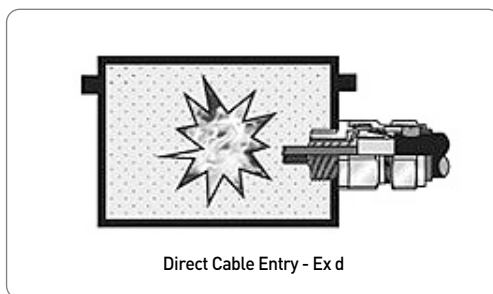
• Requirements for The Use of Ex d Compound Barrier Type Cable Glands

Where circumstances require Cable Glands of the Compound Barrier type to be selected instead of those utilising an elastomeric seal. The following pages describes under what conditions a Compound Barrier Gland should be used. In summary with good engineering practice prevailing, the use of Barrier Glands is generally advised in the following circumstances

- When Cables Directly Enter Flameproof Type 'd' Equipment and ;
 - Cable used is not round, extruded bedded and suitably filled
 - The enclosure contains an internal ignition source, is approved for Zone 1 use and the internal free volume exceeds 2 liters
 - There is a risk of gas migration via the cable from a hazardous area to a safe area, or in transition of zones.

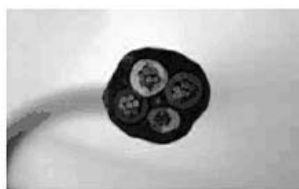
- Cable Entries Into Ex d Enclosures

Two situations can be considered, direct cable entry and indirect cable entry.



- Cable Construction - Should Be Round

In order to comply with IEC installation standards, cable glands using elastomeric sealing rings as a means of maintaining the Flameproof protection method can only be used if the cable selected is :-
"Substantially compact and circular with an extruded bedding, and if any fillers are used they are Non-Hygroscopic"



- This is clearly not always the case with cables used in hazardous areas.
- But the cable must play a part in the safety of the installation, even in the case of indirect cable entry, when gas migration must be avoided.
- e.g., where cables run across two zones, or indeed from a hazardous area into a safe area.

- Sample IEC Cable Configurations

Which type is suitable for use with Flameproof Ex d equipment when a cable gland with an elastomeric sealing ring would be considered?



Cable A



Cable B



Cable C



Cable D



Cable E

- Cable A is not suitable to apply a Flameproof sealing ring as this cable is the incorrect shape, and unless the cable is round the sealing ring will not be able to make an effective seal on the cable.
- Cables B, D & E are not suitable to apply a Flameproof sealing ring, as the white areas represent a gap or void in the cable whereby there is either no inner cable sheath, or extruded bedding, or suitable fillers are absent. In this case no protection to the interstices of the cable can be offered by a sealing ring.
- Cable C is the only one of the five sample cables illustrated which could be selected as correctly meeting the IEC 60079-14 criteria, as it has an extruded inner cable bedding and there is no gas migration path between the conductors.
Equally, if the cable is not adequately filled, and allows the passage of air or gas to flow along the cable length then there would be no protection to the inner part of the cable when an elastomeric sealing ring is used. In this case a compound barrier type cable gland is the only safe solution and this is needed to maintain the integrity of the equipment as explained above, and prevent gas migration from equipment to equipment, or hazardous areas to safe areas.



Cable Glands

Industrial Cable Gland

Industrial & Hazardous Area Cable Gland Technical Description

■ BS 6121 Definitions

Below are tables composed from data included in BS 6121 : Part 1 : 1989

Cable Gland Type Designations for Unarmoured Cables

TYPE	DEFINITION
A1	For unarmoured cable with an elastomeric or plastic outer sheath, with sealing function between the cable sheath and the sealing ring of the cable gland.
A2	As type A1, but with seal protection degree IP66
A3	As type A1, but with an electrical bond for the metallic inner screen

Cable Gland Type Designations for Armoured Cables

CODE	DEFINITION
B	No Seal
C	Single Outer Seal
D	Single Inner Seal
E	- Double (Inner & Outer) Seal - suffix '1' = Normal - suffix '2' = Lead Sheathed

Cable Type Designations

CODE			
T	Pliable Wire Armour	Y	Strip Armour
W	Single Wire Armour	Z	Tape Armour
X	Braid		

■ Cable Gland Material Selection

With the help of several independently accredited laboratories SAMWHA Products has carried out extensive testing of materials for cable glands to be used in hostile environments, particularly with regards to the mating of dissimilar metals. Together with the results of detailed research and the findings of this bespoke testing, SAMWHA Products has been able to select the most suitable material for cable glands to suit a wide variety of environmental applications including:

- Hostile salt water marine (offshore) situations,
- Dust and salt laden (coastal) atmospheres,
- High and low temperature extremes,
- Ultra Violet (UV) degradation,
- EMI/RFI pollution via electromagnetic interference,
- Metallurgical corrosion caused by chemical attack and liquid,
- Acid and vapourised pollutants, and
- The chemical agents used in industrial cleaning processes such as the wash or hose down operations in the offshore drilling industry.

Recognizing that the specific conditions of any installation will play a major part in the selection of the most suitable cable gland material and taking into account the level of environmental exposure along with the nature of the enclosure and cable armour material the following tables are offered as a general guide to operations under normal conditions. Subject to there being no adverse environmental conditions prevailing these tables can be used on a regular basis to determine the cable gland material recommended for several different situations.

Cable gland material selection is shown in Table 1.

■ Electrical Properties-Protective Connection to Earth (Category A, B OR C)

(Requirements of EN 50262) - is shown in Table 2

■ The Short Circuit Fault Current Rating Values for Earth Tags

- Is shown in Table 2

EARTH TAG SIZE	SHORT CIRCUIT RATING SYMMETRICAL FAULT CURRENT (KA) FOR 1 SECOND
20	3.06
25	4.00
32	5.40
40	7.20
50	10.40
63	10.40
75	10.40

■ Inspection & Maintenance

The subject of Inspection and maintenance is a very important one, as in common with any non-hazardous area installations, the presence of an inspection and maintenance regime will always be effective by way of a preventative measure against the risk of incidents or accidents from arising that may otherwise go unnoticed.

The two main IEC Inspection & Maintenance standards that are in use today for gas / vapour hazards and dust hazards are detailed below.

IEC 60079 -17 : Electrical apparatus for explosive gas atmospheres - Part 17: Inspection and maintenance of electrical installations in hazardous areas (other than mines)

IEC 61241 -17 : Electrical apparatus for use in the presence of combustible dust - Part 17: Inspection and maintenance of electrical installations in hazardous areas (other than mines)

Table 1 Cable Gland Material Selection

CABLE TYPE	Enclosure / Cable Plate Material				
	ALUMINUM	BRASS	STAINLESS STEEL	STEEL	NON-METALLIC
NON-ARMoured CABLES	Suggested Cable Gland Material				
E.G. PVC/XLPE	Aluminum or Stainless Steel	Brass (*)	Stainless Steel or Brass (*)	Stainless Steel or Brass (*)	Brass (*) or Non-metallic
ARMoured CABLES	Suggested Cable Gland Material				
AWA or ASA	Aluminum or Stainless Steel	Stainless Steel or Nickel Plated Brass	Stainless Steel or Nickel Plated Brass	Stainless Steel or Nickel Plated Brass	Stainless Steel or Aluminum
GSWA, SWA, OR STA	Stainless Steel or Nickel Plated Brass	Brass (*)	Stainless Steel or Brass (*)	Stainless Steel or Brass (*)	Brass (*)
SWB or GSWB	Stainless Steel or Nickel Plated Brass	Brass (*)	Stainless Steel or Brass (*)	Stainless Steel or Brass (*)	Brass (*)
TCWB	Stainless Steel or Nickel Plated Brass	Brass (*)	Stainless Steel or Brass (*)	Stainless Steel or Brass (*)	Brass (*)
BWB	Stainless Steel or Nickel Plated Brass	Brass (*)	Stainless Steel or Brass (*)	Stainless Steel or Brass (*)	Brass (*)

Note : Where tables make reference to N/P Brass, the definition is Nickel Plated Brass. Where suggested cable gland material is Brass (*), the user may also use optional Nickel Plated Brass Cable Glands at their discretion.

Table 2 Electrical Properties - Protective Connection to Earth (Category A, B OR C).

(Requirements of EN 50262)

Cable Diameter	Rms current (kA)			Nearest SAMWHA Cable Gland Size (Metric)
	Category A – Cable Gland only	Category B – with an Earth Tag attached	Category C – with a heavy duty integral Earth Lug	
> 4 to 8	0.5	3.1	10.0	16
> 8 to 11	0.5	3.1	13.1	20S
> 11 to 16	0.5	3.1	13.1	20
> 16 to 23	0.5	4	13.1	25
> 23 to 31	0.5	5.4	13.1	32
> 31 to 43	1.8	7.2	43.0	40
> 43 to 55	2.3	10.4	43.0	50
> 55	2.8	10.4	43.0	63

Note : CATEGORY A, is the minimum requirement which may apply in cases where the cable armouring (other than steel wire) is the limiting factor & where the cable gland is screwed into a threaded hole in the metallic equipment enclosure.

CATEGORY B, is the medium requirement which may apply in cases where steel wire / metallic sheathed armoured cable is used and the system includes a high sensitivity method of secondary protection against fault currents and where earth tags are used with the cable gland.

CATEGORY C, is the highest requirement, which may apply in cases where steel wire / metallic sheathed armoured cable is used and the system relies on a low sensitivity method of secondary protection against fault currents and where integral earth lugs.



Cable Glands

Industrial Cable Gland

CGK Un-armoured, Outer Sheath Seal CGK Industrial Cable Gland

Rain-tight / Water-tight / Corrosion Resistant

NEMA 4, 4X / IP 55

- For Un-armoured Cables
- KS V 8811

■ Applications

CGK Type indoor and outdoor cable gland for use with all types of Un-armoured cable, providing an environmental seal on the cable outer sheath.

■ Features

The CGK type range of industrial cable glands is designed and tested to KS V 8811 All metallic cable gland components are manufactured from the same grade of material. Brass locknuts are produced in the same CU Zn39PB3 grade as the cable gland.

■ Standard Materials

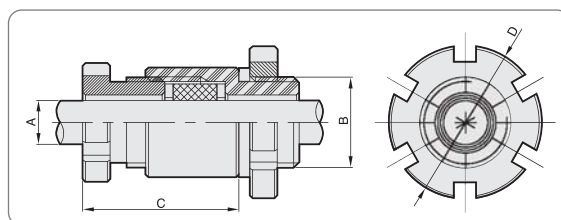
- Brass Extruded bar ⇒ EN12168: 1998 Grade CuZn39Pb (CW614N) (Previously BS2874: 1986)
- IP55-Neoprene or Rubber "O" ring

■ Standard Finishes

- Brass ⇒ Natural or Nickel-Cr Plated

■ Compliances / Approvals

- IEC 60529 Degree of protection provided by enclosures (IP Code)
- NPT ⇒ ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- BSPP ⇒ ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads.



TECHNICAL DATA			
Model	CGK	Cable Type	Un-armoured
Design Specification	KS V 8811	Sealing Technique	Compressed Seal
Ingress Protection Rating	IP55	Sealing Area(s)	Cable Outer Sheath
Continuous Operating Temperature	-30° C to +150° C	Optional Accessories	Adaptor/Reducer

■ Cable Gland Selection Table

Cable Gland Size	Available Entry Threads BSPP OR NPT "B"	Minimum Thread Length	Overall Cable Diameter "A"		Across Corners "D" Max	Protrusion Length "C"
			Min	Max		
#10	NPT 3/8" (PF 3/8")	11.0	4.0	8.0	28.0	32.0
#15	NPT 1/2" (PF 1/2")	11.0	6.4	11.0	31.0	36.0
#20	NPT 3/4" (PF 3/4")	11.0	9.5	15.0	37.0	39.0
#25	NPT 1" (PF 1")	11.0	14.0	20.0	45.0	47.0
#30	NPT 1-1/4" (PF 1-1/4")	12.0	19.0	26.0	56.0	53.0
#35	NPT 1-1/2" (PF 1-1/2")	12.0	24.5	30.0	63.0	55.0
#40	NPT 1-1/2" (PF 1-1/2")	12.0	28.5	34.0	63.0	55.0
#45	NPT 2" (PF 2")	12.0	33.0	40.0	76.0	60.0
#50	NPT 2" (PF 2")	12.0	38.5	44.0	76.0	60.0
#55	NPT 2-1/2" (PF 2-1/2")	12.0	43.0	50.0	95.0	72.0
#60	NPT 2-1/2" (PF 2-1/2")	12.0	49.0	56.0	95.0	72.0
#65	NPT 3" (PF 3")	15.0	54.5	60.0	110.0	79.0
#70	NPT 3" (PF 3")	15.0	58.5	64.0	110.0	79.0
#75	NPT 3" (PF 3")	15.0	63.0	70.0	110.0	79.0
#80	NPT 3-1/2" (PF 3-1/2")	15.0	68.5	74.0	130.0	87.0
#85	NPT 3-1/2" (PF 3-1/2")	15.0	72.5	78.0	130.0	87.0
#90	NPT 4" (PF 4")	20.0	76.5	81.0	140.0	105.0
#95	NPT 4" (PF 4")	20.0	80.0	86.0	140.0	105.0
#100	NPT 4" (PF 4")	20.0	84.5	100.0	156.0	115.0

CGC Un-armoured, Outer Sheath Seal CGC Industrial Cable Gland

Rain-tight / Water-tight / Corrosion Resistant NEMA 4, 4X / IP 55

- For Un-armoured Cables



Applications

CGC Type indoor and outdoor cable gland for use with all types of Un-armoured cable, providing an environmental seal on the cable outer sheath.

Features

All metallic cable gland components are manufactured from the same grade of material. Brass locknuts are produced in the same CU Zn39PB3 grade as the cable gland.

Standard Materials

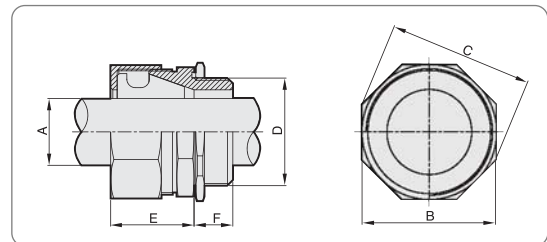
- Brass Extruded bar \Rightarrow EN12168 : 1998 Grade CuZn39Pb (CW614N) (Previously BS2874: 1986)
- IP55 \Rightarrow Neoprene or Rubber "O" ring

Standard Finishes

- Brass \Rightarrow Natural or Nickel-Cr Plated

Compliances / Approvals

- IEC 60529 Degree of protection provided by enclosures (IP Code)
- NPT \Rightarrow ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- BSPP \Rightarrow ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads.



TECHNICAL DATA			
Model	CGK	Cable Type	Un-armoured
Sealing Technique	Compressed Seal	Sealing Area(s)	Cable Outer Sheath
Ingress Protection Rating	IP55	Optional Accessories	Adaptor/Reducer
Continuous Operating Temperature	-30° C to +150° C	—	—

Cable Gland Selection Table

Cable Gland Size		Available Entry Threads "D"		Minimum Thread Length "F"		Overall Cable Diameter "A"		Across Flats "B"	Across Corners "C"	Protrusion Length "E"
		BSPP	NPT	BSPP	NPT	Min	Max	Max	Max	
16	A	1/2"	1/2"	13.0	14.0	3.5	6.5	32.0	35.0	27.0
	B					6.5	9.5			
	C					9.5	12.7			
22	A	3/4"	3/4"	14.0	14.0	3.5	6.5	38.0	41.0	27.0
	B					6.5	9.5			
	C					9.5	12.7			
28	A	1"	1"	15.0	18.0	12.7	16.0	46.0	49.0	35.0
	B					16.0	12.7			
	C					19.0	16.0			
36	A	1-1/4"	1-1/4"	18.0	18.0	19.0	19.0	55.0	59.0	38.0
	B					22.5	22.5			
	C					25.5	22.5			
42	A	1-1/2"	1-1/2"	18.0	19.0	28.5	25.5	62.0	66.0	38.0
	B					30.2	28.5			
	C					22.5	32.0			
54	A	2"	2"	21.0	21.0	25.5	32.0	75.0	80.0	43.0
	B					28.5	25.5			
	C					32.0	28.5			
70	A	2-1/2"	2-1/2"	24.0	39.0	32.0	32.0	92.0	98.0	70.0
	B					36.0	36.0			
	C					40.0	40.0			
82	A	3"	3"	28.0	41.0	36.0	41.5	108.0	114.0	75.8
	B					40.0	44.5			
	C					41.5	40.0			
90	A	3-1/2"	3-1/2"	32.0	41.0	44.5	44.5	136.0	142.0	89.0
	B					47.5	47.5			
	C					49.5	49.5			
104	A	4"	4"	32.0	44.0	55.5	54.5	136.0	142.0	91.0
	B					55.5	55.5			
	C					55.5	60.0			
130	A	5"	5"	39.0	45.0	49.5	55.5	164.0	170.0	86.0
	B					55.5	63.5			
	C					63.5	67.3			



Cable Glands

Industrial Cable Gland

A2 Un-armoured, Outer Sheath Seal A2 Industrial Cable Gland

Rain-tight / Water-tight / Corrosion Resistant

NEMA 4, 4X / IP 66

- For Un-armoured Cables
- BS 6121 : Part 1 : 1989

■ Applications

A2 Type indoor and outdoor cable gland for use with all types of Un-armoured cable, providing mechanical cable retention and an environmental seal on the cable outer sheath.

■ Features

The A2 type range of industrial cable glands is designed and tested to BS 6121:Part 1:1989

All metallic cable gland components are manufactured from the same grade of material. Brass locknuts are produced in the same CU Zn39PB3 grade as the cable gland.

■ Standard Materials

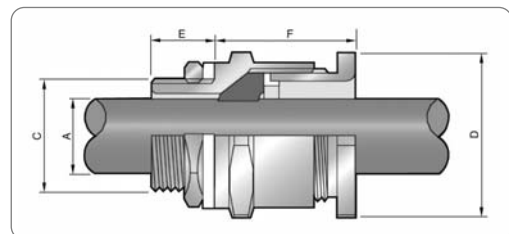
- Brass Extruded bar ⇒ EN12168 : 1998 Grade CuZn39Pb (CW614N) (Previously BS2874 : 1986)
- Stainless Steel ⇒ EN10088-2 : 2005 Grade 316L (Previously BS970 Part 1 : 1991)
- Mild Steel ⇒ BS970 Part 1 : 1996 Grade 220M07Pb
- IP66 - Neoprene or Rubber "O" ring

■ Standard Finishes

- Brass ⇒ Natural or Nickel Plated
- Mild Steel ⇒ Electro Zinc Plated

■ Compliances / Approvals

- IEC 60529 Degree of protection provided by enclosures (IP Code)
- NPT ⇒ ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- BSPP ⇒ ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- PG ⇒ DIN 40430 : 1971 PG threads
- Metric ⇒ ISO 965-1, ISO 965-3 medium fit(6g) for external threads
- BS 6121 : Part 1 : 1989



TECHNICAL DATA

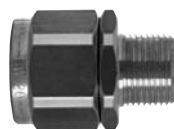
Model	A2	Cable Type	IP66
Design Specification	BS 6121:Part 1:1989, EN 50262:1999	Sealing Technique	Un-armoured
EN 50262 Mechanical Classifications	Retention = Class B, Impact = Level 8	Sealing Area(s)	Cable Outer Sheath
Continuous Operating Temperature	-30° C to +150° C	Optional Accessories	Adaptor/Reducer, Earth Tag, Serrated Washer, Shroud

■ Cable Gland Selection Table

Cable Gland Size	Available Entry Threads "C"			Minimum Thread Length "E"	Overall Cable Diameter "A"		Across Flats "D"	Across Corners	Protrusion Length "F"	PVC Shroud Ref
	Standard		Option		Min	Max	Max	Max		
	Metric	NPT	NPT							
20S/16	M20	1/2"	3/4"	10.0	3.1	8.6	25.0	28.0	26.5	GPS20
20S	M20	1/2"	3/4"	10.0	7.0	11.6	28.0	31.0	26.5	GPS20
20	M20	1/2"	3/4"	10.0	11.0	13.9	30.0	33.0	26.5	GPS20
25	M25	3/4"	1"	10.0	13.0	19.9	40.0	44.0	28.5	GPS25
32	M32	1"	1 1/4"	10.0	19.0	24.2	48.0	53.0	32.5	GPS32
40	M40	1 1/4"	1 1/2"	15.0	25.0	32.1	55.0	61.0	40.5	GPS40
50S	M50	1 1/2"	2"	15.0	31.5	38.1	60.0	67.0	40.5	GPS50
50	M50	2"	2 1/2"	15.0	36.5	44.0	70.0	77.0	40.5	GPS50
63S	M63	2"	2 1/2"	15.0	42.5	47.3	75.0	82.0	42.5	GPS63
63	M63	2 1/2"	3"	15.0	48.5	55.9	80.0	98.0	43.0	GPS63
75S	M75	2 1/2"	3"	15.0	54.5	61.9	90.0	99.0	46.0	GPS75
75	M75	3"	3 1/2"	15.0	60.5	67.9	100.0	110.0	46.0	GPS75
90	M90	3"	3 1/2"	15.0	67.5	79.3	120.0	132.0	47.5	GPS90

BW Armoured, None Seal BW Industrial Cable Gland

- For Armoured Cables
- BS 6121 : Part 1 : 2005



■ Applications

BW Type indoor cable gland for use with all types of Single Wire armoured (SWA) cable, providing mechanical cable retention and electrical continuity via armour wire termination.

■ Features

The BW type range of industrial cable glands is designed and tested to BS 6121:Part 1:2005.

All metallic cable gland components are manufactured from the same grade of material. Brass locknuts are produced in the same CU Zn39PB3 grade as the cable gland.

■ Standard Materials

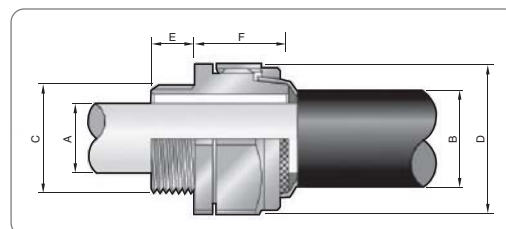
- Brass Extruded bar ⇒ EN12168 : 1998 Grade CuZn39Pb (CW614N) (Previously BS2874 : 1986)
- Stainless Steel ⇒ EN10088-2 : 2005 Grade 316L (Previously BS970 Part 1 : 1991)
- Mild Steel ⇒ BS970 Part 1 : 1996 Grade 220M07Pb

■ Standard Finishes

- Brass ⇒ Natural or Nickel Plated
- Mild Steel ⇒ Electro Zinc Plated

■ Compliances / Approvals

- NPT ⇒ ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- BSPP ⇒ SO 228/1 Pipe threads where pressure-tight joints General purpose (Inch)
- are not made on the threads
- PG ⇒ DIN 40430 : 1971 PG threads
- Metric ⇒ ISO 965-1, ISO 965-3 medium fit (6g) for external threads
- BS 6121 : Part 1 : 2005



TECHNICAL DATA

Model	BW	Cable Type	Armoured
Design Specification	BS 6121:Part 1:2005, EN 50262:1999	Armour Clamping	Two part Armour Lock
EN 50262 Mechanical Classifications	Retention = Class B, Impact = Level 8	Optional Accessories	Adaptor/Reducer, Earth Tag, Serrated Washer, Shroud
Continuous Operating Temperature	-20° C to +150° C		

■ Cable Gland Selection Table

Cable Gland Size	Available Entry Threads "C"			Minimum Thread Length "E"	Cable Bedding Diameter "A"	Overall Cable Diameter "B"	Across Flats "D"		Across Corners	Protrusion Length "F"	PVC Shroud Ref
	Standard		Option				Min	Max			
	Metric	NPT	NPT								
20S	M20	1/2"	3/4"	10.0	11.6	15.9	0.9	1.25	31.0	24.0	GPS20
20	M20	1/2"	3/4"	10.0	13.9	20.9	0.9	1.25	33.0	24.0	GPS20
25	M25	3/4"	1"	10.0	19.9	27.4	1.25	1.6	44.0	24.0	GPS25
32	M32	1"	1 1/4"	10.0	26.2	33.9	1.6	2.0	53.0	28.0	GPS32
40	M40	1 1/4"	1 1/2"	15.0	32.1	40.4	1.6	2.0	61.0	31.0	GPS40
50S	M50	1 1/2"	2"	15.0	38.1	46.7	2.0	2.5	67.0	33.0	GPS50
50	M50	2"	2 1/2"	15.0	44.0	53.1	2.0	2.5	77.0	33.0	GPS50
63S	M63	2"	2 1/2"	15.0	49.9	59.4	2.5		82.0	40.0	GPS63
63	M63	2 1/2"	3"	15.0	55.9	65.9	2.5		88.0	41.0	GPS63
75S	M75	2 1/2"	3"	15.0	61.9	72.1	2.5		99.0	47.5	GPS75
75	M75	3"	3 1/2"	15.0	67.9	78.5	2.5	3.15	110.0	47.5	GPS75



Cable Glands

Industrial Cable Gland

CW Armoured, Outer Sheath Seal CW Industrial Cable Gland

Rain-tight / Water-tight / Corrosion Resistant

NEMA 4, 4X / IP 66

- For Armoured Cables
- BS 6121 : Part 1 : 1989

■ Applications

CW Type indoor and outdoor cable gland for use with Single Wire Armoured (SWA) Cable providing an environmental seal on the cable outer sheath, providing mechanical cable retention and electrical continuity via armour wire termination.

■ Features

The CW type range of industrial cable glands is designed and tested to BS 6121:Part 1:1989. All metallic cable gland components are manufactured from the same grade of material. Brass locknuts are produced in the same CU Zn39PB3 grade as the cable gland.

■ Standard Materials

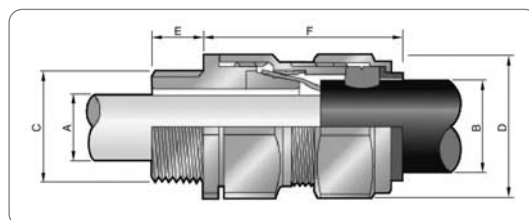
- Brass Extruded bar ⇒ EN12168 : 1998 Grade CuZn39Pb (CW614N) (Previously BS2874: 1986)
- Stainless Steel ⇒ EN10088-2 : 2005 Grade 316L (Previously BS970 Part 1 : 1991)
- Mild Steel ⇒ BS970 Part 1 : 1996 Grade 220M07Pb
- IP66 - Neoprene or Rubber "O" ring

■ Standard Finishes

- Brass ⇒ Natural or Nickel Plated
- Mild Steel ⇒ Electro Zinc Plated

■ Compliances / Approvals

- IEC 60529 Degree of protection provided by enclosures (IP Code)
- NPT ⇒ ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- BSPP ⇒ ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- PG ⇒ DIN 40430:1971 PG threads
- Metric ⇒ ISO 965-1, ISO 965-3 medium fit(6g) for external threads
- BS 6121 : Part 1 : 1989



TECHNICAL DATA

Model	CW	Cable Type	Armoured
Design Specification	BS 6121:Part 1:1989, EN 50262:1999	Sealing Technique	Displacement Seal
EN 50262 Mechanical Classifications	Retention = Class B, Impact = Level 8	Sealing Area(s)	Cable Outer Sheath
Continuous Operating Temperature	-30° C to +150° C	Optional Accessories	Adaptor/Reducer, Earth Tag, Serrated Washer, Shroud
Ingress Protection Rating	IP66		

■ Cable Gland Selection Table

Cable Gland Size	Available Entry Threads "C"			Minimum Thread Length "E"	Cable Bedding Diameter "A"	Overall Cable Diameter "B"		Armour Range		Across Flats "D"	Across Corners	Protrusion Length "F"	PVC Shroud Ref	
	Standard		Option			Max	Min	Max	Min					Max
	Metric	NPT	NPT											
20S/16	M20	1/2"	3/4"	10.0	8.6	8.0	13.4	0.9		25.0	29.0	69.0	GPS20	
20S	M20	1/2"	3/4"	10.0	11.6	12.0	15.9	0.9	1.25	28.0	31.0	69.0	GPS20	
20	M20	1/2"	3/4"	10.0	13.9	15.0	20.9	0.9	1.25	30.0	33.0	69.0	GPS20	
25	M25	3/4"	1"	10.0	19.9	20.0	27.4	1.25	1.6	40.0	44.0	74.0	GPS25	
32	M32	1"	1 1/4"	10.0	26.2	26.5	33.9	1.6	2.0	48.0	53.0	80.0	GPS32	
40	M40	1 1/4"	1 1/2"	15.0	32.1	33.0	40.4	1.6	2.0	55.0	61.0	90.0	GPS40	
50S	M50	1 1/2"	2"	15.0	38.1	39.0	46.7	2.0	2.5	60.0	67.0	93.0	GPS50	
50	M50	2"	2 1/2"	15.0	44.0	45.5	53.1	2.0	2.5	70.0	77.0	93.0	GPS50	
63S	M63	2"	2 1/2"	15.0	49.9	52.0	59.4	2.5		75.0	82.0	104.0	GPS63	
63	M63	2 1/2"	3"	15.0	55.9	58.0	65.9	2.5		80.0	88.0	104.0	GPS63	
75S	M75	2 1/2"	3"	15.0	61.9	64.0	72.1	2.5		90.0	99.0	110.0	GPS75	
75	M75	3"	3 1/2"	15.0	67.9	71.0	78.5	2.5	3.15	100.0	110.0	110.0	GPS75	
90	M90	3"	3 1/2"	15.0	79.3	78.5	90.4	3.15		120.0	132.0	112.0	GPS90	

CX Armoured, Outer Sheath Seal CX Industrial Cable Gland

Rain-tight / Water-tight / Corrosion Resistant

NEMA 4, 4X / IP 66

- For Armoured Cables
- BS 6121 : Part 1 : 1989



■ Applications

CX Type indoor and outdoor cable gland for use with all types of Wire Braid, Strip Armour, Pliable Wire Armour & Steel Tape Armour (STA) Cable providing an environmental seal on the cable outer sheath, providing mechanical cable retention and electrical continuity via armour wire termination .

■ Features

The CX type range of industrial cable glands is designed and tested to BS 6121:Part 1:1989
All metallic cable gland components are manufactured from the same grade of material. Brass locknuts are produced in the same CU Zn39PB3 grade as the cable gland.

■ Standard Materials

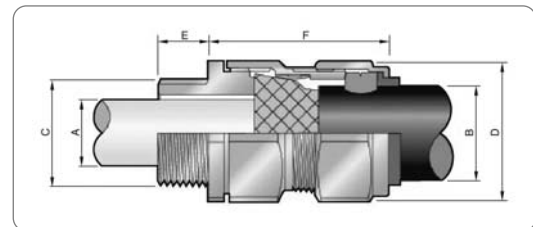
- Brass Extruded bar ⇒ EN12168 : 1998 Grade CuZn39Pb (CW614N) (Previously BS2874 :1986)
- Stainless Steel ⇒ EN10088-2 : 2005 Grade 316L (Previously BS970 Part 1 : 1991)
- Mild Steel ⇒ BS970 Part 1 : 1996 Grade 220M07Pb
- IP66 - Neoprene or Rubber "O" ring

■ Standard Finishes

- Brass ⇒ Natural or Nickel Plated
- Mild Steel ⇒ Electro Zinc Plated

■ Compliances / Approvals

- IEC 60529 Degree of protection provided by enclosures (IP Code)
- NPT ⇒ ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- BSPP ⇒ ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- PG ⇒ DIN 40430 :1971 PG threads
- Metric ⇒ ISO 965-1, ISO 965-3 medium fit(6g) for external threads
- BS 6121 : Part 1 : 1989



TECHNICAL DATA			
Model	CX	Cable Type	Armoured
Design Specification	BS 6121:Part 1:1989, EN 50262:1999	Sealing Technique	Displacement Seal
EN 50262 Mechanical Classifications	Retention = Class B, Impact = Level 8	Sealing Area(s)	Cable Outer Sheath
Continuous Operating Temperature	-30° C to +150° C	Optional Accessories	Adaptor/Reducer, Earth Tag, Serrated Washer, Shroud
Ingress Protection Rating	IP66		

■ Cable Gland Selection Table

Cable Gland Size	Available Entry Threads "C"			Minimum Thread Length "E"	Cable Bedding Diameter "A"	Overall Cable Diameter "B"		Armour Range		Across Flats "D"	Across Corners	Protrusion Length "F"	PVC Shroud Ref
	Standard		Option										
	Metric	NPT	NPT			Max	Min	Max	Min	Max	Max	Max	
20S/16	M20	1/2"	3/4"	10.0	8.6	8.0	13.4	0	1.0	25.0	29.0	48.5	GPS20
20S	M20	1/2"	3/4"	10.0	11.6	12.0	15.9	0	1.0	28.0	31.0	48.5	GPS20
20	M20	1/2"	3/4"	10.0	13.9	15.0	20.9	0	1.0	30.0	33.0	49.0	GPS20
25	M25	3/4"	1"	10.0	19.9	20.0	27.4	0	1.0	40.0	44.0	53.0	GPS25
32	M32	1"	1 1/4"	10.0	26.2	26.5	33.9	0	1.0	48.0	53.0	58.0	GPS32
40	M40	1 1/4"	1 1/2"	15.0	32.1	33.0	40.4	0	1.0	55.0	61.0	59.5	GPS40
50S	M50	1 1/2"	2"	15.0	38.1	39.0	46.7	0	1.0	60.0	67.0	64.0	GPS50
50	M50	2"	2 1/2"	15.0	44.0	45.5	53.1	0	1.0	70.0	77.0	64.0	GPS50
63S	M63	2"	2 1/2"	15.0	49.9	52.0	59.4	0	1.0	75.0	82.0	72.5	GPS63
63	M63	2 1/2"	3"	15.0	55.9	58.0	65.9	0	1.0	80.0	88.0	72.5	GPS63
75S	M75	2 1/2"	3"	15.0	61.9	64.0	72.1	0	1.0	90.0	99.0	77.5	GPS75
75	M75	3"	3 1/2"	15.0	67.9	71.0	78.5	0	1.0	100.0	110.0	77.5	GPS75
90	M90	3"	3 1/2"	15.0	79.3	78.5	90.4	0	1.6	120.0	132.0	77.0	GPS90



Cable Glands

Industrial Cable Gland

CXT Armoured, Outer Sheath Seal CXT Industrial Cable Gland

Rain-tight / Water-tight / Corrosion Resistant

NEMA 4, 4X / IP 66

- For Armoured Cables
- BS 6121 : Part 1 : 1989

■ Applications

CXT Type indoor and outdoor cable gland for use with all types of Screened Flexible Wire Braid or Wire Braid Armour Cable providing an environmental seal on the cable outer sheath, providing mechanical cable retention and electrical continuity via armour wire termination.

■ Features

The CXT type range of industrial cable glands is designed and tested to BS 6121:Part 1:1989. All metallic cable gland components are manufactured from the same grade of material. Brass locknuts are produced in the same CU Zn39PB3 grade as the cable gland.

■ Standard Materials

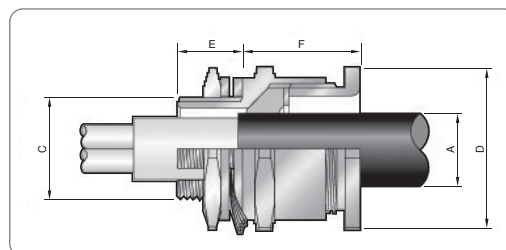
- Brass Extruded bar ⇒ EN12168: 1998 Grade CuZn39Pb (CW614N) (Previously BS2874: 1986)
- Stainless Steel ⇒ EN10088-2:2005 Grade 316L (Previously BS970 Part 1 : 1991)
- Mild Steel ⇒ BS970 Part 1 : 1996 Grade 220M07Pb
- IP66 - Neoprene or Rubber "O" ring

■ Standard Finishes

- Brass ⇒ Natural or Nickel Plated
- Mild Steel ⇒ Electro Zinc Plated

■ Compliances / Approvals

- IEC 60529 Degree of protection provided by enclosures (IP Code)
- Metric ⇒ ISO 965-1, ISO 965-3 medium fit(6g) for external threads
- BS 6121 : Part 1 : 1989



TECHNICAL DATA			
Model	CXT	Cable Type	Armoured
Design Specification	BS 6121:Part 1:1989, EN 50262:1999	Sealing Technique	Displacement Seal
EN 50262 Mechanical Classifications	Retention = Class B, Impact = Level 8	Sealing Area(s)	Cable Outer Sheath
Continuous Operating Temperature	-30° C to +150° C	Optional Accessories	Adaptor/Reducer, Earth Tag, Serrated Washer, Shroud
Ingress Protection Rating	IP66		

■ Cable Gland Selection Table

Cable Gland Size	Entry Thread "C"	Minimum Thread Length "E"	Overall Cable Diameter "A"		Across Flats "D" Max	Across Corners Max	Protrusion Length "F"	PVC Shroud Ref
			Min	Max				
20S/16	M20	15.0	3.1	8.6	25.0	28.0	26.5	GPS20
20S	M20	15.0	7.0	11.6	28.0	31.0	26.5	GPS20
20	M20	15.0	11.0	13.9	30.0	33.0	26.5	GPS20
25	M25	15.0	13.0	19.9	40.0	44.0	28.5	GPS25
32	M32	15.0	19.0	24.2	48.0	53.0	32.5	GPS32
40	M40	15.0	25.0	32.1	55.0	61.0	40.5	GPS40
50S	M50	15.0	31.5	38.1	60.0	67.0	40.5	GPS50
50	M50	15.0	36.5	44.0	70.0	77.0	40.5	GPS50
63S	M63	15.0	42.5	47.3	75.0	82.0	42.5	GPS63
63	M63	15.0	48.5	55.9	80.0	88.0	43.0	GPS63
75S	M75	15.0	54.5	61.9	90.0	99.0	46.0	GPS75
75	M75	15.0	60.5	67.9	100.0	110.0	46.0	GPS75
90	M90	15.0	67.5	79.3	120.0	132.0	47.5	GPS90

E1W Armoured, Outer & Inner Sheath Seal E1W Industrial Cable Gland

Rain-tight / Water-tight / Corrosion Resistant

NEMA 4, 4X / IP 66

- For Armoured Cables
- BS 6121 : Part 1 : 1989



■ Applications

E1W Type indoor and outdoor cable gland for use with Single Wire Armoured (SWA) Cable providing an environmental seal on the cable outer sheath and the cable inner sheath, providing mechanical cable retention and electrical continuity via armour wire termination.

■ Features

The E1W type range of industrial cable glands is designed and tested to BS 6121:Part 1:1989

All metallic cable gland components are manufactured from the same grade of material. Brass locknuts are produced in the same CU Zn39PB3 grade as the cable gland.

■ Standard Materials

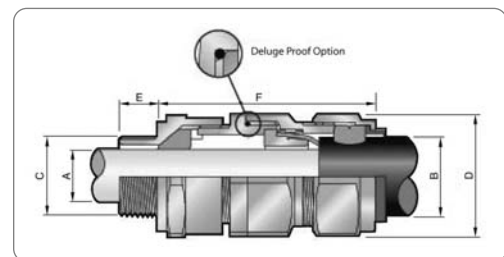
- Brass Extruded bar ⇒ EN12168 : 1998 Grade CuZn39Pb (CW614N) (Previously BS2874 : 1986)
- Stainless Steel ⇒ EN10088-2 : 2005 Grade 316L (Previously BS970 Part 1 : 1991)
- Mild Steel ⇒ BS970 Part 1 : 1996 Grade 220M07Pb
- IP66 - Neoprene or Rubber "O" ring

■ Standard Finishes

- Brass ⇒ Natural or Nickel Plated
- Mild Steel ⇒ Electro Zinc Plated

■ Compliances / Approvals

- IEC 60529 Degree of protection provided by enclosures (IP Code)
- NPT ⇒ ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- BSPP ⇒ ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- PG ⇒ DIN 40430:1971 PG threads
- Metric ⇒ ISO 965-1, ISO 965-3 medium fit(6g) for external threads
- BS 6121 : Part 1 : 1989



TECHNICAL DATA			
Model	E1W	Cable Type	Armoured
Design Specification	BS 6121:Part 1:1989, EN 50262:1999	Sealing Technique	Displacement Seal
EN 50262 Mechanical Classifications	Retention = Class B, Impact = Level 8	Sealing Area(s)	Cable Inner Sheath and Outer Sheath
Continuous Operating Temperature	-30° C to +150° C	Optional Accessories	Adaptor/Reducer, Earth Tag, Serrated Washer, Shroud
Ingress Protection Rating	IP66		

■ Cable Gland Selection Table

Cable Gland Size	Available Entry Threads "C"			Minimum Thread Length "E"	Cable Bedding Diameter "A"		Overall Cable Diameter "B"		Armour Range		Across Flats "D"	Across Corners	Protrusion Length "F"	PVC Shroud Ref
	Standard		Option		Min	Max	Min	Max	Min	Max	Max	Max		
	Metric	NPT	NPT											
20S/16	M20	1/2"	3/4"	10.0	3.1	8.6	8.0	13.4	0.9		25.0	29.0	69.0	GPS20
20S	M20	1/2"	3/4"	10.0	7.0	11.6	12.0	15.9	0.9	1.25	28.0	31.0	69.0	GPS20
20	M20	1/2"	3/4"	10.0	11.0	13.9	15.0	20.9	0.9	1.25	30.0	33.0	69.0	GPS20
25	M25	3/4"	1"	10.0	13.0	19.9	20.0	27.4	1.25	1.6	40.0	44.0	74.0	GPS25
32	M32	1"	1 1/4"	10.0	19.0	26.2	26.5	33.9	1.6	2.0	48.0	53.0	80.0	GPS32
40	M40	1 1/4"	1 1/2"	15.0	25.0	32.1	33.0	40.4	1.6	2.0	55.0	61.0	90.0	GPS40
50S	M50	1 1/2"	2"	15.0	31.5	38.1	39.0	46.7	2.0	2.5	60.0	67.0	93.0	GPS50
50	M50	2"	2 1/2"	15.0	36.5	44.0	45.5	53.1	2.0	2.5	70.0	77.0	93.0	GPS50
63S	M63	2"	2 1/2"	15.0	42.5	49.9	52.0	59.4	2.5		75.0	82.0	104.0	GPS63
63	M63	2 1/2"	3"	15.0	48.5	55.9	58.0	65.9	2.5		80.0	88.0	104.0	GPS63
75S	M75	2 1/2"	3"	15.0	54.5	61.9	64.0	72.1	2.5		90.0	99.0	110.0	GPS75
75	M75	3"	3 1/2"	15.0	60.5	67.9	71.0	78.5	2.5	3.15	100.0	110.0	110.0	GPS75
90	M90	3"	3 1/2"	15.0	67.5	79.3	78.5	90.4	3.15		120.0	132.0	112.0	GPS90



Cable Glands

Industrial Cable Gland

E1X Armoured, Outer & Inner Sheath Seal E1X Industrial Cable Gland

Rain-tight / Water-tight / Corrosion Resistant

NEMA 4, 4X / IP 66

- For Armoured Cables
- BS 6121 : Part 1 : 1989

■ Applications

E1X Type indoor and outdoor cable gland for use with all types of Wire Braid Armour, Strip Armour, Pliable Wire Armour & Steel Tape Armour Cable providing an environmental seal on the cable outer sheath and the cable inner sheath, providing mechanical cable retention and electrical continuity via armour wire termination.

■ Features

The E1X type range of industrial cable glands is designed and tested to BS 6121 : Part 1 : 1989. All metallic cable gland components are manufactured from the same grade of material. Brass locknuts are produced in the same CU Zn39PB3 grade as the cable gland.

■ Standard Materials

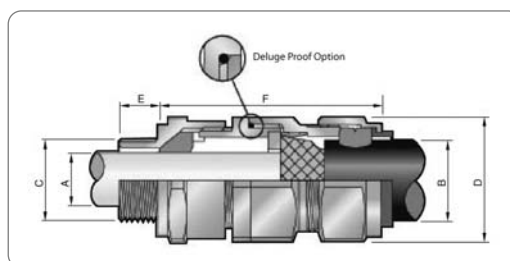
- Brass Extruded bar ⇒ EN12168 : 1998 Grade CuZn39Pb [CW614N] (Previously BS2874 : 1986)
- Stainless Steel ⇒ EN10088-2 : 2005 Grade 316L (Previously BS970 Part 1 : 1991)
- Mild Steel ⇒ BS970 Part 1 : 1996 Grade 220M07Pb
- IP66 - Neoprene or Rubber "O" ring

■ Standard Finishes

- Brass ⇒ Natural or Nickel Plated
- Mild Steel ⇒ Electro Zinc Plated

■ Compliances / Approvals

- IEC 60529 Degree of protection provided by enclosures (IP Code)
- NPT ⇒ ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- BSPP ⇒ ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- PG ⇒ DIN 40430 : 1971 PG threads
- Metric ⇒ ISO 965-1, ISO 965-3 medium fit(6g) for external threads
- BS 6121 : Part 1 : 1989



TECHNICAL DATA

Model	E1X	Cable Type	Armoured
Design Specification	BS 6121:Part 1:1989, EN 50262:1999	Sealing Technique	Displacement Seal
EN 50262 Mechanical Classifications	Retention = Class B, Impact = Level 8	Sealing Area(s)	Cable Inner Sheath and Outer Sheath
Continuous Operating Temperature	-30° C to +150° C	Optional Accessories	Adaptor/Reducer, Earth Tag, Serrated Washer, Shroud
Ingress Protection Rating	IP66		

■ Cable Gland Selection Table

Cable Gland Size	Available Entry Threads "C"			Minimum Thread Length "E"	Cable Bedding Diameter "A"		Overall Cable Diameter "B"		Armour Range		Across Flats "D"	Across Corners	Protrusion Length "F"	PVC Shroud Ref
	Standard		Option		Min	Max	Min	Max	Min	Max	Max	Max		
	Metric	NPT	NPT											
20S/16	M20	1/2"	3/4"	10.0	3.1	8.6	8.0	13.4	0	1.0	25.0	29.0	69.0	GPS20
20S	M20	1/2"	3/4"	10.0	7.0	11.6	12.0	15.9	0	1.0	28.0	31.0	69.0	GPS20
20	M20	1/2"	3/4"	10.0	11.0	13.9	15.0	20.9	0	1.0	30.0	33.0	69.0	GPS20
25	M25	3/4"	1"	10.0	13.0	19.9	20.0	27.4	0	1.0	40.0	44.0	74.0	GPS25
32	M32	1"	1 1/4"	10.0	19.0	26.2	26.5	33.9	0	1.0	48.0	53.0	80.0	GPS32
40	M40	1 1/4"	1 1/2"	15.0	25.0	32.1	33.0	40.4	0	1.0	55.0	61.0	90.0	GPS40
50S	M50	1 1/2"	2"	15.0	31.5	38.1	39.0	46.7	0	1.0	60.0	67.0	93.0	GPS50
50	M50	2"	2 1/2"	15.0	36.5	44.0	45.5	53.1	0	1.0	70.0	77.0	93.0	GPS50
63S	M63	2"	2 1/2"	15.0	42.5	49.9	52.0	59.4	0	1.0	75.0	82.0	104.0	GPS63
63	M63	2 1/2"	3"	15.0	48.5	55.9	58.0	65.9	0	1.0	80.0	88.0	104.0	GPS63
75S	M75	2 1/2"	3"	15.0	54.5	61.9	64.0	72.1	0	1.0	90.0	99.0	110.0	GPS75
75	M75	3"	3 1/2"	15.0	60.5	67.9	71.0	78.5	0	1.0	100.0	110.0	110.0	GPS75
90	M90	3"	3 1/2"	15.0	67.5	79.3	78.5	90.4	0	1.6	120.0	132.0	112.0	GPS90

E2W Armoured, Outer & Inner Sheath Seal, Lead Sheath E2W Industrial Cable Gland

Rain-tight / Water-tight / Corrosion Resistant

NEMA 4, 4X / IP 66

- For Armoured Cables
- For Inner Lead Sheathed Cables
- BS 6121 : Part 1 : 1989



■ Applications

E2W Type indoor and outdoor cable gland for use with all types of Lead Sheathed and Single Wire Armoured (SWA) Cable providing an environmental seal on the cable outer sheath and the cable inner lead sheath, providing mechanical cable retention and electrical continuity via armour wire termination.

■ Features

The E2W type range of industrial cable glands is designed and tested to BS 6121:Part 1:1989

All metallic cable gland components are manufactured from the same grade of material. Brass locknuts are produced in the same CU Zn39PB3 grade as the cable gland.

■ Standard Materials

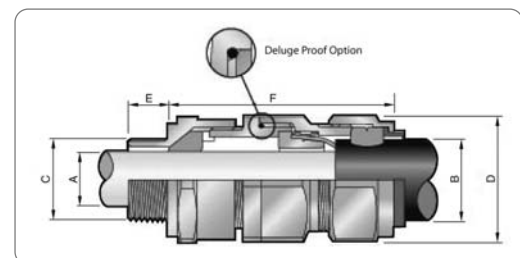
- Brass Extruded bar ⇒ EN12168 : 1998 Grade CuZn39Pb (CW614N) (Previously BS2874 : 1986)
- Stainless Steel ⇒ EN10088-2 : 2005 Grade 316L (Previously BS970 Part 1 : 1991)
- Mild Steel ⇒ BS970 Part 1 : 1996 Grade 220M07Pb
- IP66 - Neoprene or Rubber "O" ring

■ Standard Finishes

- Brass ⇒ Natural or Nickel Plated
- Mild Steel ⇒ Electro Zinc Plated

■ Compliances / Approvals

- IEC 60529 Degree of protection provided by enclosures (IP Code)
- NPT ⇒ ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- BSPP ⇒ ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- PG ⇒ DIN 40430 : 1971 PG threads
- Metric ⇒ ISO 965-1, ISO 965-3 medium fit (6g) for external threads
- BS 6121 : Part 1 : 1989



TECHNICAL DATA

Model	E2W	Cable Type	Armoured
Design Specification	BS 6121:Part 1:1989, EN 50262:1999	Sealing Technique	Displacement Seal
EN 50262 Mechanical Classifications	Retention = Class B, Impact = Level 8	Sealing Area(s)	Cable Inner Lead Sheath and Outer Sheath
Continuous Operating Temperature	-30° C to +150° C	Optional Accessories	Adaptor/Reducer, Earth Tag, Serrated Washer, Shroud
Ingress Protection Rating	IP66		

■ Cable Gland Selection Table

Cable Gland Size	Available Entry Threads "C"			Minimum Thread Length "E"	Cable Bedding Diameter "A"		Overall Cable Diameter "B"		Armour Range		Across Flats "D"	Across Corners	Protrusion Length "F"	PVC Shroud Ref
	Standard		Option		Min	Max	Min	Max	Min	Max	Max	Max		
	Metric	NPT	NPT											
20S/16	M20	1/2"	3/4"	10.0	3.1	8.6	8.0	13.4	0.9		25.0	29.0	69.0	GPS20
20S	M20	1/2"	3/4"	10.0	7.0	11.6	12.0	15.9	0.9	1.25	28.0	31.0	69.0	GPS20
20	M20	1/2"	3/4"	10.0	11.0	13.9	15.0	20.9	0.9	1.25	30.0	33.0	69.0	GPS20
25	M25	3/4"	1"	10.0	13.0	19.9	20.0	27.4	1.25	1.6	40.0	44.0	74.0	GPS25
32	M32	1"	1 1/4"	10.0	19.0	26.2	26.5	33.9	1.6	2.0	48.0	53.0	80.0	GPS32
40	M40	1 1/4"	1 1/2"	15.0	25.0	32.1	33.0	40.4	1.6	2.0	55.0	61.0	90.0	GPS40
50S	M50	1 1/2"	2"	15.0	31.5	38.1	39.0	46.7	2.0	2.5	60.0	67.0	93.0	GPS50
50	M50	2"	2 1/2"	15.0	36.5	44.0	45.5	53.1	2.0	2.5	70.0	77.0	93.0	GPS50
63S	M63	2"	2 1/2"	15.0	42.5	49.9	52.0	59.4	2.5		75.0	82.0	104.0	GPS63
63	M63	2 1/2"	3"	15.0	48.5	55.9	58.0	65.9	2.5		80.0	88.0	104.0	GPS63
75S	M75	2 1/2"	3"	15.0	54.5	61.9	64.0	72.1	2.5		90.0	99.0	110.0	GPS75
75	M75	3"	3 1/2"	15.0	60.5	67.9	71.0	78.5	2.5	3.15	100.0	110.0	110.0	GPS75
90	M90	3"	3 1/2"	15.0	67.5	79.3	78.5	90.4	3.15		120.0	132.0	112.0	GPS90



Cable Glands

Industrial Cable Gland

BCW Armoured BCW Industrial Cable Gland

- For Armoured Cables

■ Applications

BCW Type indoor cable gland for use with Single Wire Armoured (SWA) Cable providing mechanical cable retention and electrical continuity via armour wire termination.

■ Features

All metallic cable gland components are manufactured from the same grade of material.

■ Standard Materials

- Body ⇒ Cast Brass
- Bolt & Clamp ⇒ Steel

■ Standard Finishes

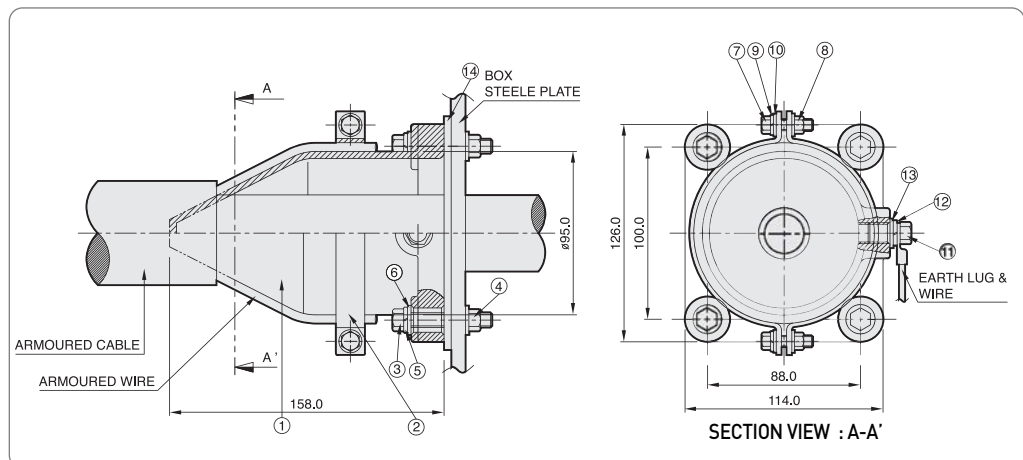
- Cast Brass ⇒ Natural
- Steel ⇒ Electro Zinc Plated

■ Compliances / Approvals

- NPT ⇒ ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- BSPP ⇒ ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- PG ⇒ DIN 40430 :1971 PG threads
- Metric ⇒ ISO 965-1, ISO 965-3 medium fit (6g) for external threads

■ Specification & Dimensions

N0	Description	Material	Specification
1	Body	Cast Brass	
2	Armour Clamp	Steel	Electro Zinc Plated
3	Body Fix Bolt	Steel	M12
4	Body Fix Nut	Steel	M12
5	Body Fix Spring Washer	Steel	M12
6	Body Fix Washer	Steel	M12
7	Armour Clamp Fix Bolt	Steel	M10
8	Armour Clamp Fix Nut	Steel	M10
9	Armour Clamp Spring Washer	Steel	M10
10	Armour Clamp Fix Washer	Steel	M10
11	Earth Bolt	Steel	M10
12	Earth Spring Washer	Steel	M10
13	Earth Washer	Steel	M10
14	Body Gasket		



Cable Glands

Hazardous Area Type Cable Gland

ECG Un-armoured, Outer Sheath Seal, Ex d & Ex e"

ECG Flame-proof Ex d & Increased Safety Ex e Cable Gland

Explosion-proof / Rain-tight / Water-tight / Corrosion Resistant

Cl. I, Div. 1 & 2, Groups A, B, C, D / NEMA 4, 4X / II 2G Ex d II C & Ex e II IP 65

- For Un-armoured Cables



Applications

ECG Type indoor and outdoor cable gland for use in Zone1, Zone2 hazardous areas with all types of Un-armoured cable, providing mechanical cable retention and an environmental seal on the cable outer sheath.

Features

All metallic cable gland components are manufactured from the same grade of material. Brass locknuts are produced in the same CU Zn39PB3 grade as the cable gland.

Standard Materials

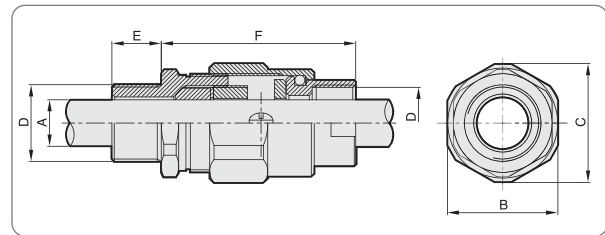
- Brass Extruded bar ⇒ EN12168 : 1998 Grade CuZn39Pb (CW614N) (Previously BS2874 : 1986)
- Stainless Steel ⇒ EN10088-2 : 2005 Grade 316L (Previously BS970 Part 1 : 1991)
- Mild Steel ⇒ BS970 Part 1 : 1996 Grade 220M07Pb
- IP65-Neoprene or Rubber "O" ring

Standard Finishes

- Brass ⇒ Natural or Nickel Plated
- Mild Steel ⇒ Electro Zinc Plated

Compliances / Approvals

- IEC 60079-0 Equipment-General requirements
- EC 60079-1 Equipment protection by flameproof enclosures "d"
- IEC 60079-7 Equipment protection by increased safety "e"
- IEC 60529 Degree of protection provided by enclosures (IP Code)
- NPT ⇒ ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- BSPP ⇒ ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads



TECHNICAL DATA			
Model	ECG	Ingress Protection Rating	IP65
Design Specification	IEC60079-0,1:2007	Cable Type	Un-armoured
ATEX Code of Protection Category	ATEX II 2G Ex d IIC, Ex e II	Sealing Technique	Displacement Seal
IEC Ex Code of Protection Category	Ex d II C, Ex e II	Sealing Area(s)	Cable Outer Sheath
EN 50262 Mechanical Classifications	Retention = Class B, Impact = Level 6	Optional Accessories	Adaptor/Reducer
Continuous Operating Temperature	-20 °C to +80 °C		

Cable Gland Selection Table

Cable Gland Size	Available Entry Threads "D"		Minimum Thread Length "E"	Overall Cable Diameter "A"		Across Flats "B"	Across Corners "C"	Protrusion Length "F"
	Standard			Min	Max	Max	Max	
	BSPP	NPT						
16	1/2"	1/2"	17.0	7.0	11.0	32.0	36.0	64
22	3/4"	3/4"	17.0	10.5	15.0	38.0	41.0	66
28	1"	1"	21.0	16.5	21.3	50.0	50.0	72
36	1-1/4"	1-1/4"	21.0	20.6	27.0	55.0	55.0	83
42	1-1/2"	1-1/2"	26.0	23.7	29.0	63.0	63.0	92
54	2"	2"	27.0	30.9	39.0	75.0	75.0	93
70	2-1/2"	2-1/2"	30.0	40.3	51.0	95.0	95.0	94
82	3"	3"	30.0	52.6	63.0	108.0	108.0	109
104	4"	4"	31.0	64.2	75.0	140.0	144.0	125



Cable Glands

Hazardous Area Type Cable Gland

ECG-CB Un-armoured, Outer Sheath Seal, "Ex d & Ex e" ECG-CB Flame-proof Ex d & Increased Safety Ex e Cable Gland

Explosion-proof / Rain-tight / Water-tight / Corrosion Resistant Cl. I, Div. 1 & 2, Groups A, B, C, D / NEMA 4, 4X / II 2G Ex d II C & Ex e II IP 65

- For Un-armoured Cables
- Compound Barrier Type

■ Applications

ECG-CB Type indoor and outdoor cable gland for use in Zone1, Zone2 hazardous areas with all types of Un-armoured cable, providing a compound barrier seal around the conductors and an environmental seal on the cable outer sheath.

■ Features

All metallic cable gland components are manufactured from the same grade of material. Brass locknuts are produced in the same CU Zn39PB3 grade as the cable gland.

■ Standard Materials

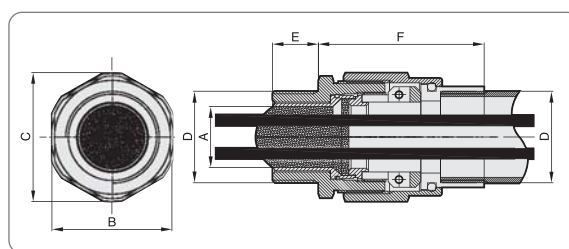
- Brass Extruded bar ⇒ EN12168 : 1998 Grade CuZn39Pb (CW614N) (Previously BS2874 : 1986)
- Stainless Steel ⇒ EN10088-2 : 2005 Grade 316L (Previously BS970 Part 1 : 1991)
- Mild Steel ⇒ BS970 Part 1 : 1996 Grade 220M07Pb
- IP65-Neoprene or Rubber "O" ring

■ Standard Finishes

- Brass ⇒ Natural or Nickel Plated
- Mild Steel ⇒ Electro Zinc Plated

■ Compliances / Approvals

- IEC 60079-0 Equipment-General requirements
- EC 60079-1 Equipment protection by flameproof enclosures "d"
- IEC 60079-7 Equipment protection by increased safety "e"
- IEC 60529 Degree of protection provided by enclosures (IP Code)
- NPT ⇒ ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- BSPP ⇒ ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads



TECHNICAL DATA			
Model	ECG-CB	Ingress Protection Rating	IP65
Design Specification	IEC60079-0,1:2007	Cable Type	Un-armoured
ATEX Code of Protection Category	ATEX II 2G Ex d IIC, Ex e II	Sealing Technique	Compound Barrier
IEC Ex Code of Protection Category	Ex d II C, Ex e II	Sealing Area(s)	Cable Outer Sheath
EN 50262 Mechanical Classifications	Retention = Class B, Impact = Level 6	Optional Accessories	Adaptor/Reducer
Continuous Operating Temperature	-20 °C to +80 °C		

■ Cable Gland Selection Table

Cable Gland Size	Available Entry Threads "D"		Minimum Thread Length "E"	Overall Cable Diameter "A"		Across Flats "B"	Across Corners "C"	Protrusion Length "F"
	Standard			Min	Max	Max	Max	
	BSPP	NPT						
16	1/2"	1/2"	17.0	1.0	8.5	32.0	36.0	64
22	3/4"	3/4"	17.0	1.0	13.0	38.0	41.0	66
28	1"	1"	21.0	1.0	19.0	50.0	50.0	72
36	1-1/4"	1-1/4"	21.0	1.0	26.0	55.0	55.0	83
42	1-1/2"	1-1/2"	26.0	1.0	32.0	63.0	63.0	92
54	2"	2"	27.0	1.0	40.0	75.0	75.0	93
70	2-1/2"	2-1/2"	30.0	1.0	50.0	95.0	95.0	94
82	3"	3"	30.0	1.0	62.0	108.0	108.0	109
104	4"	4"	31.0	1.0	74.0	140.0	144.0	125

EGB Un -armoured, Outer Sheath Seal, "Ex d" EGB Flame-proof Ex d Cable Gland

Explosion-proof / Rain-tight / Water-tight / Corrosion Resistant CL I, Div. 1 & 2, Groups A, B, C, D / NEMA 4, 4X / II 2G Ex d II C IP 65

- For Un-armoured Cables
- Bell Type



■ Applications

EGB Type indoor and outdoor cable gland for use in Zone1, Zone2 hazardous areas with all types of Un-armoured cable, providing mechanical cable retention and an environmental seal on the cable outer sheath.

■ Features

All metallic cable gland components are manufactured from the same grade of material. Aluminum locknuts are produced in the same ASTM B26 356-T6 (AC4C-T6) grade as the cable gland.

■ Standard Materials

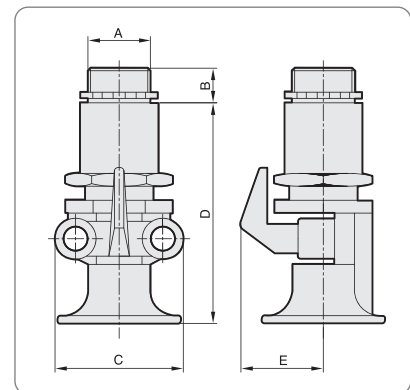
- Copper Free Aluminum
- IP65-Neoprene or Rubber "O" ring

■ Standard Finishes

- Spray (Color : Munsel No. 7.5BG 6/1.5)

■ Compliances / Approvals

- IEC 60079-0 Equipment-General requirements
- EC 60079-1 Equipment protection by flameproof enclosures "d"
- IEC 60079-7 Equipment protection by increased safety "e"
- IEC 60529 Degree of protection provided by enclosures (IP Code)
- NPT ⇒ ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- BSPP ⇒ ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads



TECHNICAL DATA			
Model	EGB	Ingress Protection Rating	IP65
Design Specification	IEC60079-0,1:2007	Cable Type	Un-armoured
ATEX Code of Protection Category	ATEX II 2G Ex d IIC	Sealing Technique	Compressed Seal
IEC Ex Code of Protection Category	Ex d II C	Sealing Area(s)	Cable Outer Sheath
EN 50262 Mechanical Classifications	Retention = Class B, Impact = Level 6	Optional Accessories	Adaptor/Reducer
Continuous Operating Temperature	-20 °C to +80° C		

■ Cable Gland Selection Table

Cable Gland Size	Available Entry Threads "A"		Minimum Thread Length "B"	Overall Cable Diameter		Rotate Radius "E"	Across Corners "C"	Protrusion Length "D"
	Standard			Min	Max			
	BSPP	NPT				Max	Max	
16	1/2"	1/2"	18.0	9.0	11.5	25.0	49.0	73.0
22	3/4"	3/4"	18.0	11.0	16.0	26.0	50.0	80.0
28	1"	1"	24.0	14.0	20.0	27.0	58.0	95.0
36	1-1/4"	1-1/4"	26.0	26.0	27.0	42.0	76.0	138.0
42	1-1/2"	1-1/2"	26.0	27.5	32.5	47.0	85.0	155.0
54	2"	2"	27.0	33.5	43.5	55.0	94.0	170.0
70	2-1/2"	2-1/2"	30.0	48.0	55.0	62.0	110.0	170.0
82	3"	3"	40.0	47.0	67.5	65.0	130.0	180.0
104	4"	4"	45.0	82.0	90.0	85.0	160.0	240.0



Cable Glands

Hazardous Area Type Cable Gland

EGC Un-armoured, Outer Sheath Seal, "Ex d" EGC Flame-proof Ex d Cable Gland

Explosion-proof / Rain-tight / Water-tight / Corrosion Resistant Cl. I, Div. 1 & 2, Groups A, B, C, D / NEMA 4, 4X / II 2G Ex d II C IP 65

- For Un-armoured Cables
- Compound Type

■ Applications

EGC Type indoor and outdoor cable gland for use in Zone1, Zone2 hazardous areas with all types of Un-armoured cable, providing mechanical cable retention and an environmental seal on the cable outer sheath.

■ Features

All metallic cable gland components are manufactured from the same grade of material. Aluminum locknuts are produced in the same ASTM B26 356-T6 (AC4C-T6) grade as the cable gland.

■ Standard Materials

- Copper Free Aluminum
- IP65 – Neoprene or Rubber "O"ring

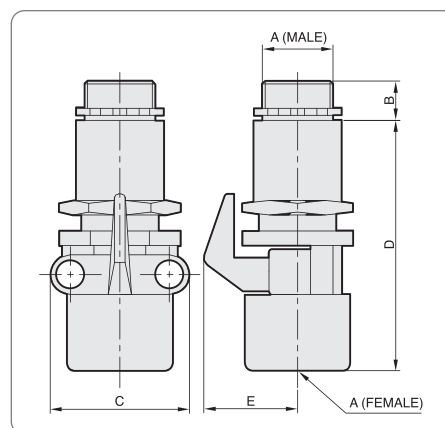
■ Standard Finishes

- Spray (Color : Munsel No. 7.5BG 6/1.5)



■ Compliances / Approvals

- IEC 60079-0 Equipment-General requirements
- EC 60079-1 Equipment protection by flameproof enclosures "d"
- IEC 60529 Degree of protection provided by enclosures (IP Code)
- NPT ⇒ ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- BSPP ⇒ ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads



TECHNICAL DATA			
Model	EGC	Ingress Protection Rating	IP65
Design Specification	IEC60079-0,1:2007	Cable Type	Un-armoured
ATEX Code of Protection Category	ATEX II 2G Ex d IIC	Sealing Technique	Compressed Seal
IEC Ex Code of Protection Category	Ex d II C	Sealing Area(s)	Cable Outer Sheath
EN 50262 Mechanical Classifications	Retention = Class B, Impact = Level 6	Optional Accessories	Adaptor/Reducer
Continuous Operating Temperature	-20° C to +80° C		

■ Cable Gland Selection Table

Cable Gland Size	Available Entry Threads "A"		Minimum Thread Length "B"	Overall Cable Diameter		Rotate Radius "E"	Across Corners "C"	Protrusion Length "D"
	Standard			Min	Max	Max	Max	
	BSPP	NPT						
16	1/2"	1/2"	18.0	9.0	11.5	25.0	49.0	73.0
22	3/4"	3/4"	18.0	11.0	16.0	26.0	50.0	80.0
28	1"	1"	24.0	14.0	20.0	27.0	58.0	95.0
36	1-1/4"	1-1/4"	26.0	26.0	27.0	42.0	76.0	125.0
42	1-1/2"	1-1/2"	26.0	27.5	32.5	47.0	85.0	145.0
54	2"	2"	27.0	33.5	43.5	55.0	94.0	148.0
70	2-1/2"	2-1/2"	30.0	48.0	55.0	62.0	110.0	160.0
82	3"	3"	40.0	47.0	67.5	65.0	130.0	160.0
104	4"	4"	45.0	82.0	90.0	85.0	160.0	200.0

MCG Un-armoured, Outer Sheath Seal, "Ex d"

MCG Multi Core Custom Build Flame-proof Ex d Cable Gland

Explosion-proof / Rain-tight / Water-tight / Corrosion Resistant

Cl. I, Div. 1 & 2, Groups A, B, C, D / NEMA 4, 4X / II 2G Ex d II C IP 65

- For Un-armoured Cables
- Conduit Type
- For Three or Four Wires (3P-1E or 3P)
- 4" Only
- Cable Multi Clamping



■ Applications

MCG Type indoor and outdoor Multi Core cable gland for use in Zone1, Zone2 hazardous areas with all types of Un-armoured cable, providing mechanical cable retention and an environmental seal on the cable outer sheath.

■ Features

All metallic cable gland components are manufactured from the same grade of material. Brass locknuts are produced in the same CU Zn39PB3 grade as the cable gland.

■ Standard Materials

- Brass Extruded bar ⇒ EN12168 : 1998 Grade CuZn39Pb (CW614N) (Previously BS2874 : 1986)
- Stainless Steel ⇒ EN10088-2 : 2005 Grade 316L (Previously BS970 Part 1 : 1991)
- Mild Steel ⇒ BS970 Part 1 : 1996 Grade 220M07Pb
- IP65-Neoprene or Rubber "O" ring

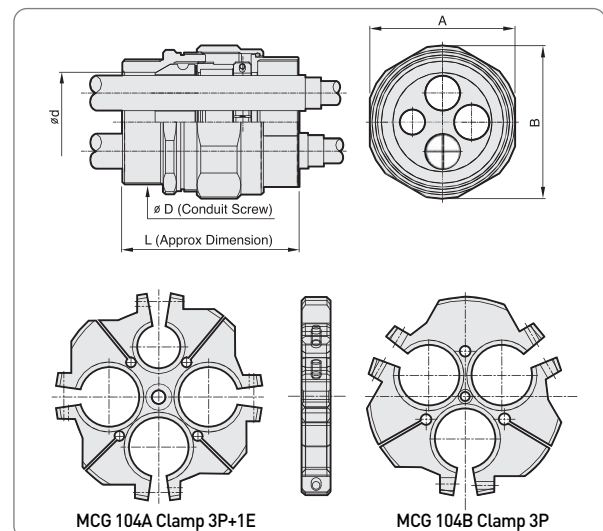
■ Standard Finishes

- Brass ⇒ Natural or Nickel Plated
- Mild Steel ⇒ Electro Zinc Plated

■ Compliances / Approvals

- IEC 60079-0 Equipment-General requirements
- EC 60079-1 Equipment protection by flameproof enclosures "d"
- IEC 60529 Degree of protection provided by enclosures (IP Code)
- NPT ⇒ ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- BSPP ⇒ ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads

■ Dimensions



TECHNICAL DATA			
Model	MCG	Ingress Protection Rating	IP65
Design Specification	IEC60079-0,1:2007	Cable Type	Un-armoured
ATEX Code of Protection Category	ATEX II 2G Ex d IIC	Sealing Technique	Displacement Seal
IEC Ex Code of Protection Category	Ex d II C	Sealing Area(s)	Cable Outer Sheath
EN 50262 Mechanical Classifications	Retention = Class B, Impact = Level 6	Optional Accessories	Adaptor/Reducer
Continuous Operating Temperature	-20° C to +80° C	Number Of Cable Grip	For Three or Four Wires

Cable Gland Size	Available Entry Threads		Minimum Thread Length	Overall Cable Diameter (Max)		Inner Diameter	Across Flats	Across Corners	Protrusion Length
	Standard			3P	1E				
	BSPP	NPT					Max	Max	
MCG104 A	4"	4"	37.0	32.0	23.0	92.0	132.0	139.0	157.0
MCG104 B				37.0	-				



Cable Glands

Hazardous Area Type Cable Gland

MCG Un-armoured, Outer Sheath Seal, "Ex d"

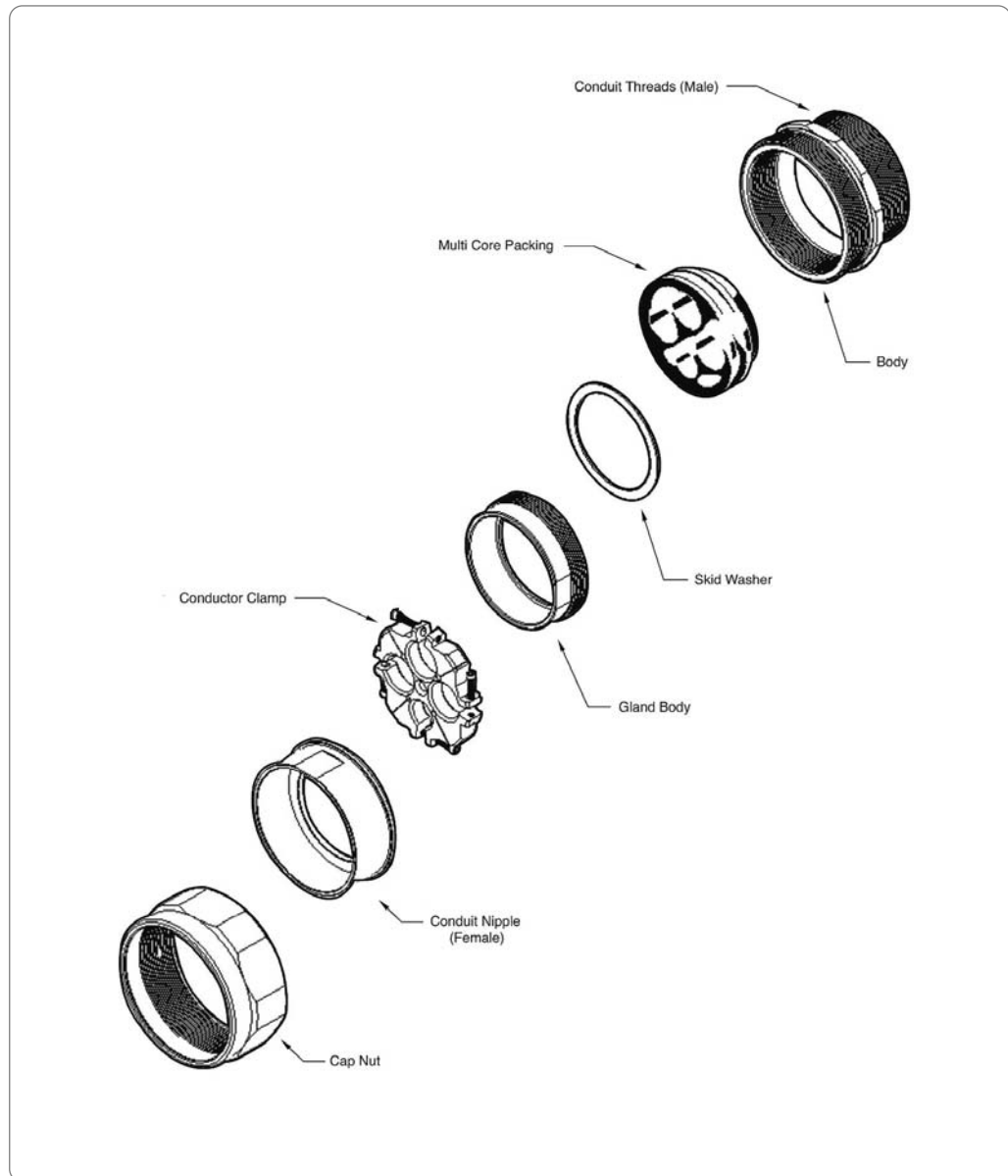
MCG Multi Core Custom Build Flame-proof Ex d Cable Gland

Explosion-proof / Rain-tight / Water-tight / Corrosion Resistant

CL. I, Div. 1 & 2, Groups A, B, C, D / NEMA 4, 4X / II 2G Ex d II C IP 65

- For Un-armoured Cables
- Conduit Type
- For Three or Four Wires (3P-1E or 3P)
- 4" Only
- Cable Multi Clamping

■ Construction



A2F Un-armoured, Outer Sheath Seal, "Ex d & Ex e" A2F Flame-proof Ex d & Increased Safety Ex e Cable Gland

Explosion-proof / Rain-tight / Water-tight /
Corrosion Resistant

Cl. I, Div. 1 & 2, Groups A, B, C, D / NEMA 4, 4X /
II 2G Ex d II C & Ex e II IP 66

- For Un-armoured Cables
- BS 6121 : Part 1 : 1989



■ Applications

A2F Type indoor and outdoor cable gland for use in Zone1, Zone2 hazardous areas with all types of Un-armoured cable, providing mechanical cable retention and an environmental seal on the cable outer sheath.

■ Features

The A2F type range of industrial cable glands is designed and tested to BS 6121:Part1:1989. All metallic cable gland components are manufactured from the same grade of material. Brass locknuts are produced in the same CU Zn39PB3 grade as the cable gland.

■ Standard Materials

- Brass Extruded bar ⇒ EN12168: 1998 Grade CuZn39Pb (CW614N) (Previously BS2874: 1986)
- Stainless Steel ⇒ EN10088-2:2005 Grade 316L (Previously BS970 Part 1 : 1991)
- Mild Steel ⇒ BS970 Part 1 : 1996 Grade 220M07Pb
- IP66 - Neoprene or Rubber "O" ring

■ Standard Finishes

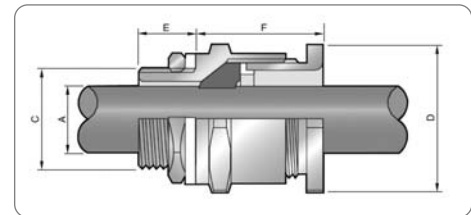
- Brass ⇒ Natural or Nickel Plated
- Mild Steel ⇒ Electro Zinc Plated

■ Certificates

- IECEx BAS 11,0061X
- Baseefa 11ATEX0135X

■ Compliances / Approvals

- IEC 60079-0 Equipment-General requirements
- EC 60079-1 Equipment protection by flameproof enclosures "d"
- IEC 60079-7 Equipment protection by increased safety "e"
- IEC 60529 Degree of protection provided by enclosures (IP Code)
- NPT ⇒ ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- BSPP ⇒ ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- PG ⇒ DIN 40430:1971 PG threads
- Metric ⇒ ISO 965-1, ISO 965-3 medium fit (6g) for external threads
- BS 6121 : Part 1 : 1989



TECHNICAL DATA			
Model	A2F	Ingress Protection Rating	IP66
Design Specification	BS 6121:Part 1:1989, EN 50262:1999	Cable Type	Un-armoured
ATEX Code of Protection Category	ATEX II 2G Ex d IIC, Ex e II	Sealing Technique	Compressed Seal
IEC Ex Code of Protection Category	Ex d IIC, Ex e II	Sealing Area(s)	Cable Outer Sheath
EN 50262 Mechanical Classifications	Retention = Class B, Impact = Level 6	Optional Accessories	Adaptor/Reducer
Continuous Operating Temperature	-20° C to +80° C		

■ Cable Gland Selection Table

Cable Gland Size	Available Entry Threads "C"			Minimum Thread Length "E"	Overall Cable Diameter "A"		Across Flats "D"	Across Corners	Protrusion Length "F"	PVC Shroud Ref
	Standard		Option		Min	Max				
	Metric	NPT	NPT							
20S/16	M20	1/2"	3/4"	15.0	3.1	8.6	25.0	28.0	26.5	GPS20
20S	M20	1/2"	3/4"	15.0	7.0	11.6	28.0	31.0	26.5	GPS20
20	M20	1/2"	3/4"	15.0	11.0	13.9	30.0	33.0	26.5	GPS20
25	M25	3/4"	1"	15.0	13.0	19.9	40.0	44.0	28.5	GPS25
32	M32	1"	1 1/4"	15.0	19.0	24.2	48.0	53.0	32.5	GPS32
40	M40	1 1/4"	1 1/2"	15.0	25.0	32.1	55.0	61.0	40.5	GPS40
50S	M50	1 1/2"	2"	15.0	31.5	38.1	60.0	67.0	40.5	GPS50
50	M50	2"	2 1/2"	15.0	36.5	44.0	70.0	77.0	40.5	GPS50
63S	M63	2"	2 1/2"	15.0	42.5	47.3	75.0	82.0	42.5	GPS63
63	M63	2 1/2"	3"	15.0	48.5	55.9	80.0	88.0	43.0	GPS63
75S	M75	2 1/2"	3"	15.0	54.5	61.9	90.0	99.0	46.0	GPS75
75	M75	3"	3 1/2"	15.0	60.5	67.9	100.0	110.0	46.0	GPS75
90	M90	3"	3 1/2"	15.0	67.5	79.3	120.0	132.0	47.5	GPS90



Cable Glands

Hazardous Area Type Cable Gland

CWe Armoured, Outer Sheath Seal, "Ex e" CWe Increased Safety Ex e Cable Gland

Explosion-proof / Rain-tight / Water-tight /
Corrosion Resistant

Cl. I, Div. 1 & 2, Groups A, B, C, D/ NEMA 4, 4X /
II 2G Ex d II C & Ex e II IP 66

- For Armoured Cables
- BS 6121 : Part 1 : 1989



■ Applications

CWe Type indoor and outdoor cable gland for use in Zone1, Zone2 hazardous areas with Single Wire Armoured (SWA) Cable providing an environmental seal on the cable outer sheath, providing mechanical cable retention and electrical continuity via armour wire termination.

■ Features

The CWe type range of industrial cable glands is designed and tested to BS 6121:Part 1:1989. All metallic cable gland components are manufactured from the same grade of material. Brass locknuts are produced in the same CU Zn39PB3 grade as the cable gland.

■ Standard Materials

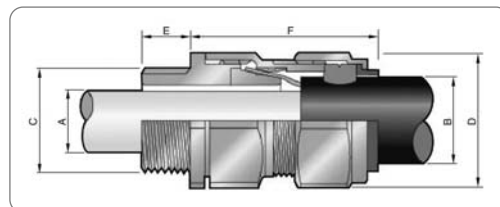
- Brass Extruded bar ⇒ EN12168: 1998 Grade CuZn39Pb (CW614N) (Previously BS2874 : 1986)
- Stainless Steel ⇒ EN10088-2 : 2005 Grade 316L (Previously BS970 Part 1 : 1991)
- Mild Steel ⇒ BS970 Part 1 : 1996 Grade 220M07Pb
- IP66 - Neoprene or Rubber "O" ring

■ Standard Finishes

- Brass ⇒ Natural or Nickel Plated
- Mild Steel ⇒ Electro Zinc Plated

■ Compliances / Approvals

- IEC 60079-0 Equipment-General requirements
- IEC 60079-7 Equipment protection by increased safety "e"
- IEC 60529 Degree of protection provided by enclosures (IP Code)
- NPT ⇒ ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- BSPP ⇒ ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- PG ⇒ DIN 40430:1971 PG threads
- Metric ⇒ ISO 965-1, ISO 965-3 medium fit (6g) for external threads
- BS 6121 : Part 1 : 1989



TECHNICAL DATA			
Model	CWe	Ingress Protection Rating	IP66
Design Specification	BS 6121:Part 1:1989, EN 50262:1999	Cable Type	Armoured
ATEX Code of Protection Category	ATEX II 2G Ex d IIC, Ex e II	Sealing Technique	Displacement Seal
IEC Ex Code of Protection Category	Ex d II C, Ex e II	Sealing Area(s)	Cable Outer Sheath
EN 50262 Mechanical Classifications	Retention = Class B, Impact = Level 6	Optional Accessories	Adaptor/Reducer, Earth Tag, Serrated Washer, Shroud
Continuous Operating Temperature	-20° C to +80° C		

■ Cable Gland Selection Table

Cable Gland Size	Available Entry Threads "C"			Minimum Thread Length "E"	Cable Bedding Diameter "A"	Overall Cable Diameter "B"		Armour Range		Across Flats "D"	Across Corners	Protrusion Length "F"	PVC Shroud Ref	
	Standard		Option			Max	Min	Max	Min					Max
	Metric	NPT	NPT											
20S/16	M20	1/2"	3/4"	15.0	8.6	8.6	13.4	0.9		25.0	29.0	48.5	GPS20	
20S	M20	1/2"	3/4"	15.0	11.6	12.0	15.9	0.9	1.25	28.0	31.0	48.5	GPS20	
20	M20	1/2"	3/4"	15.0	13.9	15.0	20.9	0.9	1.25	30.0	33.0	49.0	GPS20	
25	M25	3/4"	1"	15.0	19.9	20.0	27.4	1.25	1.6	40.0	44.0	53.0	GPS25	
32	M32	1"	1 1/4"	15.0	26.2	26.5	33.9	1.6	2.0	48.0	53.0	58.0	GPS32	
40	M40	1 1/4"	1 1/2"	15.0	32.1	33.0	40.4	1.6	2.0	55.0	61.0	59.5	GPS40	
50S	M50	1 1/2"	2"	15.0	38.1	39.0	46.7	2.0	2.5	60.0	67.0	64.0	GPS50	
50	M50	2"	2 1/2"	15.0	44.0	45.5	53.1	2.0	2.5	70.0	77.0	64.0	GPS50	
63S	M63	2"	2 1/2"	15.0	49.9	52.0	59.4	2.5		75.0	82.0	72.5	GPS63	
63	M63	2 1/2"	3"	15.0	55.9	58.0	65.9	2.5		80.0	88.0	72.5	GPS63	
75S	M75	2 1/2"	3"	15.0	61.9	64.0	72.1	2.5		90.0	99.0	77.5	GPS75	
75	M75	3"	3 1/2"	15.0	67.9	71.0	78.5	2.5	3.15	100.0	110.0	77.5	GPS75	
90	M90	3"	3 1/2"	15.0	79.3	78.5	90.4	3.15		120.0	132.0	77.0	GPS90	

CXe Armoured, Outer Sheath Seal, "Ex e" CXe Increased Safety Ex e Cable Gland

Explosion-proof / Rain-tight / Water-tight /
Corrosion Resistant

Cl. I, Div. 1 & 2, Groups A, B, C, D / NEMA 4, 4X /
II 2G Ex d II C & Ex e II IP 66

- For Armoured Cables
- BS 6121 : Part 1 : 1989



■ Applications

CXe Type indoor and outdoor cable gland for use in Zone1, Zone2 hazardous areas with all types of Wire Braid, Strip Armour, Pliable Wire Armour & Steel Tape Armour (STA) Cable providing an environmental seal on the cable outer sheath, providing mechanical cable retention and electrical continuity via armour wire termination.

■ Features

The CXe type range of industrial cable glands is designed and tested to BS 6121:Part 1:1989. All metallic cable gland components are manufactured from the same grade of material. Brass locknuts are produced in the same CU Zn39PB3 grade as the cable gland.

■ Standard Materials

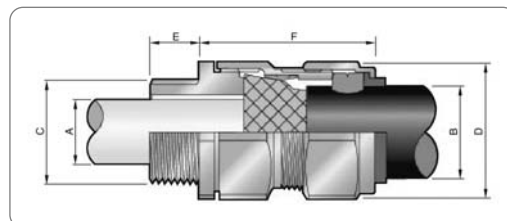
- Brass Extruded bar ⇒ EN12168: 1998 Grade CuZn39Pb (CW614N) (Previously BS2874: 1986)
- Stainless Steel ⇒ EN10088-2:2005 Grade 316L (Previously BS970 Part 1 : 1991)
- Mild Steel ⇒ BS970 Part 1 : 1996 Grade 220M07Pb
- IP66 - Neoprene or Rubber "O" ring

■ Standard Finishes

- Brass ⇒ Natural or Nickel Plated
- Mild Steel ⇒ Electro Zinc Plated

■ Compliances / Approvals

- IEC 60079-0 Equipment-General requirements
- IEC 60079-7 Equipment protection by increased safety "e"
- IEC 60529 Degree of protection provided by enclosures (IP Code)
- NPT ⇒ ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- BSPP ⇒ ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- PG ⇒ DIN 40430 :1971 PG threads
- Metric ⇒ ISO 965-1, ISO 965-3 medium fit {6g} for external threads
- BS 6121 : Part 1 : 1989



TECHNICAL DATA			
Model	CXe	Ingress Protection Rating	IP66
Design Specification	BS 6121:Part 1:1989, EN 50262:1999	Cable Type	Armoured
ATEX Code of Protection Category	ATEX II 2G Ex d IIC, Ex e II	Sealing Technique	Displacement Seal
IEC Ex Code of Protection Category	Ex d II C, Ex e II	Sealing Area(s)	Cable Outer Sheath
EN 50262 Mechanical Classifications	Retention = Class B, Impact = Level 6	Optional Accessories	Adaptor/Reducer, Earth Tag, Serrated Washer, Shroud
Continuous Operating Temperature	-20° C to +80° C		

■ Cable Gland Selection Table

Cable Gland Size	Available Entry Threads "C"			Minimum Thread Length "E"	Cable Bedding Diameter "A"	Overall Cable Diameter "B"		Armour Range		Across Flats "D"	Across Corners	Protrusion Length "F"	PVC Shroud Ref
	Standard		Option			Min	Max	Min	Max				
	Metric	NPT	NPT										
20S/16	M20	1/2"	3/4"	15.0	8.6	8.0	13.4	0.15	1.0	25.0	29.0	48.5	GPS20
20S	M20	1/2"	3/4"	15.0	11.6	12.0	15.9	0.15	1.0	28.0	31.0	48.5	GPS20
20	M20	1/2"	3/4"	15.0	13.9	15.0	20.9	0.15	1.0	30.0	33.0	49.0	GPS20
25	M25	3/4"	1"	15.0	19.9	20.0	27.4	0.15	1.0	40.0	44.0	53.0	GPS25
32	M32	1"	1 1/4"	15.0	26.2	26.5	33.9	0.15	1.0	48.0	53.0	58.0	GPS32
40	M40	1 1/4"	1 1/2"	15.0	32.1	33.0	40.4	0.15	1.0	55.0	61.0	59.5	GPS40
50S	M50	1 1/2"	2"	15.0	38.1	39.0	46.7	0.15	1.0	60.0	67.0	64.0	GPS50
50	M50	2"	2 1/2"	15.0	44.0	45.5	53.1	0.15	1.0	70.0	77.0	64.0	GPS50
63S	M63	2"	2 1/2"	15.0	49.9	52.0	59.4	0.15	1.0	75.0	82.0	72.5	GPS63
63	M63	2 1/2"	3"	15.0	55.9	58.0	65.9	0.15	1.0	80.0	88.0	72.5	GPS63
75S	M75	2 1/2"	3"	15.0	61.9	64.0	72.1	0.15	1.0	90.0	99.0	77.5	GPS75
75	M75	3"	3 1/2"	15.0	67.9	71.0	78.5	0.15	1.0	100.0	110.0	77.5	GPS75
90	M90	3"	3 1/2"	15.0	79.3	78.5	90.4	0.25	1.6	120.0	132.0	77.0	GPS90



Cable Glands

Hazardous Area Type Cable Gland

E1FW Armoured, Outer & Inner Sheath Seal, "Ex d & Ex e" E1FW Flame-proof Ex d & Increased Safety Ex e Cable Gland

Explosion-proof / Rain-tight / Water-tight /
Corrosion Resistant

Cl. I, Div. 1 & 2, Groups A, B, C, D/ NEMA 4, 4X /
II 2G Ex d II C & Ex e II IP 66

- For Armoured Cables
- BS 6121 : Part 1 : 1989



Applications

E1FW Type indoor and outdoor cable gland for use in Zone1, Zone2 hazardous areas with Single Wire Armoured (SWA) Cable providing an environmental seal on the cable outer sheath and the cable inner sheath, providing mechanical cable retention and electrical continuity via armour wire termination.

Features

The E1FW type range of industrial cable glands is designed and tested to BS 6121:Part 1:1989. All metallic cable gland components are manufactured from the same grade of material. Brass locknuts are produced in the same CU Zn39PB3 grade as the cable gland.

Standard Materials

- Brass Extruded bar ⇒ EN12168: 1998 Grade CuZn39Pb (CW614N) (Previously BS2874: 1986)
- Stainless Steel ⇒ EN10088-2:2005 Grade 316L (Previously BS970 Part 1 : 1991)
- Mild Steel ⇒ BS970 Part 1 : 1996 Grade 220M07Pb
- IP66 - Neoprene or Rubber "O" ring

Standard Finishes

- Brass ⇒ Natural or Nickel Plated
- Mild Steel ⇒ Electro Zinc Plated

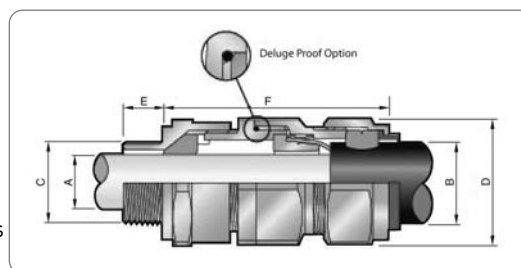
Certificates

- IECEX BAS 10,0057X
- Baseefa 03ATEX0412X

Compliances / Approvals

- IEC 60079-0 Equipment-General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- IEC 60079-7 Equipment protection by increased safety "e"
- IEC 60529 Degree of protection provided by enclosures (IP Code)
- NPT ⇒ ANSI / ASME B 1.20.1 Pipe
- BSPP ⇒ ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- PG ⇒ DIN 40430 : 1971 PG threads

- Metric ⇒ ISO 965-1, ISO 965-3 medium fit (6g) for external threads threads, General purpose (Inch)
- BS 6121 : Part 1 : 1989



TECHNICAL DATA

Model	E1FW	Ingress Protection Rating	IP66
Design Specification	BS 6121:Part 1:1989, EN 50262:1999	Cable Type	Armoured
ATEX Code of Protection Category	ATEX II 2G Ex d IIC, Ex e II	Sealing Technique	Displacement Seal
IEC Ex Code of Protection Category	Ex d II C, Ex e II	Sealing Area(s)	Cable Outer Sheath and Inner sheath
EN 50262 Mechanical Classifications	Retention = Class B, Impact = Level 6	Optional Accessories	Adaptor/Reducer, Earth Tag, Serrated Washer, Shroud
Continuous Operating Temperature	-20 °C to +80 °C		

Cable Gland Selection Table

Cable Gland Size	Available Entry Threads "C"			Minimum Thread Length "E"	Cable Bedding Diameter "A"		Overall Cable Diameter "B"		Armour Range		Across Flats "D"	Across Corners	Protrusion Length "F"	PVC Shroud Ref
	Standard		Option		Min	Max	Min	Max	Min	Max	Max	Max		
	Metric	NPT	NPT											
20S/16	M20	1/2"	3/4"	15.0	3.1	8.6	8.0	13.4	0	1.0	25.0	29.0	69.0	GPS20
20S	M20	1/2"	3/4"	15.0	7.0	11.6	12.0	15.9	0	1.0	28.0	31.0	69.0	GPS20
20	M20	1/2"	3/4"	15.0	11.0	13.9	15.0	20.9	0	1.0	30.0	33.0	69.0	GPS20
25	M25	3/4"	1"	15.0	13.0	19.9	20.0	27.4	0	1.0	40.0	44.0	74.0	GPS25
32	M32	1"	1 1/4"	15.0	19.0	26.2	26.5	33.9	0	1.0	48.0	53.0	80.0	GPS32
40	M40	1 1/4"	1 1/2"	15.0	25.0	32.1	33.0	40.4	0	1.0	55.0	61.0	90.0	GPS40
50S	M50	1 1/2"	2"	15.0	31.5	38.1	39.0	46.7	0	1.0	60.0	67.0	93.0	GPS50
50	M50	2"	2 1/2"	15.0	36.5	44.0	45.5	53.1	0	1.0	70.0	77.0	93.0	GPS50
63S	M63	2"	2 1/2"	15.0	42.5	49.9	52.0	59.4	0	1.0	75.0	82.0	104.0	GPS63
63	M63	2 1/2"	3"	15.0	48.5	55.9	58.0	65.9	0	1.0	80.0	88.0	104.0	GPS63
75S	M75	2 1/2"	3"	15.0	54.5	61.9	64.0	72.1	0	1.0	90.0	99.0	110.0	GPS75
75	M75	3"	3 1/2"	15.0	60.5	67.9	71.0	78.5	0	1.0	100.0	110.0	110.0	GPS75
90	M90	3"	3 1/2"	15.0	67.5	79.3	78.5	90.4	0	1.0	120.0	132.0	112.0	GPS90

E1FX Armoured, Outer & Inner Sheath Seal "Ex d & Ex e" E1FX Flame-proof Ex d & Increased Safety Ex e Cable Gland

Explosion-proof / Rain-tight / Water-tight /
Corrosion Resistant

CL I, Div. 1 & 2, Groups A, B, C, D/ NEMA 4, 4X /
II 2G Ex d II C & Ex e II IP 66

- For Armoured Cables
- BS 6121 : Part 1 : 1989



■ Applications

E1FX Type indoor and outdoor cable gland for use in Zone1, Zone2 hazardous areas with all types of Wire Braid Armour, Strip Armour, Pliable Wire Armour & Steel Tape Armour Cable providing an environmental seal on the cable outer sheath and the cable inner sheath, providing mechanical cable retention and electrical continuity via armour wire termination.

■ Features

The E1FX type range of industrial cable glands is designed and tested to BS 6121: Part 1:1989. All metallic cable gland components are manufactured from the same grade of material. Brass locknuts are produced in the same CU Zn39PB3 grade as the cable gland.

■ Standard Materials

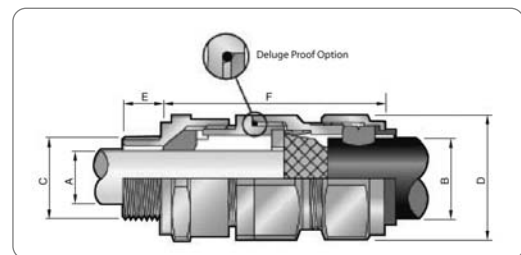
- Brass Extruded bar ⇒ EN12168 : 1998 Grade CuZn39Pb (CW614N) [Previously BS2874: 1986]
- Stainless Steel ⇒ EN10088-2 : 2005 Grade 316L [Previously BS970 Part 1 : 1991]
- Mild Steel ⇒ BS970 Part 1 : 1996 Grade 220M07Pb
- IP66 - Neoprene or Rubber "O" ring

■ Standard Finishes

- Brass ⇒ Natural or Nickel Plated
- Mild Steel ⇒ Electro Zinc Plated

■ Compliances / Approvals

- IEC 60079-0 Equipment-General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- IEC 60079-7 Equipment protection by increased safety "e"
- IEC 60529 Degree of protection provided by enclosures (IP Code)
- NPT ⇒ ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- BSPP ⇒ ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- PG ⇒ DIN 40430 : 1971 PG threads
- Metric ⇒ ISO 965-1, ISO 965-3 medium fit {6g} for external threads
- BS 6121 : Part 1 : 1989



TECHNICAL DATA

Model	E1FX	Ingress Protection Rating	IP66
Design Specification	BS 6121: Part 1:1989, EN 50262:1999	Cable Type	Armoured
ATEX Code of Protection Category	ATEX II 2G Ex d IIC, Ex e II	Sealing Technique	Displacement Seal
IEC Ex Code of Protection Category	Ex d II C, Ex e II	Sealing Area(s)	Cable Outer Sheath and Inner sheath
EN 50262 Mechanical Classifications	Retention = Class B, Impact = Level 6	Optional Accessories	Adaptor/Reducer, Earth Tag, Serrated Washer, Shroud
Continuous Operating Temperature	-20 °C to +80 °C		

■ Cable Gland Selection Table

Cable Gland Size	Available Entry Threads "C"			Minimum Thread Length	Cable Bedding Diameter "A"	Overall Cable Diameter "B"			Armour Range		Across Flats "D"	Across Corners	Protrusion Length "F"	PVC Shroud Ref
	Standard		Option											
	Metric	NPT	NPT			"E"	Min	Max	Min	Max				
20S/16	M20	1/2"	3/4"	10.0	3.1	8.6	8.0	13.4	0.9		25.0	29.0	69.0	GPS20
20S	M20	1/2"	3/4"	10.0	7.0	11.6	12.0	15.9	0.9	1.25	28.0	31.0	69.0	GPS20
20	M20	1/2"	3/4"	10.0	11.0	13.9	15.0	20.9	0.9	1.25	30.0	33.0	69.0	GPS20
25	M25	3/4"	1"	10.0	13.0	19.9	20.0	27.4	1.25	1.6	40.0	44.0	74.0	GPS25
32	M32	1"	1 1/4"	10.0	19.0	26.2	26.5	33.9	1.6	2.0	48.0	53.0	80.0	GPS32
40	M40	1 1/4"	1 1/2"	15.0	25.0	32.1	33.0	40.4	1.6	2.0	55.0	61.0	90.0	GPS40
50S	M50	1 1/2"	2"	15.0	31.5	38.1	39.0	46.7	2.0	2.5	60.0	67.0	93.0	GPS50
50	M50	2"	2 1/2"	15.0	36.5	44.0	45.5	53.1	2.0	2.5	70.0	77.0	93.0	GPS50
63S	M63	2"	2 1/2"	15.0	42.5	49.9	52.0	59.4	2.5		75.0	82.0	104.0	GPS63
63	M63	2 1/2"	3"	15.0	48.5	55.9	58.0	65.9	2.5		80.0	88.0	104.0	GPS63
75S	M75	2 1/2"	3"	15.0	54.5	61.9	64.0	72.1	2.5		90.0	99.0	110.0	GPS75
75	M75	3"	3 1/2"	15.0	60.5	67.9	71.0	78.5	2.5	3.15	100.0	110.0	110.0	GPS75
90	M90	3"	3 1/2"	15.0	67.5	79.3	78.5	90.4	3.15		120.0	132.0	112.0	GPS90



Cable Glands

Hazardous Area Type Cable Gland

E2FW Armoured, Outer & Inner Sheath Seal, Lead Sheath "Ex d & Ex e"

E2FW Flame-proof Ex d & Increased Safety Ex e Cable Gland

Explosion-proof / Rain-tight / Water-tight /
Corrosion Resistant

Cl. I, Div. 1 & 2, Groups A, B, C, D/ NEMA 4, 4X /
II 2G Ex d II C & Ex e II IP 66

- For Armoured Cables
- For Inner Lead Sheathed Cables
- BS 6121 : Part 1 : 1989



■ Applications

E2FW Type indoor and outdoor cable gland for use in Zone1, Zone2 hazardous areas with all types of Lead Sheathed and Single Wire Armoured (SWA) Cable providing an environmental seal on the cable outer sheath and the cable inner lead sheath, providing mechanical cable retention and electrical continuity via armour wire termination.

■ Features

The E2FW type range of industrial cable glands is designed and tested to BS 6121:Part 1:1989. All metallic cable gland components are manufactured from the same grade of material. Brass locknuts are produced in the same CU Zn39PB3 grade as the cable gland.

■ Standard Materials

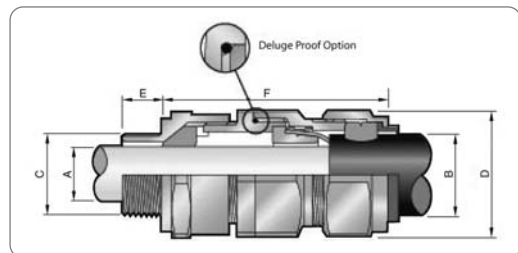
- Brass Extruded bar ⇒ EN12168 : 1998 Grade CuZn39Pb (CW614N) (Previously BS2874: 1986)
- Stainless Steel ⇒ EN10088-2 : 2005 Grade 316L (Previously BS970 Part 1 : 1991)
- Mild Steel ⇒ BS970 Part 1 : 1996 Grade 220M07Pb
- IP66 - Neoprene or Rubber "O" ring

■ Standard Finishes

- Brass ⇒ Natural or Nickel Plated
- Mild Steel ⇒ Electro Zinc Plated

■ Compliances / Approvals

- IEC 60079-0 Equipment-General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- IEC 60079-7 Equipment protection by increased safety "e"
- IEC 60529 Degree of protection provided by enclosures (IP Code)
- NPT ⇒ ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- BSPP ⇒ ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- PG ⇒ DIN 40430:1971 PG threads
- Metric ⇒ ISO 965-1, ISO 965-3 medium fit (6g) for external threads
- BS 6121 : Part 1 : 1989



TECHNICAL DATA

Model	E2FW	Ingress Protection Rating	IP66
Design Specification	BS 6121: Part 1:1989, EN 50262:1999	Cable Type	Armoured
ATEX Code of Protection Category	ATEX II 2G Ex d IIC, Ex e II	Sealing Technique	Displacement Seal
IEC Ex Code of Protection Category	Ex d II C, Ex e II	Sealing Area(s)	Cable Outer Sheath and Inner Lead sheath
EN 50262 Mechanical Classifications	Retention = Class B, Impact = Level 6	Optional Accessories	Adaptor/Reducer, Earth Tag, Serrated Washer, Shroud
Continuous Operating Temperature	-20 °C to +80 °C		

■ Cable Gland Selection Table

Cable Gland Size	Available Entry Threads "C"			Minimum Thread Length "E"	Cable Bedding Diameter "A"	Overall Cable Diameter "B"			Armour Range		Across Flats "D"	Across Corners	Protrusion Length "F"	PVC Shroud Ref	
	Standard		Option			Min	Max	Min	Max	Min					Max
	Metric	NPT	NPT												
20S/16	M20	1/2"	3/4"	10.0	3.1	8.6	8.0	13.4	0.9		25.0	29.0	69.0	GPS20	
20S	M20	1/2"	3/4"	10.0	7.0	11.6	12.0	15.9	0.9	1.25	28.0	31.0	69.0	GPS20	
20	M20	1/2"	3/4"	10.0	11.0	13.9	15.0	20.9	0.9	1.25	30.0	33.0	69.0	GPS20	
25	M25	3/4"	1"	10.0	13.0	19.9	20.0	27.4	1.25	1.6	40.0	44.0	74.0	GPS25	
32	M32	1"	1 1/4"	10.0	19.0	26.2	26.5	33.9	1.6	2.0	48.0	53.0	80.0	GPS32	
40	M40	1 1/4"	1 1/2"	15.0	25.0	32.1	33.0	40.4	1.6	2.0	55.0	61.0	90.0	GPS40	
50S	M50	1 1/2"	2"	15.0	31.5	38.1	39.0	46.7	2.0	2.5	60.0	67.0	93.0	GPS50	
50	M50	2"	2 1/2"	15.0	36.5	44.0	45.5	53.1	2.0	2.5	70.0	77.0	93.0	GPS50	
63S	M63	2"	2 1/2"	15.0	42.5	49.9	52.0	59.4	2.5		75.0	82.0	104.0	GPS63	
63	M63	2 1/2"	3"	15.0	48.5	55.9	58.0	65.9	2.5		80.0	88.0	104.0	GPS63	
75S	M75	2 1/2"	3"	15.0	54.5	61.9	64.0	72.1	2.5		90.0	99.0	110.0	GPS75	
75	M75	3"	3 1/2"	15.0	60.5	67.9	71.0	78.5	2.5	3.15	100.0	110.0	110.0	GPS75	
90	M90	3"	3 1/2"	15.0	67.5	79.3	78.5	90.4	3.15		120.0	132.0	112.0	GPS90	

SS2K Un-armoured, Outer & Inner Sheath Seal "Ex d & Ex e"

SS2K Flame-proof Ex d & Increased Safety Ex e Cable Gland

Explosion-proof / Rain-tight / Water-tight /
Corrosion Resistant

Cl. I, Div. 1 & 2, Groups A, B, C, D/ NEMA 4, 4X /
II 2G Ex d II C & Ex e II IP 66

- For Un-armoured Cables
- BS 6121 : Part 1 : 1989



Applications

SS2K Type indoor and outdoor cable gland for use in Zone1, Zone2 hazardous areas with all types of Un-armoured cable, providing mechanical cable retention and an environmental seal on the cable outer sheath and the cable inner sheath.

Features

The SS2K type range of industrial cable glands is designed and tested to BS 6121:Part1:1989. All metallic cable gland components are manufactured from the same grade of material. Brass locknuts are produced in the same CU Zn39PB3 grade as the cable gland.

Standard Materials

- Brass Extruded bar ⇒ EN12168 : 1998 Grade CuZn39Pb (CW614N) (Previously BS2874: 1986)
- Stainless Steel ⇒ EN10088-2 : 2005 Grade 316L (Previously BS970 Part 1 : 1991)
- Mild Steel ⇒ BS970 Part 1 : 1996 Grade 220M07Pb
- IP66 - Neoprene or Rubber "O" ring

Standard Finishes

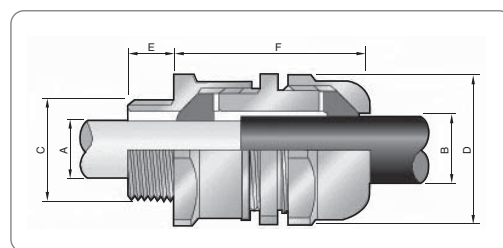
- Brass ⇒ Natural or Nickel Plated
- Mild Steel ⇒ Electro Zinc Plated

Certificates

- IECEX BAS 11,0061X
- Baseefa HATEX0135X

Compliances / Approvals

- IEC 60079-0 Equipment-General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- IEC 60079-7 Equipment protection by increased safety "e"
- IEC 60529 Degree of protection provided by enclosures (IP Code)
- NPT ⇒ ANSI / ASME B 1.20.1 Pipe threads, General purpose (Inch)
- BSPP ⇒ ISO 228/1 Pipe threads where pressure-tight joints are not made on the threads
- PG ⇒ DIN 40430:1971 PG threads
- Metric ⇒ ISO 965-1, ISO 965-3 medium fit (6g) for external threads
- BS 6121 : Part 1 : 1989



TECHNICAL DATA			
Model	SS2K	Ingress Protection Rating	IP66
Design Specification	BS 6121:Part 1:1989, EN 50262:1999	Cable Type	Un-armoured
ATEX Code of Protection Category	ATEX II 2G Ex d IIC, Ex e II	Sealing Technique	Displacement Seal
IEC Ex Code of Protection Category	Ex d II C, Ex e II	Sealing Area(s)	Cable Outer Sheath and Inner sheath
EN 50262 Mechanical Classifications	Retention = Class B, Impact = Level 6	Optional Accessories	Adaptor/Reducer, Earth Tag, Serrated Washer, Shroud
Continuous Operating Temperature	-20 °C to +80 °C		

Cable Gland Selection Table

Cable Gland Size	Available Entry Threads "C"			Minimum Thread Length "E"	Cable Bedding Diamete "A"		Overall Cable Diameter "B"		Across Corners	Protrusion Length "F"	PVC Shroud Ref
	Standard		Option		Min	Max	Min	Max			
	Metric	NPT	NPT								
20S/16	M20	1/2"	3/4"	15.0	3.1	8.6	3.1	8.6	26.0	51.5	GPS20
20S	M20	1/2"	3/4"	15.0	7.0	11.6	7.0	11.6	30.0	53.5	GPS20
20	M20	1/2"	3/4"	15.0	11.0	13.9	11.0	13.9	32.0	54.0	GPS20
25	M25	3/4"	1"	15.0	13.0	19.9	13.0	19.9	44.0	63.0	GPS25
32	M32	1"	1 1/4"	15.0	19.0	26.2	19.0	26.2	51.0	67.5	GPS32
40	M40	1 1/4"	1 1/2"	15.0	25.0	32.1	25.0	32.1	61.0	80.0	GPS40
50S	M50	1 1/2"	2"	15.0	31.5	38.1	31.5	38.1	67.0	80.0	GPS50
50	M50	2"	2 1/2"	15.0	36.5	44.0	36.5	44.0	77.0	81.0	GPS50
63S	M63	2"	2 1/2"	15.0	42.5	49.9	42.5	49.9	82.0	80.0	GPS63
63	M63	2 1/2"	3"	15.0	48.5	55.9	48.5	55.9	88.0	82.5	GPS63
75S	M75	2 1/2"	3"	15.0	54.5	61.9	54.5	61.9	99.0	89.5	GPS75
75	M75	3"	3 1/2"	15.0	60.5	67.9	60.5	67.9	110.0	89.5	GPS75
90	M90	3"	3 1/2"	15.0	67.5	79.3	67.5	79.3	132.0	94.0	GPS90



Cable Glands Accessories

Earth Tags

- BS 6121 :
Part 1 : 1989



■ Applications

Earth Tags (Slip type) installed between the cable gland and equipment, provide an earth bond connection as specified in BS 6121:Part5:1993.

■ Metric Earth Tags

Reference Cable Entry Size	Minimum Thickness	Nominal Collar Diameter	Earth Link Connection Hole Size	Nominal Length	Nominal Centers
M20	1.5	28.5	M6	55.0	33.8
M25	1.5	35.8	M6	61.5	36.6
M32	1.5	43.5	M10	76.0	44.3
M40	1.5	52.2	M13	92.0	53.9
M50	1.5	64.0	M13	111.0	67.0
M63	1.5	77.5	M13	128.7	78
M75	1.5	90.0	M13	141.3	84.3
M90	1.5	106.0	M13	165.0	100

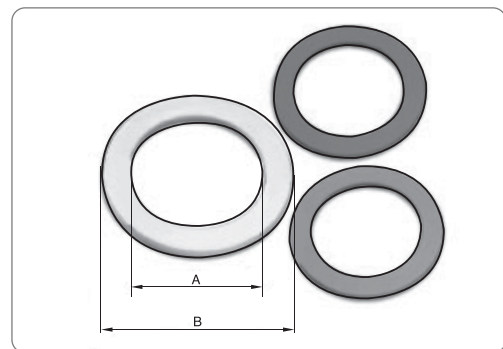
■ NPT Earth Tags

Reference Cable Entry Size	Minimum Thickness	Nominal Collar Diameter	Earth Link Connection Hole Size	Nominal Length	Nominal Centers
1/2" NPT	1.5	28.5	M6	55.0	33.8
3/4" NPT	1.5	35.8	M6	61.5	36.6
1" NPT	1.5	43.5	M10	76.0	44.3
1-1/4" NPT	1.5	52.2	M13	92.0	53.9
1-1/2" NPT	1.5	64.0	M13	111.0	67.0
2" NPT	1.5	77.5	M13	128.7	78
2-1/2" NPT	1.5	90.0	M13	141.3	84.3
3" NPT	1.5	90.0	M13	141.3	84.3
4" NPT	1.5	106.0	M13	165.0	100

Entry Thread Seal



To maintain the Ingress Protection rating between the equipment and cable gland it may be necessary to fit an Entry Thread Seal at the gland entry interface. For Explosion Protected equipment it is essential to maintain the integrity of the degree of Ingress Protection at which the equipment has been rated. The need for a sealing washer will very much depend on the Ingress Protection rating and code of protection of the equipment and the type of entry holes available within that equipment.



■ Metric Entry Thread Seal

Reference Diameter	Minimum Thickness	External Diameter
M16	1.5	26.0
M20	1.5	26.0
M25	1.5	35.0
M32	1.5	42.0
M40	1.5	49.0
M50	1.5	62.0
M63	1.5	75.0
M75	1.5	87.0
M90	1.5	102.0

■ NPT Entry Thread Seal

Reference Diameter	Minimum Thickness	External Diameter
1/2" NPT	1.5	28.0
3/4" NPT	1.5	35.0
1" NPT	1.5	42.0
1-1/4" NPT	1.5	49.0
1-1/2" NPT	1.5	62.0
2" NPT	1.5	75.0
2-1/2" NPT	1.5	87.0
3" NPT	1.5	102.0

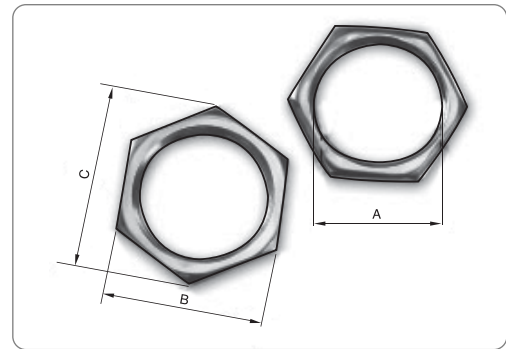
Lock-Nuts



■ Applications

Brass Locknuts are the recommended items used in securing brass cable glands, unions, adaptors, reducers, and stopper plugs to a gland plate or into equipment.

Zinc Plated Mild Steel locknuts are a cost effective alternative to brass locknuts and should only be used in dry, low humidity conditions.



■ Metric Lock-Nuts

Thread Diameter "A"	Minimum Thickness	Across Flats Dimension "B"	Across Corners Diameter "C"
M16 x 1.5	5	25.0	27.5
M20 x 1.5	5	30.0	33.0
M25 x 1.5	5	35.0	38.0
M32 x 1.5	5	40.0	45.0
M40 x 1.5	7	50.0	56.0
M50 x 1.5	7	60.0	65.0
M63 x 1.5	7	70.0	77.0
M75 x 1.5	7	85.0	94
M90 x 2.0	7	120.0	132

■ NPT Lock-Nuts

Thread Diameter "A"	Minimum Thickness	Across Flats Dimension "B"	Across Corners Diameter "C"
1/2" NPT	5	25.0	27.5
3/4" NPT	5	35.0	38.0
1" NPT	5	40.0	45.0
1-1/4" NPT	5	50.0	56.0
1-1/2" NPT	7	60.0	65.0
2" NPT	7	70.0	77.0
2-1/2" NPT	7	85.0	94
3" NPT	7	100.0	112
4" NPT	7	120.0	132

Shroud

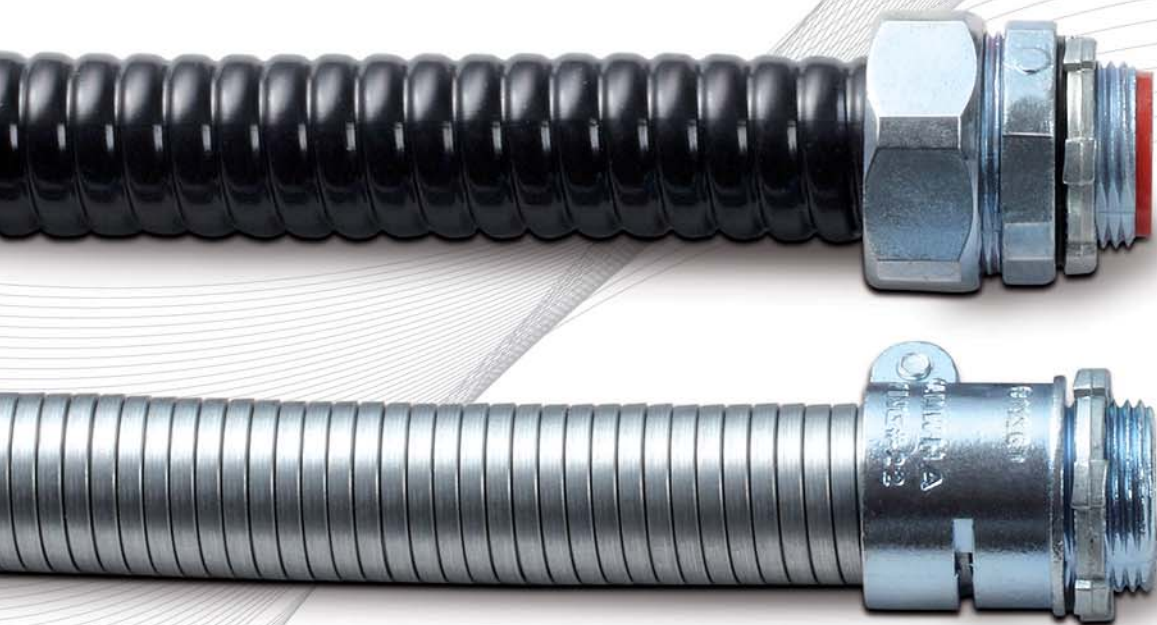


SAMWHA manufactures a range of push on shrouds which are used to minimize the risk of dirt or foreign substances gathering on the Cable Gland body, and/or point of cable to cable gland interface

Cable Gland Size	Shrouds for BW Cable Gland Group	Shrouds for CW Cable Gland Group	Shrouds for A2 Cable Gland Group	Shrouds for E1W Cable Gland Group
16	-	GPS16	GPS16	-
20S/16	-	GPS20	GPS20	GPS20
20S	GPS20	GPS20	GPS20	GPS20
20	GPS20	GPS20	GPS20	GPS20
25S	GPS25	GPS25	GPS25	GPS25
25	GPS25	GPS25	GPS25	GPS25
32	GPS32	GPS32	GPS32	GPS32
40	GPS40	GPS40	GPS40	GPS40
50S	GPS50	GPS50	GPS50	GPS50
50	GPS50	GPS50	GPS50	GPS50
63S	GPS63	GPS63	GPS63	GPS63
63	GPS63	GPS63	GPS63	GPS63
75S	GPS75	GPS75	GPS75	GPS75
75	GPS75	GPS75	GPS75	GPS75
90	-	GPS90	GPS90	GPS90

Outstanding Tensile and Compressive Strength are the Best Brands in Korea

KS and UL listed Samwha's conduits system fully protect cables under any work environment. In fact, our flexible conduits that feature tensile and compressive strength are the best brands in Korea. They are widely used in shipbuilding (LNG carriers), offshore plants, industrial machinery and machine tools, railroads, power plants and cars.





Electrical Conduit Systems/Cable Trays



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Electrical Conduit System / Cable Trays

Features

An electrical conduit is an electrical piping system used for protection and routing of electrical wiring. Electrical conduit may be made of metal, plastic, fiber, or fired clay. Flexible conduit is available for special purposes.

Conduit is generally installed by electricians at the site of installation of electrical equipment. Its use, form, and installation details are often specified by wiring regulations, such as the U.S. NEC or other national or local code. The term "conduit" is commonly used by electricians to describe any system that contains electrical conductors, but the term has a more restrictive definition when used in wiring regulations.

Early electric lighting installations made use of existing gas pipe to gas light fixtures (converted to electric lamps). Since this technique provided very good protection for interior wiring, it was extended to all types of interior wiring



■ Conduit Performance Selection Table

	Metallic	Allow to be threaded	Flexible or Pliable	Liquid tight
RMC	◆(Coated, Heavy)	◆	—	◆
RNC	—	—	—	◆
GRC	◆(Galvanized, Heavy)	◆	—	◆
EMT	◆(Galvanized, Thin)	—	—	◆
ENT	—	—	◆	◆
FMC	◆(Thin)	—	◆	—
LFMC	◆(Thin)	—	◆	◆
LFNC	—	—	◆	◆
IMC	◆(Galvanized, Middle)	◆	—	◆
PVC conduit	—	—	—	◆
AL conduit	◆	◆	—	◆

■ Comparison with other Wiring Methods

Electrical conduit provides very good protection to enclosed conductors from impact, moisture, and chemical vapors. Varying numbers, sizes, and types of conductors can be pulled into a conduit, which simplifies design and construction compared to multiple runs of cables or the expense of customized composite cable. Wiring systems in buildings are subject to frequent alterations. Frequent wiring changes are made simpler and safer through the use of electrical conduit, as existing conductors can be with drawn and new conductors installed, with little disruption along the path of the conduit.

A conduit system can be made waterproof or submersible. Metal conduit can be used to shield sensitive circuits from electromagnetic in-terference, and also can prevent emission of such interference from enclosed power cables. When installed with proper sealing fittings, a conduit will not permit the flow of flammable gases and vapors, which provides protection from fire and explosion hazard in areas handling volatile substances. Some types of conduit are approved for direct encasement in concrete.

This is commonly used in commercial buildings to allow electrical and communication outlets to be installed in the middle of large open areas. For example, retail display cases and open-office areas use floor-mounted conduit boxes to connect power and communications cables.

Both metal and plastic conduit can be bent at the job site to allow a neat installation without excessive numbers of manufactured fittings. This is particularly advantageous when following irregular or curved building profiles. The cost of conduit installation is higher than other wiring methods due to the cost of materials and labor. In applications such as residential construction, the high degree of physical damage protection is not required so the expense of conduit is not warranted. Conductors installed within conduit cannot dissipate heat as readily as those installed in open wiring, so the current capacity of each conductor must be reduced if many are installed in one conduit. It is impractical, and prohibited by wiring regulations, to have more than 360 degrees of total bends in a run of conduit, so special outlet fittings must be provided to allow conductors to be installed without damage in such runs.

While metal conduit can be used as a grounding conductor, the circuit length is limited. A long run of conduit as grounding conductor will not allow proper operation of overcurrent devices on a fault.

■ Types of Conduit

Conduit systems are classified by the wall thickness, mechanical stiffness, and material used to make the tubing.

- **Rigid Metal Conduit (RMC)**

Rigid Metal Conduit (RMC) is a thick threaded tubing, usually made of coated steel, stainless steel or aluminum.

- **Rigid Nonmetallic Conduit (RNC)**

Rigid Metal Conduit (RNC) is a thick threaded tubing.

- **Galvanized Rigid Conduit (GRC)**

Galvanized rigid conduit (GRC) is galvanized steel tubing, with a tubing wall that is thick enough to allow it to be threaded. Its common applications are in commercial and industrial construction.

- **Electrical Metallic Tubing (EMT)**

Electrical metallic tubing (EMT), sometimes called thin-wall, is commonly used instead of galvanized rigid conduit (GRC), as it is less costly and lighter than GRC. EMT itself may not be threaded, but can be used with threaded fittings that clamp to it. Lengths of conduit are connected to each other and to equipment with clamp-type fittings. Like GRC, EMT is more common in commercial and industrial buildings than in residential applications. EMT is generally made of coated steel, though it may be aluminum.

- **Electrical Nonmetallic Tubing (ENT)**

Electrical Nonmetallic Tubing (ENT) is a thin-walled corrugated tubing that is moisture-resistant and flame retardant. It is pliable such that it can be bent by hand and is often flexible although the fittings are not. It is not threaded due to its corrugated shape although the fittings might be.

- **Flexible Metallic Conduit (FMC)**

Flexible Metallic Conduit (FMC) is made through the coiling of a self-interlocked ribbed strip of aluminum or steel, forming a hollow tube through which wires can be pulled. FMC is used primarily in dry areas where it would be impractical to install EMT or other non-flexible conduit, yet where metallic strength to protect conductors is still required. The flexible tubing does not maintain any permanent bend. Cutting FMC requires a specialized hand tool with a rotary abrasive disc to create a small incision into the ribbing so that a twisting motion separates the segments.

The disc cuts deep enough to sever the armor coil but not so deep that it could damage the inside conductors. Short segments of FMC called "whips" are often used as circuit "pigtails" between fixtures and a [junction box], especially in [suspended ceiling]s. Whip assemblies save a great deal of repetitive labor when installations require several pigtails for several fixtures.

Flexible metal conduit coated with a UV-resistant polymer is liquid-tight when installed with appropriate [Gland (engineering)]glandular fittings containing liquid-tight features such as [O-ring]s.

Wiring regulations vary; in locales following the U.S. [National Electrical Code | National Electric Code] (NEC), flexible metallic conduit may serve as an equipment-grounding conductor. Other areas may require a bonding wire for equipment grounding. The bonding wire in direct contact with the interior of the conduit creates a lower resistance grounding conductor than the conduit alone.



Electrical Conduit System / Cable Trays

Features

■ Types of Conduit

- **Liquid-tight Flexible Metal Conduit (LFMC)**

Liquid-tight Flexible Metal Conduit (LFMC) is a metallic flexible conduit covered by a waterproof plastic coating. The interior is similar to FMC.

- **Flexible Metallic Tubing (FMT)**

Flexible Metallic Tubing (FMT) is not the same as Flexible Metallic Conduit (FMC) aka "greenfield" or "flex" which is National Electrical Code (NEC) Art 348. FMT is a raceway, but not a conduit and is a separate NEC Article - 360. It only comes in 1/2" & 3/4" trade sizes whereas FMC is sized 1/2" ~ 4" trade sizes. NEC 360.2 describes it as: "A raceway that is circular in cross section, flexible, metallic and liquid-tight without a nonmetallic jacket."

- **Liquid-tight Flexible Nonmetallic Conduit (LFNC)**

Liquid-tight Flexible Nonmetallic Conduit (LFNC) refers to several types of flame-resistant non-metallic tubing. Interior surfaces may be smooth or corrugated. There may be integral reinforcement within the conduit wall. It is also known as FNMC.

- **Aluminum Conduit**

Aluminum conduit, similar to galvanized steel conduit, is a rigid conduit, generally used in commercial and industrial applications, where a higher resistance to corrosion is needed. Such locations would include food processing plants, where large amounts of water and cleaning chemicals would make galvanized conduit unsuitable. Aluminum cannot be directly embedded in concrete, since the metal reacts with the alkalis in cement. The conduit may be coated to prevent corrosion by incidental contact with concrete. The extra cost of aluminum is somewhat offset by the lower labor cost to install, since a length of aluminum conduit will have about one-third the weight of an equally-sized rigid steel conduit.

- **Intermediate Metal Conduit (IMC)**

Intermediate Metal Conduit (IMC) is a steel tubing heavier than EMT but lighter than RMC. It may be threaded.

- **PVC Conduit**

PVC conduit is the lightest in weight compared to other conduit materials, and usually lower in cost than other forms of conduit. In North American electrical practice, it is available in three different wall thicknesses, with the thin-wall variety only suitable for embedded use in concrete, and heavier grades suitable for direct burial and exposed work. The various fittings made for metal conduit are also made for PVC. The plastic material resists moisture and many corrosive substances, but since the tubing is non-conductive an extra bonding (grounding) conductor must be pulled into each conduit. PVC conduit may be heated and bent in the field. Joints to fittings are made with slip-on solvent-welded connection, which set up rapidly after assembly and attain full strength in about one day. Since slip-fit sections do not need to be rotated during assembly, the special union fittings used with threaded conduit (Ericson) are not required. Since PVC conduit has a higher thermal coefficient of expansion than other types, it must be mounted so as to allow for expansion and contraction of each run. Care should be taken when installing PVC underground in multiple or parallel run configurations due to mutual heating effect of cable.

- **Other Metal Conduits**

In extreme corrosion environments where plastic coating of the tubing is insufficient, conduits may be made from stainless steel, bronze or brass.

- **Underground Conduit**

Large diameter (more than 2 inch/50 mm) conduit may be installed underground between buildings to allow installation of power and communication cables. An assembly of these conduits, often called a duct bank, may either be directly buried in earth or encased in concrete. A duct bank will allow replacement of damaged cables between buildings or additional power and communications circuits to be added, without the expense of ex-cavation of a trench. While metal conduit is occasionally used for burial, usually PVC, polyethylene or polystyrene plastics are now used due to lower cost. Formerly, compressed asbestos fiber mixed with cement was used for some underground installations. Telephone and communications circuits were installed in fired-clay conduit.

■ Comparison of Some Types of Conduit

Exact ratios of installation labor, weight and material cost vary depending on the size of conduit, but the values for 3/4 inch (21 metric) trade size are representative.

Relative to rigid galvanized steel conduit, 3/4 inch (21 metric) size

Relative	RGS	Aluminum	IMC	EMT	PVC
Labor	1.0	0.89	0.89	0.62	0.55
Weight	1.0	0.34	0.76	0.42	0.20
Material cost	1.0	0.99	0.84	0.35	0.43

■ Other Wire-ways

• Surface Mounted Raceway (wire molding)

This type of "decorative" conduit is designed to provide an aesthetically acceptable passageway for wiring without hiding it inside or behind a wall. This is used where additional wiring is required, but where going through a wall would be difficult or require remodeling. The conduit has an open face with removable cover, secured to the surface, and wire is placed inside. Plastic raceway is often used for telecommunication wiring, such as network cables in an older structure, where it is not practical to drill through concrete block.

Advantages

- It allows one to add new wiring to an existing building without removing or cutting holes into the drywall or lath and plaster.
- It allows circuits to be easily locatable and accessible for future changes thus enabling minimum effort upgrades.

Disadvantages

It's appearance may not be acceptable to all observers.

Trunking

The term TRUNKING is used in the United Kingdom for electrical wire-ways, generally rectangular in cross section with removable lids. Mini TRUNKING is a term used in the UK for small form-factor (usually 6mm to 25mm square or rectangle sectioned) PVC wire ways. In North American practice "wire trough" or "lay-in wire-ways" are terms used to designate similar products, but these are never used enclosed in masonry or a wall.



Electrical Conduit System / Cable Trays

Technical tip for Electrical Wiring

Electrical wiring in North America follows regulations and standards for installation of building wiring. Electrical wiring in the United States is generally in compliance with the National Electrical Code, a standard sponsored by the National Fire Protection Association which has been periodically revised since 1897. Local amendments or supplements to this model code are common in American cities or states. For electrical wiring in Canada, the Canadian Electrical Code is a very similar standard published in Canada by the Canadian Standards Association since 1927. Other countries neighboring the U.S. also usually use the same standards, including much of Mexico.

• Terminology

Although much of the electrician's field terminology matches that of the electrical codes, usages can vary.

- A neutral wire is the return leg of a circuit; in building wiring systems the neutral wire is connected to earth ground at least at one point. North American standards state that the neutral is neither switched nor fused. The neutral is connected to the center tap of the power company transformer of a split-phase system, or the center of the wye connection of a poly-phase power system. American electrical codes require that the neutral be connected to earth at the "service panel" only and at no other point within the building wiring system. Formally the neutral is called the "grounded conductor"; as of the 2008 defined in the Code to record what had been common usage.
- Hot is any conductor (wire or otherwise) connected with an electrical system that has electric potential to electrical ground or neutral.
- Grounded is a conductor with continuity to earth.
- Leg as in 'hot leg' refers to one of multiple hot conductors in an electrical system. The most common service in the U.S., single split-phase, 240 V, features a neutral and two hot legs, 240 V to each other, and 120 V each to the neutral. A three-phase system will have three "hot" legs.
- An outlet is called a receptacle in the NEC. In the NEC an outlet is a device for easily connecting a utilization device by inserting a mating plug.

■ Electrical Codes and Standards

The National Electrical Code (NEC) specifies acceptable wiring methods and materials. Local jurisdictions usually adopt the NEC or another published code and then distribute documents describing how local codes vary from the published codes. They cannot distribute the NEC itself for copyright reasons.

The purpose of the NEC is to protect persons and property from hazards arising from the use of electricity. The NEC is not any jurisdiction's electrical code per se; rather, it is an influential work of standards that local legislators (e.g., city council members, state legislators, etc. as appropriate) tend to use as a guide when enacting local electrical codes. The NFPA states that excerpts quoted from the National Electrical Code must have a disclaimer indicating that the excerpt is not the complete and authoritative position of the NFPA and that the original NEC document must be consulted as the definitive reference. New construction, additions or major modifications must follow the relevant code for that jurisdiction, which is not necessarily the latest version of the NEC. Regulations in each jurisdiction will indicate when a change to an existing installation is so great that it must then be rebuilt to comply with the current electrical code. Generally existing installations are not required to be changed to meet new codes.

Enforcement of code requirements varies by jurisdiction in the United States. In many areas, a homeowner, for example, can perform household wiring for a building which the owner occupies; this may even be complete wiring of a home. A few cities have more restrictive rules and require electrical installations to be done by licensed electricians. The work will be inspected by a designated authority at several stages before permission is obtained to energize the wiring from the local electric utility; the inspector may be an employee of the state or city, or an employee of an electrical supply utility.

• Design and Installation Conventions

For residential wiring, some basic rules given in the NEC are:

- Phase wire in a circuit may be black, red, orange (high leg delta) insulated wire, sometimes other colors, but never green, gray, or white (whether these are solid colors or stripes). Specific exceptions apply, such as a cable running to a switch and back (known as a traveler) where the white wire will be the hot wire feeding that switch. Another is for a cable used to feed an outlet for 250VAC 15 or 20 amp appliances that do not need a neutral, there the white is hot (but should be identified as being hot, usually with black tape inside junction boxes).

- The neutral wire is identified by gray or white insulated wire, perhaps with stripes.
- Grounding wire of circuit may be bare or identified insulated wire of green or having green stripes. Note that all metallic systems in a building are to be bonded to the building grounding system, such as water, natural gas, HVAC piping, and others.
- Larger wires are furnished only in black; these may be properly identified with suitable paint or tape.
- All wiring in a circuit except for the leads that are part of a device or fixture must be the same gauge. Note that different size wires may be used in the same raceway so long as they are all insulated for the maximum voltage of any of these circuits.
- The Code gives rules for calculating circuit loading.
- Ground-fault circuit interrupter (GFCI) protection is required on receptacles in wet locations. This includes all small appliance circuits in a kitchen, receptacles in a crawl space, basements, bathrooms and a receptacle for the laundry room, as well as outdoor circuits within easy reach of the ground. However, they are not required for refrigerators because unattended disconnection could cause spoilage of food, nor for garbage disposals. Instead, for refrigerators and other semi-permanent appliances in basements and wet areas, use a one-outlet non-GFCI dedicated receptacle. Two-wire outlets having no grounding conductor may be protected by an upstream gfcI and must be labeled "no grounding". Most GFCI receptacles allow the connection and have GFCI protection for down-stream connected receptacles. Receptacles protected in this manner should be labeled "GFCI protected".
- Most circuits have the metallic components inter-connected with a grounding wire connected to the third, round prong of a plug, and to metal boxes and appliance chassis.
- Furnaces, water heaters, heat pumps, central air conditioning units and stoves must be on dedicated circuits.
- The code provides rules for sizing electrical boxes for the number of wires and wiring devices in the box.
- The foregoing is just a brief overview and must not be used as a substitute for the actual National Electrical Code.

- **Comparison of US Practices with other Countries**

Electrical wiring practices developed in parallel in many countries in the late 19th and early 20th centuries. As a result, national and regional variations developed and remain in effect. (see National Electrical Code, electrical wiring, electrical wiring in the United Kingdom). Some of these are retained for technical reasons, since the safety of wiring systems depends not only on the wiring code but also on the technical standards for wiring devices, materials, and equipment. Grounding (earthing) of distribution circuits is a notable difference in practice between United States wiring systems and those elsewhere in the world. Since the early 1960s, wiring in new construction has required a separate grounding conductor used to bond (electrically connect) all normally non-current carrying parts of an electrical installation. Portable appliances with metal cases also have a bonding conductor in the flexible cable and plug connecting them to the distribution system. The circuit return conductor (neutral) is also connected to ground at the service entrance panel only; no other connections from neutral to ground are allowed, unlike regulations in other parts of the world. Lighting and power receptacle circuits in North American systems are typically radial from a distribution panel containing circuit breakers to protect each branch circuit. The smallest branch circuit rating is 15 amperes, used for general purpose receptacles and lighting. In residential construction, branch circuits for higher ratings are usually dedicated to one appliance, for example, fixed cooking appliances, electric clothes dryers, and air conditioners. Lighting and general purpose receptacles are at 120 volts AC, with larger devices fed by three wire single-phase circuits at 240 volts. In commercial construction, three-phase circuits are used. Generally, receptacles are fed by 120 V or 208 V (in place of 240 V in a house), and can include special amperage rated outlets for industrial equipment. Lighting is usually fed by 277 V (with exception for special-use lights that use 120 V). Equipment can be hard-wired into the building using either 120/208 V or 277/480 V. Countries such as Mexico may adopt the NFPA standard as their national electrical code, with local amendments similar to those in United States jurisdictions. The Canadian Electrical Code, while developed independently from the NFPA code, is similar in scope and intent to the US NEC, with only minor variations in technical requirement details; harmonization of the CSA and NEC codes is intended to facilitate free trade between the two countries.



Electrical Conduit System / Cable Trays

Technical tip for Electrical Wiring

■ Wiring Methods

• Conduit.

In Class I, Division 1, locations, all conduit must be rigid metal or steel IMC with at least five full tapered threads tightly engaged in the enclosure. (An exception to 500.8(E) allows 4-1/2 for factory threaded NPT entries.)

All factory-drilled and tapped SAMWHA enclosures satisfy this requirement. When field drilling and tapping is performed it may be required to drill and tap deeper than standard NPT to insure engagement of five full threads. For further information contact your SAMWHA field representative. A common method of wiring employs thick-walled conduit with a corrosion-resistant finish. In addition to the protective finish on the conduit, various types of paints or special finishes are used extensively to give extra protection from corrosive atmospheres. Alternate changes in temperature and barometric pressure cause "breathing" — the entry and circulation of air throughout the conduit. As joints in a conduit system and its components are seldom tight enough to prevent this breathing, moisture in the air condenses and collects at the base of vertical conduit runs and equipment enclosures. This could cause equipment shorts or grounds. To eliminate this condition, inspection fittings should be installed and equipped with Explosion-proof drains to automatically drain off the water.

• Seals for Conduit System.

NEC 501.15 requires that sealing fittings filled with approved compound be installed in conduits entering explosion-proof enclosures. Seals are necessary to limit volume, to prevent an explosion from traveling throughout the conduit system, to block gases or vapors from moving from a hazardous to a nonhazardous area through connecting raceways or from enclosure to enclosure, and to stop pressure piling - the buildup of pressure inside conduit lines caused by pre-compression as the explosion travels through the conduit. (See Appendix III - Selection of Seals and Drains.)

The standard type seals are not intended to prevent the passage of liquids, gases or vapors at pressures continuously above atmospheric.

Temperature extremes and highly corrosive liquids and vapors may affect the ability of seals to perform their intended function. In hazardous locations, seals are needed in the following instances:

- Where the conduit enters an enclosure that houses arcing or high-temperature equipment. (A seal must be within 18 inches or closer if the manufacturer's instructions so specify of the enclosure it isolates.)
- Where the conduit enters enclosures that house terminals, splices or taps, if the conduit is 2-inch trade size or larger.
- Where the conduit leaves a Division I area or passes from a Division 2 hazardous area to a nonhazardous location.

• Mineral Insulated Cable.

Another type of wiring system suitable for Division 1 is mineral insulated (MI) cable. Mineral-insulated wiring consists of copper conductors properly spaced and encased in tightly compressed magnesium oxide, clad in an overall copper sheath. Below the melting temperature of the copper sheath, MI cable is impervious to fire. Because of limitations on end connections, its operating range is generally considered to be -40 to 80°C with standard terminals, and up to 250°C with special terminals. When properly installed, MI cable is suitable for all Class I and Class II locations.

MI cable is available with one to 17 conductors, making it most suitable for wiring of control boards, control components and instrumentation circuits where crowded conditions make conduit installations difficult and expensive.

MI cable is hygroscopic; therefore, moisture can be a problem when the ends are left exposed. Care must be taken to install and seal the end fittings as soon as possible to prevent moisture accumulation. If moisture enters, the end must be cut off or dried out with a torch.

- **Metal-Clad Cable.**

Metal-clad cable (Type MC) is permitted by the National Electrical Code for application in Class I, Division 2 locations.

Use of this type of cable is not limited to any voltage class. The armor itself is available in various metals. When further protection from chemical attack is needed, a supplemental protective jacket may be used.

The NEC also permits, under certain restrictions, a particular kind of metal-clad cable (MC-HL) to be used in Class I, Division 1 locations. This is detailed in 501.10(A)(1)(c). Similarly, 501.10(A)(1)(d) permits a certain type of Instrumentation Tray Cable (ITC-HL).



- **Tray Cable.**

Power and control tray cable (Type TC) is permitted in Class I, Division 2 locations. It is a factory assembly of two or more insulated conductors with or without the grounding conductor under a nonmetallic sheath.

- **Other Permitted Cables.**

In Class I, Division 2 locations, the NEC also recognizes the use of Type PLTC, similar to TC except the conductors are limited to No. 22 through No. 16; also Type MV, a single or multi-conductor solid dielectric insulated cable rated 2001 volts or higher. The NEC also permits Type ITC cable, as covered by Article 727, Instrumentation Tray Cable, which details its construction and use.

- **G. Cable Sealing.**

In Class I, Division 1 locations the use of cable, except types MI, MC-HL and ITC-HL, is limited to installation in conduit.

Multi-conductor cables that cannot transmit gases through the cores are sealed as single conductors; this type of cable, however, is not readily available. If a cable can transmit gases through its core, the outer jacket must be removed so that the sealing compound surrounds each individual insulated conductor and the jacket, or it can be sealed as a single conductor if the cable end in the enclosure is sealed by an approved means. SAMWHA epoxy is such a means.

In Class I, Division 2 locations cables must be sealed where they enter enclosures required to be explosion-proof.

In the case of extra-hard-usage flexible cord, SHF or SVF seals with appropriate cable terminators are recommended. If the cable core can transmit gases, the outer jacket must be removed so that the sealing compound surrounds each conductor to prevent the passage of gases.

Cables without a gas-tight continuous sheath must be sealed at the boundary of the Division 2 and unclassified locations.

If attached to equipment that may cause a pressure at a cable end, a sheathed cable that can transmit gases through its core must be sealed to prevent migration of gases into an unclassified area.

- **Nonmetallic Conduit**

Under certain restrictions, in Class I, Division 2 locations, reinforced thermosetting resin conduit (RTRC) and Schedule 80 PVC conduit and associated fittings may be used.



Electrical Conduit / Cable Trays

Rigid Conduits

KS C 8401 & JIS C 8305 Intermediate Metal Conduit (IMC)

- KS C 8401 & JIS C 8305 - Zinc Coated

■ Scope

This Korea Industrial Standard specifies rigid steel conduits, (here-after referred to as the “conduit tubes”) used for protecting electric wires in electrical wiring work.

- Remarks The following Standards are cited in this Standard
- KS B 0023 Screw Threads for Rigid Metal Conduits and Fittings
- KS D 0201 Methods of Test for Hot Dip Galvanized Coatings
- KS D 3512 Cold Rolled Carbon Steel Sheets and Strip
- KS D 3555 Hot Rolled Carbon Steel Strip for Pipes and Tubes
- KS D 9502 Methods of Neutral Salt Spray Testing

■ Type

Conduit tubes are classified into three types of thick rigid steel conduit tubes, thin rigid steel conduit tubes and thread-less rigid steel conduit tubes.

■ Bending Performance

When a conduit tube is subjected to the test of 9.1, the variation in outside diameter shall be $\pm 20\%$ of the original outside diameter, and no separation or split of the welded seam shall take place and no crack or peeling off shall develop on the galvanized surface or coated film.

■ Corrosion-resistance

The rust prevention given to conduit tubes shall comply with the relevant items described below.

- a) The surface treated by galvanizing or thermal spraying shall not reach the end point when subjected to the uniformity test of 9.2.1.
- b) No white corrosion product shall be produced on the surface electrically galvanized and chromate, when the salt-spray test of 9.2.2. is carried out
- c) Neither blister, peeling off, nor rust shall develop on the coated surface when the salt-spray test of 9.2.2 is carried out.

■ Dimension, Mass, Effective Length of Threaded Part and Tolerances on Outside Diameter and Mass

- a) The dimension, mass effective length of threaded part and tolerances on outside diameter and mass of a conduit tube shall be as given in Tabel 1, 2 and 3
- b) In general, the length shall be 3660mm and the tolerance shall be $\pm 5\text{mm}$, However, the length may be changed according to the agreement between the parties concerned with acceptance.

Table 1 Dimension, Mass, Effective Length of Threaded Part and Tolerances on Outside Diameter and Mass of Thick Rigid Steel Conduit Tubes

Designation	Outside Diameter (mm)	Tolerance on outside Diameter (mm)	Thickness (mm)	Mass ⁽¹⁾ (²) (Kg/m)	Effective length of threaded part (mm)	
					Max.	Min.
G 16	21.0	±0.3	2.3	1.06	19	16
G 22	26.5	±0.3	2.3	1.37	22	19
G 28	33.3	±0.3	2.5	1.90	25	22
G 36	41.9	±0.3	2.5	2.43	28	25
G 42	47.8	±0.3	2.5	2.79	28	25
G 54	59.6	±0.3	2.8	3.92	32	28
G 70	75.2	±0.3	2.8	5.00	36	32
G 82	87.9	±0.3	2.8	5.88	40	36
G 92	100.7	±0.4	3.5	8.39	42	36
G 104	113.4	±0.4	3.5	9.48	45	39

Note

(1) The mass given in Tables 1 and 2 indicates the mass not including that of threaded part.

(2) Tolerance on mass per one bundle of conduit tubes (within 50 kg) shall be -7%. No tolerance on plus side is specified. In the calculation of tolerance on mass, the difference of actual mass and calculated mass is divided by the calculated mass and expressed in percentage. The value of mass is calculated from the following formula, by taking the mass of a cm³ steel as 7.85 g, and rounded off to three significant figures in accordance with KS A 0021.

Table 2 Dimension, Mass and Tolerances on Outside Diameter and Mass of Threaded Rigid Steel Conduit Tubes

Designation	Outside Diameter (mm)	Tolerance on Outside Diameter (mm)	Thickness (mm)	Mass ⁽¹⁾ (²) (Kg/m)	Effective length of threaded part (mm)	
					Max.	Min.
C 19	19.1	±0.2	1.6	0.690	14	12
C 25	25.4	±0.2	1.6	0.939	17	15
C 31	31.8	±0.2	1.6	1.19	19	17
C 39	38.1	±0.2	1.6	1.44	21	19
C 51	50.8	±0.2	1.6	1.94	24	22
C 63	63.5	±0.35	2.0	3.03	27	25
C 75	76.2	±0.35	2.0	3.66	30	28

Table 3 Dimension, Mass and Tolerances on Outside Diameter and Mass of Threadless Rigid Steel Conduit Tubes

Designation	Outside Diameter (mm)	Tolerance on Outside Diameter (mm)	Thickness (mm)	Mass ⁽¹⁾ (²) (Kg/m)
E 19	19.1	±0.15	1.2	0.530
E 25	25.4	±0.15	1.2	0.716
E 31	31.8	±0.15	1.4	1.05
E 39	38.1	±0.15	1.4	1.27
E 51	50.8	±0.15	1.4	1.71
E 63	63.5	±0.25	1.6	2.44
E 75	76.2	±0.25	1.6	3.30



Electrical Conduit / Cable Trays

Rigid Conduits

ANSI C 80.1 Galvanized Rigid Conduit (GRC)

- ANSI C 80.
1- Zinc Coated

■ Scope

This American National Standard for rigid steel conduit is furnished in nominal 10-ft.(3.05m) length, threaded on each end with one coupling attached. It is protected on the exterior surface with a metallic zinc coating and on the interior surface with a zinc, enamel, or other equivalent corrosion-resistant coating.

■ Zinc Coating

The coating on the outside surface is equivalent to a minimum thickness of 0.0008 inch (0.02mm).

■ Enamel or Equivalent Coating

This have a smooth continuous surface. An occasional variation due to uneven flow of coating shall be acceptable. The coating shall not soften at a temperature of 120°F (49°C)

■ Dimension, Mass, Dimensions and Weights of Rigid Steel Conduit

Designation	Inside Diameter (mm)	Outside Diameter (mm)	Thickness (mm)	Length without coupling meters	Minimum weight of ten unit lengths with couplings Attached (kg)
1/2"-16 GRC	16.1	21.3	2.64	3.03	35.83
3/4"-21GRC	21.2	26.7	2.72	3.03	47.63
1"-27GRC	27.0	33.4	3.20	3.02	69.40
1-1/4"-35GRC	35.4	42.2	3.38	3.02	91.17
1-1/2"-41GRC	41.2	48.3	3.51	3.02	112.95
2"-53GRC	52.9	60.3	3.71	3.02	150.60
2-1/2"-63GRC	63.2	73.0	4.90	3.01	239.05
3"-78GRC	78.5	88.9	5.21	3.01	309.63
3-1/2"-91GRC	90.7	101.6	5.46	3.0	376.94
4"-103GRC	102.9	114.3	2.72	3.0	441.04
5"-129GRC	128.9	141.3	6.22	3.0	595.85
6"-155GRC	154.8	168.3	6.76	3.0	791.67

Note Applicable tolerances :

- Length : $\pm 1/4$ inch (6.35mm) (without coupling)
- Outside Diameter : For trade sizes $\frac{1}{2}$ " (16GRC) through 2" (53GRC) : ± 0.015 inch (± 0.38 mm) / For trade sizes 2- $\frac{1}{2}$ " (83GRC) through 4" (103GRC) : ± 0.025 inch (± 0.64 mm) / For trade sizes 5" (129GRC) through 6" (155GRC) : $\pm 1\%$

KS C 8431 & JIS C 8430 PVC Conduit (PVC)

- KS C 8431 &
JIS C 8430-
Class VE

Specified as electrical conduit pipe in Korean Industrial Standards (KS C 8431), equal to JIS 8430. Can be installed in the same manner as conventional metal or steel pipes. High impact pipe and a complete line of accessories are available. Can be embedded in concrete.

■ Dimension, Mass, Dimensions and Weights of Class VE PVC & HI-PVC pipe

Designation	Outside Diameter (mm)	Wall Thickness (mm)	Tolerance of wall thickness (mm)	Approximate inside Diameter (mm)	Calculated weight(g/m)
14	18	2.0	± 0.20	14	144
16	22	2.0	± 0.20	18	180
22	26	2.0	± 0.20	22	216
28	34	3.0	± 0.30	28	418
36	42	3.5	± 0.40	35	605
42	48	4.0	± 0.40	40	791
54	60	4.5	± 0.40	51	1,122
70	76	4.5	± 0.40	67	1,445
82	89	5.9	± 0.40	78	2,202
100	114	6.5	± 0.60	101	3,138
*100	111	5.5	± 0.50	100	2,650

- Note 1. Nominal size *100 mm complies with specification permissible in Korea telecommunication Association.
2. Standard length : 4M

KS C 8431 & JIS C 8430 HI-PVC Conduit (HI-PVC)

- KS C 8431 & JIS C 8430

SAMWHA HI PVE pipe which is specially integrated with mechanical strength, sufficient elasticity and high impact strength is made to be safe and more effective for all kinds of installation. SAMWHA HI PVE pipe is 3~5 times stronger in impact strength than normal PVC pipe.

■ Applications

- Cold area installation.
- Ground installation requiring high impact strength.
- All kinds of services in buildings and apartments, especially conduit line of taller building.

■ Features

- Excellent high impact strength.
- Non-corrosion and low flow loss.
- Easy handling and installation.
- Low cost.

■ Properties of SAMWHA HI-PVC pipe

Items	Unit	Characteristic Value
Specific Gravity	—	1.35~1.43
Tensile Strength at 15°C	Kg/cm ² (psi)	470~540(6,700~7,000)
Elongation at Ultimate	%	50~150
Modulus of Elasticity	Kg/cm ² (psi)	2.0~2.5x10 ⁴ (2.8~3.6x10 ⁵)
Impact Strength	Kg/-cm/cm ² (lb/-ft/inch ²)	15~25 (2.7~4.6)
Co-efficient of Linear Expansion	°C-1	6~8 x10 ⁻⁶

ELP Corrugated Hard Poly-ethylene Pipe

- KS C 8455

Specified as electrical conduit pipe in Korean Industrial Standards (KS C 8455). High impact pipe and a complete line of accessories are available. Can be embedded in concrete.



■ Dimensions

Designation	Approximate Outside Diameter (mm)	Approximate Inside Diameter (mm)	Pitch (mm)	Unit Length (M)
30	40.0±2.0	30.0±2.0	10.0±0.5	100.0
40	53.5±2.0	40.0±2.0	13.0±0.8	100.0
50	64.5±2.5	50.0±2.5	17.0±1.0	100.0
65	84.5±2.5	65.0±2.5	21.0±1.0	100.0
80	105±3.0	80.0±3.0	25.0±1.0	100.0
100	130±4.0	100.0±4.0	30.0±1.0	100.0
125	160±4.0	125.0±4.0	38.0±1.0	50.0
150	188±4.0	150.0±4.0	45.0±1.5	50.0
175	230±4.0	175.0±4.0	55.0±1.5	30.0
200	260±4.0	200.0±4.0	60.0±1.5	30.0



Electrical Conduit / Cable Trays

Rigid Conduits

NEMA TC-2 & NEMA TC-6 PVC Conduit (PVC)

- NEMA TC-2

Specified as electrical conduit pipe in NEMA TC-2. Can be installed in the same manner as conventional metal or steel pipes. High impact pipe and a complete line of accessories are available. Can be embedded in concrete.

■ Dimensions (Inch)

NOMINAL SIZE (INCH)	OUTSIDE DIAMETERS, INCHES					WALL THICKNESS, INCHES						
	AVERAGE	OUT OF ROUNDNESS				EPT PVC		EPC.40.PVC AND EPT PVC		EPC.80.PVC		MINIMUM CROSS SECTIONAL AREA, SQUARE INCHES OF EPC.80.PVC
		PVC		PE								
		MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	
1/2	0.840±0.004	0.048	0.832	0.855	0.825	0.080	0.060	0.129	0.109	—	—	—
3/4	1.050±0.004	1.060	1.040	1.070	1.030	0.080	0.060	0.133	0.113	—	—	—
1	1.315±0.005	1.325	1.305	1.340	1.290	0.080	0.060	0.153	0.133	—	—	—
1 1/4	1.660±0.005	1.672	1.648	1.685	1.635	0.090	0.070	0.160	0.140	—	—	—
1 1/2	1.900±0.006	1.912	1.888	1.930	1.870	0.100	0.080	0.165	0.145	0.224	0.200	1.71
2	2.375±0.006	2.387	2.363	2.410	2.340	0.120	0.080	0.174	0.154	0.244	0.218	2.87
2 1/2	2.875±0.007	2.890	2.860	2.910	2.840	0.130	0.100	0.227	0.203	0.309	0.276	4.12
3	3.500±0.008	3.515	3.485	3.540	3.460	0.145	0.125	0.242	0.216	0.336	0.300	6.43
3 1/2	4.000±0.008	4.050	3.950	4.045	3.955	0.165	0.145	0.253	0.356	0.356	0.318	8.65
4	4.500±0.009	4.550	4.450	4.550	4.450	0.170	0.150	0.265	0.237	0.377	0.337	11.2
5	5.563±0.010	5.613	5.513	5.618	5.508	—	—	0.289	0.258	0.420	0.375	17.8
6	6.625±0.011	6.675	6.575	6.690	6.560	—	—	0.314	0.280	0.484	0.432	25.8

- NEMA TC-6

Specified as electrical conduit pipe in NEMA TC-6. Can be installed in the same manner as conventional metal or steel pipes. High impact pipe and a complete line of accessories are available. Can be embedded in concrete.

■ Dimensions (Inch)

NOMINAL SIZE (INCH)	Outside Diameters					Minimum Wall Thickness				Minimum Inside Diameter
	Plus or Minus Tolerance (inch)					Type EB		Type DB		
	Average	For Average Diameter	Out-of-roundness	ABS	PVC	ABS	PVC			
1/2	0.840 ± 0.004	0.048	0.832	0.855	0.825	0.080	0.060	0.129	0.109	—
3/4	1.050 ± 0.004	1.060	1.040	1.070	1.030	0.080	0.060	0.133	0.113	—
1	1.315 ± 0.005	1.325	1.305	1.340	1.290	0.080	0.060	0.153	0.133	—
1 1/4	1.660 ± 0.005	1.672	1.648	1.685	1.635	0.090	0.070	0.160	0.140	—
1 1/2	1.900 ± 0.006	1.912	1.888	1.930	1.870	0.100	0.080	0.165	0.145	0.224
2	2.375 ± 0.006	2.387	2.363	2.410	2.340	0.120	0.080	0.174	0.154	0.244
2 1/2	2.875 ± 0.007	2.890	2.860	2.910	2.840	0.130	0.100	0.227	0.203	0.309
3	3.500 ± 0.008	3.515	3.485	3.540	3.460	0.145	0.125	0.242	0.216	0.336
3 1/2	4.000 ± 0.008	4.050	3.950	4.045	3.955	0.165	0.145	0.253	0.356	0.356
4	4.500 ± 0.009	4.550	4.450	4.550	4.450	0.170	0.150	0.265	0.237	0.377
5	5.563 ± 0.010	5.613	5.513	5.618	5.508	—	—	0.289	0.258	0.420
6	6.625 ± 0.011	6.675	6.575	6.690	6.560	—	—	0.314	0.280	0.484

Electrical Conduit / Cable Trays

Flexible & Pliable Metal Conduits

Flexible & Pliable Metallic Conduit (FMC & LFMC)

SAMWHAFLEX® SUNFLEX® PLICA®

- KS C 8422
- UL 360

First class
Standard M typeFirst class
Interlock I type

Second class

■ Scope

This Korea Industrial Standard specifies Flexible Metallic conduits, (here-after referred to as the "FMC") used for protecting electric wires in electrical wiring work.

- Remarks The following Standards are cited in this Standard
- KS C 2329 Bulkernized fiber plate.
- KS D 0201 Testing method for melting zinc plated.
- KS D 3506 Melting zinc plated steel plate and bar.
- KS D 3512 Cold rolled steel plate and bar.
- KS D 6701 Aluminum plate and bar of aluminum and alloyed.
- KS D 9502 Testing method for the spraying of salt water.
- KS M 3156 Soft poly salted vinyl compound.

■ Type

The type of flexible conduits consist of the shall be 4 types as follows.

- First class flexible metal conduits (Here in after called as class flexible conduits.)
- First class vinyl coated flexible metal conduits.
(Here in after called as first class vinyl coated flexible conduits).
- Second class flexible metal conduits. (Here in after called as second class flexible conduits).
- Second class vinyl coated flexible metal conduits.
(Here in after called as second class vinyl coated flexible conduit).

■ Performance

• Bending Performance

Small lines or cracks and any clearance not be occurred on the any parts of specimen.
(Test method 8.6)

• Corrosion-resistance

- a) Not reached at final point of it. (Test method 8.2(a))
- b) Shall not occurred the steel rust or swelling up. (Test method 8.2(b),(c))

• Electric Resistance

- a) Below 0.02Ω before testing of the described in the item 8.6.
- b) Below 0.03 Ω after testing of the described in the item 8.6.

• Tension

Any cracks on the any parts of specimen not be occurred. (Test method 8.3)

• Compression

Outside diameter of specimen not be increased or reduced by over 30% compared with the diameter of previous compression. (Test method 8.4)



Electrical Conduit / Cable Trays

Flexible & Pliable Metal Conduits

Flexible & Pliable Metallic Conduit (FMC & LFMC)

SAMWHAFLEX® SUNFLEX® PLICA®

- KS C 8422
- UL 360

■ Structure

• Inside surface of flexible conduits.

Inside surface of the flexible conduits are smooth throughout along the whole length and harmful defects which damage to the outer sheath of cables shall not be allowed.

■ First Class Flexible Conduit

- Standard Type => M type
- Interlock Type => I type

■ Second Class Pliable Conduit

- Second class pliable conduit have three layer :
 1. Metal winding parts – Zinc galvanized thin plate
 2. Metal winding parts – Steel thin plate
 3. Non-metal winding parts – Insulating paper

■ Materials

- First class metal flexible conduit be made in compliance with the KS D 3506, KS D 3512.
- Second class metal flexible conduit be made in compliance with the KS D 3506, KS D 3512, KS D 0701 and KS C 2329 and also synthetic resin or waterproof paper.
- Vinyl coated first and second class metal flexible conduit be made in compliance with above mentioned item a, b and first class or vinyl compound, Which the mechanical strength is equal or over compared with the first class product stipulated in KS M 3156.

■ Tension Stretching

CAT. NO. OF FIRST CLASS	TENSION LOAD MAX N(KG.F)	CAT. NO. OF SECOND CLASS	TENSION LOAD MAX N(KG.F)
10 {1/4"}	686(70)	10 {1/2"}	981(100)
12 {3/8"}	882(90)	12 {1/2"}	1079(110)
16 {1/2"}		15 {1/2"}	1226(125)
22 {3/4"}		17 {1/2"}	1324(135)
28 {1"}		24 {3/4"}	1667(170)
36 {1-1/4"}		30 {1"}	1961(200)
42 {1-1/2"}	1334(136)	38 {1-1/4"}	
54 {2"}		50 {1-1/2"}	
70 {2-1/2"}		63 {2"}	
82 {3"}		76 {2-1/2"}	
104 {4"}		83 {3"}	
—	—	101 {4"}	—

■ Compression

CAT. NO. OF SECOND CLASS	COMPRESSION LOAD MAX N(KG.F)
10 {1/2"}	785(80)
12 {1/2"}	932(95)
15 {1/2"}	1128(115)
17 {1/2"}	1255(128)
24 {3/4"}	1667(170)
30 {1"}	1961(200)
38 {1-1/4"}	
50 {1-1/2"}	
63 {2"}	
76 {2-1/2"}	
83 {3"}	
101 {4"}	

■ Bending

CAT. NO. OF FIRST CLASS	BEND DIA. MAX (MM)	CAT. NO. OF SECOND CLASS	BEND DIA. MAX (MM)
10 {1/4"}	100	10 {1/2"}	35
12 {3/8"}	102	12 {1/2"}	42
16 {1/2"}	165	15 {1/2"}	53
22 {3/4"}	216	17 {1/2"}	60
28 {1"}	330	24 {3/4"}	84
36 {1-1/4"}	406	30 {1"}	105
42 {1-1/2"}	457	38 {1-1/4"}	133
54 {2"}	565	50 {1-1/2"}	175
70 {2-1/2"}	749	63 {2"}	220
82 {3"}	889	76 {2-1/2"}	266
104 {4"}	1016	83 {3"}	290
—	1219	101 {4"}	350

■ Flexible Metal Conduit Selection Table

CAT. NO. OF FIRST CLASS			#10 (1/4")	#12 (3/8")	#16 (1/2")	#32 (3/4")	#28 (1")	#36 (1-1/4")	#42 (1-1/2")	#54 (2")	#70 (2-1/2")	#82 (3")	#104 (4")	#130 (5")
NORMAL	STEEL	KM	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	-
		KI	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
		GF	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	-
		SF	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
	SUS	SM	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	-
		SI	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
WATER PROOF	STEEL	KMS	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	-
		KIS	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
		GW	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	-
		SW	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
	SUS	SMS	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	-
		SIS	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
FLAMMABILITY	STEEL	KWV	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	-
		KIV	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	-
	SUS	SMV	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	-
		SIV	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	-
COLD RESISTANT	STEEL	KMC	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	-
		KIC	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	-
	SUS	SMC	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	-
		SIC	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	-
HEAT RESISTANT	STEEL	KMH	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	-
		KIH	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	-
	SUS	SMH	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	-
		SIH	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	-
OIL RESISTANT	STEEL	KMO	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	-
		KIO	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	-
	SUS	SMO	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	-
		SIO	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	-
BRAID	STEEL	KMB	-	◆	◆	◆	◆	◆	◆	◆	-	-	-	-
		KIB	-	◆	◆	◆	◆	◆	◆	◆	-	-	-	-
	SUS	SMB	-	◆	◆	◆	◆	◆	◆	◆	-	-	-	-
		SIB	-	◆	◆	◆	◆	◆	◆	◆	-	-	-	-
UL Certi.	STEEL	KUS	-	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	-
MACHINE	STEEL	KPS	-	-	◆	◆	◆	◆	◆	◆	-	-	-	-

■ Pliable Metal Conduit Selection Table

CAT. NO. OF FIRST CLASS			#10	#12	#15	#17 (1/2")	#24 (3/4")	#30 (1")	#38 (1-1/4")	#50 (1-1/2")	#63 (2")	#76 (2-1/2")	#83 (3")	#101 (4")
NORMAL	STEEL	PZ	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
	SUS	PS	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
LIQUID TIGHT	STEEL	PV	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
	SUS	PVS	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
COLD RESISTANT	STEEL	PE	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
HEAT RESISTANT	STEEL	PVH	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆



Electrical Conduit / Cable Trays

Flexible & Pliable Metal Conduits

First Class SAMWHAFLEX® Flexible Metal Conduits First Class Normal Flexible Metal Conduits (FMC)

SAMWHAFLEX®

- KS C 8422



KM & SM



KI & SI

■ Applications

The SAMWHA SAMWHAFLEX® First Class Flexible Conduits are used for Non-hazardous areas with KFNG Series Box connector.

■ Features

- Smooth inside for easier wire pulling, no hazardous sharp edges or burrs, will not damage conductors.
- Corrosion resistant for touch environmental conditions.
- Quick installation, cuts with utility knife.
- 90° has smooth interior to prevent abrasion of conductors.

■ Materials

- Melting Zinc Plated Steel Plate
- Stainless Steel Plate

■ Compliances / Approvals

KS C 8422 Flexible Metal Conduits

■ Dimensions, Weights, Lengths Per 1 roll

CAT. NO. OF FIRST CLASS		MINIMUM OF INSIDE DIAMETER (MM)	MAXIMUM OF OUTSIDE DIAMETER (MM)	WEIGHTS (KG/ROLL)				LENGTHS (M/ROLL)	COMPATIBLE CONDUITS	
				KM	KI	SM	SI		EMT	IMC
KM& SM & KI & SI	#10 [1/4"]	10.0	13.2	6	8	5	6	50	—	—
	#12 [3/8"]	12.3	15.6	7	10	6	9	50	—	—
	#16 [1/2"]	15.8	19.1	10	12	7	10	50	19	16
	#22 [3/4"]	20.8	24.2	12	17	10	15	50	25	22
	#28 [1"]	26.4	31.1	10	14	9	11	30	31	28
	#36 [1-1/4"]	35.0	39.7	16	22	12	17	30	39	36
	#42 [1-1/2"]	40.0	44.7	11	16	10	13	20	51	42
	#54 [2"]	51.3	56.0	14	20	12	19	20	63	54
	#70 [2-1/2"]	63.0	69.0	11	18	9	15	10	75	70
	#82 [3"]	78.0	85.4	13	23	10	17	10	—	82
	#104 [4"]	101.6	109.2	14	17	11	14	6	—	104
	#130 [5"]	126.4	134.9	—	—	—	—	6	—	—

First Class SAMWHAFLEX® Flexible Metal Conduits

First Class Liquid-Tight Flexible Metal Conduits (LFMC)

SAMWHAFLEX®

• KS C 8422



KMS & SMS



KIS & SIS

■ Applications

The SAMWHA SAMWHAFLEX® First Class Waterproof Flexible Conduits are used for Non-hazardous areas with KF Series Box connector.

■ Features

- Suitable for wet locations.
- Smooth inside for easier wire pulling, no hazardous sharp edges or burrs, will not damage conductors.
- Corrosion resistant for touch environmental conditions.
- Quick installation, cuts with utility knife.
- 90° has smooth interior to prevent abrasion of conductors.

■ Materials

- Melting Zinc Plated Steel Plate
- Stainless Steel Plate
- PVC jacket (-15°C ~ 60°C)

■ Compliances / Approvals

KS C 8422 Flexible Metal Conduits

■ Dimensions, Weights, Lengths Per 1 roll

CAT. NO. OF FIRST CLASS		MINIMUM OF INSIDE DIAMETER (MM)	MAXIMUM OF OUTSIDE DIAMETER (MM)	WEIGHTS (KG/ROLL)				LENGTHS (M/ROLL)	COMPATIBLE CONDUITS	
				KMS	KIS	SMS	SIS		EMT	IMC
KMS& SMS& KIS& SIS	#10 (1/4")	10.0	15.0	9.5	12	9	10	50	—	—
	#12 (3/8")	12.3	17.7	10.5	17	10	16	50	—	
	#16 (1/2")	15.8	21.1	15	20	14	18	50	19	16
	#22 (3/4")	20.8	26.4	18	25	16	23	50	25	22
	#28 (1")	26.4	33.2	14	21	13	18	30	31	28
	#36 (1-1/4")	35.0	42.0	22	29	20	27	30	39	36
	#42 (1-1/2")	40.0	47.7	15	27	14	24	20	51	42
	#54 (2")	51.3	59.7	19	33	18	32	20	63	54
	#70 (2-1/2")	63.0	72.3	16.5	25	12	23	10	75	70
	#82 (3")	78.0	88.7	18	30	15	28	10	—	82
	#104 (4")	101.6	113.8	24	27	16	25	6	—	104
	#130 (5")	126.4	140.6	—	—	—	—	6	—	—



Electrical Conduit / Cable Trays

Flexible & Pliable Metal Conduits

First Class SAMWHAFLEX® Flexible Metal Conduits

SAMWHAFLEX®

First Class Heat Resistant Liquid-tight Flexible Metal Conduits (LFMC)

• KS C 8422

■ Applications

The SAMWHA SAMWHAFLEX® First Class Heat resistant Flexible Conduits are used for Non-hazardous areas with KF Series Box connector.

■ Materials

- Melting Zinc Plated Steel Plate
- Stainless Steel Plate
- PVC jacket (-15°C ~ 105°C)

■ Compliances / Approvals

KS C 8422 Flexible Metal Conduits

■ Features

- Suitable for wet locations.
- Smooth inside for easier wire pulling, no hazardous sharp edges or burrs, will not damage conductors.
- Corrosion resistant for touch environmental conditions.
- Quick installation, cuts with utility knife.
- 90° has smooth interior to prevent abrasion of conductors.
- Resists high temperature, water, metal shavings.

First Class SAMWHAFLEX® Flexible Metal Conduits

SAMWHAFLEX®

First Class Incombustible Liquid-tight Flexible Metal Conduits (LFMC)

• KS C 8422

• UL 94V-0

■ Applications

The SAMWHA SAMWHAFLEX® First Class In-combustible Flexible Conduits are used for Non-hazardous areas with KF Series Box connector.

■ Features

- Suitable for wet locations.
- Smooth inside for easier wire pulling, no hazardous sharp edges or burrs, will not damage conductors.
- Corrosion resistant for touch environmental conditions.
- Quick installation, cuts with utility knife.
- 90° has smooth interior to prevent abrasion of conductors.
- Resists flame, water, metal shavings.

■ Materials

- Melting Zinc Plated Steel Plate
- Stainless Steel Plate
- PVC jacket (-15°C ~ 60°C). UL94V-0

■ Compliances / Approvals

KS C 8422 Flexible Metal Conduits



KMV, H & SMV, H



KIV, H & SIV, H

■ Dimensions, Weights, Lengths per 1 roll

CAT. NO. OF FIRST CLASS	MINIMUM OF INSIDE DIAMETER (MM)	MAXIMUM OF OUTSIDE DIAMETER (MM)	WEIGHTS (KG/ROLL)				LENGTHS (M/ROLL)	COMPATIBLE CONDUITS	
			KMV, H	KIV, H	SMV, H	SIV, H		EMT	IMC
#10 (1/4")	10.0	15.0	9.5	12	9	10	50	—	—
#12 (3/8")	12.3	17.7	10.5	17	10	16	50	—	—
#16 (1/2")	15.8	21.1	15	20	14	18	50	19	16
#22 (3/4")	20.8	26.4	18	25	16	23	50	25	22
#28 (1")	26.4	33.2	14	21	13	18	30	31	28
#36 (1-1/4")	35.0	42.0	22	29	20	27	30	39	36
#42 (1-1/2")	40.0	47.7	15	27	14	24	20	51	42
#54 (2")	51.3	59.7	19	33	18	32	20	63	54
#70 (2-1/2")	63.0	72.3	16.5	25	12	23	10	75	70
#82 (3")	78.0	88.7	18	30	15	28	10	—	82
#104 (4")	101.6	113.8	24	27	16	25	6	—	104

First Class SAMWHAFLEX® Flexible Metal Conduits

First Class Cold Resistant Liquid-tight Flexible Metal Conduits (LFMC)

SAMWHAFLEX®

- KS C 8422

■ Applications

The SAMWHA SAMWHAFLEX® First Class Cold resistant Flexible Conduits are used for Non-hazardous areas with KF Series Box connector.

■ Materials

- Melting Zinc Plated Steel Plate
- Stainless Steel Plate
- PVC jacket (-20°C ~ 60°C)

■ Compliances / Approvals

KS C 8422 Flexible Metal Conduits

■ Features

- Suitable for wet locations.
- Smooth inside for easier wire pulling, no hazardous sharp edges or burrs, will not damage conductors.
- Corrosion resistant for touch environmental conditions.
- Quick installation, cuts with utility knife.
- 90° has smooth interior to prevent abrasion of conductors.
- Resists cold temperature, water, metal shavings.

First Class SAMWHAFLEX® Flexible Metal Conduits

First Class Oil Resistant Liquid-tight Flexible Metal Conduits (LFMC)

SAMWHAFLEX®

- KS C 8422



KMC, O & SMC, O



KIC, O & SIC, O

■ Applications

The SAMWHA SAMWHAFLEX® First Class In-combustible Flexible Conduits are used for Non-hazardous Areas with KF Series Box connector.

■ Features

- Suitable for Wet locations.
- Smooth inside for easier wire pulling, no hazardous sharp edges or burrs, will not damage conductors.
- Corrosion resistant for touch environmental conditions.
- Quick installation, cuts with utility knife.
- 90° has smooth interior to prevent abrasion of conductors.
- Resists oil, water, metal shavings.

■ Materials

- Melting Zinc Plated Steel Plate
- Stainless Steel Plate
- PVC jacket (-15°C ~ 60°C)

■ Compliances / Approvals

KS C 8422 Flexible Metal Conduits

■ Dimensions, Weights, Lengths per 1 roll

CAT. NO. OF FIRST CLASS	MINIMUM OF INSIDE DIAMETER (MM)	MAXIMUM OF OUTSIDE DIAMETER (MM)	WEIGHTS (KG/ROLL)				LENGTHS (M/ROLL)	COMPATIBLE CONDUITS	
			KMC, O	KIC, O	SMC, O	SIC, O		EMT	IMC
#10 (1/4")	10.0	15.0	9.5	12	9	10	50	—	—
#12 (3/8")	12.3	17.7	10.5	17	10	16	50	—	—
#16 (1/2")	15.8	21.1	15	20	14	18	50	19	16
#22 (3/4")	20.8	26.4	18	25	16	23	50	25	22
#28 (1")	26.4	33.2	14	21	13	18	30	31	28
#36 (1-1/4")	35.0	42.0	22	29	20	27	30	39	36
#42 (1-1/2")	40.0	47.7	15	27	14	24	20	51	42
#54 (2")	51.3	59.7	19	33	18	32	20	63	54
#70 (2-1/2")	63.0	72.3	16.5	25	12	23	10	75	70
#82 (3")	78.0	88.7	18	30	15	28	10	—	82
#104 (4")	101.6	113.8	24	27	16	25	6	—	104



Electrical Conduit / Cable Trays

Flexible & Pliable Metal Conduits

First Class SAMWHAFLEX® Flexible Metal Conduits First Class Braid Flexible Metal Conduits (FMC)

SAMWHAFLEX®

- KS C 8422



KMB & SMB & KIB & SIB

■ Applications

The SAMWHA SAMWHAFLEX® First Class Flexible Conduits are used for Non-hazardous areas with KFNG Series Box connector.

■ Features

- Smooth inside for easier wire pulling, no hazardous sharp edges or burrs, will not damage conductors.
- Corrosion resistant for touch environmental conditions.
- Quick installation, cuts with utility knife.
- 90° has smooth interior to prevent abrasion of conductors.
- Prevent conduit pullout due to stress, tension, strain, vibration, or movement.

■ Materials

- Melting Zinc Plated Steel Plate
- Stainless Steel Plate
- Stainless Steel Wire : Braid

■ Compliances / Approvals

KS C 8422 Flexible Metal Conduits

■ Dimensions, Weights, Lengths Per 1 roll

CAT. NO. OF FIRST CLASS	MINIMUM OF INSIDE DIAMETER (MM)	MAXIMUM OF OUTSIDE DIAMETER (MM)	WEIGHTS (KG/ROLL)				LENGTHS (M/ROLL)	COMPATIBLE CONDUITS	
			KMB	KIB	SMB	SIB		EMT	IMC
#12 (3/8")	12.3	16.9	15	17	14	16	50	—	—
#16 (1/2")	15.8	20.4	17	19	16	17	50	19	16
#22 (3/4")	20.8	25.4	22	25	21	24	50	25	22
#28 (1")	26.4	32.3	21	23	20	21	50	31	28
#36 (1-1/4")	35.0	41.0	27	30	26	28	30	39	36
#42 (1-1/2")	40.0	45.9	20	24	19	22	20	51	42
#54 (2")	51.3	57.2	25	29	24	28	20	63	54

First Class SAMWHAFLEX® Flexible Metal Conduits

First Class UL Listed -special KUS Series

Liquid-tight Flexible Metal Conduits (LFMC)

SAMWHAFLEX®

- UL 360 & KS C 8422
- KEPIC-EN Certificate



KUS

■ Applications

The SAMWHA SAMWHAFLEX® First Class UL Listed Liquid-tight Flexible Conduits are used for Non-hazardous areas with KFXT Series Box connector.

■ Features

- Suitable for wet locations.
- Smooth inside for easier wire pulling, no hazardous sharp edges or burrs, will not damage conductors.
- Corrosion resistant for touch environmental conditions.
- Quick installation, cuts with utility knife.
- 90° has smooth interior to prevent abrasion of conductors
- #12 (3/8") ~ #36 (1-1/4") of KUS have a structure of minimizing the electric resistance of flexible metal conduits and grounding of short-circuit current by inside core of copper wire.
- #42 (1-1/2") ~ #104 (4") of KUS need separate grounding wires according to article 351 of NEC.

■ Materials

- Melting Zinc Plated Steel Plate
- PVC jacket (-15°C ~ 60°C)
- Copper wire

■ Compliances / Approvals

- UL 360
- KEPIC-EN END 1100, END 2000, END 3830

■ Certificate

- UL 360 Certi. NO. : 011702-E201391
- KEPIC-EN Certi. No. : EN-335

■ Dimensions, Weights, Lengths Per 1 roll, Curve Radius

CAT. NO. OF FIRST CLASS	MINIMUM OF INSIDE DIAMETER (MM)	MAXIMUM OF OUTSIDE DIAMETER (MM)	WEIGHTS (KG/ROLL)	LENGTHS (M/ROLL)	MINIMUM OF INNER CURVE RADIUS (MM)		COMPATIBLE CONDUITS		
					STATIC	KINETIC	EMT	IMC	GRC
#12 (3/8")	12.30	17.70	8	20	50	100	—	—	—
#16 (1/2")	15.80	21.10	9.8	20	80	160	19	16	1/2"
#22 (3/4")	20.85	26.40	16	20	100	200	25	22	3/4"
#28 (1")	26.45	33.20	20	20	140	280	31	28	1"
#36 (1-1/4")	35.05	42.00	24	20	180	360	39	36	1-1/4"
#42 (1-1/2")	40.00	47.70	27	20	180	360	51	42	1-1/2"
#54 (2")	51.30	59.70	33	20	270	540	63	54	2"
#70 (2-1/2")	63.00	72.50	25	10	350	700	75	70	2-1/2"
#82 (3")	78.00	88.40	30	10	400	800	—	82	3"
#104 (4")	101.60	113.80	27	6	500	1,000	—	104	4"



Electrical Conduit / Cable Trays

Flexible & Pliable Metal Conduits

First Class SAMWHAFLEX® Flexible Metal Conduits

SAMWHAFLEX®

First Class Machine Tool-special KPS Series

Liquid-tight Flexible Metal Conduits (LFMC)

- KS C 8422



KPS

■ Applications

The SAMWHA SAMWHAFLEX® First Class Machine tool Liquid-tight Flexible Conduits are used for Non-hazardous areas with KF Series Box connector.

■ Features

- Suitable for wet locations.
- Smooth inside for easier wire pulling, no hazardous sharp edges or burrs, will not damage conductors.
- Corrosion resistant for touch environmental conditions.
- Quick installation, cuts with utility knife.
- 90° has smooth interior to prevent abrasion of conductors.
- Superior in flexibility with Polypropylene string inserted structure and mitigating cracks at a minimum curvature limit point.
- Suitable for machine tool wirings with proper mechanical strength and excellent flexibility.

■ Materials

- Melting Zinc Plated Steel Plate
- PVC jacket (-15°C ~ 60°C)
- PVC jacket (-20°C ~ 70°C)

■ Compliances / Approvals

- KS C 8422 Flexible Metal Conduits

■ Dimensions, Weights, Lengths Per 1 roll

CAT. NO. OF FIRST CLASS	MINIMUM OF INSIDE DIAMETER (MM)	MAXIMUM OF OUTSIDE DIAMETER (MM)	WEIGHTS (KG/ROLL)	LENGTHS (M/ROLL)	COMPATIBLE CONDUITS	
					EMT	IMC
#16 [1/2"]	15.8	21.1	16	50	19	16
#22 [3/4"]	20.8	26.4	19	50	25	22
#28 [1"]	26.4	33.2	15	30	31	28
#36 [1-1/4"]	35.0	42.0	23	30	39	36
#42 [1-1/2"]	40.0	47.7	16	20	51	42
#52 [2"]	51.3	59.7	20	20	63	54

First Class SUNFLEX® Flexible Metal Conduits

First Class Normal Flexible Metal Conduits (FMC)

SUNFLEX®

- KS C 8422



GF (General type)



SF (Special type)

■ Applications

The SAMWHA SAMWHAFLEX® First Class Flexible Conduits are used for Non-hazardous areas with KFNG Series Box connector.

■ Features

- Smooth inside for easier wire pulling, no hazardous sharp edges or burrs, will not damage conductors.
- Corrosion resistant for touch environmental conditions.
- Quick installation, cuts with utility knife.
- 90° has smooth interior to prevent abrasion of conductors.

■ Materials

- Melting Zinc Plated Steel Plate

■ Compliances / Approvals

- KS C 8422 Flexible Metal Conduits

■ Dimensions, Weights, Lengths Per 1 roll

CAT. NO. OF FIRST CLASS		MINIMUM OF INSIDE DIAMETER (MM)	MAXIMUM OF OUTSIDE DIAMETER (MM)	WEIGHTS (KG/ROLL)		LENGTHS (M/ROLL)	COMPATIBLE CONDUITS	
				GF	SF		EMT	IMC
GF&SF	#10 (1/4")	10.0	13.2	6	8	50	—	—
	#12 (3/8")	12.3	15.6	7	10	50	—	—
	#16 (1/2")	15.8	19.1	10	12	50	19	16
	#22 (3/4")	20.8	24.2	12	17	50	25	22
	#28 (1")	26.4	31.1	10	14	30	31	28
	#36 (1-1/4")	35.0	39.7	16	22	30	39	36
	#42 (1-1/2")	40.0	44.7	11	16	20	51	42
	#54 (2")	51.3	56.0	14	20	20	63	54
	#70 (2-1/2")	63.0	69.0	11	18	10	75	70
	#82 (3")	78.0	85.4	13	23	10	—	82
	#104 (4")	101.6	109.2	14	17	6	—	104
	#130 (5")	126.4	134.9	—	—	6	—	—



Electrical Conduit / Cable Trays

Flexible & Pliable Metal Conduits

First Class SUNFLEX® Flexible Metal Conduits First Class Liquid-tight Flexible Metal Conduits (LFMC)

SUNFLEX®

• KS C 8422



GW (General type)



SW (Special type)

■ Applications

The SAMWHA SAMWHAFLEX® First Class Wa-terproof Flexible Conduits are used for Non-hazardous Areas with KF Series Box Connector.

■ Features

- Suitable for wet locations.
- Smooth inside for easier wire pulling, no hazardous sharp edges or burrs, will not damage conductors.
- Corrosion resistant for touch environmental conditions.
- Quick installation, cuts with utility knife.
- 90° has smooth interior to prevent abrasion of conductors.

■ Materials

- Melting Zinc Plated Steel Plate
- PVC jacket (-15°C ~ 60°C)

■ Compliances / Approvals

KS C 8422 Flexible Metal Conduits

■ Dimensions, Weights, Lengths Per 1 roll

CAT. NO. OF FIRST CLASS		MINIMUM OF INSIDE DIAMETER (MM)	MAXIMUM OF OUTSIDE DIAMETER (MM)	WEIGHTS (KG/ROLL)		LENGTHS (M/ROLL)	COMPATIBLE CONDUITS	
				GW	SW		EMT	IMC
GW&SW	#10 {1/4"}	10.0	15.0	9.5	12	50	—	—
	#12 {3/8"}	12.3	17.7	10.5	17	50	—	—
	#16 {1/2"}	15.8	21.1	15	20	50	19	16
	#22 {3/4"}	20.8	26.4	18	25	50	25	22
	#28 {1"}	26.4	33.2	14	21	30	31	28
	#36 {1-1/4"}	35.0	42.0	22	29	30	39	36
	#42 {1-1/2"}	40.0	47.7	15	27	20	51	42
	#54 {2"}	51.3	59.7	19	33	20	63	54
	#70 {2-1/2"}	63.0	72.3	16.5	25	10	75	70
	#82 {3"}	78.0	88.7	18	30	10	—	82
	#104 {4"}	101.6	113.8	24	27	6	—	104
	#130 {5"}	126.4	140.6	—	—	6	—	—

Second Class PLICA® Pliable Metal Conduits

Second Class Normal Pliable Metal Conduits (FMC)

PLICA®

- KS C 8422



PZ (Zinc plate)
PS (Stainless steel plate)

■ Applications

The SAMWHA PLICA® Second Class Pliable Metal Conduits are used for Non-hazardous areas with WNG Series Box connector.

■ Features

- Smooth inside for easier wire pulling, no hazardous sharp edges or burrs, will not damage conductors.
- Corrosion resistant for touch environmental conditions.
- Quick installation, cuts with utility knife.
- 90° has smooth interior to prevent abrasion of conductors

■ Materials

- Melting Zinc Plated Steel Plate
- Stainless Steel Plate

■ Compliances / Approvals

KS C 8422 Flexible Metal Conduits

■ Dimensions, Weights, Lengths Per 1 roll

CAT. NO. OF SECOND CLASS		MINIMUM OF INSIDE DIAMETER (MM)	MAXIMUM OF OUTSIDE DIAMETER (MM)	WEIGHTS (KG/ROLL)	LENGTHS (M/ROLL)	COMPATIBLE CONDUITS	
						EMT	IMC
PZ&PS	10 (1/2")	9.2	13.3	10	50	—	—
	12 (1/2")	11.4	16.1	14	50	—	—
	15 (1/2")	14.1	19.0	16	50	19	—
	17 (1/2")	16.6	21.5	22	50	25	16
	24 (3/4")	23.8	28.8	33	50	31	22
	30 (1")	29.3	34.9	19	25	39	28
	38 (1-1/4")	37.1	42.9	25	25	51	36
	50 (1-1/2")	49.1	54.9	24	20	63	42
	63 (2")	62.6	69.1	17	10	75	54
	76 (2-1/2")	76.0	82.9	20	10	—	70
	83 (3")	81.0	88.1	22	10	—	82
	101 (4")	100.2	107.3	16	6	—	104

EElectrical Conduit /
Cable Trays



Electrical Conduit / Cable Trays

Flexible & Pliable Metal Conduits

Second Class PLICA® Pliable Metal Conduits Second Class Liquid Tight Pliable Metal Conduits (LFMC)

PLICA®

- KS C 8422



PV (Zinc plate)
PVS (Stainless steel plate)

■ Applications

The SAMWHA PLICA® Second Class Water-proof Pliable Metal Conduits are used for Non-hazardous areas with W Series Box connector.

■ Features

- Suitable for wet locations.
- Smooth inside for easier wire pulling, no hazardous sharp edges or burrs, will not damage conductors.
- Corrosion resistant for touch environmental conditions.
- Quick installation, cuts with utility knife.
- 90° has smooth interior to prevent abrasion of conductors

■ Materials

- Melting Zinc Plated Steel Plate
- Stainless Steel Plate
- PVC jacket (-15°C ~ 60°C)

■ Compliances / Approvals

KS C 8422 Flexible Metal Conduits

■ Dimensions, Weights, Lengths Per 1 roll

CAT. NO. OF SECOND CLASS		MINIMUM OF INSIDE DIAMETER (MM)	MAXIMUM OF OUTSIDE DIAMETER (MM)	WEIGHTS (KG/ROLL)	LENGTHS (M/ROLL)	COMPATIBLE CONDUITS	
						EMT	IMC
PV&PVS	10 [1/2"]	9.2	14.9	13	50	—	—
	12 [1/2"]	11.4	17.7	18	50	—	—
	15 [1/2"]	14.1	20.6	22	50	—	—
	17 [1/2"]	16.6	23.1	29	50	19	16
	24 [3/4"]	23.8	30.4	38	50	25	22
	30 [1"]	29.3	36.5	25	25	31	28
	38 [1-1/4"]	37.1	44.9	30	25	39	36
	50 [1-1/2"]	49.1	56.9	31	20	51	42
	63 [2"]	62.6	71.5	22	10	63	54
	76 [2-1/2"]	76.0	85.3	28	10	75	70
	83 [3"]	81.0	90.9	29	10	—	82
	101 [4"]	100.2	110.1	24	6	—	104

Second Class PLICA® Pliable Metal Conduits

Second Class Heat Resistant Liquid-tight Flexible Metal Conduits (LFMC)

PLICA®

- KS C 8422

■ Applications

The SAMWHA PLICA® Second Class Heat resistant Pliable Metal Conduits are used for Non-hazardous areas with W Series Box connector.

■ Features

- Suitable for wet locations.
- Smooth inside for easier wire pulling, no hazardous sharp edges or burrs, will not damage conductors.
- Corrosion resistant for touch environmental conditions.
- Quick installation, cuts with utility knife.
- 90° has smooth interior to prevent abrasion of conductors
- Resists high temperature, water, metal shavings

■ Materials

- Melting Zinc Plated Steel Plate
- PVC jacket (-15°C ~ 105°C)

■ Compliances / Approvals

KS C 8422 Flexible Metal Conduits

Second Class PLICA® Pliable Metal Conduits

Second Class Cold Resistant Liquid-tight Flexible Metal Conduits (LFMC)

PLICA®

- KS C 8422



PVH (Heat resistant)
PE (Cold resistant)

■ Applications

The SAMWHA PLICA® Second Class Cold resistant Pliable Metal Conduits are used for Non-hazardous areas with W Series Box connector.

■ Features

- Suitable for wet locations.
- Smooth inside for easier wire pulling, no hazardous sharp edges or burrs, will not damage conductors.
- Corrosion resistant for touch environmental conditions.
- Quick installation, cuts with utility knife.
- 90° has smooth interior to prevent abrasion of conductors
- Resists cold temperature, water, metal shavings

■ Materials

- Melting Zinc Plated Steel Plate
- PVC jacket (-20°C ~ 60°C)

■ Compliances / Approvals

KS C 8422 Flexible Metal Conduits

■ Dimensions, Weights, Lengths Per 1 roll

CAT. NO. OF SECOND CLASS		MINIMUM OF INSIDE DIAMETER (MM)	MAXIMUM OF OUTSIDE DIAMETER (MM)	WEIGHTS (KG/ROLL)	LENGTHS (M/ROLL)	COMPATIBLE CONDUITS	
						EMT	IMC
PVH&PE	10 (1/2")	9.2	14.9	13	50	—	—
	12 (1/2")	11.4	17.7	18	50	—	—
	15 (1/2")	14.1	20.6	22	50	—	—
	17 (1/2")	16.6	23.1	29	50	19	16
	24 (3/4")	23.8	30.4	38	50	25	22
	30 (1")	29.3	36.5	25	25	31	28
	38 (1-1/4")	37.1	44.9	30	25	39	36
	50 (1-1/2")	49.1	56.9	31	20	51	42
	63 (2")	62.6	71.5	22	10	63	54
	76 (2-1/2")	76.0	85.3	28	10	75	70
	83 (3")	81.0	90.9	29	10	—	82
	101 (4")	100.2	110.1	24	6	—	104



Electrical Conduit / Cable Trays

Flexible & Rigid Metal Conduits

For Communication Flexible Metal Conduits (FMC)



CSM (Standard type)

■ Applications

The SAMWHA First Class Communication type Flexible Conduits are used for Non-hazardous areas with SI Series Box connector.



CSI (Interlock type)

■ Features

- Smooth inside for easier wire pulling, no hazardous sharp edges or burrs, will not damage conductors.
- Corrosion resistant for touch environmental conditions.
- Quick installation, cuts with utility knife.
- 90° has smooth interior to prevent abrasion of conductors

■ Materials

- Stainless Steel

■ Dimensions, Lengths

CAT. NO. OF FIRST CLASS		MINIMUM OF INSIDE DIAMETER (MM)	MAXIMUM OF OUTSIDE DIAMETER (MM)	LENGTHS (M/ROLL)
CSM	#3	3.3	4.8	200
	#4	4.0	5.8	200
CSI	#5.5	5.5	7.5	100
	#8	8.0	10.5	100
	#10	10.0	12.8	50
	#12	12.0	15.3	50
	#14	14.0	16.7	50
	#16	16.0	19.0	50

OHS One Hole Straps One Hole Straps For Rigid Metal Conduits



■ Applications

One Hole Straps are commercial product line for use with Rigid Metal Conduits (RMC) or Intermediate Metal Conduits (IMC) or Galvanized Rigid Conduits (GRC).

■ Standard Materials

Body-Stainless steel or Zinc Electro Galvanized Steel

■ Selection Table

CAT. NO.		DIMENSIONS(MM)		WEIGHT (G/EA)
		RADIUS	HOLE	
OHST	16 (1/2")	10.7	6.5	18.1
	22 (3/4")	13.3	6.5	22.7
	28 (1")	16.6	8.0	31.8
	36 (1-1/4")	21.1	9.5	45.4
	42 (1-1/2")	24.1	11.0	63.5
	54 (2")	30.1	14.5	90.7
	70 (2-1/2")	36.5	14.5	190.5
	82 (3")	44.4	14.5	231.3
	92 (3-1/2")	50.8	14.5	317.5
	104 (4")	57.2	14.5	353.8

Electrical Conduit / Cable Trays

Fitting for Rigid Metal Conduits

THS Two Hole Straps Two Hole Straps For Rigid Metal Conduits



■ Applications

Two Hole Straps are commercial product line for use with Rigid Metal Conduits (RMC) or Intermediate Metal Conduits (IMC) or Galvanized Rigid Conduits (GRC).

■ Standard Materials

Body-Stainless Steel or Zinc Electro Galvanized Steel

■ Selection Table

CAT. NO.		DIMENSIONS(MM)		WEIGHT (G/EA)
		RADIUS	HOLE	
THST	16 (1/2")	10.7	4.8	9.1
	22 (3/4")	13.3	4.8	13.6
	28 (1")	16.6	6.5	18.1
	36 (1-1/4")	21.1	6.5	27.2
	42 (1-1/2")	24.1	6.5	40.8
	54 (2")	30.1	9.5	54.4
	70 (2-1/2")	36.5	9.5	72.6
	82 (3")	44.4	9.5	90.7
	92 (3-1/2")	50.8	11.0	131.5
	104 (4")	57.2	11.0	145.1

OHC One Hole Clamps One Hole Clamps For Rigid Metal Conduits



■ Applications

One Hole Clamps are commercial product line for use with Rigid Metal Conduits (RMC) or Intermediate Metal Conduits (IMC) or Galvanized Rigid Conduits (GRC).

■ Standard Materials

Body-Malleable Iron

■ Selection Table

CAT. NO.		WEIGHT (G/EA)
OHC	16 (1/2")	27.2
	22 (3/4")	36.3
	28 (1")	59.0
	36 (1-1/4")	90.7
	42 (1-1/2")	136.0
	54 (2")	290.3
	70 (2-1/2")	471.7
	82 (3")	544.3
	92 (3-1/2")	680.4
	104 (4")	997.9



Electrical Conduit / Cable Trays

Fitting for Rigid Metal Conduits

OHCB One Hole Clamp Back

One Hole Clamp Back / Spacers For Rigid Metal Conduits



■ Applications

One Hole Clamp-backs are commercial product line for use with Rigid Metal Conduits (RMC) or Intermediate Metal Conduits (IMC) or Galvanized Rigid Conduits (GRC).

■ Standard Materials

Body-Malleable Iron

■ Selection Table

CAT. NO.		WEIGHT (G/EA)
OHCB	16 (1/2")	36.3
	22 (3/4")	45.3
	28 (1")	54.4
	36 (1-1/4")	95.2
	42 (1-1/2")	190.5
	54 (2")	181.4
	70 (2-1/2")	222.3
	82 (3")	281.2
	92 (3-1/2")	412.8
	104 (4")	500.0

CHG Cable & Conduit Hangers On Wall

Cable And Conduit Hangers On Wall



■ Applications

Used to provide mechanical support to conduit and raceway systems.

■ Standard Materials

Body-Zinc Electro Galvanized Steel

■ Selection Table

CAT. NO.	
CHG	16 (1/2")
	22 (3/4")
	28 (1")
	36 (1-1/4")
	42 (1-1/2")
	54 (2")
	70 (2-1/2")
	82 (3")
	92 (3-1/2")
	104 (4")

CCL Cable & Conduit Clips Cable And Conduit Clips

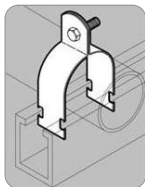


- **Applications**
Used to provide mechanical support to conduit and raceway systems.
- **Standard Materials**
Body-Zinc Electro Galvanized Steel

■ **Selection Table**

CAT. NO.	
CCL	16 (1/2")
	22 (3/4")
	28 (1")
	36 (1-1/4")
	42 (1-1/2")
	54 (2")

CCP Two Piece Conduit Clamps With Channel Two Piece Conduit Clamps With Channel



- **Applications**
Used to provide mechanical support to conduit and raceway systems.
- **Standard Materials**
Body-Zinc Electro Galvanized Steel

■ **Selection Table**

CAT. NO.	
CCP	16 (1/2")
	22 (3/4")
	28 (1")
	36 (1-1/4")
	42 (1-1/2")
	54 (2")
	70 (2-1/2")
	82 (3")
	92 (3-1/2")
	104 (4")



Electrical Conduit / Cable Trays

Fitting for Rigid Metal Conduits

BCP Beam Clamps Beam Clamps / Insulator Supports

• Model - BCP

■ Applications

Beam Clamps are commercial product line for use with Cannel

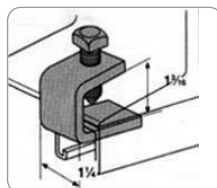


■ Features

- Jaw Openings-17mm
- Tapped Holes-M6.0

■ Standard Materials

Body-Zinc Electro Galvanized Steel



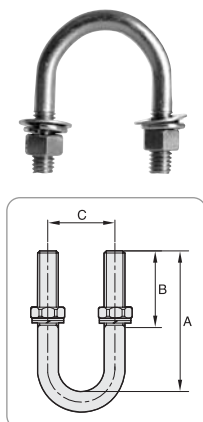
CUB U-Bolts U-Bolts

• Model - CUB

■ Standard Materials

Body-Zinc Electro Galvanized Steel

■ Selection Table



CAT. NO.		DIMENSIONS(MM)			WEIGHT (G/EA)
		A	B	C	
CUB	16 (1/2")	61.2	38.0	23.9	59.0
	22 (3/4")	69.3	38.0	29.2	63.5
	28 (1")	77.2	38.0	35.8	68.0
	36 (1-1/4")	80.3	38.0	44.7	72.6
	42 (1-1/2")	88.4	38.0	50.8	81.6
	54 (2")	109.2	44.5	63.2	136.0
	70 (2-1/2")	122.0	44.5	76.0	154.2
	82 (3")	136.0	44.5	91.7	172.4
	92 (3-1/2")	147.3	44.5	104.4	181.4
	104 (4")	165.1	44.5	117.1	204.0

SCN Strut Channels Strut Channels

• Model - SCN

■ Applications

Continuous channel framing uses a channel fitting with simple nut-and-bolt connection for quick, easy construction.



■ Standard Materials

Body-Zinc Hot Dip Galvanized Steel or Zinc Electro Galvanized Steel

■ Selection Table

CAT. NO.			DIMENSIONS(MM)			LENGTH (M)
			W	H	T	
SCN	39A	(Elec. galva.)	39	22	1.2	1.2
	42A	(Elec. galva.)	42	25	1.6	1.2
	42B	(Hot dip)	42	25	1.6	1.2
	42C	(Hot dip)	42	25	2.6	3.0
	42D	(Hot dip)	42	42	2.6	3.0
	84A	(Hot dip)	84	42	2.6	3.0

SLCC Series Cable Tray Conduit Clamps



SLCC
For use with outside rail tray



SLCCF
For use with inside rail tray

SLCC cable tray conduit clamps are used for installation on cable tray side rails with inside flanges (requiring inside tray mounting) and outside flanges; SLCCF clamps are for use exclusively on inside flanges.

■ Applications

• SLCC/SLCCF cable tray conduit clamps:

- Provide a means of clamping metal conduit (rigid steel or aluminum, IMC and EMT) to cable tray to provide for the exit of power and/or control cables from tray.
- Provide a means to firmly bond exit conduit to cable tray for best grounding continuity.
- Provide strong mechanical support for exit conduits and cables.
- Can be used indoors or outdoors, wherever cable tray systems are installed.
- Facilitate the safe exit of cables from tray-insure protection of cables from damage.

■ Selection Table

CONDUIT SIZE	INSIDE FLANGE	OUTSIDE FLANGE
1/2"	SLCCF 16	SLCC 16
3/4"	SLCCF 22	SLCC 22
1"	SLCCF 28	SLCC 28
1-1/4"	SLCCF 36	SLCC 36
1-1/2"	SLCCF 42	SLCC 42
2"	SLCCF 54	SLCC 54
2-1/2"	SLCCF 70	SLCC 70
3"	SLCCF 82	SLCC 82
3-1/2"	SLCCF 92	SLCC 92
4"	SLCCF 104	SLCC 104

■ Model Number Logic



Select
Constant



Threads Spec.
None : outside flange
F : inside flange



Conduit size
#16(1/2")~#104(4")

Example 1) outside flange type conduit size 1" SLCC 28
Example 2) inside flange type conduit size 2" SLCCF 54



■ Features

- Quick and easy installation
- low installed cost. Merely tighten clamp nut and/or set screw(s).
- Swivel hook clears conduit. No disassembly required for installation.
- No drilling or welding necessary for installation.
- Provides superior ground continuity between conduit and cable tray.
- Clamps conduit at any angle with relation to tray facilitates wire pulling, minimizes conduit bending.
- Malleable iron body provides great strength.
- Knurled body has no-slip surface for conduit and tray – positive grip assured.
- Compact design has low profile – minimum tray space required for assembly.
- Design accommodates all popular types of cable tray.
- Accommodates wide range of conduit sizes – 1/2" through 4".
- Outside mounting facilitates inside rail installation. (SLCCF)

■ Standard Materials

- Body – Cast Iron / Hook – Steel
- Set screws and clamping nut – Steel
- Hook cap – Vinyl

■ Standard Finishes

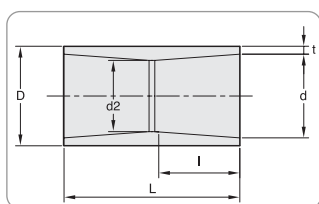
- Cast Iron – Zinc Hot Dip Galvanized
- Steel – Zinc Electro Plate
- Vinyl – Natural



Electrical Conduit / Cable Trays

Fitting for Rigid Non-Metal PVC & HI-PVC Conduits

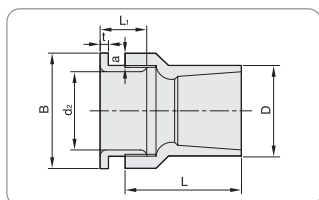
Couplings KS C 8433 for Rigid Non Metal (PVC) Conduits



■ Dimensions (mm)

CAT. NO.	d1	d2	D	L	l	t
14	18.40±0.20	17.60±0.20	22-0.30	53	25	1.0
16	22.40±0.20	21.60±0.20	26-0.30	63	30	1.0
22	26.45±0.20	25.55±0.20	30-0.40	73	35	1.0
28	34.55±0.25	33.45±0.25	40-0.50	83	40	1.8
36	42.60±0.25	41.40±0.25	50-0.60	91	44	2.2
42	48.70±0.30	47.30±0.30	57-0.60	113	55	2.2
54	60.80±0.30	59.20±0.30	70-0.70	129	63	2.5
70	76.80±0.30	75.20±0.30	86-0.70	141	69	3.0
82	89.80±0.30	88.20±0.30	101-0.70	147	72	3.5
100	115.00±0.30	112.90±0.30	129-0.70	195	92	4.5

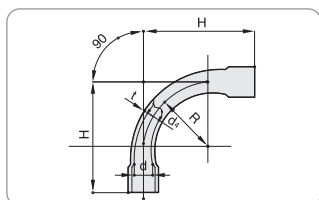
Connectors KS C 8434 for Rigid Non Metal (PVC) Conduits



■ Dimensions (mm)

CAT. NO.	D	L	B	d3	a (MIN)	t (MIN)	l.1
14	22-0.6	44±4	30	20±0.3	2	1.0	17
16	26-0.6	50±4	30	20±0.3	2	1.0	17
22	30-0.8	54±4	30	20±0.3	2	1.0	17
28	40-1.0	64±4	41	26±0.5	2	1.8	23
36	50-1.2	68±4	50	34±0.5	2	2.2	25
42	57-1.2	84±4	57	40±0.5	2	2.2	31
54	70-1.5	97±4	70	51±0.6	2	2.5	35
70	86-1.5	110±4	86	67±1.0	2	3.0	40
82	101-1.5	113±4	101	77±1.0	2	3.5	44
100	129-1.8	142±4	129	100±1.2	2	4.5	50

Normal Bends KS C 8441 for Rigid Non Metal (PVC) Conduits



■ Dimensions (mm)

CAT. NO.	d4	t (MIN)	R	H	d
14	14±2	1.0	75	105	14±0.8
16	18±2	1.0	85	120	18±0.8
22	22±2	1.0	100	140	22±0.9
28	28±3	1.8	135	185	28±1.2
36	35±4	2.2	170	230	35±1.5
42	40±4	2.2	190	260	40±1.6
54	51±5	2.5	240	325	51±1.7
70	67±7	3.0	300	410	67±1.7
82	77±8	3.5	360	490	77.2±1.7
100	101±10	4.5	460	620	101±1.8

ELP Couplings ELP Bell Mouths

- KS C 8455



■ Dimensions

DESIGNATION	*APPROXIMATE OUTSIDE DIAMETER (MM)	PITCH (MM)	*LENGTH (M)
30	47±2.0	10.0±0.5	70.0
40	61±2.0	13.0±0.8	91.0
50	72±2.5	17.0±1.0	116.0
65	91±2.5	21.0±1.0	147.0
80	111±3.0	25.0±1.0	172.0
100	142±4.0	30.0±1.0	224.0
125	174±4.0	38.0±1.0	275.0
150	204±4.0	45.0±1.5	232.0
175	237±4.0	55.0±1.5	275.0
200	267±4.0	60.0±1.5	275.0

ELP Bell Mouth ELP Bell Mouths

- KS C 8455



ELP Couplings for ELP with PVC Conduits

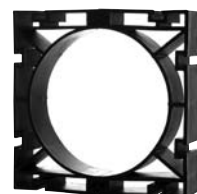
- KS C 8455



■ Dimensions (mm)

DESIGNATION	ELP SIDE					LENGTH OF ALL (MIN)
	INSIDE DIAMETER	OUTSIDE DIAMETER	THICKNESS (MIN)	LENGTH	PITCH	
100	115	140	2.5	150	30	300
125	140	175	3.0	165	38	330
150	170	210	3.5	180	45	360
175	200	245	4.0	200	55	400
200	230	280	4.5	230	60	460
DESIGNATION	PVC CONDUITS SIDE					LENGTH OF ALL (MIN)
	INSIDE DIAMETER	OUTSIDE DIAMETER	THICKNESS (MIN)	LENGTH		
124	124	130	3.0	150		300
148	148	158	3.5	165		330
172	172	180	4.0	180		360
198	198	207	4.5	200		400
230	230	240	5.0	230		460

Spacers for ELP pipe



■ Dimensions (mm)

DESIGNATION	DIMENSION (M/M)		
	WIDTH & HEIGHT	DEPTH	INSIDE DIAMETER
30	180	35.0	Ø48.0
40	180	35.0	Ø68.0
50	135	35.0	Ø68.0
65	180	35.0	Ø108
80	200	35.0	Ø143
100	225	35.0	Ø168
125	300	35.0	Ø200
150	300	35.0	Ø235
175	300	35.0	Ø265
200	300	35.0	Ø265



Electrical Conduit / Cable Trays

Fitting for Flexible & Pliable Metal Conduits Non-liquid Tight Fittings

KFNG Series for First Class Flexible Conduit Type

Conduit Fittings for First Class Flexible Metal Conduits (KS C 8422)

- KS C 8459



KFNG

■ Applications

KFNG Series indoor conduit fittings for use with all type Non liquid-tight Flexible metal conduit, providing mechanical conduit retention and electrical continuity .

■ Features

- Available in various configurations in various trade sizes.
- Lock nut bites into box.

■ Compliance / Approvals

KS C 8459 Fittings for flexible metal conduits

■ Standard Materials

Bodies & Locknuts–Zinc Die Casting

■ Selection Table

CAT. NO.		THREADS	DIMENSIONS (MM)		WEIGHT (G/EA)
		KFBG	ROTATE RADIUS	PROTRUSION LENGTH	
KFNG	10 (1/2")	PF 16	15.0	14.0	30.0
	12 (1/2")	PF 16	15.0	14.0	20.0
	16 (1/2")	PF 16	22.0	26.0	40.0
	22 (3/4")	PF 22	24.0	27.0	60.0
	28 (1")	PF 28	37.0	32.0	110.0
	36 (1-1/4")	PF 36	47.0	34.0	150.0
	42 (1-1/2")	PF 42	52.0	42.0	210.0
	54 (2")	PF 54	58.0	42.0	280.0

BP Series - Non Hazard. Bushings (PVC)

PLICA®

- For Second Class Pliable Normal Conduits PZ or PS
- 90°C Rated PVC
- KS C 8459



CAT. NO. OF SECOND CLASS	
PZ & PS	10 (1/2")
	12 (1/2")
	15 (1/2")
	17 (1/2")
	24 (3/4")
	30 (1")
	38 (1-1/4")
	50 (1-1/2")
	63 (2")
	76 (2-1/2")
	83 (3")
	101 (4")

WNG Series for Second Class Pliable Conduit Type

Conduit Fittings for Second Class Pliable Metal Conduits (KS C 8422)

- KS C 8459



WNG

■ Applications

WNG Series indoor conduit fittings for use with all type Non liquid-tight Pliable metal conduit, providing mechanical conduit retention and electrical continuity .

■ Features

- Available in various configurations in various trade sizes.
- Lock nut bites into box.

■ Compliances / Approvals

KS C 8459 Fittings for flexible metal conduits

■ Standard Materials

Bodies & Locknuts–Zinc Die Casting

■ Selection Table

CAT. NO.		THREADS			DIMENSIONS (MM)		WEIGHT (G/EA)
		WBG	WBC	WBT	ACROSS CORNERS	PROTRUSION LENGTH	
WNG	10 (1/2")	PF 16	CTC 19	—	26.0	18.0	40.0
	12 (1/2")	PF 16	CTC 19	NPT 1/2"	26.0	18.0	40.0
	15 (1/2")	PF 16	CTC 19	NPT 1/2"	26.0	18.0	40.0
	17 (1/2")	PF 16	CTC 19	NPT 1/2"	29.0	20.0	40.0
	24 (3/4")	PF 22	CTC 25	NPT 3/4"	36.0	23.0	70.0
	30 (1")	PF 28	CTC 31	NPT 1	43.0	23.0	90.0
	38 (1-1/4")	PF 36	CTC 39	NPT 1-1/4"	54.0	26.0	150.0
	50 (1-1/2")	PF 42	CTC 51	NPT 1-1/2"	66.0	29.0	210.0
	63 (2")	PF 54	CTC 63	NPT 2"	82.0	37.0	320.0
	76 (2-1/2")	PF 70	CTC 75	NPT 2-1/2"	96.0	39.0	460.0
	83 (3")	PF 82	—	NPT 3"	102.0	39.0	520.0
	101 (4")	PF 104	—	NPT 4"	126.0	44.0	920.0



Electrical Conduit / Cable Trays

Fitting for Flexible & Pliable Metal Conduits Liquid Tight Fittings

KF Series for First Class Flexible Conduit Type Liquid-tight Conduit Fittings for First Class Flexible Metal Conduits (KS C 8422) KEPIC-EN Certificate ******(Grounding type only)

- KS C 8459
- UL Listed*

SAMWHA liquid-tight product line offers high-quality, high-performance fittings. Designed to the toughest standards and integrating the latest technology, not only do you get a reliable and durable product, you also get one that reduces installation time and cost. Our versatile lines of liquid-tight fittings are designed for a wide range of applications.



KFBG



KFBC & *KFBT & **E



KFUG & KFUC & *KFUT & **E



KFAG 90° & *KFAT 90° & **E



KFAG 45° & *KFAT 45° & **E



**Grounding type Earth Nuts

■ Applications

Typical applications for liquid-tight conduit and liquid-tight fittings include the wiring of machine tools, motors, transformers, food processing equipment, robotics, air conditioning units, illuminated store front signs and billboards, etc. The flexible metallic conduit and fittings protect conductors from mechanical damage due to vibration and movement, and seal out cutting oils, coolants, water, dust, etc.

Applications such as these can be found in, but are not limited to, industries such as:

- Machine tool manufacturers
- Electric power generating plants
- Waste treatment facilities
- Paint manufacturing facilities
- Automobile manufacturing facilities
- Aerospace industries
- Breweries
- Food processing plants
- Dairies
- Pulp and paper mills
- Petroleum refineries
- Chemical and petrochemical plants

■ Standard Materials

- Bodies & Nuts & Locknuts – Zinc Die Casting
- Ferrule – Stainless Steel
- Gland nut sealing ring – Neoprene or Rubber
- Sealing Gasket – Neoprene or Rubber

■ Compliance / Approvals

- KS C 8459 Fittings for flexible metal conduits
- *UL 514B Fittings for cable and conduit
- **KEPIC-EN END 1100, END 2000, END 3830

■ Certification

- *UL 514B Certi. NO. : 011702-E201392
- **KEPIC-EN Certi. No. : EN-335

■ Features

- Provides protection in wet locations.
- Available in various configurations in various trade sizes.
- Hex surfaces on gland nut and Thermoplastic elastomer sealing gasket effectively seals out water, oil, dust and dirt.
- Lock nut bites into box.
- Cupped long grounding ferrule is distortion-free.

■ Model Number Logic

KF	0	0	0	0	00
Select Constant	Outlet type B : Straight male U : Straight female A : Angle male	Threads Spec. G : BSPP Threads C : CTC Threads *T : NPT Threads	Angle Spec. 45:45° angle 90:90° angle	Grounding None:normal E:Grounding	Threads size #10~#130

Example 1) Straight PF threads Male 1/2" KFBG 16

Example 2) 45° NPT threads Male 1-1/2" KFAT 42

■ Selection Table 1 – Straight Box Male Connector

CAT. NO.		THREADS			DIMENSIONS (MM)		WEIGHT (G/EA)
		KFBG	KFBC	KFBT	ACROSS CORNERS	PROTRUSION LENGTH	
KFBG & KFBC & *KFBT & **KFBTE	10 (1/2")	PF 16	CTC 19	—	29.0	35.0	44.0
	12 (1/2")	PF 16	CTC 19	NPT 1/2"	32.0	23.0	56.0
	16 (1/2")	PF 16	CTC 19	NPT 1/2"	36.0	25.0	72.0
	22 (3/4")	PF 22	CTC 25	NPT 3/4"	41.0	27.0	104.0
	28 (1")	PF 28	CTC 31	NPT 1	48.0	32.0	160.0
	36 (1-1/4")	PF 36	CTC 39	NPT 1-1/4"	59.0	36.0	246.0
	42 (1-1/2")	PF 42	CTC 51	NPT 1-1/2"	68.0	41.0	350.0
	54 (2")	PF 54	CTC 63	NPT 2"	81.0	44.0	518.0
	70 (2-1/2")	PF 70	CTC 75	NPT 2-1/2"	102.0	49.0	834.0
	82 (3")	PF 82	—	NPT 3"	121.0	52.0	1,256.0
	104 (4")	PF 104	—	NPT 4"	153.0	69.0	2,150.0
	130 (5")	PF 130	—	NPT 5"	177.0	71.0	—

• * * - UL Listed : Certi. No. 011702-E201392 • * * * - KEP CertiC-EN. No. EN-335

■ Selection Table 2 – Straight Box Female Connector

CAT. NO.		THREADS			DIMENSIONS (MM)		WEIGHT (G/EA)
		KFUG	KFUC	KFUT	ACROSS CORNERS	PROTRUSION LENGTH	
KFUG & KFUC & *KFUT & **KFUTE	10 (1/2")	PF 16	CTC 19	—	29.0	35.0	60.0
	12 (1/2")	PF 16	CTC 19	NPT 1/2"	32.0	37.0	62.0
	16 (1/2")	PF 16	CTC 19	NPT 1/2"	36.0	44.0	72.0
	22 (3/4")	PF 22	CTC 25	NPT 3/4"	41.0	49.0	102.0
	28 (1")	PF 28	CTC 31	NPT 1	48.0	57.0	148.0
	36 (1-1/4")	PF 36	CTC 39	NPT 1-1/4"	59.0	64.0	226.0
	42 (1-1/2")	PF 42	CTC 51	NPT 1-1/2"	68.0	69.0	322.0
	54 (2")	PF 54	CTC 63	NPT 2"	81.0	76.0	470.0
	70 (2-1/2")	PF 70	CTC 75	NPT 2-1/2"	102.0	73.0	784.0
	82 (3")	PF 82	—	NPT 3"	121.0	81.0	1,212.0
	104 (4")	PF 104	—	NPT 4"	153.0	101.0	1,856.0

• * * - UL Listed : Certi. No. 011702-E201392 • * * * - KEPIC-EN Certi. No. EN-335

■ Selection Table 3 – Angle 90° Male Connector

CAT. NO.	THREADS			DIMENSIONS (MM)			WEIGHT (G/EA)
	KFUG	KFUC	KFUT	ACROSS CORNERS	PROTRUSION LENGTH	ROTATE RADIUS	
KFA90& *KFA90E & **KFA90E	10 (1/2")	PF 16	CTC 19	—	29.0	31.0	80.0
	12 (1/2")	PF 16	CTC 19	NPT 1/2"	32.0	35.0	90.0
	16 (1/2")	PF 16	CTC 19	NPT 1/2"	36.0	39.0	108.0
	22 (3/4")	PF 22	CTC 25	NPT 3/4"	41.0	45.0	156.0
	28 (1")	PF 28	CTC 31	NPT 1	48.0	53.0	260.0
	36 (1-1/4")	PF 36	CTC 39	NPT 1-1/4"	59.0	64.0	464.0
	42 (1-1/2")	PF 42	CTC 51	NPT 1-1/2"	68.0	73.0	630.0
	54 (2")	PF 54	CTC 63	NPT 2"	81.0	88.0	1,042.0
	70 (2-1/2")	PF 70	CTC 75	NPT 2-1/2"	102.0	113.0	1,670.0
	82 (3")	PF 82	—	NPT 3"	121.0	130.0	2,461.0
	104 (4")	PF 104	—	NPT 4"	153.0	162.0	4,140.0

• * * - UL Listed : Certi. No. 011702-E201392 • * * * - KEPIC-EN Certi. No. EN-335

■ Selection Table 4 – Angle 45° Male Connector

CAT. NO.	THREADS			DIMENSIONS (MM)			WEIGHT (G/EA)
	KFUG	KFUC	KFUT	ACROSS CORNERS	PROTRUSION LENGTH	ROTATE RADIUS	
KFA45& *KFA45E & **KFA45E	10 (1/2")	PF 16	CTC 19	—	29.0	40.0	80.0
	12 (1/2")	PF 16	CTC 19	NPT 1/2"	32.0	44.0	100.0
	16 (1/2")	PF 16	CTC 19	NPT 1/2"	36.0	48.0	112.0
	22 (3/4")	PF 22	CTC 25	NPT 3/4"	41.0	54.0	166.0
	28 (1")	PF 28	CTC 31	NPT 1	48.0	64.0	286.0
	36 (1-1/4")	PF 36	CTC 39	NPT 1-1/4"	59.0	73.0	248.0
	42 (1-1/2")	PF 42	CTC 51	NPT 1-1/2"	68.0	83.0	510.0
	54 (2")	PF 54	CTC 63	NPT 2"	81.0	95.0	788.0
	70 (2-1/2")	PF 70	CTC 75	NPT 2-1/2"	102.0	131.0	1,622.0
	82 (3")	PF 82	—	NPT 3"	121.0	147.0	2,260.0
	104 (4")	PF 104	—	NPT 4"	153.0	176.0	4,344.0

• * * - UL Listed : Certi. No. 011702-E201392 • * * * - KEPIC-EN Certi. No. EN-335



Electrical Conduit / Cable Trays

Fitting for Flexible & Pliable Metal Conduits Liquid Tight Fittings

W Series for Second Class Pliable Conduit Type

Liquid-tight Conduit Fittings for Second Class Pliable Metal Conduits (KS C 8422)

• KS C 8459



WBG & WBT
WBC



WUG & WUT
WUC



WAG 90° & WAT 90°
WAC 90

SAMWHA liquid-tight product line offers high-quality, high-performance fittings. Designed to the toughest standards and integrating the latest technology, not only do you get a reliable and durable product, you also get one that reduces installation time and cost. Our versatile lines of liquid-tight fittings are designed for a wide range of applications.

■ Applications

Typical applications for liquid-tight conduit and liquid-tight fittings include the wiring of machine tools, motors, transformers, food processing equipment, robotics, air conditioning units, illuminated store front signs and billboards, etc. The pliable metallic conduit and fittings protect conductors from mechanical damage due to vibration and movement, and seal out cutting oils, coolants, water, dust, etc.

Applications such as these can be found in, but are not limited to, industries such as:

- Machine tool manufacturers
- Electric power generating plants
- Waste treatment facilities
- Paint manufacturing facilities
- Automobile manufacturing facilities
- Aerospace industries
- Breweries
- Food processing plants
- Dairies
- Pulp and paper mills
- Petroleum refineries
- Chemical and petrochemical plants

■ Features

- Provides protection in wet locations.
- Available in various configurations in various trade sizes.
- Hex surfaces on gland nut and Thermoplastic elastomer sealing gasket effectively seals out water, oil, dust and dirt.
- Lock nut bites into box.

■ Compliance / Approvals

- KS C 8459 Fittings for flexible metal conduits

■ Standard Materials

- Bodies & Nuts & Locknuts – Zinc Die Casting
- Gland nut sealing ring – Neoprene or Rubber
- Sealing Gasket – Neoprene or Rubber

■ Model Number Logic



Select
Constant



Outlet type
B : Straight male
U : Straight female
A : Angle male



Threads Spec.
G : BSPP Threads
C : CTC Threads
T : NPT Threads



Angle Spec.
90 : 90° angle



Threads size
#10~#101

Example 1) Straight PF threads Male 1/2" pliable #15 WBG 15

Example 2) 45° NPT threads Male 1-1/2" WAT 50

W Series for Second Class Pliable Conduit Type

Liquid-tight Conduit Fittings for Second Class Pliable Metal Conduits (KS C 8422)

- KS C 8459

■ Selection Table 1 – Straight Box Male Connector

CAT. NO.		THREADS			DIMENSIONS (MM)		WEIGHT (G/EA)
		WBG	WBC	WBT	ACROSS CORNERS	PROTRUSION LENGTH	
WBG & WBC & WBT	10 (1/2")	PF 16	CTC 19	—	33.0	26.0	80.0
	12 (1/2")	PF 16	CTC 19	NPT 1/2"	33.0	26.0	70.0
	15 (1/2")	PF 16	CTC 19	NPT 1/2"	38.0	27.0	100.0
	17 (1/2")	PF 16	CTC 19	NPT 1/2"	38.0	27.0	90.0
	24 (3/4")	PF 22	CTC 25	NPT 3/4"	47.0	31.0	130.0
	30 (1")	PF 28	CTC 31	NPT 1	53.0	33.0	190.0
	38 (1-1/4")	PF 36	CTC 39	NPT 1-1/4"	64.0	34.0	300.0
	50 (1-1/2")	PF 42	CTC 51	NPT 1-1/2"	78.0	37.0	410.0
	68 (2")	PF 54	CTC 63	NPT 2"	97.0	39.0	690.0
	76 (2-1/2")	PF 70	CTC 75	NPT 2-1/2"	113.0	47.0	1,070.0
	83(3")	PF 82	—	NPT 3"	122.0	52.0	1,320.0
	101 (4")	PF 104	—	NPT 4"	141.0	55.0	1,710.0

■ Selection Table 2 – Straight Box Female Connector

CAT. NO.		THREADS			DIMENSIONS (MM)		WEIGHT (G/EA)
		WUG	WUC	WUT	ACROSS CORNERS	PROTRUSION LENGTH	
WUG & WUC & WUT	10 (1/2")	PF 16	CTC 19	—	33.0	43.0	80.0
	12 (1/2")	PF 16	CTC 19	NPT 1/2"	33.0	43.0	80.0
	15 (1/2")	PF 16	CTC 19	NPT 1/2"	38.0	44.0	80.0
	17 (1/2")	PF 16	CTC 19	NPT 1/2"	38.0	44.0	100.0
	24 (3/4")	PF 22	CTC 25	NPT 3/4"	47.0	50.0	130.0
	30 (1")	PF 28	CTC 31	NPT 1	53.0	55.0	190.0
	38 (1-1/4")	PF 36	CTC 39	NPT 1-1/4"	64.0	62.0	320.0
	50 (1-1/2")	PF 42	CTC 51	NPT 1-1/2"	78.0	65.0	410.0
	68 (2")	PF 54	CTC 63	NPT 2"	97.0	71.0	740.0
	76 (2-1/2")	PF 70	CTC 75	NPT 2-1/2"	113.0	83.0	1,110.0
	83(3")	PF 82	—	NPT 3"	122.0	91.0	1,340.0
	101 (4")	PF 104	—	NPT 4"	141.0	100.0	2,090.0

■ Selection Table 3 – Angle 90° Male Connector

CAT. NO.		THREADS			DIMENSIONS (MM)			WEIGHT (G/EA)
		WAG	WAC	WAT	ACROSS CORNERS	PROTRUSION LENGTH	ROTATE RADIUS	
WAG & WAC & WAT	10 (1/2")	PF 16	CTC 19	—	33.0	33.0	51.0	120.0
	12 (1/2")	PF 16	CTC 19	NPT 1/2"	33.0	35.5	51.0	120.0
	15 (1/2")	PF 16	CTC 19	NPT 1/2"	38.0	38.0	51.0	140.0
	17 (1/2")	PF 16	CTC 19	NPT 1/2"	38.0	40.0	51.0	140.0
	24 (3/4")	PF 22	CTC 25	NPT 3/4"	47.0	48.0	59.0	200.0
	30 (1")	PF 28	CTC 31	NPT 1	53.0	55.5	69.0	330.0
	38 (1-1/4")	PF 36	CTC 39	NPT 1-1/4"	64.0	66.5	83.0	1020.0
	50 (1-1/2")	PF 42	CTC 51	NPT 1-1/2"	78.0	78.0	91.0	1340.0
	68 (2")	PF 54	CTC 63	NPT 2"	97.0	96.0	108.0	1120.0
	76 (2-1/2")	PF 70	CTC 75	NPT 2-1/2"	113.0	118.5	120.0	1460.0
	83(3")	PF 82	—	NPT 3"	122.0	130.5	130.0	1760.0
	101 (4")	PF 104	—	NPT 4"	141.0	156.0	140.0	2270.0



Electrical Conduit / Cable Trays

Fitting for Flexible & Pliable Metal Conduits Liquid Tight Fittings

KG Series Conduit Couplings For Second Class Pliable Metal Conduits (KS C 8422)

- KS C 8459



KG

■ Applications

KG Series indoor conduit Couplings for use with all type Non liquid-tight Pliable metal conduit, providing mechanical conduit retention and electrical continuity.

■ Features

Available in various configurations in various trade sizes.

■ Standard Materials

Body – Steel or Stainless Steel

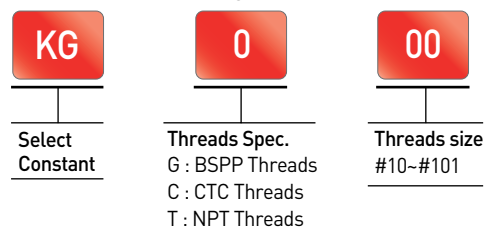
■ Finishes

Steel – Electro Zinc Plate

■ Compliance / Approvals

KS C 8459 Fittings for flexible metal conduits

■ Model Number Logic



Example 1) PF threads Male 1/2" pliable #15 KG 15
Example 2) NPT threads Male 1-1/2" KG 50

■ Selection Table

CAT. NO.		THREADS			DIMENSIONS (MM)		WEIGHT (G/EA)
		WBG	WBC	WBT	OUTER DIAMETER	LENGTH	
KG	10 (1/2")	PF 16	CTC 19	—	26.0	37.0	63.0
	12 (1/2")	PF 16	CTC 19	NPT 1/2"	26.0	37.0	80.0
	15 (1/2")	PF 16	CTC 19	NPT 1/2"	26.0	37.0	50.0
	17 (1/2")	PF 16	CTC 19	NPT 1/2"	26.0	40.0	40.0
	24 (3/4")	PF 22	CTC 25	NPT 3/4"	33.0	44.0	70.0
	30 (1")	PF 28	CTC 31	NPT 1	40.0	49.0	120.0
	38 (1-1/4")	PF 36	CTC 39	NPT 1-1/4"	50.0	56.0	90.0
	50 (1-1/2")	PF 42	CTC 51	NPT 1-1/2"	62.0	56.0	140.0
	68 (2")	PF 54	CTC 63	NPT 2"	76.0	70.0	220.0
	76 (2-1/2")	PF 70	CTC 75	NPT 2-1/2"	90.0	73.0	290.0
	83(3")	PF 82	—	NPT 3"	95.0	78.0	253.0
	101 (4")	PF 104	—	NPT 4"	120.0	87.0	491.0

Electrical Conduit / Cable Trays

Fitting for Flexible & Pliable Metal Conduits The Others**SI Series Conduit Couplings for Communication Flexible Metal Conduit Type**
For Communication Flexible Metal Conduits (KS C 8422)

SIBM



SIUM

■ Applications

SI Series indoor conduit Couplings for use with Communication Flexible metal conduit, providing mechanical conduit retention and electrical continuity.

■ Features

Available in various configurations in various trade sizes.

■ Standard Materials

Body – Stainless Steel

■ Model Number Logic

Select
Constant



Outlet type
B : Straight male
U : Straight female



Threads Spec.
M : Metric Threads



Threads size
#5.5~#16

Example 1) Male Metric M8 x 1.0 pitch SIBM 5.5

Example 2) Female Metric M22 x 2.5 pitch SIUM 16

■ Selection Table

CAT. NO.		THREADS		DIMENSIONS (MM)		
		Metric	Pitch (MM)	ACROSS CORNERS	PROTRUSION LENGTH	
					SIBM	SIUM
SIBM & SIUM	#5.5	M 8	1.0	12.0	13.0	22.0
	#8	M 12	1.25	16.0	14.0	23.0
	#10	M 14	1.25	18.0	16.0	26.0
	#12	M 16	1.5	20.0	18.0	29.0
	#14	M 18	2.5	22.0	21.0	35.0
	#16	M 22	2.5	27.0	23.0	39.0



Electrical Conduit / Cable Trays

Fitting for Flexible & Pliable Metal Conduits The Others

MS Connector Series for Flexible Conduits With Cannon Plugs

MS Connector MAS-MS/MS Connector for Flexible Conduits with Cannon Plugs

■ Applications

MS Connectors can connect flexible conduit with cannon plugs and simplify wires of connecting circuits. Servomotors, machine tools, communication and military equipment and aerial navigation.

■ Features

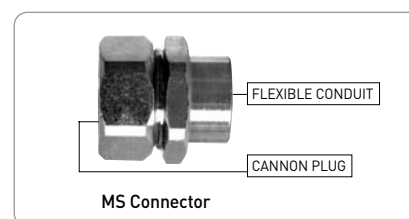
Available in various configurations in various trade sizes.

■ Standard Materials

Body – Stainless Steel or Nickel Plated Brass, Natural Aluminum

■ Selection Table

NOMINAL SIZE				V.M.S CONNECTING THREAD	INTERLOCKED THREAD LENGTH (MM)	PROTRUSION LENGTH (MM)
SIZE		MS SIZE	FLEXIBLE CONDUIT			
MS	10S-12	10S	12	1/2. 28 UNEF	10.0	34.0
	12-12	12	12	5/8. 24 UNEF	10.0	34.0
	14-12	14	12	3/4. 20 UNEF	10.0	34.0
	14-16	14	16	3/4. 20 UNEF	10.0	35.0
	16-16	16	16	7/8. 20 UNEF	10.0	35.0
	16-22	16	22	7/8. 20 UNEF	10.0	35.0
	18-22	18	12	1. 20 UNEF	10.0	34.0
	18-16	18	16	1. 20 UNEF	10.0	35.0
	20.22-12	20.22	12	1-3/16. 18 UNEF	10.0	34.0
	20.22-16	20.22	16	1-3/16. 18 UNEF	10.0	35.0
	20.22-22	20.22	22	1-3/16. 18 UNEF	10.0	35.0
	20.22-28	20.22	28	1-3/16. 18 UNEF	10.0	43.0
	24.28-22	24.28	22	1-7/16. 18 UNEF	10.0	43.0
	24.28-28	24.28	28	1-7/16. 18 UNEF	10.0	35.0
	24.28-36	24.28	36	1-7/16. 18 UNEF	10.0	46.0
	32-22	32	22	1-3/4. 18 UNS	11.5	42.0
	32-28	32	28	1-3/4. 18 UNS	11.5	43.0
	32-36	32	36	1-3/4. 18 UNS	11.5	46.0
	32-42	32	42	1-3/4. 18 UNS	11.5	51.0
	36-22	36	22	2. 18 UN	13.0	42.0
	36-28	36	28	2. 18 UN	13.0	43.0
	36-36	36	36	2. 18 UN	13.0	46.0
	36-42	36	42	2. 18 UN	13.0	51.0
	40-28	40	28	2-1/4. 16 UN	13.0	43.0
	40-36	40	36	2-1/4. 16 UN	13.5	46.0
	40-42	40	42	2-1/4. 16 UN	13.5	51.0
	40-54	40	54	2-1/4. 16 UN	13.5	54.0
	44-54	44	54	2-1/4. 16 UN	14.5	54.0
	48-70	48	70	3. 16 UN	14.5	54.0



Electrical Conduit / Cable Trays

Fitting for Flexible & Pliable Metal Conduits Accessory**Lock Nuts** Conduit Lock Nuts

- KS C 8460



Zinc Die Casting



Steel

- **Features**

- Precision-machined threads allow for easy installation.
- Heavy stock thickness and specially designed tabs tighten securely and will not easily loosen even in the most severe applications.

- **Standard Materials**

- Zinc Electro Galvanized Steel
- Zinc Die Casting

- **Selection Table**

CAT. NO.		THREADS		WEIGHT (G/10EA)
		BSPP	NPS	
CLN	#16	1/2"	1/2"	45.4
	#22	3/4"	3/4"	45.4
	#28	1"	1"	90.7
	#36	1-1/4"	1-1/4"	136.0
	#42	1-1/2"	1-1/2"	226.8
	#54	2"	2"	362.9
	#70	2-1/2"	2-1/2"	453.6
	#82	3"	3"	680.0
	#92	3-1/2"	3-1/2"	725.7
	#104	4"	4"	862.0

Ferrules for Liquid-tight Flexible Metal Conduit Only
Model – FUR

- KS C 8459
- Stainless Steel Only



- **Selection Table**

CAT. NO.	
FUR	#16
	#22
	#28
	#36
	#42
	#54
	#70
	#82
	#92
	#104



Electrical Conduit / Cable Trays

Cable Trays Ladder Series

CT Cable Trays Ladder Cable Tray

- KS C 8464
(Cable Tray)
- KS D 8308
(Hot Dip Galvanized)

■ Application

In the electrical wiring of buildings, a cable tray system is used to support insulated electric cables used for power distribution and communication.

Cable trays are used as an alternative to open wiring or electrical conduit systems, and are commonly used for cable management in commercial and industrial construction. They are especially useful in situations where changes to a wiring system are anticipated, since new cables can be installed by laying them in the tray, instead of pulling them through a pipe.

■ Standard Materials

Hot Rolled Mild Steel
(JIS G 3101-1987 SS400, KS D 3503-82 SS41)

■ Standard Finishes

Zinc Hot Dip Galvanized

■ Size Ranges

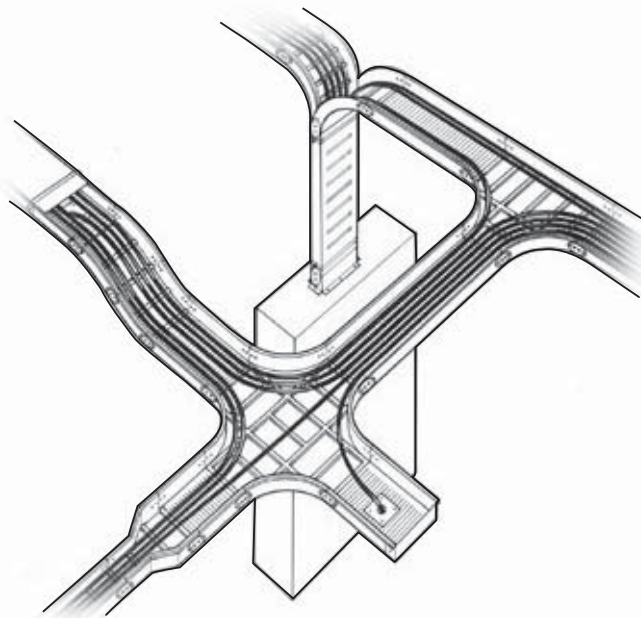
Width - 200mm~1,000mm

■ Compliances / Approvals

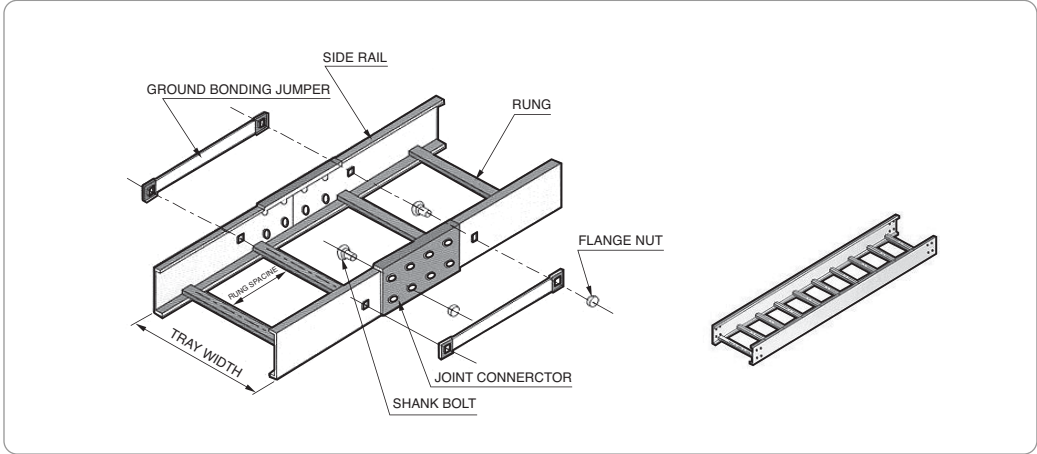
KS C 8464

■ Connector

Employ 3/8" Diameter ribbed-Neck bolts and flanged nuts.
Order connectors, bolts and nuts as separate item.



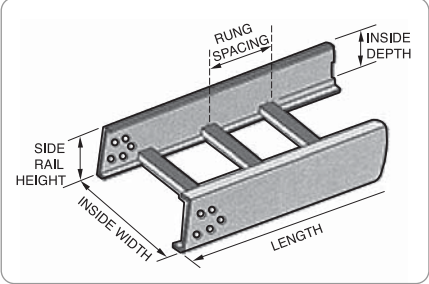
■ Construction of Ladder Tray



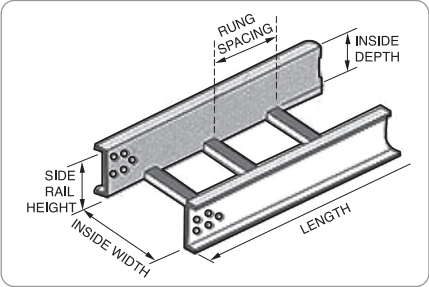
■ Selection Table

CAT.NO.	WIDTH (MM)	RUNG SPACE (MM)	LENGTH (MM)
LADDER CT22	200	200	3000
LADDER CT23		300	
LADDER CT32	300	200	3000
LADDER CT33		300	
LADDER CT42	400	200	3000
LADDER CT43		300	
LADDER CT52	500	200	3000
LADDER CT53		300	
LADDER CT62	600	200	3000
LADDER CT63		300	
LADDER CT72	700	200	3000
LADDER CT73		300	
LADDER CT82	800	200	3000
LADDER CT83		300	
LADDER CT92	900	200	3000
LADDER CT93		300	
LADDER CT102	1000	200	3000
LADDER CT103		300	

■ Ladder Tray, Inside Rail



■ Ladder Tray, Outside Rail



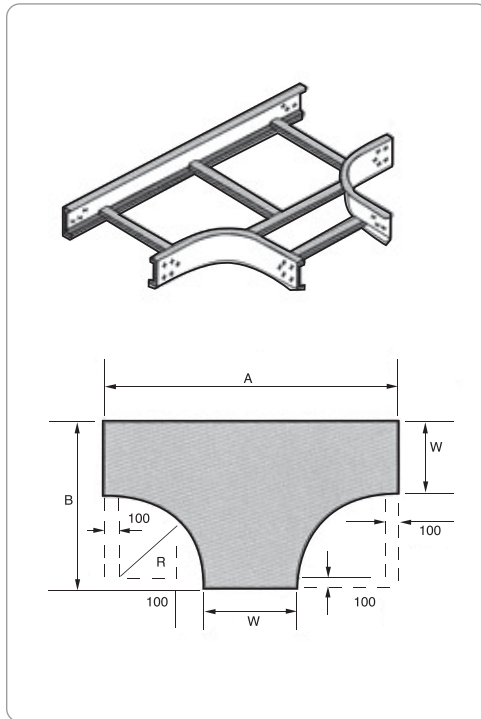


Electrical Conduit / Cable Trays

Cable Trays Ladder Series

HT Horizontal Tee Ladder Horizontal Tee

- KS C 8464
(Cable Tray)
- KS D 8308
(Hot Dip Galvanized)

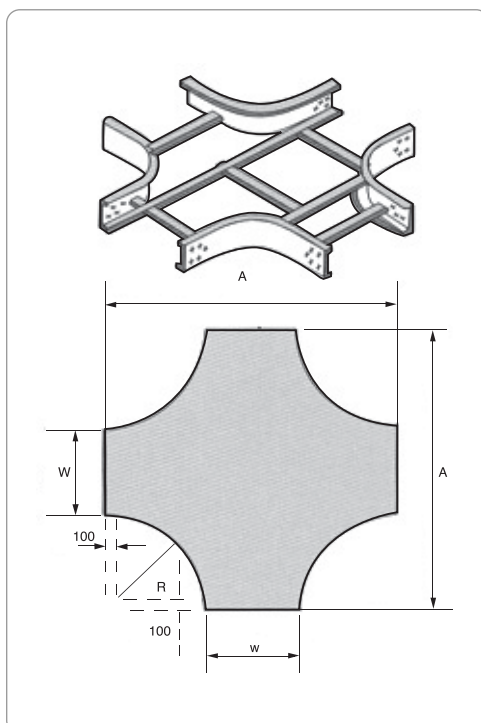


■ Selection Table

CAT.NO.	WIDTH (MM)	R (MM)	A (MM)	B (MM)
LADDER HT23	200	300	1000	600
LADDER HT26		600	1600	900
LADDER HT29		900	2200	1200
LADDER HT33	300	300	1100	700
LADDER HT36		600	1700	1000
LADDER HT39		900	2300	1300
LADDER HT43	400	300	1200	800
LADDER HT46		600	1800	1100
LADDER HT49		900	2400	1400
LADDER HT53	500	300	1300	900
LADDER HT56		600	1900	1200
LADDER HT59		900	2500	1500
LADDER HT63	600	300	1400	1000
LADDER HT66		600	2000	1300
LADDER HT69		900	2600	1600
LADDER HT73	700	300	1500	1100
LADDER HT76		600	2100	1400
LADDER HT79		900	2700	1700
LADDER HT83	800	300	1600	1200
LADDER HT86		600	2200	1500
LADDER HT89		900	2800	1800
LADDER HT93	900	300	1700	1300
LADDER HT96		600	2300	1600
LADDER HT99		900	2900	1900

HC Horizontal Cross Ladder Horizontal Cross

- KS C 8464
(Cable Tray)
- KS D 8308
(Hot Dip Galvanized)

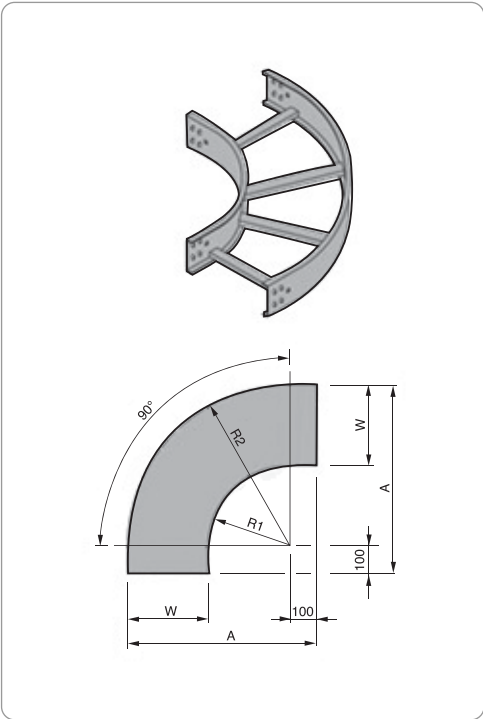


■ Selection Table

CAT.NO.	WIDTH (MM)	R (MM)	A (MM)	B (MM)
LADDER HC23	200	300	1000	600
LADDER HC26		600	1600	900
LADDER HC29		900	2200	1200
LADDER HC33	300	300	1100	700
LADDER HC36		600	1700	1000
LADDER HC39		900	2300	1300
LADDER HC43	400	300	1200	800
LADDER HC46		600	1800	1100
LADDER HC49		900	2400	1400
LADDER HC53	500	300	1300	900
LADDER HC56		600	1900	1200
LADDER HC59		900	2500	1500
LADDER HC63	600	300	1400	1000
LADDER HC66		600	2000	1300
LADDER HC69		900	2600	1600
LADDER HC73	700	300	1500	1100
LADDER HC76		600	2100	1400
LADDER HC79		900	2700	1700
LADDER HC83	800	300	1600	1200
LADDER HC86		600	2200	1500
LADDER HC89		900	2800	1800
LADDER HC93	900	300	1700	1300
LADDER HC96		600	2300	1600
LADDER HC99		900	2900	1900

HE90 Horizontal Elbow

- KS C 8464
(Cable Tray)
- KS D 8308
(Hot Dip Galvanized)

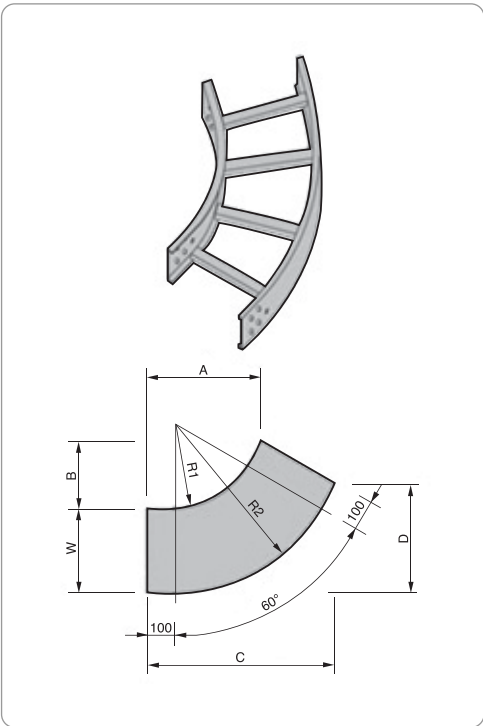


■ Selection Table

CAT.NO.	WIDTH (MM)	R1 (MM)	R2 (MM)	A (MM)
LADDER HE90 23	200	300	500	600
LADDER HE90 26		600	800	900
LADDER HE90 29		900	1100	1200
LADDER HE90 33	300	300	600	700
LADDER HE90 36		600	900	1000
LADDER HE90 39		900	1200	1300
LADDER HE90 43	400	300	700	800
LADDER HE90 46		600	1000	1100
LADDER HE90 49		900	1300	1400
LADDER HE90 53	500	300	800	900
LADDER HE90 56		600	1100	1200
LADDER HE90 59		900	1400	1500
LADDER HE90 63	600	300	900	1000
LADDER HE90 66		600	1200	1300
LADDER HE90 69		900	1500	1600
LADDER HE90 73	700	300	1000	1100
LADDER HE90 76		600	1300	1400
LADDER HE90 79		900	1600	1700
LADDER HE90 83	800	300	1100	1200
LADDER HE90 86		600	1400	1500
LADDER HE90 89		900	1700	1800
LADDER HE90 93	900	300	1200	1300
LADDER HE90 96		600	1500	1600
LADDER HE90 99		900	1800	1900

HE60 Horizontal Elbow

- KS C 8464
(Cable Tray)
- KS D 8308
(Hot Dip Galvanized)



■ Selection Table

CAT.NO.	WIDTH (MM)	R (MM)	R2 (MM)	A (MM)
LADDER HE60 23	200	300	500	410
LADDER HE60 26		600	800	670
LADDER HE60 29		900	1100	930
LADDER HE60 33	300	300	600	410
LADDER HE60 36		600	900	670
LADDER HE60 39		900	1200	930
LADDER HE60 43	400	300	700	410
LADDER HE60 46		600	1000	670
LADDER HE60 49		900	1300	930
LADDER HE60 53	500	300	800	410
LADDER HE60 56		600	1100	670
LADDER HE60 59		900	1400	930
LADDER HE60 63	600	300	900	410
LADDER HE60 66		600	1200	670
LADDER HE60 69		900	1500	930
LADDER HE60 73	700	300	1000	410
LADDER HE60 76		600	1300	670
LADDER HE60 79		900	1600	930
LADDER HE60 83	800	300	1100	410
LADDER HE60 86		600	1400	670
LADDER HE60 89		900	1700	930
LADDER HE60 93	900	300	1200	410
LADDER HE60 96		600	1500	670
LADDER HE60 99		900	1800	930

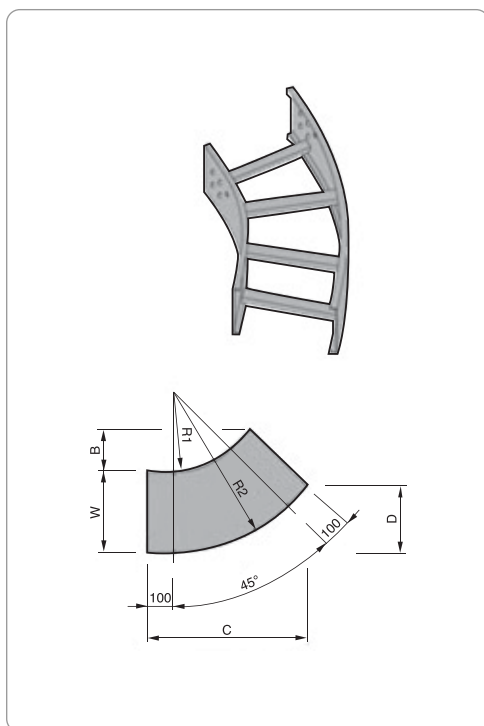


Electrical Conduit / Cable Trays

Cable Trays Ladder Series

HE45 Horizontal Elbow

- KS C 8464
(Cable Tray)
- KS D 8308
(Hot Dip Galvanized)

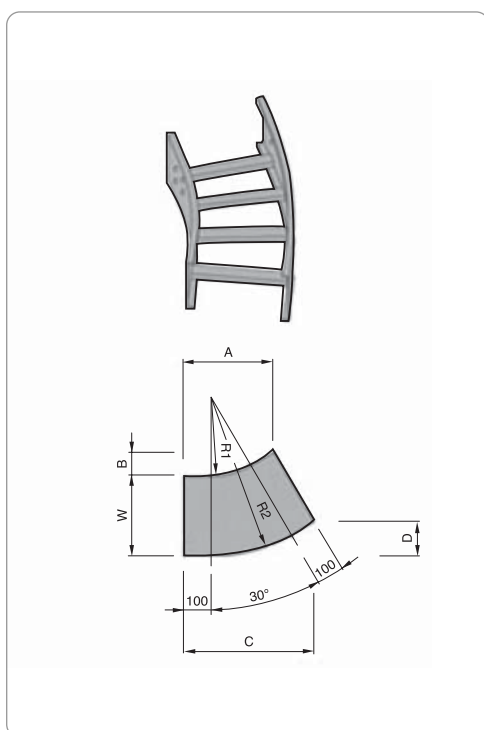


■ Selection Table

CAT.NO.	WIDTH (MM)	R1 (MM)	R2 (MM)	A (MM)
LADDER HE45 23	200	300	500	383
LADDER HE45 26		600	800	595
LADDER HE45 29		900	1100	808
LADDER HE45 33	300	300	600	383
LADDER HE45 36		600	900	595
LADDER HE45 39		900	1200	808
LADDER HE45 43	400	300	700	383
LADDER HE45 46		600	1000	595
LADDER HE45 49		900	1300	808
LADDER HE45 53	500	300	800	383
LADDER HE45 56		600	1100	595
LADDER HE45 59		900	1400	808
LADDER HE45 63	600	300	900	383
LADDER HE45 66		600	1200	595
LADDER HE45 69		900	1500	808
LADDER HE45 73	700	300	1000	383
LADDER HE45 76		600	1300	595
LADDER HE45 79		900	1600	808
LADDER HE45 83	800	300	1100	383
LADDER HE45 86		600	1400	595
LADDER HE45 89		900	1700	808
LADDER HE45 93	900	300	1200	383
LADDER HE45 96		600	1500	595
LADDER HE45 99		900	1800	808

HE30 Horizontal Elbow

- KS C 8464
(Cable Tray)
- KS D 8308
(Hot Dip Galvanized)

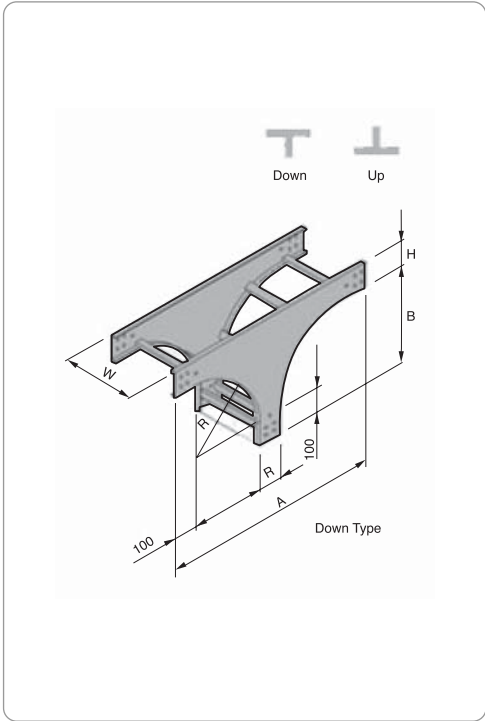


■ Selection Table

CAT.NO.	WIDTH (MM)	R1 (MM)	R2 (MM)	A (MM)
LADDER HE30 23	200	300	500	337
LADDER HE30 26		600	800	487
LADDER HE30 29		900	1100	687
LADDER HE30 33	300	300	600	337
LADDER HE30 36		600	900	487
LADDER HE30 39		900	1200	687
LADDER HE30 43	400	300	700	337
LADDER HE30 46		600	1000	487
LADDER HE30 49		900	1300	687
LADDER HE30 53	500	300	800	337
LADDER HE30 56		600	1100	487
LADDER HE30 59		900	1400	687
LADDER HE30 63	600	300	900	337
LADDER HE30 66		600	1200	487
LADDER HE30 69		900	1500	687
LADDER HE30 73	700	300	1000	337
LADDER HE30 76		600	1300	487
LADDER HE30 79		900	1600	687
LADDER HE30 83	800	300	1100	337
LADDER HE30 86		600	1400	487
LADDER HE30 89		900	1700	687
LADDER HE30 93	900	300	1200	337
LADDER HE30 96		600	1500	487
LADDER HE30 99		900	1800	687

VT Series Vertical Tee

- KS C 8464
(Cable Tray)
- KS D 8308
(Hot Dip Galvanized)

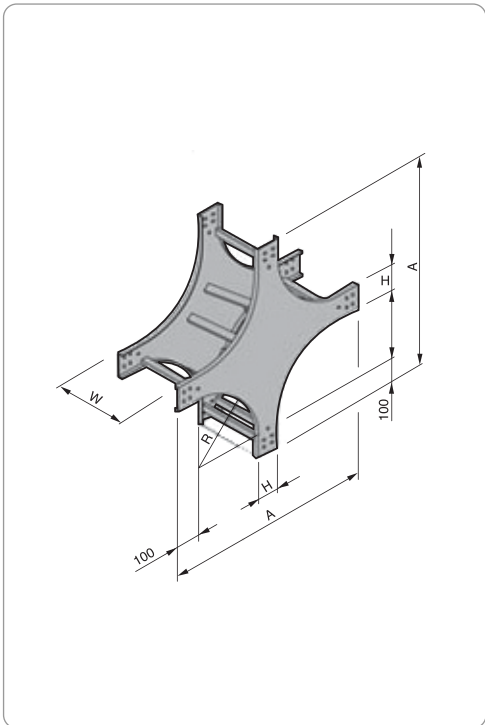


■ Selection Table

CAT.NO.	WIDTH (MM)	R (MM)	A (MM)	B (MM)
LADDER VT 23	200	300	1000	400
LADDER VT 26		600	1600	700
LADDER VT 29		900	2200	1000
LADDER VT 33	300	300	1100	400
LADDER VT 36		600	1700	700
LADDER VT 39		900	2300	1000
LADDER VT 43	400	300	1200	400
LADDER VT 46		600	1800	700
LADDER VT 49		900	2400	1000
LADDER VT 53	500	300	1300	400
LADDER VT 56		600	1900	700
LADDER VT 59		900	2500	1000
LADDER VT 63	600	300	1400	400
LADDER VT 66		600	2000	700
LADDER VT 69		900	2600	1000
LADDER VT 73	700	300	1500	400
LADDER VT 76		600	2100	700
LADDER VT 79		900	2700	1000
LADDER VT 83	800	300	1600	400
LADDER VT 86		600	2200	700
LADDER VT 89		900	2800	1000
LADDER VT 93	900	300	1700	400
LADDER VT 96		600	2300	700
LADDER VT 99		900	2900	1000

VC Series Vertical Cross

- KS C 8464
(Cable Tray)
- KS D 8308
(Hot Dip Galvanized)



■ Selection Table

CAT.NO.	WIDTH (MM)	R (MM)	A (MM)
LADDER VC 23	200	300	1000
LADDER VC 26		600	1600
LADDER VC 29		900	2200
LADDER VC 33	300	300	1100
LADDER VC 36		600	1700
LADDER VC 39		900	2300
LADDER VC 43	400	300	1200
LADDER VC 46		600	1800
LADDER VC 49		900	2400
LADDER VC 53	500	300	1300
LADDER VC 56		600	1900
LADDER VC 59		900	2500
LADDER VC 63	600	300	1400
LADDER VC 66		600	2000
LADDER VC 69		900	2600
LADDER VC 73	700	300	1500
LADDER VC 76		600	2100
LADDER VC 79		900	2700
LADDER VC 83	800	300	1600
LADDER VC 86		600	2200
LADDER VC 89		900	2800
LADDER VC 93	900	300	1700
LADDER VC 96		600	2300
LADDER VC 99		900	2900

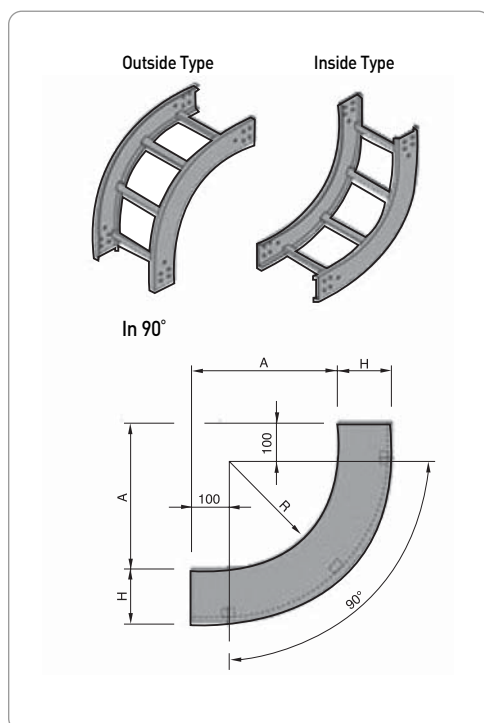


Electrical Conduit / Cable Trays

Cable Trays Ladder Series

VE90 Vertical Elbow

- KS C 8464
(Cable Tray)
- KS D 8308
(Hot Dip Galvanized)

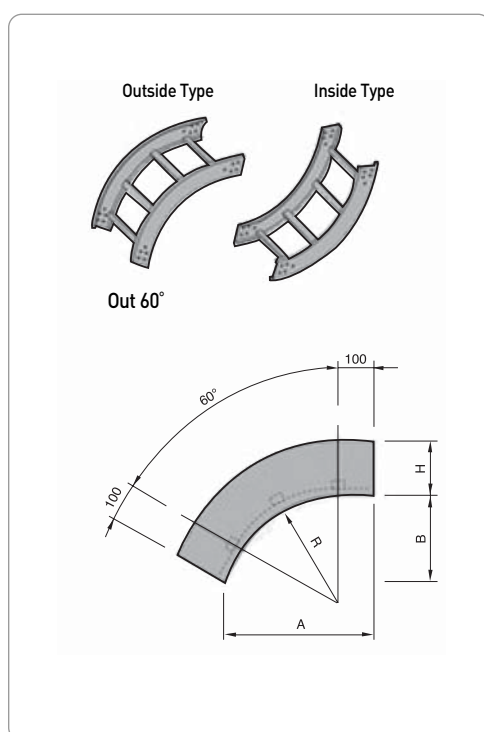


Selection Table

CAT.NO.	WIDTH (MM)	R (MM)	A (MM)
LADDER VE90 23	200	300	400
LADDER VE90 26		600	700
LADDER VE90 29		900	1000
LADDER VE90 33	300	300	400
LADDER VE90 36		600	700
LADDER VE90 39		900	1000
LADDER VE90 43	400	300	400
LADDER VE90 46		600	700
LADDER VE90 49		900	1000
LADDER VE90 53	500	300	400
LADDER VE90 56		600	700
LADDER VE90 59		900	1000
LADDER VE90 63	600	300	400
LADDER VE90 66		600	700
LADDER VE90 69		900	1000
LADDER VE90 73	700	300	400
LADDER VE90 76		600	700
LADDER VE90 79		900	1000
LADDER VE90 83	800	300	400
LADDER VE90 86		600	700
LADDER VE90 89		900	1000
LADDER VE90 93	900	300	400
LADDER VE90 96		600	700
LADDER VE90 99		900	1000

VE60 Vertical Elbow

- KS C 8464
(Cable Tray)
- KS D 8308
(Hot Dip Galvanized)

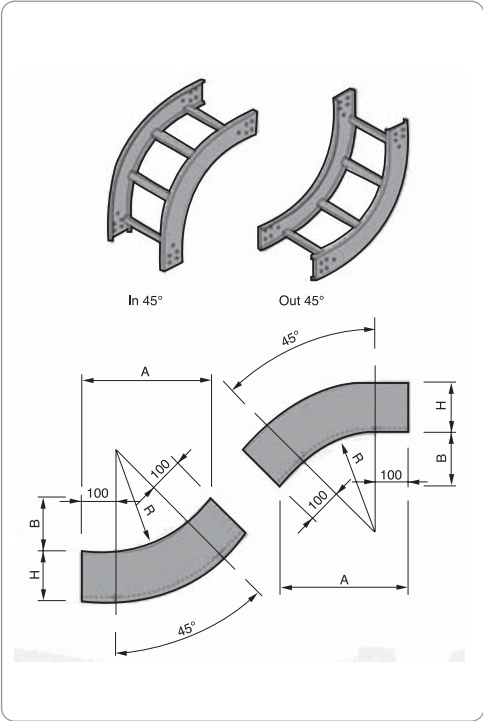


Selection Table

CAT.NO.	WIDTH (MM)	R (MM)	A (MM)	B (MM)
LADDER VE60 23	200	300	410	236
LADDER VE60 26		600	670	386
LADDER VE60 29		900	930	536
LADDER VE60 33	300	300	410	236
LADDER VE60 36		600	670	386
LADDER VE60 39		900	930	536
LADDER VE60 43	400	300	410	236
LADDER VE60 46		600	670	386
LADDER VE60 49		900	930	536
LADDER VE60 53	500	300	410	236
LADDER VE60 56		600	670	386
LADDER VE60 59		900	930	536
LADDER VE60 63	600	300	410	236
LADDER VE60 66		600	670	386
LADDER VE60 69		900	930	536
LADDER VE60 73	700	300	410	236
LADDER VE60 76		600	670	386
LADDER VE60 79		900	930	536
LADDER VE60 83	800	300	410	236
LADDER VE60 86		600	670	386
LADDER VE60 89		900	930	536
LADDER VE60 93	900	300	410	236
LADDER VE60 96		600	670	386
LADDER VE60 99		900	930	536

VE45 Vertical Elbow

- KS C 8464
(Cable Tray)
- KS D 8308
(Hot Dip Galvanized)

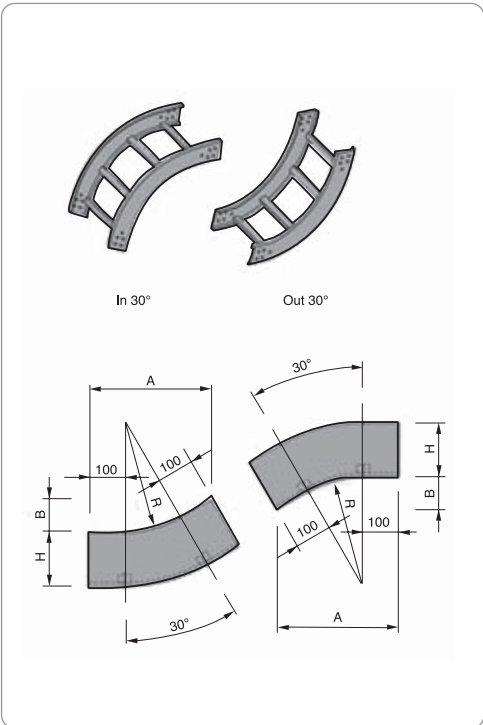


Selection Table

CAT.NO.	WIDTH (MM)	R (MM)	A (MM)	B (MM)
LADDER VE45 23	200	300	383	158
LADDER VE45 26		600	595	246
LADDER VE45 29		900	808	334
LADDER VE45 33	300	300	383	158
LADDER VE45 36		600	595	246
LADDER VE45 39		900	808	334
LADDER VE45 43	400	300	383	158
LADDER VE45 46		600	595	246
LADDER VE45 49		900	808	334
LADDER VE45 53	500	300	383	158
LADDER VE45 56		600	595	246
LADDER VE45 59		900	808	334
LADDER VE45 63	600	300	383	158
LADDER VE45 66		600	595	246
LADDER VE45 69		900	808	334
LADDER VE45 73	700	300	383	158
LADDER VE45 76		600	595	246
LADDER VE45 79		900	808	334
LADDER VE45 83	800	300	383	158
LADDER VE45 86		600	595	246
LADDER VE45 89		900	808	334
LADDER VE45 93	900	300	383	158
LADDER VE45 96		600	595	246
LADDER VE45 99		900	808	334

VE30 Vertical Elbow

- KS C 8464
(Cable Tray)
- KS D 8308
(Hot Dip Galvanized)



Selection Table

CAT.NO.	WIDTH (MM)	R (MM)	A (MM)	B (MM)
LADDER VE30 23	200	300	337	90
LADDER VE30 26		600	487	130
LADDER VE30 29		900	687	170
LADDER VE30 33	300	300	337	90
LADDER VE30 36		600	487	130
LADDER VE30 39		900	687	170
LADDER VE30 43	400	300	337	90
LADDER VE30 46		600	487	130
LADDER VE30 49		900	687	170
LADDER VE30 53	500	300	337	90
LADDER VE30 56		600	487	130
LADDER VE30 59		900	687	170
LADDER VE30 63	600	300	337	90
LADDER VE30 66		600	487	130
LADDER VE30 69		900	687	170
LADDER VE30 73	700	300	337	90
LADDER VE30 76		600	487	130
LADDER VE30 79		900	687	170
LADDER VE30 83	800	300	337	90
LADDER VE30 86		600	487	130
LADDER VE30 89		900	687	170
LADDER VE30 93	900	300	337	90
LADDER VE30 96		600	487	130
LADDER VE30 99		900	687	170

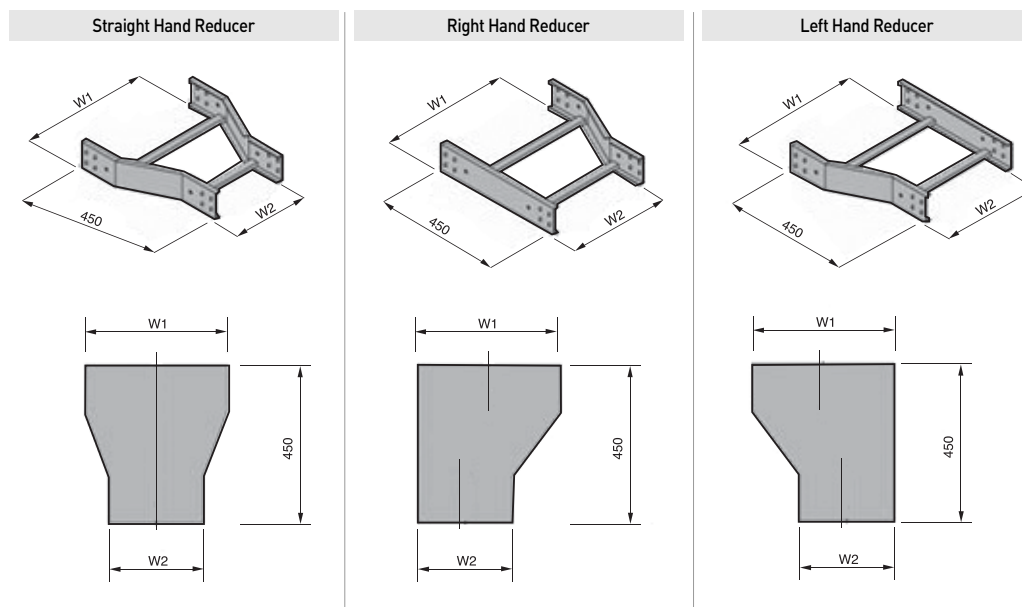


Electrical Conduit / Cable Trays

Cable Trays Ladder Series

RDS / RDR / RDL Reducer

- KS C 8464
(Cable Tray)
- KS D 8308
(Hot Dip Galvanized)

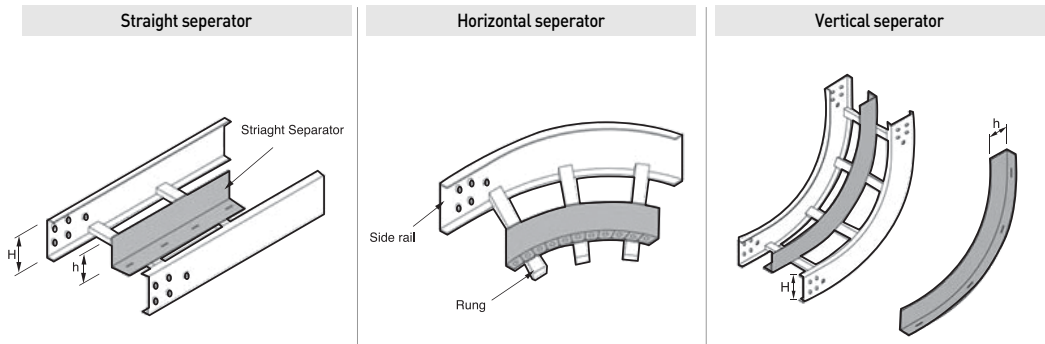


■ Selection Table

CAT.NO.			WIDTH 1 (MM)	WIDTH 2 (MM)
Straight	Right	Left		
LADDER RDS 3020	LADDER RDR 3020	LADDER RDL 3020	300	200
LADDER RDS 4020	LADDER RDR 4020	LADDER RDL 4020	400	200
LADDER RDS 4030	LADDER RDR 4030	LADDER RDL 4030		300
LADDER RDS 5030	LADDER RDR 5030	LADDER RDL 5030	500	300
LADDER RDS 5040	LADDER RDR 5040	LADDER RDL 5040		400
LADDER RDS 6030	LADDER RDR 6030	LADDER RDL 6030	600	300
LADDER RDS 6040	LADDER RDR 6040	LADDER RDL 6040		400
LADDER RDS 7030	LADDER RDR 7030	LADDER RDL 7030	700	300
LADDER RDS 7060	LADDER RDR 7060	LADDER RDL 7060		600
LADDER RDS 8030	LADDER RDR 8030	LADDER RDL 8030	800	300
LADDER RDS 8060	LADDER RDR 8060	LADDER RDL 8060		600
LADDER RDS 9030	LADDER RDR 9030	LADDER RDL 9030	900	300
LADDER RDS 9060	LADDER RDR 9060	LADDER RDL 9060		600
LADDER RDS 1030	LADDER RDR 1030	LADDER RDL 1030	1000	300
LADDER RDS 1060	LADDER RDR 1060	LADDER RDL 1060		600

TSS / TSR / TSL Tray Separator

- KS C 8464
(Cable Tray)
- KS D 8308
(Hot Dip Galvanized)

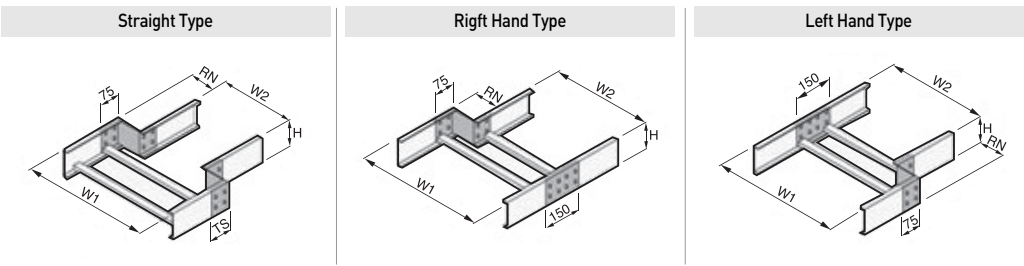


■ Selection Table

CAT.NO.			SIDERAIL (MM)	DEPTH (MM)
Straight	Horizontal	Vertical		
LADDER TSS 75	LADDER TSH 75	LADDER TSV 75	75	45
LADDER TSS 100	LADDER TSH 100	LADDER TSV 100	100	75
LADDER TSS 150	LADDER TSH 150	LADDER TSV 150	150	120

RC Reducing Connector

- KS C 8464
(Cable Tray)
- KS D 8308
(Hot Dip Galvanized)



■ Selection Table

CAT.NO.	RN (MM)
LADDER RC 50	50
LADDER RC 100	100
LADDER RC 150	150
LADDER RC 200	200
LADDER RC 250	250
LADDER RC 300	300
LADDER RC 350	350
LADDER RC 400	400
LADDER RC 450	450
LADDER RC 550	550
LADDER RC 700	700

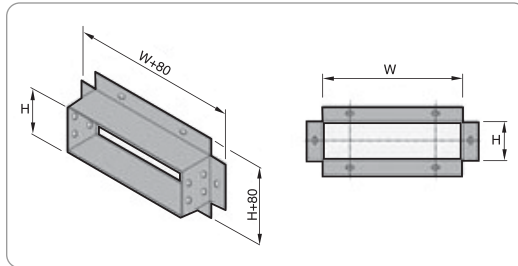


Electrical Conduit / Cable Trays

Cable Trays Ladder Series

BC Box Connector

- KS C 8464
(Cable Tray)
- KS D 8308
(Hot Dip Galvanized)

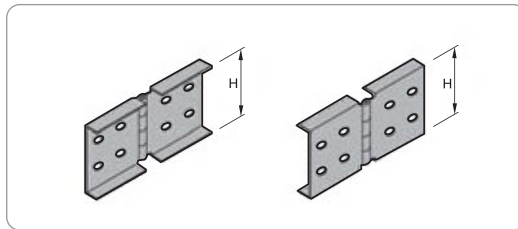


■ Selection Table

CAT.NO.	W (MM)
LADDER BC 20	200
LADDER BC 30	300
LADDER BC 40	400
LADDER BC 50	500
LADDER BC 60	600
LADDER BC 70	700
LADDER BC 80	800
LADDER BC 90	900
LADDER BC 100	1000

AHC Adjustable Horizontal Connector

- KS C 8464
(Cable Tray)
- KS D 8308
(Hot Dip Galvanized)

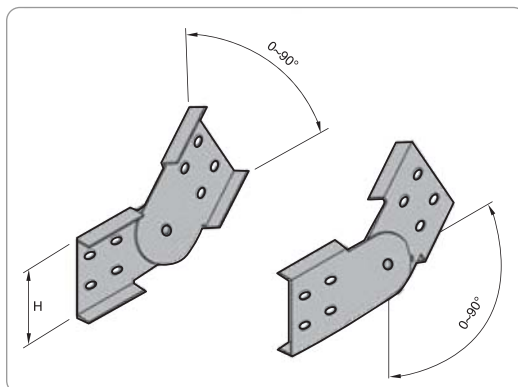


■ Selection Table

CAT.NO.	H (MM)
LADDER AHC 75	75
LADDER AHC 100	100
LADDER AHC 150	150

ARC Ladder Adjustable Riser Connector

- KS C 8464
(Cable Tray)
- KS D 8308
(Hot Dip Galvanized)

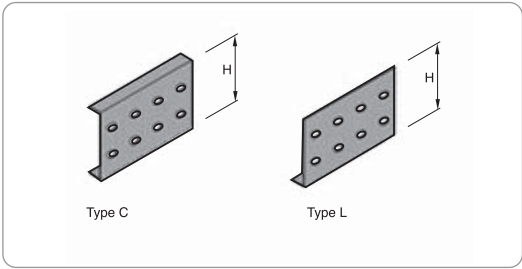


■ Selection Table

CAT.NO.	H (MM)
LADDER ARC 75	75
LADDER ARC 100	100
LADDER ARC 150	150

JC Joint Connector

- KS C 8464
(Cable Tray)
- KS D 8308
(Hot Dip Galvanized)

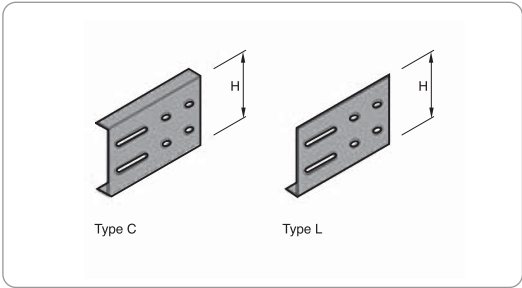


■ Selection Table

CAT.NO.		H (MM)
C TYPE	L TYPE	
LADDER JCC 75	LADDER JCL 75	75
LADDER JCC 100	LADDER JCL 100	100
LADDER JCC 150	LADDER JCL 150	150

EJC Expansion Joint Connector

- KS C 8464
(Cable Tray)
- KS D 8308
(Hot Dip Galvanized)

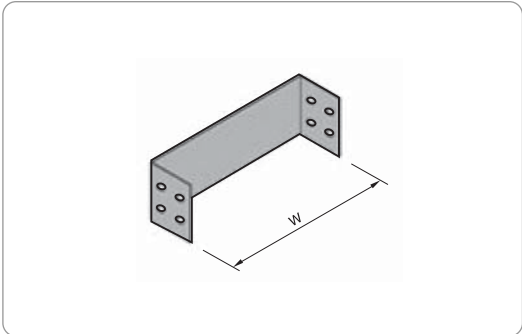


■ Selection Table

CAT.NO.		H (MM)
C TYPE	L TYPE	
LADDER EJCC 75	LADDER EJCL 75	75
LADDER EJCC 100	LADDER EJCL 100	100
LADDER EJCC 150	LADDER EJCL 150	150

EC End Cap

- KS C 8464
(Cable Tray)
- KS D 8308
(Hot Dip Galvanized)



■ Selection Table

CAT.NO.	W (MM)
LADDER EC 20	200
LADDER EC 30	300
LADDER EC 40	400
LADDER EC 50	500
LADDER EC 60	600
LADDER EC 70	700
LADDER EC 80	800
LADDER EC 90	900
LADDER EC 100	1000

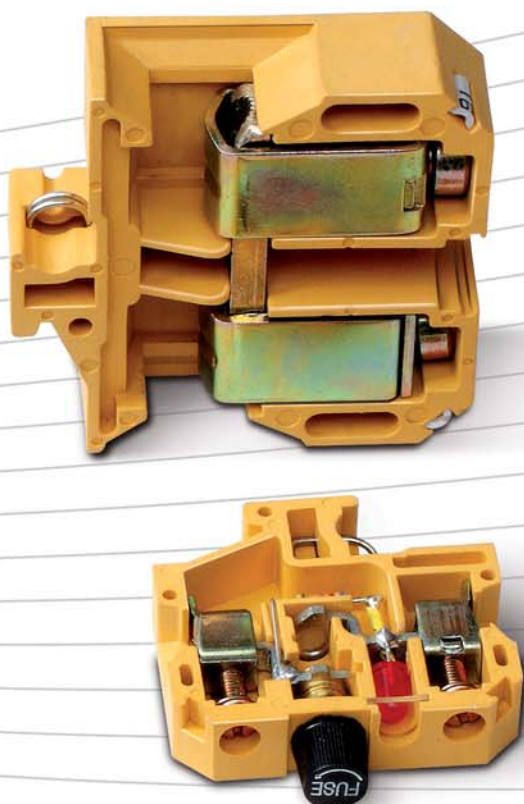
UL and Explosion-proof Certified Products

Terminal blocks are essential for ultimate safety in I&C and electrical connection, installing convenience as well. As UL and explosion-proof certified products, Samwha's terminal blocks always provide the best solution.





Controls/ Terminal Blocks



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Controls / Terminal Blocks

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Controls / Terminal Blocks

Controls

UE Series Hazardous Control Devices

Explosion-proof / Rain-tight / Water-tight
Corrosion Resistant

Cl. I, Div. 1 & 2, Groups A*, B, C, D / NEMA 4, 4X
/ II 2G Ex d II C* or II B+H2 IP 65

■ Applications

UE Series are used with Control Panel (Ex d II B+H2 or II C) or Control Box (Ex d II B+H2) :

- For Zone 1&2, Flame Proof type (Ex d II B+H2 or Ex d II C)
- Indoors or outdoors in damp, wet, dusty, corrosive, hazardous locations
- Where exposure to frequent or heavy rain, water, spray, moisture, and humidity is common ; such as : offshore drilling facilities, cooling towers, coal preparation and handling facilities and sewage and waste water treatment plant.
- In areas which are hazardous due to the presence of hydrogen or gases and vapors of equivalent hazard such as found in process industries, gas manufacturing plants.

■ Features

- IP 65 grade with seal type lock nut
- Lower installation cost
Installation is a one person job. The devices fit into M30 x 1.5 pitch or M30 x 2 pitch* tapping hole, are secured by tightening the seal type lock nut.
- These can be easily replaced in the field and custom engraving is available.
- LED (Light Emitting Diode) Pilot lights
- UEL & UELC provide reliable indication for 100,000 hours (half life). These will continue to operate for many years, are shock and vibration resistant and have a low power consumption.
- Pushbutton & Selector Switches have 1 normally open contact and 1 normally closed contact.
Additional configurations are available, contact SAMWHA.

■ Standard Materials

- Brass

■ Standard Finishes

- Body : Natural or Nickel Plated
- Cap & Handle : Chrome Plated

■ Compliances

- IEC 60079-0 Equipment - General requirements
- IEC 60079-1 Equipment protection by flameproof enclosures "d"
- ISO 261 Metric screw threads
- NEC 500
- NEMA 4, 4X
- IEC 60529

■ Certification

- Certified KOSHA (Korea Occupational Safety & Health Agency)



UEL & UELC*



UEBL



UEB & UEBC*



UEE



UES & UESC*



UEC



UECC*



UEZC*



UEAC*



UEVC*

■ Model Number Logic

UE

**Series
Constant**

UE

Unit Spec.
 BL : Pilot light & Push Button
 B : Push Button
 E : Emergency switch
 S : Selector switch
 C : Cam switch
 ZC* : Buzzer
 SC* : Selector switch II C type
 LC* : Pilot light II C type
 BC* : Push Button II C type
 CC* : Cam switch II C type
 AC* : Ampere meter
 VC* : Volt meter

00

Voltage@60Hz
 11 - AC110V
 12 - DC12V
 22 - AC220V
 24 - DC24V

00

Color
 RD - Red
 GR - Green
 YL - Yellow
 WT - White
 BU - Blue

Example 1) Push Button Lamp AC220V Green UEEL 22 GR
 Example 2) Pilot Lamp AC 110V Yellow UEL 11 YL

■ Technical Data

N0	Name	Ex grade	Model No.	Rated Voltage	Rated Current	Remarks
1	Pilot Light	Ex d II B+H2	UEL	DC12, 24V, AC110, 220V	Max 5A	M30 x1.5p
2	Pilot Lamp & Push Button		UEBL			
3	Push Button		UEB			
4	Emergency Switch		UEE			
5	Selector Switch		UES			
6	Cam Switch		UEC			
7	Buzzer	Ex d II C	UEZC*	AC110, 220V	Max 5A	M30 x 1.5p
8	Selector Switch		UESC*	DC12, 24V AC110, 220V		
9	Pilot Lights		UELC*			
10	Push Button		UEBC*			
11	Cam Switch		UECC*			
12	Ampare Meter		UEAC*	AC600V	Max 5A	M63 x1.5p
13	Volt Meter		UEVC*	AC600V	Max 3A	

UEC & UECC are custom build type, refer to CXS Series cam switches.

■ Contact Form Chart

Model	Contact Form	Terminal Code	2 stages		3 stages		
			Left	Right	Left	Center	Right
UEE	1a1b	NO	—	◆	—	—	—
		NC	◆	—	—	—	—
UEB & UEBC*	1a1b	NO	—	◆	—	—	—
		NC	◆	—	—	—	—
UEBL	1a1b	NO	—	◆	—	—	—
		NC	◆	—	—	—	—
UES & UESC*	1a1b	NO	—	◆	◆	—	—
		NC	◆	—	—	—	◆
	2a	NO	—	◆	◆	—	—
		NC	—	◆	◆	—	—
	2a2b	NO	—	◆	◆	—	—
		NC	◆	—	—	—	◆
		NO	—	◆	◆	—	—
		NC	◆	—	—	—	◆
	4a	NO	—	◆	◆	—	—
		NC	—	◆	◆	—	—
		NO	—	◆	◆	—	—
		NC	—	◆	◆	—	—



Controls / Terminal Blocks

Controls

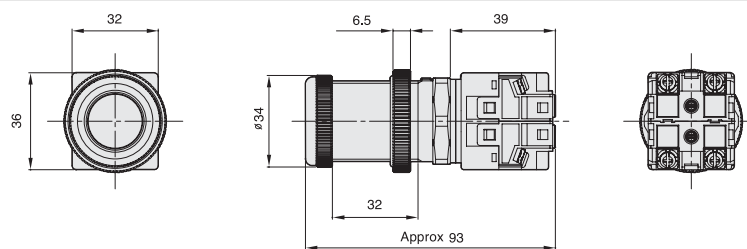
UE Series Hazardous Control Devices

Explosion-proof / Rain-tight /
Water-tight / Corrosion Resistant

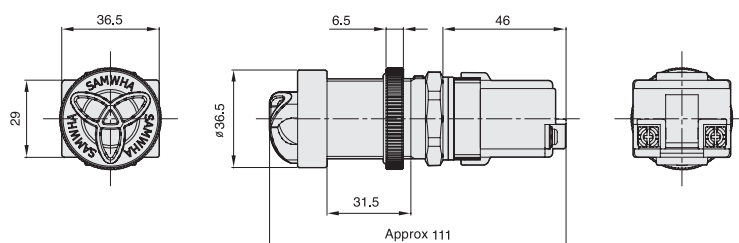
Cl. I, Div. 1 & 2, Groups A*, B, C, D /
NEMA 4, 4X / II 2G Ex d II C* or II B+H2 IP 65

■ Dimensions

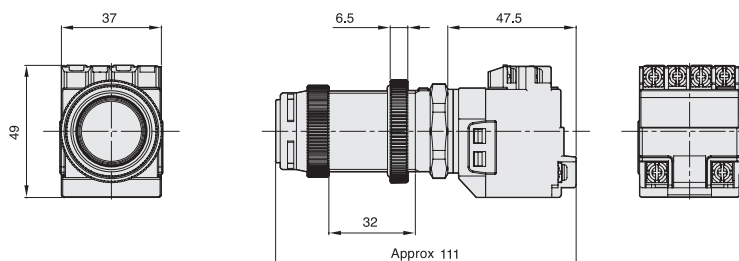
UER



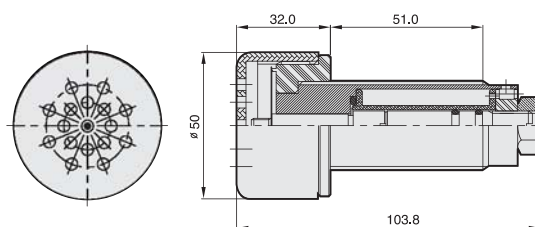
UEL & UELC*



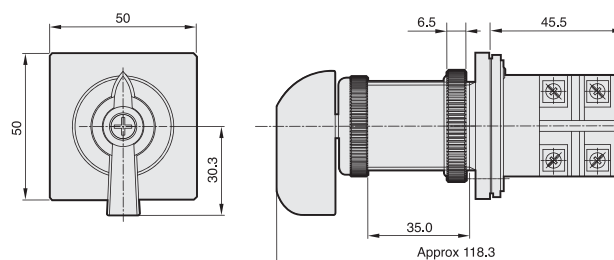
UEBL



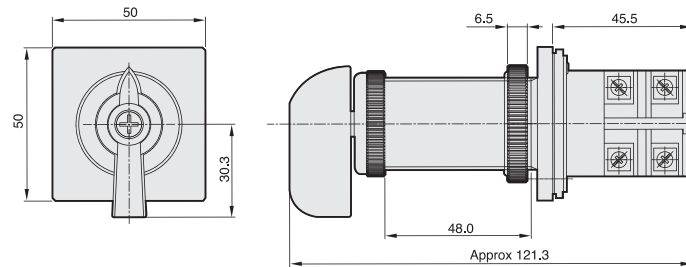
UEZC*



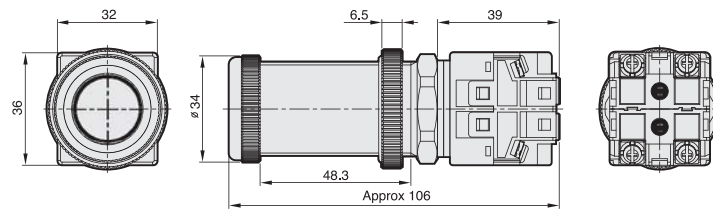
UEC



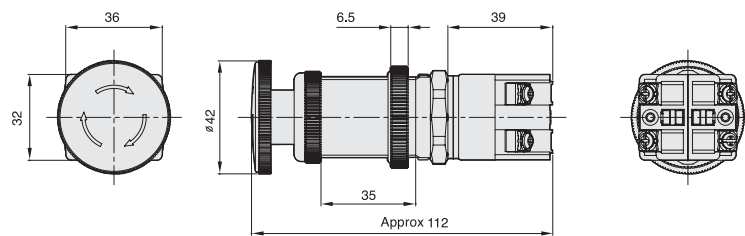
UECC*



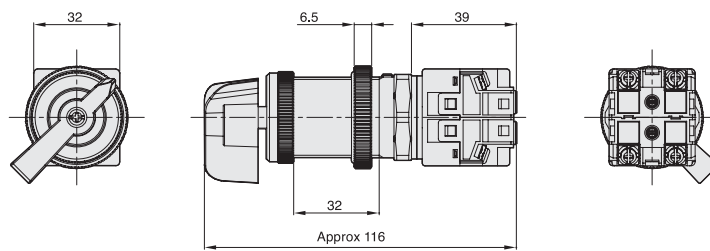
UEBC*



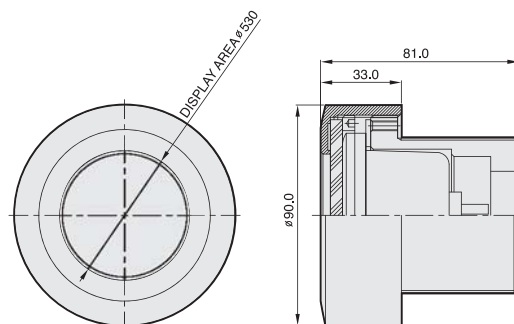
UEE



UES & UESC*



UEVC* & UEAC*





Controls / Terminal Blocks

Controls

CXS Series Special Cam Switches (IEC 947-3)

- IEC 947-3

■ Special Cam Switches CXS Series Features

SAMWHA CXS Series Cam Switches are used for non hazardous area.

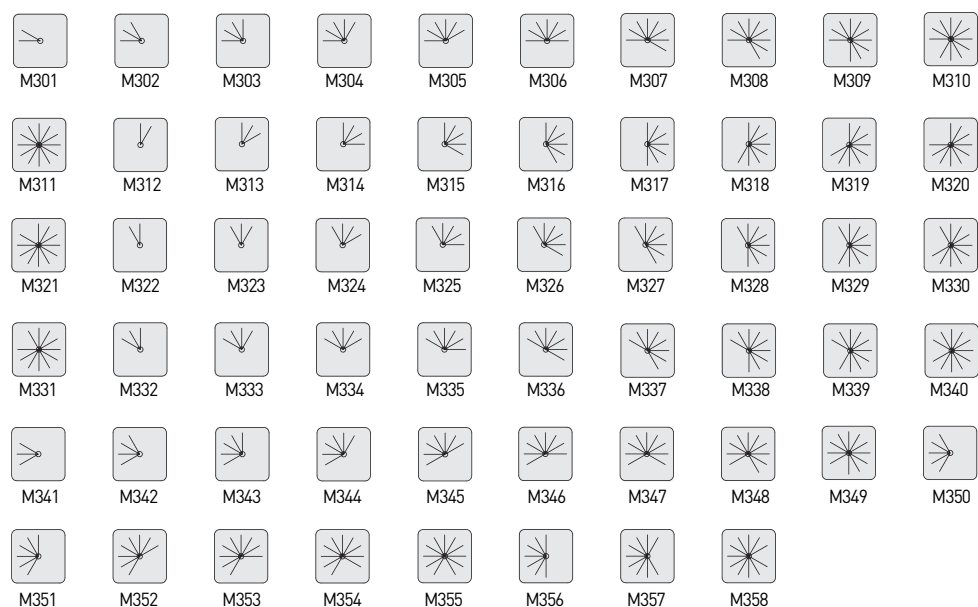
- Functionally voltmeter switches, ammeter switches, volt ammeter switches, control switches, selector switches and also by made to order special types are available.
- Custom build type.
- For max. 12 grips with 24 contacts and 5A.
- A variety of handles are available.



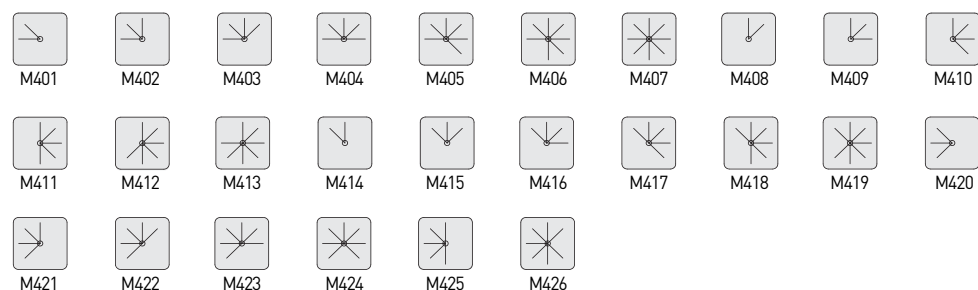
■ Switch Positions

- Manual return type are capable for up to max.
12 grips with diverse angles of 30°, 45°, 60°, 90° providing various positions.

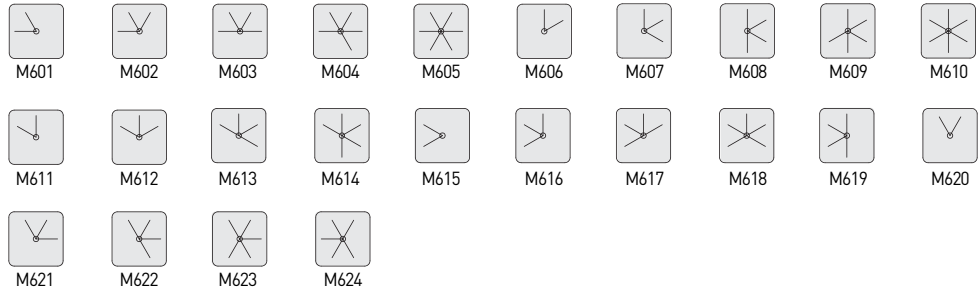
■ Manual return 30° positions



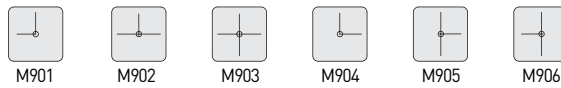
■ Manual return 45° positions



■ Manual return 60° positions

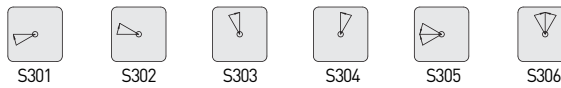


■ Manual return 90° positions

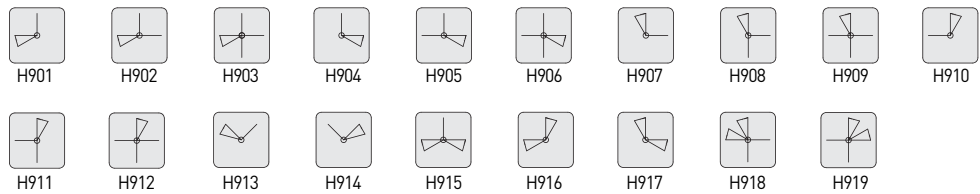


- Spring return type are capable for up to max. 6 grips with 90° manual and 30° spring return, providing various positions.

■ Spring return 30° positions



■ 90° Manual return & Spring 30° positions





Controls / Terminal Blocks





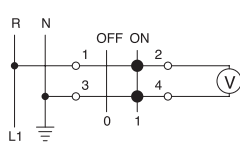


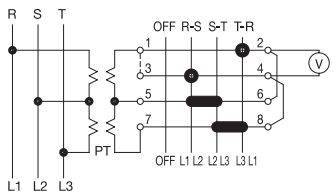


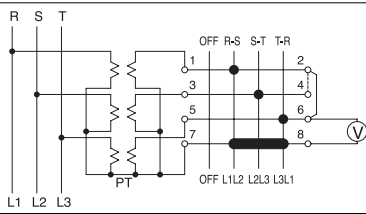


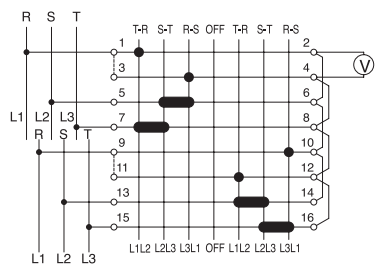


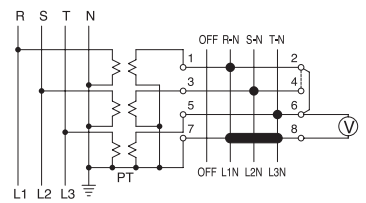


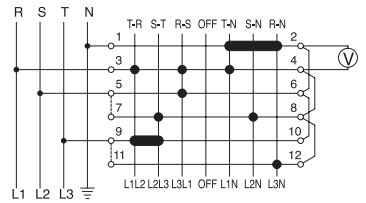
Controls

CXS Series Special Cam Switches (IEC 947-3)





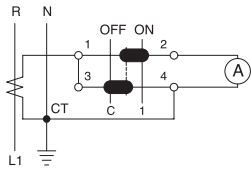




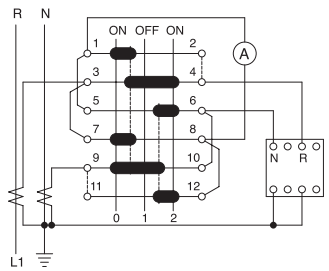


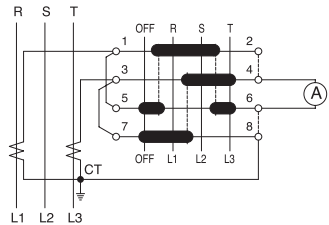
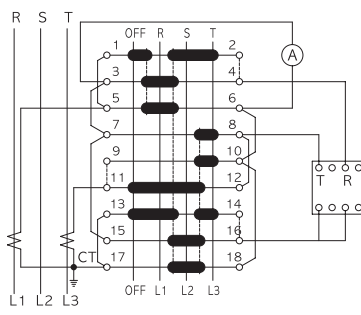
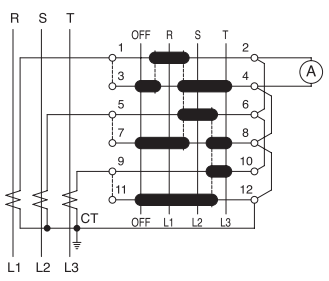
• IEC 947-3

■ Standard Functions

Volt-meter Switches (V/S)

TYPE OF FUNCTION	ESCUTCHEON PLATE	CONNECTING DIAGRAM
CVS-2W 1Ø2W 1phase 2 wires. 1phase to neutral.	1 stages  V401  V402  V903  V904	
CVS-3W 3Ø3W 2PT 3 phase 3 wires. 3 phase to neutral With 2 potential Transformers.	2 stages  V405  V406	
CVS-3WT 3Ø3W 3PT 3 phase 3 wires. 3 phase to neutral With 3 potential Transformer.	 V405  V406	
CVS-3WD 3Ø3W 2 lines 3 phase 3wires. 2 separates 3 phase to phase with center OFF.	4 stages  V307  V308	
CVS-4W 3Ø4W 3PT 3 phase 4 wires. 3 phase to neutral With 3 potential Transformers.	2 stages  A409  A410	
CVS-34W 3Ø3&4W 3 phase 3 & 4 wires. 3 phase to phase and 3 phases to neutral with center OFF.	3 stages  V311  V312	

Ampere-meter Switches (A/S)

TYPE OF FUNCTION	ESCUTCHEON PLATE	CONNECTING DIAGRAM
CAS-2W 1Ø2W 1CT 1 phase 2 wires. 1 current transformers.	1 stages  A401  A402  A903  A904	
CAS-2WL 1Ø2W 2CT 1 phase 2 wires. 2 current transformers.	3 stages  A405  A406  A907  A908	
CAS-WL 3Ø3W 2CTW (2stages) 3Ø3W 2CT (5stages) 3 phase 3 wires. 2 current transformers.	 A409  A410	2 stages 
		5 stages 
CAS-3WT 3Ø3W 3CT 3 phase 3 wires. 3 current transformers.		3 stages 

F

Controls /
Terminal Blocks



Controls / Terminal Blocks



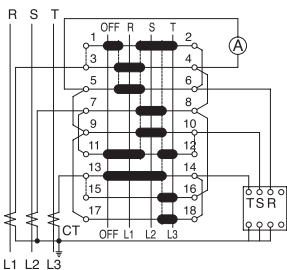
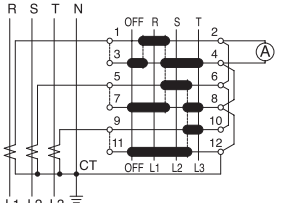


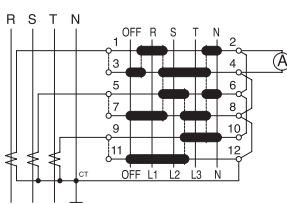
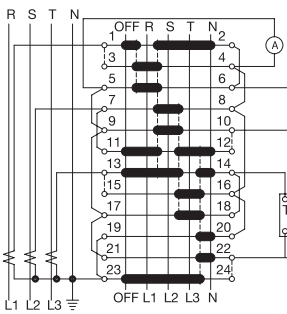
Controls

CXS Series Special Cam Switches (IEC 947-3)



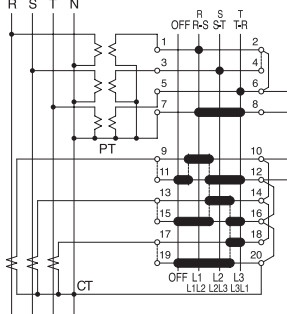
• IEC 947-3

■ Standard Functions



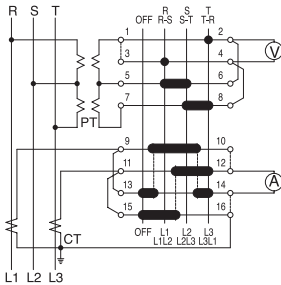
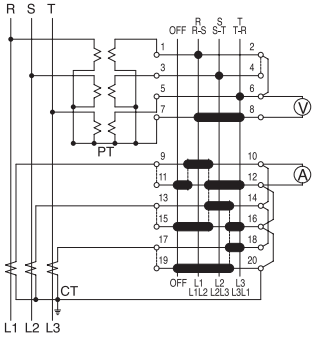
Ampere-meter Switches (A/S)

TYPE OF FUNCTION	ESCUTCHEON PLATE	CONNECTING DIAGRAM
CAS-3WK 3Ø3W 3CT 3 phase 3 wires. 3 current transformers.	  A409 A410	 5 stages
CAS-4W 3Ø4W 3CT 3 phase 4 wires. 3 current transformers.		 3 stages
CAS-4WN 3Ø4W 3CT 3 phase 4 wires. 3 current transformers. 5 step switch with neutral position.	  A411 A412	 3 stages
CAS-4WL 3Ø4W 3CT 3 phase 4 wires. 3 current transformers. 5 step switch with neutral position.		 6 stages



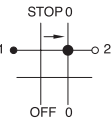


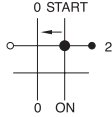
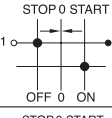


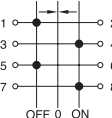

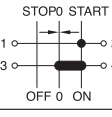



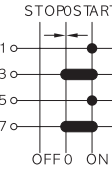
Volt & Ampere-meter Switches (VA/S)

TYPE OF FUNCTION	ESCUTCHEON PLATE	CONNECTING DIAGRAM
CVAS-4W 3Ø4W 3PT & CT 3 phases voltage 3 phases current 4 wires. 3 potential transformers and current transformers.	  VA403 VA404	 5 stages

Volt & Ampere-meter Switches (VA/S)

TYPE OF FUNCTION	ESCUTCHEON PLATE	CONNECTING DIAGRAM
CVAS-3W 3Ø3W 2PT & CT 3 phases voltage 3 phases current 3 wires. 2 potential transformers and current transformers.	 VA401  VA402	 4 stages
CVAS-3WT 3Ø3W 3PT & CT 3 phases voltage 3 phases current 3 wires. 3 potential transformers and current transformers.		 5 stages

Control Switch (C/S)

TYPE OF FUNCTION	ESCUTCHEON PLATE	CONNECTING DIAGRAM
CCS-211S Stop switch with spring return from STOP position	1 stages  C301  C302	
CCS-212S Start switch with spring return from START position	1 stages  C303  C304	
CCS-313S Circuit breaker control switch. Stop-start switch with spring return from STOP and START positions.		 1 stages
CCS-324S	 C305  C306	 2 stages
CCS-315S	 C307	 1 stages
CCS-326S	 C308  C309  C310	 2 stages





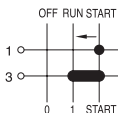


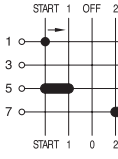


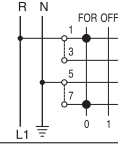
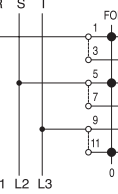


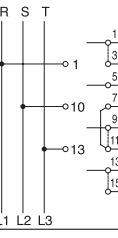


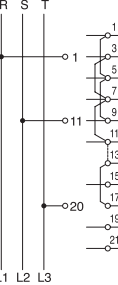


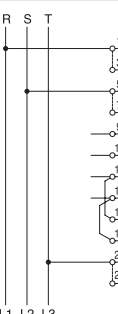
Controls / Terminal Blocks

Controls

CXS Series Special Cam Switches (IEC 947-3)

• IEC 947-3

■ Standard Functions

TYPE OF FUNCTION	ESCUTCHEON PLATE	CONNECTING DIAGRAM
CCS-311H Stop-start switch with spring return from START to RUN	1 stages   C911 C912	
CCS-522H Stop-start switch with spring return to RUN for 2 units	2 stages   C913 C914	
CCS-321M Motor reversing switch 1 phase 2 wires.	  C415 C416	 2 stages
CCS-332M Motor reversing switch 3 phase 3 wires.		 3 stages
CCS-343M Pole-changing in two-speed motors with one winding. 3 phase 3 wires. Pos1 : low speed Pos2 : high speed	4 stages   C417 C418	
CCS-464M Pole-changing in three-speed motors with two windings and one common winding for speed 1 and 2. 3 phase 3 wires.	6 stages   C419 C420	
CCS-464M Pole-changing and reversing of two-speed motors with one winding. 3 phase 3 wires. Pos1 : low speed Pos2 : high speed	6 stages   C421 C422	

■ Handles



Round type (RHS, RHL)



Square type (SHS, SHL)



Chrysanthemum (CHS, CHL)



Oval type (OHS)



Pistol type (PHL)



Pad lock type (LHL)

■ Accessories

Face Ring



RS - 35Ø ⇒ For 35Ø
RS - 42Ø ⇒ For 42Ø

Connecting Link



Inner (C 101)



Outer (C 103)



Controls / Terminal Blocks

Controls

CXS Series Special Cam Switches (IEC 947-3)

• IEC 947-3

■ Shaft Sealing Cover

■ Face Plate

Shaft Sealing Cover



C 104 ⇒ Small type
C 105 ⇒ Large type

Square type



SPS ⇒ 48*48
SPL ⇒ 64*64

Rectangular type



RPS ⇒ 48*64
RPL ⇒ 64*80

■ Technical Data

Rated insulation voltage (UL/CSA)	600V	600V
Thermal rated current (UL/CSA)	12A	20A

Rated Operating Currents in Accordance with UL & CSA

In AC 11 duty, P.F = 0.7 Switching of control devices, contactors, valves etc	110~120V	8A
	220~250V	6A
	380~440V	4A
	600V	2A

Ratings in Accordance with UL & CSA

Standard motor load Direct-on-line rating			
Direct-on-line starting, and switching during running	3 phase 3 pole	120V	1HP
		240V	2HP
		480~600V	5HP
	1 phase 2 pole	120V	0.5HP
		240~277V	1HP
Heavy motor load-reversing			
Direct-on-line starting, inching, plugging and reversing	3 phase 3 pole	120V	0.5HP
		240V	1HP
		480~600V	2HP
	1 phase 2 pole	120V	0.16HP
		240~277V	0.33HP

DC Switching Capacity

DC 1 resistive loads $T \leq 1\text{ms}$	48V	12A
	60V	3.8A
	110V	0.85A
	220V	0.35A
	440V	0.27A
Inductive loads $T=50\text{ms}$	24V	12A
	30V	5A
	48V	2A
	60V	0.8A
	110V	0.35A

Fuse Capacity For Short-Circuit Protection

Max. permissible rated current for protective fuse at a prospective short-circuit.	20A normal
--	------------

Max. Contact Cross Section

One or more wires	2.5mm ² (13 AWG)
Flexible wire (with sleeve)	2.5mm ² (13 AWG)

Ambient Temperature Range

Continuous	-30°C to +70°C
Short-term	-50°C to +95°C

Ambient Humidity

At the temperature +40°C	50% or below
At the temperature +20°C	90% or below

Dielectric Strength

Between live parts of opposite parity	
Between live parts and exposed dead metal parts	60Hz, 2500Vac. For 1 min.

Insulation Resistance

Between live parts of opposite parity	At 500Vac, 100MQ or above
Between live parts and exposed dead metal parts	

Service Life

Mechanical life	1 million operations or above
Electrical life	100,000 operations or above

Strength & Operating Force

Strength	Operating part	20kgf. cm, For 1 min.
	Terminal part	5kgf. cm, For 5 sec.
Operating force		6-8kgf. cm

Shock

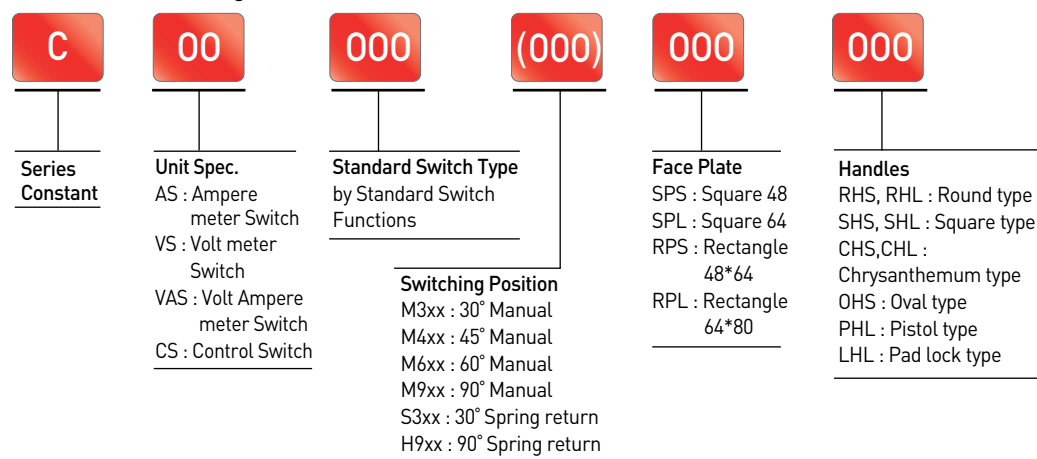
Applied shock value	490cm/s ²
Direction of shock	3-axis of up-down, forward-backward and right-left.

Vibration

Oscillation frequency	10-55Hz
Complex oscillation width	4mm
Direction of oscillation	3-axis of up-down, forward-backward and right-left.

Insulation Distance

Clearance distance	6mm or above
Creepage distance	8mm or above

■ Model Number Logic

Example 1) Volt Ampere meter Switch, 3Ø3W 3PT & CT, Manual 402, Rectangle 48*64, Pistol handle CVAS - 3WT (M402), RPS PHL

Example 2) Volt meter Switch, 1Ø2W, Manual 401, Square 48, Pad lock handle CVS - 2W (M401), SPS LHL



Controls / Terminal Blocks

Controls

HML Series Mono Lever Switches

- Contact Block
Rated for 600V,
10A - 30Ø

■ Features

- Available in 2-, 3-, and 4-positions.
- Maintained and spring return modes available.
- Models available with interlock mechanism to prevent inadvertent actuation.

■ Specifications

OPERATING TEMPERATURE		-25℃ to 50℃(without freezing)
INSULATION RESISTANCE		100MΩ
CONTACT RATING	RATED VOLTAGE : CURRENT	110Vdc : 3A
		24Vac / Vdc : 10A
		120Vac : 10A
		240Vac : 6A
		480Vac : 2A
		600Vac : 1A
	INSULATION VOLTAGE	600Vac / Vdc
	RATED THERMAL CURRENT	10A
	ELECTRICAL LIFE	Over 500,000 operations

■ Mono Lever Switches (Sub - Assembled)



Contact Blocks



Operator



Complete Part

■ ML Contact Blocks



CONTACT ARRANGEMENT	PART NUMBER
2 NO contacts	LB 20
1 NO & 1 NC contact	LB 11
2 NC contacts	LB 02

The contact block contains two pairs of double-break silver contacts, available with 1NO-1NC, 2NO, 2NC contacts. Up to four contact blocks can be mounted on an operating base.

■ Replacement Parts



Bellows



Knob(Ball)



Standard Mono Lever Operators



Standard Lever



Short Lever



Interlocking Lever

■ Lever Directions

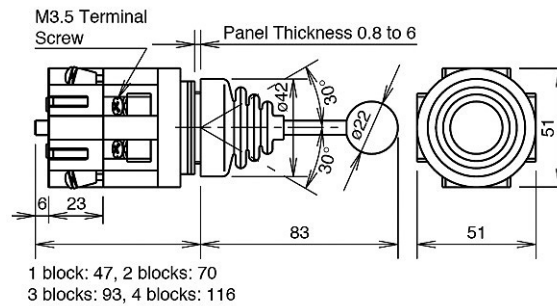
2 Ways	UP-Down	21
	Right-Left	22
3 Ways	Up-Right-Down	31
	Up-Left-Down	32
	Up-Right-Left	33
	Down-Right-Left	34
Cross 4 Ways		40

■ Model Number Logic

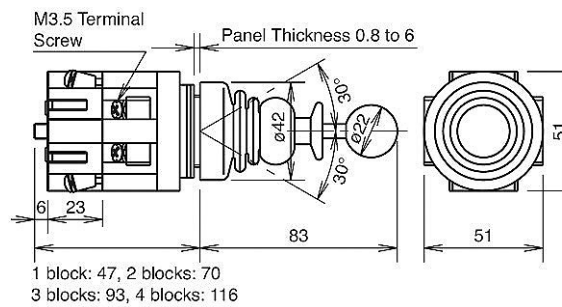
HML	00	0	0	0	0	0	0	0	0
Series Constant		Lever Returns M : Manual return S : Spring return	Lever Center Locking L : With Locking N : Without Locking	Lever Length X : Short type Y : Std. type	Lever Handle Color B : Black G : Green R : Red	Contacts on Each Way (UP, Right, Down, Left) 00 : None 10 : 1 NO 01 : 1 NC 11 : 1NO - 1NC 20 : 2NO 02 : 2NC			
Lever Directions 21,22 : Single 2ways 31,32,33,34 : 3ways 40 : Cross 4ways									

■ Dimensions

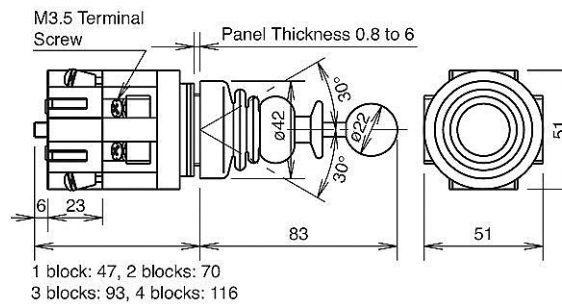
Standard Lever Switch



Interlocking Lever Switch



Short Lever Switch



Industrial & Hazardous Area Terminal Block General Technical Description



■ Environmental Protection

Product-related Environmental Protection

The health of our employees as well as the reduction of environmental impact through our products are in the focus of SAMWHA's accurate environmental management.

• RoHS

The restriction of lead and five other potentially hazardous substances in electrical and electronic equipment is specified by the EU-Directive 2002/95/EC.

The following substances used in electronic products are within the limits of the directive:

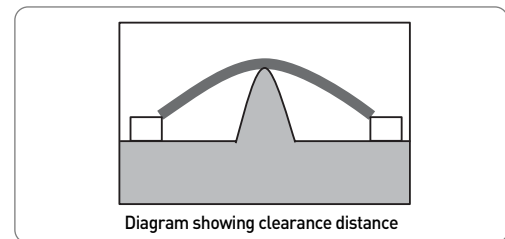
- | | |
|------------------------|---|
| - Lead (Pb) of 1000ppm | - Hexavalent chrome [Cr (VI)] |
| - Mercury (Hg) | - Polybrominated biphenyl (PBB) |
| - Cadmium (Cd) | - Polybrominated diphenyl ethers (PBDE) |

■ Rating The Clearance and Creepage Distances of Electrical Equipment

• Clearance Distances

Clearance distances are rated in accordance with the following factors :

- Anticipated over-voltages
- Used
- Measures to prevent soiling

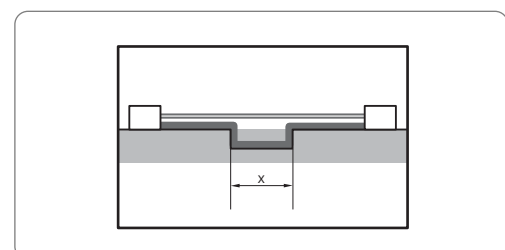
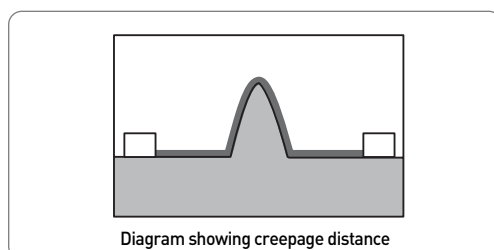


■ Creepage Distance

• Clearance Distances

Creepage distances are rated in accordance with the following factors :

- Intended
- Used insulation materials
- Measures to prevent soiling



Groove are taken into account when measuring creepage distances if their minimum width X is rated according to the following table :

Degree of soiling	Minimum width X in mm
1	0.25
2	1.0
3	1.5
4	2.5

If the corresponding clearance distance is less than 3mm, the smallest groove width may be reduced to 1/3 of this clearance distance.

■ Rated Voltage

The rated voltage is derived from the rated voltage of the power supply and the corresponding network type.

Single Phase 3 or 2 Conductor AC or DC Networks

Rated voltage of the power supply system (network)	For insulation conductor-conductor[1]	For insulation conductor-earth
	All systems	3-conductor systems, with mid-point earthing
V	V	V
12.5	12.5	-
24 / 25 / 30	25, 32	-
42 / 48 / 50 / 60	50, 63	-
30-60	63	32
100	100	-
110 / 120 / 150	125, 600	-
220	250	-
110-220 120-240	250	125
300	320	-
220-440	500	250
600	630	-
480-960	1000	500
1000	1000	-

Three Phase 4 or 3 Conductor AC Networks

Rated voltage of the power supply system (network)	For insulation conductor-conductor[1]	For insulation conductor-earth	
	All systems	Three -phase 4-conductor systems with earthed neutral	Three -phase 3-conductor system : unearthed or earthed conductor
V	V	V	V
60	63	32	63
110/120/127	125	80	125
150	160	-	160
208	200	125	200
220 / 230 / 240	250	160	250
300	320	-	320
380 / 400 / 415	400	250	400
440	500	250	500
480 / 500	500	320	500
575	630	400	630
600	630	-	630
660 / 690	630	400	630
720 / 830	800	500	800
960	1000	630	1000
1000	1000	-	1000



Control / Terminal Blocks

Industrial & Hazardous Area Terminal Block General Technical Description

■ Insulation Material Group

The insulation materials are divided into four groups depending on the comparative figures for creepage distance [CTI : comparative tracking index] :

I	$600 \leq \text{CTI}$
II	$400 \leq \text{CTI} < 600$
III a	$175 \leq \text{CTI} < 400$
III b	$100 \leq \text{CTI} < 175$

The comparative tracking index is required to have been determined using special samples produced for this purpose with test solution A in compliance with IEC 60112

■ Converting AWG Conductors to mm^2

This gives no indication of the actual conductor cross-sectional area. The relation-ship between AWG and mm^2 is shown in the following table.

AWG	mm^2	AWG	mm^2
28	0.08	5	16.77
26	0.13	4	21.15
24	0.21	3	26.67
22	0.22	2	33.63
20	0.52	1	42.41
19	0.65	1/0	53.49
18	0.82	2/0	67.43
17	1.04	3/0	85.01
16	1.31	4/0	107
15	1.65	250	127
14	2.08	300	152
13	2.63	350	177
12	3.31	400	203
11	4.17	500	253
10	5.26	600	304
9	6.63	700	355
8	8.37	750	380
7	10.55	800	405
6	13.30		

■ Materials

- **Polyamide PA** is one of the most frequently used technical plastics. The advantages of this material includes its very good electrical and mechanical properties, flexibility and resistance to breakage. In addition, its chemical structure gives PA good fire resistance even without the use of flame retardants.
- **Polybutylene Terephthalate PBT** offers excellent dimensional stability and high continuous service temperature. It has lower creepage current resistance than other insulation materials.
- **Steel** parts whose function is to permanently maintain contact force are Zinc electroplated, with an additional chromate layer added to provide additional passivation. Surface protection complies with the very highest standards. Results from laboratory tests are incorporated in producing the surface finish. Zinc still offers corrosion protection over a longer period of time even if the Zinc coating is partially damaged by scratches or pores. Zinc acquires a negative charge in relation to steel under the influence of an electrolytic fluid. The metal ions in the Zinc migrate to the steel giving the base material lasting protection against corrosive attack.
- **Conductive Materials**
The current-carrying materials copper, brass and bronze are characterized by both high conductivity and good mechanical properties.

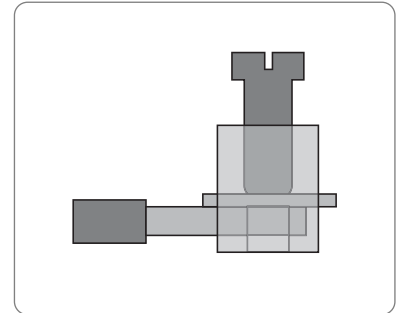
■ Connection Types

• Ring Lug Type

The Ring Lug types is providing high mechanical retention and vibration resistance

• Clamping Yoke Connection

Tension clamp system optically combines the specific properties of steel and copper. Both the tension clamp and the clamping screw consist of hardened steel. This clamping yoke unit generates the necessary contact force. Connection of the conductor involves the tension clamp pressing the conductor against the bus-bar, which is made of copper or high quality brass.



TS32 C type



TS35 U type

■ Mounting and End Brackets

- Terminal strips mounted from left to right
- Closed side on the left, open side on the right
- Open side of the terminal always closed using end plates or partition plates.
- End brackets placed at the beginning and end of the terminal strip.

■ Mounting Rail- All Aluminum Alloy

- TS32-DIN 46277-1 & EN 50035 G type RAIL
- TS35-DIN 46277-3 & EN 50022 HAT type RAIL

■ DIN Rail Support-Zinc Plated Steel

- 35° mounting angle
- Mount hole center 60mm
- Mount hole size $\varnothing 7.0$
- DIN rail fix bolt M6.0





Control / Terminal Blocks

SAMWHA Industrial & Hazardous Area Terminal Block

■ General Technical Description & Selection Table

CAT. NO	WIRE RANGE		FW	Tq In.- Lb	V	A	MATERIAL	FLAM-MA BILITY	CERTIFICATE				CONNECTION TYPE			Sectional	MOUNTING TYPE		
	AWG	SQ							UL	KOSHA (Ex e II)	KEPIC	KNHP	Lug- less	Bus Bar	Lug		TS32	TS35	SCREW
SH-STB-1.2F	10-18 SOL/STR	6	2	10	500	15	PBT	UL94-0	◆	-	◆	-	◆	-	-	-	-	-	-
SH-STB-1.2FW	10-18 SOL/STR	6	2	10	380	20	PBT	UL94-0	-	-	◆	-	◆	-	-	-	◆	-	-
SH-STB-1.6T	12 STR	4	2	12	600	16	PBT	UL94-0	-	-	◆	-	◆	-	-	-	◆	-	-
SH-STB-1.6R	12 STR	4	4	12	500	16	PBT	UL94-0	-	-	◆	-	◆	-	-	-	◆	-	-
SH-STB-2.5C	12 STR	2.5	2	12	600	20	PBT	UL94-0	-	-	◆	-	◆	-	-	-	◆	-	-
SH-STB-2.5D	12 STR	2.5	4	12	600	20	PBT	UL94-0	-	-	◆	-	◆	-	-	-	◆	-	-
SH-STB-4C	12 STR	4	2	12	600	20	PBT	UL94-0	◆	-	◆	-	◆	-	-	-	◆	-	-
SH-STB-4U	12 STR	4	2	12	600	27	PA6	UL94-0	-	◆	◆	-	◆	-	-	-	◆	◆	-
SH-STB-6C	10 STR	6	2	12	750	36	PBT	UL94-0	-	-	◆	-	◆	-	-	-	◆	-	-
SH-STB-6U	10 STR	6	2	12	600	36	PA6	UL94-0	-	◆	◆	-	◆	-	-	-	◆	◆	-
SH-STB-10C	16-8 STR	10	2	15	600	40	PBT	UL94-0	◆	-	◆	-	◆	-	-	-	◆	-	-
SH-STB-16C	6	16	2	15	750	65	PBT	UL94-0	-	-	◆	-	◆	-	-	-	◆	-	-
SH-STB-25C	10-6	25	2	20	600	55	PBT	UL94-0	◆	-	◆	-	◆	-	-	-	◆	-	-
SH-STB-50C	4 STR	50	2	75	600	95	PBT	UL94-0	◆	-	◆	-	◆	-	-	-	◆	-	-
SH-STB-70C	2 STR	70	2	75	750	125	PBT	UL94-0	◆	-	◆	-	◆	-	-	-	◆	-	-
SH-STB-20E-16CT	10	6	2	15	600	20	PHENOL	-	-	-	◆	◆	-	-	◆	◆	-	-	◆
SH-STB-30E	14-10	6	2	15	600	30	PHENOL	-	◆	-	◆	◆	-	-	◆	◆	-	-	◆
SH-STB-150A	3-1	-	2	120	600	95	PC/PHENOL	-	◆	-	◆	◆	-	◆	-	-	-	-	◆
SH-STB-100B	4-2	38	2	150	600	95	PC/PHENOL	-	◆	-	◆	◆	-	◆	-	-	-	-	◆
SH-STB-200B	3-1	80	2	100	600	145	PC/PHENOL	-	◆	-	◆	◆	-	◆	-	-	-	-	◆
SH-STB-300B	1/0-2/0 STR	125	2	195	600	180	PC/PHENOL	-	◆	-	◆	◆	-	◆	-	-	-	-	◆
SH-STB-400B	3/0-4/0 STR	200	2	195	600	250	PC/PHENOL	-	◆	-	◆	◆	-	◆	-	-	-	-	◆
SH-STB-500B	3/0-4/0 STR	250	2	195	600	250	PC/PHENOL	-	◆	-	◆	◆	-	◆	-	-	-	-	◆
SH-STB-600B	3/0-4/0 STR	325	2	195	600	250	PC/PHENOL	-	◆	-	◆	◆	-	◆	-	-	-	-	◆
SH-STB-015L	12 STR	4	2	10.6	600	15	PA6	UL94-0	-	◆	◆	-	-	-	◆	-	◆	-	-
SH-STB-015LD	12 STR	4	4	10.6	600	15	PA6	UL94-0	-	-	◆	-	-	-	◆	-	◆	-	-
SH-STB-015LT	12 STR	4	2	10.6	600	15	PA6	UL94-0	-	-	◆	-	-	-	◆	-	◆	-	-
SH-STB-025L	10 STR	6	2	22	600	25	PA6	UL94-0	-	-	◆	-	-	-	◆	-	◆	-	-
SH-STB-035L	8 STR	10	2	88.5	600	35	PA6	UL94-0	-	-	◆	-	-	-	◆	-	◆	-	-
SH-STB-065L	6 STR	16	2	220	600	65	PA6	UL94-0	-	-	◆	-	-	-	◆	-	◆	-	-
SH-STB-100L	2 STR	35	2	220	600	110	PA6	UL94-0	-	-	◆	-	-	-	◆	-	◆	-	-

Control / Terminal Blocks

Terminal Blocks for Industry

Lug-Less Type Lugless Terminal Block (Component)

- UL 1059 LISTED
- TS 32 – DIN 46227
-1 G TYPE RAIL

SH-STB-4C, 10C,
25C, 50C

SH-STB-1.2F

■ Applications

- SAMWHA terminal blocks are screw fixing type intended for application in control equipment and systems.
- These terminal blocks are made up of individually molded units with electrical conductor.
- Suitability for specific application depends upon the equipment specification in terms of creepage, clearance and breakdown voltage requirements, mounting and wire connectors used.
- Cross-connections between terminals.
- In complete jumpering units, common bar, sleeve and screw are supplied ready assembled to the required number of poles.
- SH-STB-1.2F* type terminal block for use with Fuse, providing a circuit safety.

■ Standard Materials

- Body - Polybutylene Terephthalate PBT
- Clamp - Steel
- Current Bar - Copper

■ Finishes

- Steel - Electro Zinc Plated

■ Mounting Rail

- TS32-DIN 46277-1 & EN 50035 G type RAIL

■ Connection Type

- Clamping yoke type

■ Compliances / Approvals

- UL 1059

■ Certificate

- UL Listed NO. : XCFR2.E104831

■ Dimensions & Weight

CAT. NO.	DIMENSIONS				WEIGHT (KG/100)
	WIDTH	HEIGHT	DEPT	EP	
SH-STB-1.2F*	54.0	58.5	13.0	1.9	4.07
SH-STB-4C	37.0	45.0	6.5	1.6	1.17
SH-STB-10C	40.0	47.0	10.0	1.7	2.37
SH-STB-25C	40.0	47.0	12.0	2.0	3.65
SH-STB-50C	58.0	65.0	16.5	2.4	8.53

■ Technical Data

CAT. NO.	WIRE RANGE		WIRE TYPE	FW	TQ (In.-Lb)	RATED VOLTAGE	RATED CURRENT	MATERIAL	FLAMMABILITY
	AWG	SQ							
SH-STB-1.2F*	10-18 SOL/STR	6	CU	2	10	AC500V	15A	PBT	UL94-0
SH-STB-4C	12 STR	4	CU	2	12	AC600V	20A	PBT	UL94-0
SH-STB-10C	16-8 STR	10	CU	2	15	AC600V	40A	PBT	UL94-0
SH-STB-25C	10-6	25	CU	2	20	AC600V	55A	PBT	UL94-0
SH-STB-50C	4 STR	50	CU	2	75	AC600V	95A	PBT	UL94-0

Note : *⇒ With Fuse



Control / Terminal Blocks

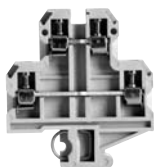
Terminal Blocks for Industry

Lug-LessType Lugless Terminal Block (Component)

- UL 1059
- TS 32 – DIN 46227
-1 G TYPE RAIL



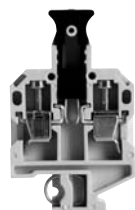
SH-STB-2.5C 6C, 16C



SH-STB-2.5D



SH-STB-1.2FW



SH-STB-1.6T



SH-STB-1.6R



SH-STB-70C

■ Applications

- SAMWHA terminal blocks are screw fixing type intended for application in control equipment and systems.
- These terminal blocks are made up of individually molded units with electrical conductor.
- Suitability for specific application depends upon the equipment specification in terms of creepage, clearance and breakdown voltage requirements, mounting and wire connectors used.
- Cross-connections between terminals.
- In complete jumpering units, common bar, sleeve and screw are supplied ready assembled to the required number of poles.
- SH-STB-1.2FW* type terminal block for use with Fuse & LED indicator, providing a circuit safety & an error signal.
- SH-STB-1.6R type is used with open barrel terminals and lug-less wires.
- SH-STB-1.6T type is used with test block.
- SH-STB-2.5D type is used with 4 forward wires.

■ Standard Materials

- Body - Polybutylene Terephthalate PBT
- Clamp - Steel
- Current Bar - Copper

■ Finishes

- Steel - Electro Zinc Plated

■ Mounting Rail

- TS32-DIN 46277-1 & EN 50035 G type RAIL

■ Connection Type

- Clamping yoke type

■ Compliances / Approvals

- UL 1059

■ Dimensions & Weight

CAT. NO.	DIMENSIONS				WEIGHT (KG/100)
	WIDTH	HEIGHT	DEPT	EP	
SH-STB-1.2FW*	54.0	58.5	13.0	1.9	4.26
SH-STB-1.6T	43.0	70.5	8.3	1.9	2.29
SH-STB-1.6R	58.0	44.5	6.7	1.6	1.55
SH-STB-2.5C	28.0	38.5	6.5	1.6	0.78
SH-STB-2.5D	51.5	56.0	7.1	1.8	1.74
SH-STB-6C	41.0	49.5	7.1	1.8	1.60
SH-STB-16C	42.0	49.5	9.8	1.7	2.47
SH-STB-70C	74.0	76.0	21.7	3.8	18.2

■ Technical Data

CAT. NO.	WIRE RANGE		WIRE TYPE	FW	TQ (In.-Lb)	RATED VOLTAGE	RATED CURRENT	MATERIAL	FLAMMABILITY
	AWG	SQ							
SH-STB-1.2FW*	10-18 SOL/STR	6	CU	2	10	380	20	PBT	UL94-0
SH-STB-1.6T	12 STR	4	CU	2	12	600	16	PBT	UL94-0
SH-STB-1.6R	12 STR	4	CU	4	12	500	16	PBT	UL94-0
SH-STB-2.5C	12 STR	2.5	CU	2	12	600	20	PBT	UL94-0
SH-STB-2.5D	12 STR	2.5	CU	4	12	600	20	PBT	UL94-0
SH-STB-6C	10 STR	6	CU	2	12	750	36	PBT	UL94-0
SH-STB-16C	6	16	CU	2	15	750	65	PBT	UL94-0
SH-STB-70C	2 STR	70	CU	2	75	750	125	PBT	UL94-0

Note : *⇒ With Fuse & LED Indicator

Ring Lug Type Ring Lug Terminal Block (Component)

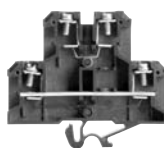
- KS C 2625 1990
- TS 32 – DIN 46227
-1 G TYPE RAIL



SH-STB-025L,
035L, 065L, 110L



SH-STB-015LT



SH-STB-015LT

■ Applications

- SAMWHA terminal blocks are screw fixing type intended for application in control equipment and systems.
- These terminal blocks are made up of individually molded units with electrical conductor.
- Suitability for specific application depends upon the equipment specification in terms of creepage, clearance and breakdown voltage requirements, mounting and wire connectors used.
- Cross-connections between terminals.
- In complete jumpering units, common bar, sleeve and screw are supplied ready assembled to the required number of poles.
- SH-STB-015LT type is used with test block.
- SH-STB-015LD type is used with 4 forward wires.

■ Standard Materials

- Body - Polyamide PA6
- Current Bar - Copper

■ Finishes

- Steel - Electro Zinc Plated

■ Mounting Rail

- TS32-DIN 46277-1 & EN 50035 G type RAIL

■ Connection Type

- Clamping yoke type

■ Compliances / Approvals

- KS C 2625 1990

■ Dimensions & Weight

CAT. NO.	DIMENSIONS				WEIGHT (KG/100)
	WIDTH	HEIGHT	DEPT	EP	
SH-STB-015LD	70.0	60.0	8.9	1.4	2.30
SH-STB-015LT	43.0	61.0	8.9	1.2	1.40
SH-STB-015L*	39.0	37.0	8.9	1.1	1.0
SH-STB-025L	42.0	38.5	10.9	1.2	1.40
SH-STB-035L	45.5	42.0	11.7	1.3	1.71
SH-STB-065L	53.0	51.0	14.6	1.6	3.30
SH-STB-100L	64.0	56.0	19.5	1.8	3.32

■ Technical Data

CAT. NO.	WIRE RANGE		WIRE TYPE	FW	TQ (In.-Lb)	RATED VOLTAGE	RATED CURRENT	MATERIAL	LUG SIZE O.D-I.D	FLAM-MABILIT
	AWG	SQ								
SH-STB-015LD	12 STR	4	CU	4	10.6	600	15	PA6	Max7.2-Min3.5	UL94-0
SH-STB-015LT	12 STR	4	CU	2	10.6	600	15	PA6	Max7.2-Min3.5	UL94-0
SH-STB-015L*	12 STR	4	CU	4	10.6	600	15	PA6	Max7.2-Min3.5	UL94-0
SH-STB-025L	10 STR	6	CU	2	22	600	25	PA6	Max9.0-Min4.0	UL94-0
SH-STB-035L	8 STR	10	CU	2	88.5	600	35	PA6	Max9.8-Min4.5	UL94-0
SH-STB-065L	6 STR	16	CU	2	220	600	65	PA6	Max12.5-Min6.0	UL94-0
SH-STB-100L	2 STR	35	CU	2	220	600	110	PA6	Max16.5-Min7.0	UL94-0

Note : '**' For Hazardous Area Terminal Block See to (Page No F30.)



Control / Terminal Blocks

Terminal Blocks for Industry

Ring Lug Section Type

Nuclear Class 1E Ring Lug Sectional Terminal Block (Component)

- KS C 2625 1990
- KEPIC-EN Class 1E
- KHNP Certificate (Korea Hydro & Nuclear Power)



SH-STB-30E



SH-STB-30E

■ Applications

- SAMWHA terminal blocks are screw fixing type intended for application in control equipment and systems.
- These terminal blocks are made up of individually molded units with electrical conductor.
- Suitability for specific application depends upon the equipment specification in terms of creepage, clearance and breakdown voltage requirements, mounting and wire connectors used.
- Cross-connections between terminals.
- In complete jumpering units, common bar, sleeve and screw are supplied ready assembled to the required number of poles.
- Qualified through EQ test.

■ Standard Materials

- Body - Phenolic resin
- Current Bar - Copper

■ Finishes

- Steel - Electro Zinc plated

■ Mounting Type

- Screw surface mounting

■ Connection Type

- Ring lug type

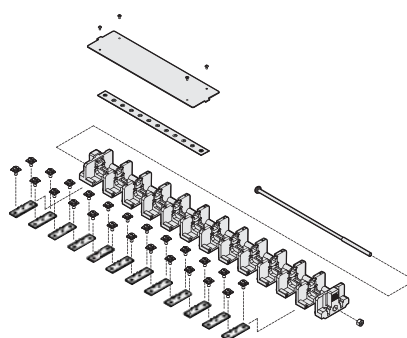
■ Compliances / Approvals

- KS C 2625 1990
- KEPIC-EN Class-1E Terminal Block
- END 1100, END 2000, END 3830

■ Certificates

- KEPIC-EN Certi. No. : EN-335
- KHNP (Korea Hydro & Nuclear Power Co., Ltd. Certi. No. : SP-2009-006

Sectional Construction



■ Dimensions & Weight

CAT. NO.	DIMENSIONS			WEIGHT (KG/100)
	LENGTH	HEIGHT	BETWEEN MOUNTING HOLE	
SH-STB-20E-16CT	120.0	41.0	109.5	24.13
SH-STB-30E-3	70.0	35.5	59.0	12.14
SH-STB-30E-6	120.0	35.5	109.0	21.25
SH-STB-30E-10	186.0	35.5	175.0	32.72
SH-STB-30E-12	218.5	35.5	208.5	37.65

■ Technical Data

CAT. NO.	WIRE RANGE		WIRE TYPE	FW	TQ (In.-Lb)	RATED VOLTAGE	RATED CURRENT	MATERIAL
	AWG	SQ						
SH-STB-20E-16CT	10	8	CU	2	15	600	20	PHENOL
SH-STB-30E-3,6,10,12	14-10	8	CU	2	15	600	30	PHENOL

Bus Bar Section Type Nuclear Class 1E Bus Bar Terminal Block (Component)

- UL 1059 LISTED
- KEPIC-EN Class 1E
- KHNP Certificate (Korea Hydro & Nuclear Power)



SH-STB-025L,
035L, 065L, 110L



SH-STB-105A,
100B~600B

■ Applications

- SAMWHA terminal blocks are screw fixing type intended for application in control equipment and systems.
- These terminal blocks are made up of individually molded units with electrical conductor.
- Suitability for specific application depends upon the equipment specification in terms of creepage, clearance and breakdown voltage requirements, mounting and wire connectors used.
- Cross-connections between terminals.
- In complete jumpering units, common bar, sleeve and screw are supplied ready assembled to the required number of poles.
- Qualified through EQ test.

■ Standard Materials

- Body - Phenolic resin or Polycarbonate
- Current Bar - Copper

■ Finishes

- Steel - Electro Zinc plated

■ Mounting Type

- Screw surface mounting

■ Connection Type

- Bus bar type

■ Compliances / Approvals

- UL 1059
- KEPIC-EN Class-1E Terminal Block
- END 1100, END 2000, END 3830

■ Certificates

- UL Listed NO. : XCFR2.E104831
- KEPIC-EN Certi. No. : EN-335
- KHNP (Korea Hydro & Nuclear Power Co., Ltd. Certi. No. : SP-2009-006

■ Dimensions

CAT. NO.	BODY DIMENSIONS			BETWEEN MOUNTING HOLE (1 pole)
	LENGTH	WIDTH	HEIGHT	
SH-STB-150A	46.2	40	48	62
SH-STB-100B	46.2	40	48	62
SH-STB-200B	46.2	40	48	62
SH-STB-300B	46.2	40	48	62
SH-STB-400B	62.4	40	48	75.8
SH-STB-500B	62.4	40	48	75.8
SH-STB-600B	62.4	40	48	75.8

CAT. NO.	BUS BAR		BOLT	BUS BAR FIXED POINT
	W	T		
SH-STB-150A	30	3	M10	1
SH-STB-100B	30	3	M10	1
SH-STB-200B	30	4	M12	1
SH-STB-300B	30	5	M18	1
SH-STB-400B	40	4	M16	1
SH-STB-500B	50	5	M16	1
SH-STB-600B	50	6	M16	1



Control / Terminal Blocks

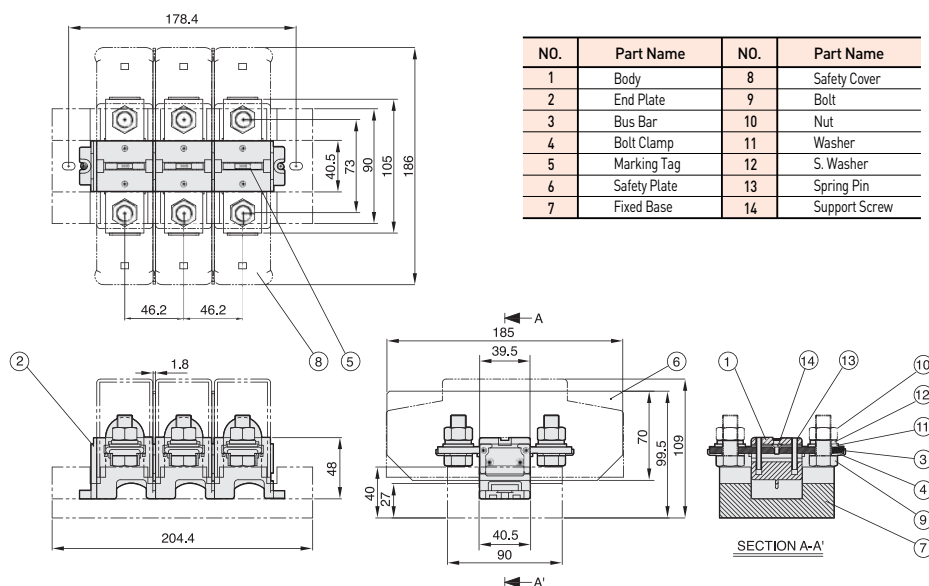
Terminal Blocks for Industry

Bus Bar Section Type Nuclear Class 1E Bus Bar Terminal Block (Component)

■ Technical Data

CAT. NO.	WIRE RANGE		WIRE TYPE	FW	TQ (In.-Lb)	RATED VOLTAGE	RATED CURRENT	MATERIAL	WEIGHT (KG/100)
	AWG	SQ							
SH-STB-150A	3-1	-	CU	4	120	600	95	PC/PHENOL	18.80
SH-STB-100B	4-2	38	CU	2	150	600	95	PC/PHENOL	18.80
SH-STB-200B	3-1	80	CU	2	100	600	145	PC/PHENOL	24.85
SH-STB-300B	1/0-2/0 STR	125	CU	2	195	600	180	PC/PHENOL	32.12
SH-STB-400B	3/0-4/0 STR	200	CU	2	195	600	250	PC/PHENOL	55.35
SH-STB-500B	3/0-4/0 STR	250	CU	2	195	600	250	PC/PHENOL	64.25
SH-STB-600B	3/0-4/0 STR	325	CU	2	195	600	250	PC/PHENOL	73.18

Construction & Installation

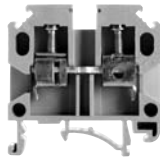


Control / Terminal Blocks

Terminal Blocks for Hazardous Area

Lugless Increased Safety Ex e II Type Terminal Block (Component)

- UL 1059
- TS 32-DIN 46227-1 G TYPE RAIL
- TS 35-DIN 46277-3 HAT Type RAIL
- KOSHA Certificate (Korea Occupational Safety & Health Agency)



SH-STB-4U, 6U

■ Applications

- SAMWHA terminal blocks are screw fixing type intended for application in control equipment and systems.
- These terminal blocks are made up of individually molded units with electrical conductor.
- Suitability for specific application depends upon the equipment specification in terms of creepage, clearance and breakdown voltage requirements, mounting and wire connectors used.
- Cross-connections between terminals.
- In complete jumpering units, common bar, sleeve and screw are supplied ready assembled to the required number of poles.

■ Standard Materials

- Body - Polyamide PA6
- Clamp - Steel

■ Finishes

- Steel - Electro Zinc plated

■ Mounting Rail

- TS32-DIN 46277-1 & EN 50035 G type RAIL
- TS35-DIN 46277-3 & EN 50022 HAT type RAIL

■ Connection Type

- Clamping yoke type

■ Dimensions & Weight

CAT. NO.	DIMENSIONS				WEIGHT (KG/100)
	WIDTH	HEIGHT	DEPT	EP	
SH-STB-4U	41.5	42.0	7.0	1.6	1.0
SH-STB-6U	42	42	7.0	1.6	1.1

■ Technical Data

CAT. NO.	WIRE RANGE		WIRE TYPE	FW	TQ (In.-Lb)	RATED VOLTAGE	RATED CURRENT	MATERIAL	FLAMMABILITY
	AWG	SQ							
SH-STB-4U	12 STR	4	CU	2	12	600	27	PA6	UL94-0
SH-STB-6U	12 STR	6	CU	2	12	600	36	PA6	UL94-0

■ Compliances / Approvals

- UL 1059
- IEC 60079-0 Equipment - General requirements
- IEC 60079-7 Equipment protection by increased safety "e"

■ Certificate

- Certified KOSHA (Korea Occupational Safety & Health Agency) : 10-AV2BO-0003U & 4U



Control / Terminal Blocks

Terminal Blocks for Hazardous Area

Ring Lug Increased Safety Ex e II Type Terminal Block (Component)

- KS C 2625 1990
- KOSHA Certificate (Korea Occupational Safety & Health Agency)



SH-STB-015L

■ Applications

- SAMWHA terminal blocks are screw fixing type intended for application in control equipment and systems.
- These terminal blocks are made up of individually molded units with electrical conductor.
- Suitability for specific application depends upon the equipment specification in terms of creepage, clearance and breakdown voltage requirements, mounting and wire connectors used.
- Cross-connections between terminals.
- In complete jumpering units, common bar, sleeve and screw are supplied ready assembled to the required number of poles.

■ Standard Materials

- Body - Polyamide PA6
- Current Bar - Copper

■ Finishes

- Steel - Electro Zinc plated

■ Mounting Type

- Screw surface mounting

■ Connection Type

- Ring lug type

■ Dimensions & Weight

CAT. NO.	DIMENSIONS				WEIGHT (KG/100)
	WIDTH	HEIGHT	DEPT	EP	
SH-STB-015L	39.0	37.0	8.9	1.1	1.0

■ Technical Data

CAT. NO.	WIRE RANGE		WIRE TYPE	FW	TQ (In.-Lb)	RATED VOLTAGE	RATED CURRENT	MATERIAL	UG SIZE O.D-I.D	FLAM-MABILIT
	AWG	SQ								
SH-STB-015L	12 STR	4	CU	4	10.6	600	15	PA6	Max7.2-Min3.5	UL94-0

■ Compliances / Approvals

- KS C 2625 1990
- IEC 60079-0 Equipment - General requirements
- IEC 60079-7 Equipment protection by increased safety "e"

■ Certificate

- Certified KOSHA (Korea Occupational Safety & Health Agency) : 10-AV2BO-0002U

Control / Terminal Blocks

Accessories

End Plate EP End Plate



EP is made Polybutylene terephthalate PBT or Polyamide PA6 which applies only to the Clip-on mounting terminal blocks.

End Stopper ESS & ESL End Stopper



ESS



ESL

ESS & ESL are made Polyamide PA6 which applies only to the Clip-on mounting terminal blocks.

CAT. NO.	DIMENSIONS		COLOR	WEIGHT (KG/100)
	WIDTH	HEIGHT		
ESS	35.0	8.6	Yellow or Black	0.62
ESL	44.5	15.8	Yellow or Black	0.78

Mounting Rail TS 32 & TS 35 Mounting Rail



TS 32



TS 35

TS 32 & TS 35 are made Aluminum Alloy which applies only to the Clip-on mounting terminal blocks.

- TS32-DIN 46277-1 & EN 50035 G type RAIL
- TS35-DIN 46277-3 & EN 50022 HAT type RAIL

Support Bracket



DIN Rail Support-Zinc Plated Steel

- 35° mounting angle
- Mount hole center 60mm
- Mount hole size $\varnothing 7.0$
- DIN rail fix bolt M6.0



Control / Terminal Blocks Accessories

Marking Tag RM5 Marking Tag

The SAMWHA marking tag card as an individual marking system consists of 5 strips with 10 tags per strip (50 tags per card.) RM5 tags with flexible feet and RM5 tags are made of a soft PVC which can be easily inserted either before or after assembly of terminal blocks. Marking letters can be printed with numbers 0,1,2...100 etc, to 999. For self Marking, there is a marker pen which can be directly used on unprinted tags. Special marking letters can be printed according to customer order.



Fixed Base

Fixed base is made of BAKELITE which applies only to Bus-Bar type terminal blocks. Fixed base can be designed according to customer order.

■ MEMO

F

Controls /
Terminal Blocks

Efficiency and Safety, Electric Line and Equipment Protection

Manufactured by high technology and long-term experience, Samwha's power panels provide efficiency and safety, as well as various control functions. Samwha always supply it's quality products that build long-last relationships with our customers.





Power/ Control Panels



Contents

SAMWHA Electrical

Power & Control Panels	
Products	G2



SAMWHA Electrical Power & Control Panels

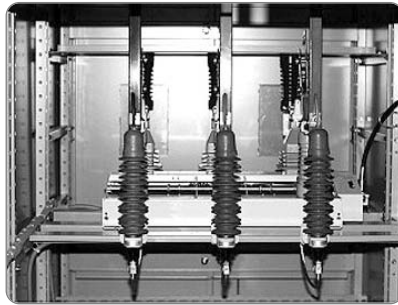
Products

■ High Voltage Switchgear (HVS)

SAMWHA's High Voltage Switchgear provides centralized control and protection of high-voltage power equipment and circuits in industrial, commercial, and utility installations involving generators, motors, feeder circuits, and transmission and distribution lines.



HVS (High Voltage Switchgear)



LBS (Line Breaker Switch) &
LA (Lightning Arrester)



MOF (Metering out fit)



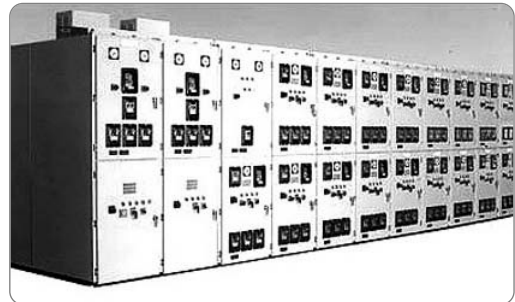
PT (Voltage transformer)
& PF (Power Fuse)



VCB
(Vacuum circuit breaker)

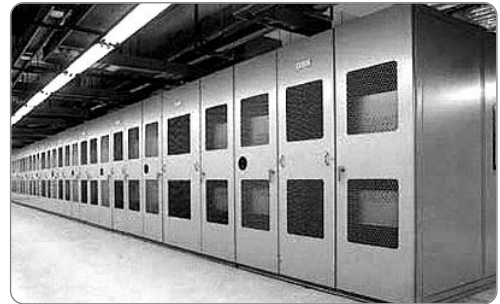
■ Medium Voltage Switchgear (MVS)

SAMWHA's Medium Voltage Switchgear provides centralized control and protection of medium-voltage power equipment and circuits in industrial, commercial, and utility installations involving generators, motors, feeder circuits, and transmission and distribution lines.



■ Transformer Switchgear (TRS)

We offer a wide range of Power Transformers, which is used in various industries for distribution and transmission.



■ Low Voltage Switchgear(LVS)

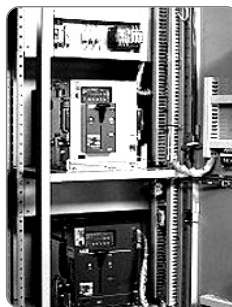
SAMWHA's low voltage switchgear provides centralized control and protection of low voltage power equipment and circuits in industrial, commercial, and utility installations involving generators, motors, feeder circuits, and transmission and distribution lines.



LVS (Low Voltage Switchgear)



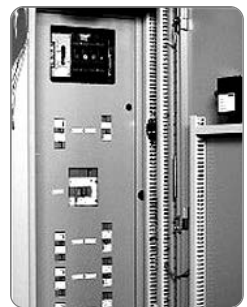
RB (Rectifier & Battery)



ACB & Tie ACB
(Air circuit Breaker)



ACB & MCCB
(Mold cased circuit breaker)



ATS(Auto transfer switch) &
MCCB



SAMWHA Electrical Power & Control Panels

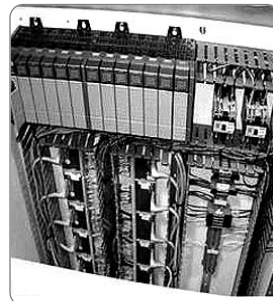
Products ■ Motor Control Centers(MCC)

SAMWHA's motor control centers offer the best method for grouping motor control, associated control, distribution equipment and industrial communications. They are specially designed to operate machinery, industrial processes, and commercial building systems.



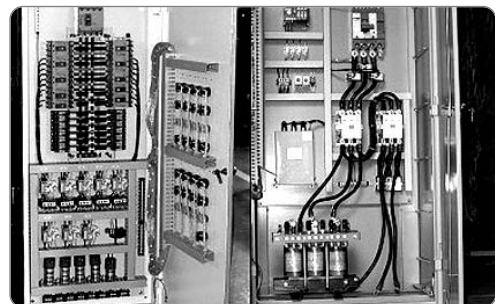
■ Plc Control Panels (PCP)

PLC Control panels are used for sequential relay control, motion control, process control, distributed control systems and networking. This offer data handling and storage and processing power and communication capabilities.



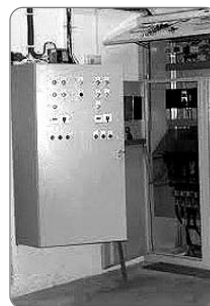
■ Power Distribution Centers (PDC)

SAMWHA provides top quality rack-mounted and floor-based power distribution products. Features offer space savings, cost savings, and the ultimate in customization to meet a wide variety of applications and environments.



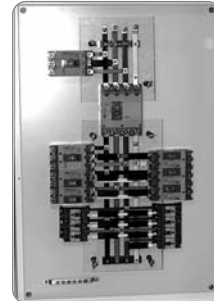
■ Local Control Panels (LCP)

Local control panels help to perform a temporary and local action on electrical and temperature installations of a room. Their action is generally applied to heating / ventilation and lighting devices but several other functions are possible.



■ Lighting Distribution Panels (LDP)

SAMWHA's lighting distribution panels offer the best method for grouping lighting fixture line control, distribution equipment and industrial communications. They are specially designed to operate machinery, industrial processes, and commercial building systems.



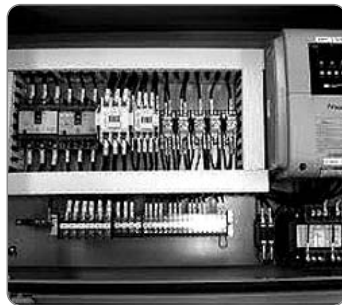
■ Motor Control Panels (MCP)

SAMWHA's motor control panels offer individual motor control. They are specially designed to operate machinery, industrial processes, and commercial building systems.

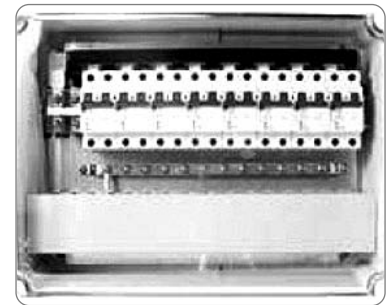


■ Inverter Control Panels (ICP)

SAMWHA's Inverter control panels are engineered to offer tight control over both torque and speed regulation, while offering the industry's simplest and most user-friendly operator interface. Designed to handle the industry's most demanding conditions, our drives and panels deliver only the highest level of performance.



ONE HOUSING CUSTOM
BUILD PANELS



PC CIRCUIT BREAKER BOXES

■ Welding Receptacles Panel

SAMWHA's Welding receptacles panels offer the best method and cost of control. Also most user-friendly operator interface.



PC CONTROL BOXES



Appendix

Explosion Proof Technical Explosion Protection



■ Combustion Principles

Three basic conditions must be satisfied for a fire or explosion to occur:

- A flammable liquid, vapor or combustible dust must be present in sufficient quantity
- The flammable liquid, vapor or combustible dust must be mixed with air or oxygen in the proportions required to produce an explosive mixture
- A source of energy must be applied to the explosive mixture

In applying these principles, the quantity of the flammable liquid or vapor that may be liberated and its physical characteristics must be recognized.

Vapors from flammable liquids also have a natural tendency to disperse into the atmosphere, and rapidly become diluted to concentrations below the lower flammable limit, particularly when there is natural or mechanical ventilation.

The possibility that the gas concentration may be above the upper flammable limit does not afford any degree of safety, as the concentration must first pass through the flammable range to reach the upper flammable limit.

■ The Hazard Triangle

For an area to be classified as a Hazardous Location there must be the possibility that the conditions for an explosion or fire may exist as the result of some abnormal occurrence. To better understand what these conditions may be, an understanding of the combustion triangle is a fundamental requirement.

For an explosion to take place, all three sides of the triangle, satisfying the following conditions, must be present:

- There must be a supply of oxygen present. In most situations this is applicable as a result of the oxygen content in the air (21%)
- There must be sufficient fuel present in the air to form an ignitable mixture. The fuel may be in the form of a gas, vapor, mist or dust
- There must be a source of ignition with sufficient energy to ignite the fuel-air mixture. For electrical equipment this may be from an arcing or sparking device or from a hot surface.

There may be sources of ignition other than electrical equipment, such as hot exhaust surfaces from internal combustion engines. These devices do not fall within the scope of the North American electrical codes and are normally covered by other codes and standards such as Occupational Health and Safety

The basic approach to design in a Hazardous Location is to ensure that all three sides of the triangle do not exist simultaneously. If any one side of the triangle is not present, an explosion cannot occur.

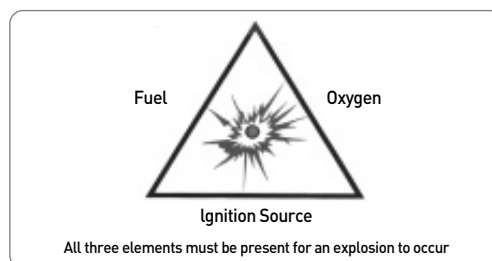
Protection against explosions will therefore require control or elimination of one or more sides of the triangle.

• The Oxygen Side

In most situations there is sufficient oxygen present in the air (21%) to meet the conditions for an explosion.

In some situations however, oxygen may be excluded by blanketing an enclosed area with another gas to ensure there will not be sufficient oxygen present.

The blanket gas is normally an inert gas, such as nitrogen, or in some cases it may even be a flammable gas such as methane.



• The Fuel Side

If avoiding the use of flammable substances is not possible, the fuel side of the triangle is removed by enclosing the gas or dust in piping, or vessels in the case of gas, vapors or flammable liquids, or in enclosed ducts in the case of dust.

Of course there is always the possibility that flammable materials could be released in sufficient quantity to form an explosive mixture as a result of a malfunction of equipment. In some situations an explosive mixture may be present frequently or continuously as a result of normal operations such as the interior of vented fuel storage tanks or the interior of paint spray booths.

The determination of the amount of time that an explosive mixture will be present in an area is the basis of "area classification"

• The Ignition Side

The electrical equipment installed in Hazardous Locations forms the ignition side of the triangle.

The various designs used for electrical equipment ensure there will not be a simultaneous occurrence of all three sides of the triangle. The specific design of an electrical device for use in a Hazardous Location will depend on the amount of time it will be exposed to flammable concentrations of flammable material. In other words, the design must be suitable for the classification of the area in which it is installed.

Overall the design of equipment for the different "Zones" or "Divisions" is based on ensuring the probability of the simultaneous occurrence of a flammable gas (or vapor, mist or dust) concentration and an ignition source from equipment is so low that in practice it does not happen. It has been suggested in a number of industry papers that the probability of an ignition occurring once every hundred years is so low that in practice it will not happen.

Probabilities at this level (approximately 1 in 1,000,000) are similar to those done for the catastrophic failure of piping or vessels.

■ Ignition Sources - Gases & Vapors

Ignition sources can occur by various mechanical means, but for the purpose of this publication we consider only electrical sources of potential ignition.

The most important characteristics of flammable substances in regard to ignition are:

- Upper Flammable Limit
- Lower Flammable Limit
- Flash Point of the flammable material
- Auto-Ignition Temperature
- Vapor Density

■ Upper & Lower Flammable Limits

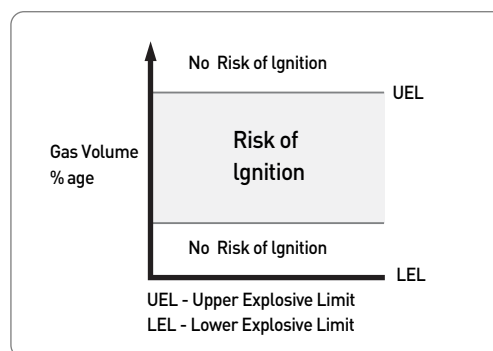
There are a number of characteristics of gases and vapors that are important for the classification of a Hazardous Location and the application of equipment within the Hazardous Location.

• Lower Explosive Limit (LEL)

is the lowest percentage by volume of gas (or vapor) in a gas-air mixture that will form an ignitable concentration. Below that concentration there is insufficient gas or vapor in the mixture and the gas-air mixture is too lean to be ignited

• Upper Explosive Limit (UEL)

is the highest percentage by volume of gas or vapor in a gas-air mixture that will form an ignitable concentration. Above that concentration there is too much gas or vapor in the mixture and the gas-air mixture is too rich to ignite.





Appendix

Explosion Proof Technical Explosion Protection

■ Upper & Lower Flammable Limits

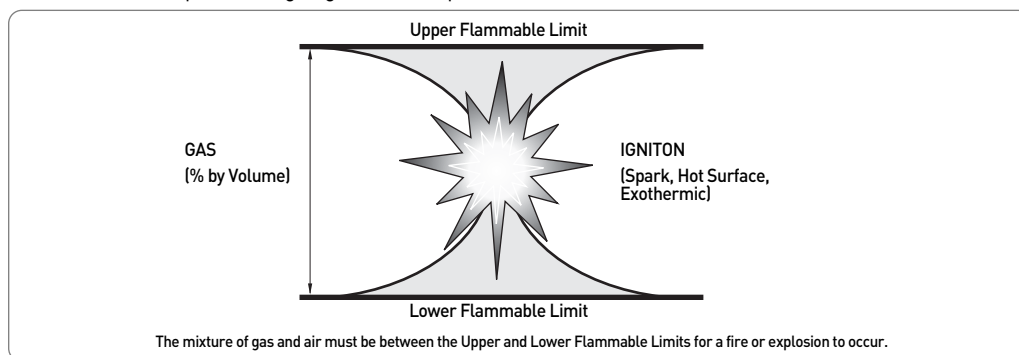
If the percentage of gas is below the lower limit, the mixture is too lean (insufficient fuel) to ignite. The mixture is too rich (insufficient oxygen) if the percentage is above the upper limit.

Some gases, such as methane, are ignitable over a relatively narrow range of 5% to 15%. Methane is frequently used in the form of natural gas to provide a low-pressure gas blanket over liquid in a tank to ensure an ignitable mixture is not formed.

The presence of the natural gas blanket ensures the mixture in the tank will always be above the UEL.

Other gases are ignitable over a relatively large range, such as acetylene (2.5 to 100%) and hydrogen, which is ignitable from 4% to 75%. As hydrogen is a very light gas, it is often used in large turbine generators to reduce the friction loss of the rotor.

Because of the extremely large explosive range of hydrogen, great care must be taken to ensure concentrations within the generator do not enter the explosive range as the result of the introduction of air. Refer to Appendix I NFPA 325 M-1991, Fire Hazard Properties of Flammable Liquids, Gases & Volatile Solids, for the complete listing of gases and vapors.



■ Flash Point of The Flammable Materials Auto Ignition Temperature Vapor Density

- is shown in table 1.6

■ Classification of Hazardous Atmospheres Selected from NEC 2008

• Class I Atmospheric Hazards

Class I atmospheric hazards are divided not only into the four groups, A, B, C, and D shown in Appendix I, but also into two divisions.

Division 1 covers locations where flammable gases or vapors may exist under normal operating conditions, under frequent repair or maintenance operations, or where breakdown or faulty operation of process equipment might also cause simultaneous failure of electrical equipment.

Division 2 covers locations where flammable gases, vapors or volatile liquids are handled either in a closed system, or confined within suitable enclosures, or where hazardous concentrations are normally prevented by positive mechanical ventilation.

Areas adjacent to Division 1 locations, into which gases might occasionally flow, would also be Division 2.

• Class II Atmospheric Hazards

Class II atmospheric hazards cover three groups of combustible dusts, summarized in Appendix II.

The groups are based on the type of material : Group E metallic, Group F carbonaceous, or Group G organic.

Whether an area is Division 1 or 2 depends on the quantity of dust present, except that for Group E there is only Division 1.

• Class III Atmospheric Hazards

Class III atmospheric hazards cover locations where combustible Fibers / flyings are present but not likely to be in suspension in air in quantities sufficient to produce ignitable mixtures.

Division 1 is where they are manufactured and Division 2 is where they are stored.

• Evaluation of Hazardous Areas

Each area that contains gases or dusts that are considered hazardous must be carefully evaluated to make certain the correct electrical equipment is selected.

Many hazardous atmospheres are Class I, Group D, or Class II, Group G.

However, certain areas may involve other groups, particularly Class I, Groups B and C.

■ About NEC Scope

• NEC 501

the requirements for electrical and electronic equipment and wiring for all voltages in **Class I, Division 1 and 2** locations where fire or explosion hazards may exist due to **flammable gases or vapors or flammable liquids**.

• NEC 502

the requirements for electrical and electronic equipment and wiring for all voltages in **Class II, Division 1 and 2** locations where fire or explosion hazards may exist due to **combustible dust**.

• NEC 503

the requirements for electrical and electronic equipment and wiring for all voltages in **Class III, Division 1 and 2** locations where fire or explosion hazards may exist due to **ignitable fibers/flyings**.

• NEC 504

the installation of **intrinsically safe (I.S.) apparatus**, wiring, and systems for **Class I, II, and III** locations.

• NEC 505

the requirements for the zone classification system as an alternative to the division classification system covered in Article 500 for electrical and electronic equipment and wiring for all voltages in **Class I, Zone 0, Zone 1, and Zone 2** hazardous (classified) locations where fire or explosion hazards may exist due to **flammable gases, vapors, or liquids**.

■ Comparison Between Divisions & Zones Comparison of Protection Between NEC Article 500 & NEC Article 505

- is shown in table 1.7 & 1.10

A comparison of the Division and Zone classification system is shown in Table 3.1. Division 2 is equivalent to Zone 2 while Division 1 is either Zone 0 or 1. Zone 0 is reserved for those areas continuously hazardous (e.g., inside a vented fuel tank), so other Division 1 areas would be classified as Zone 1.

■ Equipment Temperature Classification

The marking shall specify the temperature class or operating temperature at a 40°C ambient temperature, or at the higher ambient temperature if the equipment is rated and marked for an ambient temperature of greater than 40°C.

The temperature class, if provided, shall be indicated using the temperature class (T Codes) shown in Table . Equipment for Class I and Class II shall be marked with the maximum safe operating temperature, as determined by simultaneous exposure to the combinations of Class I and Class II conditions.

• Classification of Maximum Surface Temperature

NEC 500.3 CEC 18-052	Temp. (°C)	Temp. (°F)	IEC /EN NEC 505-10	JIS
T1	300~450	572~842	T1	G1
T2	280~300	536~572	T2	G2
T2A	260~280	500~536		
T2B	230~260	446~500		
T2C	215~230	419~446		
T2D	200~215	392~419	T3	G3
T3	180~200	356~392		
T3A	165~180	329~356		
T3B	160~165	320~329		
T3C	135~160	275~320	T4	G4
T4	120~135	248~275		
T4A	100~120	212~248	T5	G5
T5	85 ~100	185~212	T6	
T6	~85	~185		





Appendix

Explosion Proof Technical Explosion Protection

■ Method of Protection

The definition of Explosion Protection is electrical apparatus designed with specific safety measures to prevent ignition of a surrounding gas or vapor during normal operation. An explosion-protected device will not create an internal, or transmit an external ignition source, either by spark, or hot surfaces. Types of protection is shown Table 1.8-9

■ Condition of Hazardous Area

- is shown in table 1.11

■ Equipment Protection Levels – EPL

- is shown in table 1.12 & 1.13

This concept allows for consideration of risk (ie consequences of an explosion) as opposed to just the probability of a flammable atmosphere existing-the conventional selection criteria between the types of protection and the zone of use

■ NEMA vs IP Ratings

Enclosures are designed to protect components mounted inside from the outside environment. When these enclosures contain electrical equipment, the degree of protection is critical to shield the components from moisture and dusts that could contaminate and damage the equipment. The North American Electrical Manufacturers Association (NEMA) have designated numbers to describe the protection that the enclosure will render. Likewise the IEC Standard IEC 60529 provides a means of classifying the degree of protection from touch, dust, water and impact.

The IEC designation of the ratings is known as Ingress

Protection or IP. The IP classification should not be construed as indicating corrosion resistance. The IP is followed by 2 numbers with the first number providing the degree of protection against solid objects and dust, and the second number the degree of protection against water.

IP Grade is shown in Table 1.14

NEMA vs IP Ratings are shown in table 1.15

COMPARISON ENCLOSURE BETWEEN NEC CODE & NEMA CODE is shown in table 1.16

■ Combating Corrosion

When designing a new facility or improving an old one, corrosion control can mean the difference between trouble-free operation and costly downtime. At SAMWHA, our years of experience in corrosion control can help you reduce equipment failures, costly repairs and loss of production. The general guide below can help you in selecting the most suitable material for products used in corrosive environments.

General Guide for Product Material Selection is shown in Table 1.17

■ SAMWHA Corrosion-Resistant Materials

Here are capsule descriptions of the standard materials available in the comprehensive SAMWHA product line.

• Copper-Free Aluminum

Copper-free aluminum is particularly resistant to salt atmospheres, sulfur gases, and ammonium nitrate. SAMWHA copper-free aluminum alloy contains a maximum of 4/10 of 1% copper. Above this level, the rate of corrosion due to galvanic action within the structure of the metal increases rapidly. SAMWHA copper-free aluminum products provide optimum protection against galvanic corrosion.

• Cast Iron

Cast iron generally resists corrosion from alkalis, organic compounds, neutral and slightly acidic solutions, and certain concentrated acids and neutral brines. Cast Iron products are normally supplied with a finish of electrogalvanized zinc plate covered with an aluminum acrylic paint or Zinc Hot dip galvanized.

• Brass

This metal was developed for structural and engineering uses requiring metals with high strength and fabrication capabilities, along with a corrosion resistance equal to that of copper. Brass is resistant to most dry gases and has excellent marine, industrial and rural atmospheric corrosion resistance. With variations of temper and chemical composition, a variety of nonmagnetic, high strength, readily fabricated Brass can be achieved.

- **Stainless Steel**

Mounting hardware, hinges and cover bolts on most SAMWHA enclosures and lighting fixtures are made of 300 Series stainless steel, one of the highest grades of stainless steel offering strong, durable components that have excellent corrosion resistance to most chemicals and vapors. Stainless steel cover bolts and hinges reduce hassles that can be caused by corroding steel hardware when accessing enclosures for routine maintenance, offering labor savings to the end user.

- **Neoprene**

A major industry workhorse. Neoprene is classified as a moderately oil-resistant rubber, with very good weather/ozone resistance, along with good resistance to oxidative chemicals. Neoprene has inherent high tensile strength, elongation and wear properties, at pure gum levels. Due to its excellent flame resistance and self extinguishing characteristics, it is a must in areas where fire is a potential hazard. Neoprene is used for gaskets, o-rings, bushings and boots on a variety of products.

- **Other**

In addition to the selection of the enclosure or housing materials best suited for use in a specific corrosive environment, careful attention should also be given to such components as cover fastening bolts, operating shafts, etc. For the classic weakest link reasons, these should be of a suitable material and of a physical configuration compatible with the intended installation and operation.

For example: should the corrosive environment involve chemicals that tend to accumulate on operating mechanisms (such as pushbuttons, operating shafts, etc.), a design should be selected that shields the mechanism as best possible, or one that would positively overcome any build-up when operated.

Threaded operating mechanisms and cover openings require lubricants to inhibit corrosion and maintain rain tightness.

Use of O-ring gaskets on threaded covers and operating shafts can provide additional resistance to corrosion of the threaded joints and interior of the device.

Installation of breathers, drains or space heaters in enclosures can reduce or eliminate the corrosion of interior components due to condensation build-up. A breather is installed in the top of an enclosure to provide ventilation to minimize condensation in enclosures.

Drains are used in humid atmospheres or in wet locations where it is likely that water can gain entrance to the interiors of enclosures or raceways and are installed in the bottom of the enclosure. A space heater in an enclosure with heat producing electrical components can eliminate the cycling of temperatures in an enclosure that can draw in condensation. The space heater can maintain a positive internal pressure that prevents condensation, reducing corrosion effects.

Provides protection for a wide range of ferrous and non-ferrous metals including steel, copper, aluminum, brass, solder, silver and others.





Appendix

Explosion Proof Technical Explosion Protection

■ Table 1.6 Flash Point of the Flammable Materials, Auto Ignition Temperature, Vapor Density

NEC500 Class I* Group	IEC 60079	Substance	Auto-Ignition Temp.*		Flash Point**		Flammable Limits** Percent by Volume		Vapor Density** (Air Equals 1.0)
			°F	°C	°F	°C	Lower	Upper	
C	II A	Acetaldehyde	347	175	-38	-39	4.0	60	1.5
D	II A	Acetic Acid	867	464	103	39	4.0	19.9@200°F	2.1
D		Acetic Anhydride	600	316	120	49	2.7	10.3	3.5
D	II A	Aceton	869	465	-4	-20	2.5	13	2.0
D		Acetone Cyanohydrin	1270	688	165	74	2.2	12.0	2.9
D	II A	Acetonitril	975	524	42	6	3.0	16.0	1.4
A	II C	Acetylene	581	305	gas	gas	2.5	100	0.9
B(C)	II B	Acrolein (inhibited)1	455	235	-15	-26	2.8	31.0	1.9
D		Acrylic Acid	820	438	122	50	2.4	8.0	2.5
D	II B	Acrylonitrile	898	481	32	0	3.0	17	1.8
D		Adiponitrile	-	-	200	93	-	-	-
C	II A	Allyl Alcohol	713	378	70	21	2.5	18.0	2.0
D		Allyl Chloride	905	485	-25	-32	2.9	11.1	2.6
B(C)		Allyl Glycidyl Ether1	-	-	-	-	-	-	-
D	II A	Ammonia2	928	498	gas	gas	15	28	0.6
D	II A	n-Amyl Acetate	680	360	60	16	1.1	7.5	4.5
D		sec-Amyl Acetate	-	-	89	32	-	-	4.5
D	II A	Aniline	1139	615	158	70	1.3	11	3.2
D	II A	Benzene	928	498	12	-11	1.3	7.9	2.8
D		Benzyl Chloride	1085	585	153	67	1.1	-	4.4
B(D)	II B	1,3-Butadiene1	788	420	gas	gas	2.0	12.0	1.9
D	II A	Butane	550	288	-76	-60	1.6	8.4	2.0
D	II A	1-Butanol	650	343	98	37	1.4	11.2	2.6
D	II A	2-Butanol	761	405	75	24	1.7@212°F	9.8@212°F	2.6
D		n-Butyl Acetate	790	421	72	22	1.7	7.6	4.0
D		iso-Butyl Acetate	790	421	-	-	-	-	-
D		sec-Butyl Acetate	-	-	88	31	1.7	9.8	4.0
D		t-Butyl Acetate	-	-	-	-	-	-	-
D		n-Butyl Acrylate (inhibited)	559	293	118	48	1.5	9.9	4.4
C		n-Butyl Formal	-	-	-	-	-	-	-
B(C)		n-Butyl Glycidyl Ether1	-	-	-	-	-	-	-
C		Butyl Mercaptan	-	-	35	2	-	-	3.1
D		t-Butyl Toluene	-	-	-	-	-	-	-
D		Butylamine	594	312	10	-12	1.7	9.8	2.5
D		Butylene	725	385	gas	gas	1.6	10.0	1.9
C		n-Butyraldehyde	425	218	-8	-22	1.9	12.5	2.5
D		n-Butyric Acid	830	443	161	72	2.0	10.0	3.0
A	II C	Carbon Disulfide	194	90	-22	-30	1.3	50.0	2.6
C	II A	Carbon Monoxide	1128	609	gas	gas	12.5	74.0	1.0
C		Chloroacetaldehyde	-	-	-	-	-	-	-
D		Chlorobenzene	1099	593	82	28	1.3	9.6	3.9
C		1-Chloro-1-Nitropropane	-	-	144	62	-	-	4.3
D		Chloroprene	-	-	-4	-20	4.0	20.0	3.0
D		Cresol	1038-1110	559-599	178-187	81-86	1.1-1.4	-	-
C		Crotonaldehyde	450	232	55	13	2.1	15.5	2.4
D		Cumene	795	424	96	36	0.9	6.5	4.1
D	II A	Cyclohexane	473	245	-4	-20	1.3	8.0	2.9
D	II A	Cyclohexanol	572	300	154	68	-	-	3.5
D		Cyclohexanone	473	245	111	44	1.1@212°F	9.4	3.4
D		Cyclohexene	471	244	< 20	< -7	-	-	2.8
D	II B	Cyclopropane	938	503	gas	gas	2.4	10.4	1.5
D		p-Cymene	817	436	117	47	0.7@212°F	5.6	4.6
C		n-Decaldehyde	-	-	-	-	-	-	-
D		n-Decanol	550	288	180	82	-	-	5.5
D		Decene	455	235	< 131	< 55	-	-	4.84
D		Diacetone Alcohol	1118	603	148	64	1.8	6.9	4.0
D		o-Dichlorobenzene	1198	647	151	66	2.2	9.2	5.1

NEC500 Class I* Group	IEC 60079	Substance	Auto-Ignition Temp.*		Flash Point**		Flammable Limits** Percent by Volume		Vapor Density** (Air Equals 1.0)
			°F	°C	°F	°C	Lower	Upper	
D		1,1-Dichloroethane	820	438	22	-6	5.6	-	-
D	II B	1,2-Dichloroethylene	860	460	36	2	5.6	12.8	3.4
C		1,1-Dichloro-1-Nitroethane	-	-	168	76	-	-	5.0
D		1,3-Dichloropropene	-	-	95	35	5.3	14.5	3.8
C		Dicyclopentadiene	937	503	90	32	-	-	-
D		Diethyl Benzene	743-842	395-450	133-135	56-57	-	-	4.6
C	II B	Diethyl Ether	320	160	-49	-45	1.9	36.0	2.6
C		Diethylamine	594	312	-9	-23	1.8	10.1	2.5
C		Diethylaminoethanol	-	-	-	-	-	-	-
C		Diethylene Glycol Monobutyl Ether	442	228	172	78	0.85	24.6	5.6
C		Diethylene Glycol Monomethyl Ether	465	241	205	96	-	-	-
D		Di-isobutyl Ketone	745	396	120	49	0.8@200°F	7.1@200°F	4.9
D		Di-isobutylene	736	391	23	-5	0.8	4.8	3.9
C		Di-isopropylamine	600	316	30	-1	1.1	7.1	3.5
C		N-N-Dimethyl Aniline	700	371	145	63	-	-	4.2
D		Dimethyl Formamide	833	455	136	58	2.2@212°F	15.2	2.5
D		Dimethyl Sulfate	370	188	182	83	-	-	4.4
C		Dimethylamine	752	400	gas	gas	2.8	14.4	1.6
C		1,4-Dioxane	356	180	54	12	2.0	22	3.0
D		Dipentene	458	237	113	45	0.7@302°F	6.1@302°F	4.7
C		Di-n-propylamine	570	299	63	17	-	-	3.5
C		Dipropylene Glycol Methyl Ether	-	-	186	86	-	-	5.11
D		Dodecene	491	255	-	-	-	-	-
C		Epichlorohydrin	772	411	88	31	3.8	21.0	3.2
D	II A	Ethane	882	472	gas	gas	3.0	12.5	1.0
D	II A	Ethanol	685	363	55	13	3.3	19	1.6
D	II A	Ethyl Acetate	800	427	24	-4	2.0	11.5	3.0
D	II A	Ethyl Acrylate (inhibited)	702	372	50	10	1.4	14	3.5
D		Ethyl sec-Amyl Ketone	-	-	-	-	-	-	-
D		Ethyl Benzene	810	432	70	21	0.8	6.7	3.7
D		Ethyl Butanol	-	-	-	-	-	-	-
D		Ethyl Butyl Ketone	-	-	115	46	-	-	4.0
D		Ethyl Chloride	966	519	-58	-50	3.8	15.4	2.2
D		Ethyl Formate	851	455	-4	-20	2.8	16.0	2.6
D		2-Ethyl Hexanol	448	231	164	73	0.88	9.7	4.5
D		2-Ethyl Hexyl Acrylate	485	252	180	82	-	-	-
C		Ethyl Mercaptan	572	300	< 0	< -18	2.8	18.0	2.1
C		n-Ethyl Morpholine	-	-	-	-	-	-	-
A	II C	Ethyl nitrate	-	-	-	-	-	-	-
C		2-Ethyl-3-Propyl Acrolein	-	-	155	68	-	-	4.4
D		Ethyl Silicate	-	-	125	52	-	-	7.2
D		Ethylamine	725	385	< 0	< -18	3.5	14.0	1.6
C	II B	Ethylene	842	450	gas	gas	2.7	36.0	1.0
D		Ethylene Chlorohydrin	797	425	140	60	4.9	15.9	2.8
D		Ethylene Dichloride	775	413	56	13	6.2	16	3.4
C		Ethylene Glycol Monobutyl Ether	460	238	143	62	1.1@200°F	12.7@275°F	4.1
C		Ethylene Glycol Mono-butyl Ether Acetate	645	340	160	71	0.88@200°F	8.54@275°F	-
C		Ethylene Glycol Monoethyl Ether	455	235	110	43	1.7@200°F	15.6@200°F	3.0
C		Ethylene Glycol Mono-ethyl Ether Acetate	715	379	124	52	1.7	-	4.72
D		Ethylene Glycol Monomethyl ether	545	285	102	39	1.8@STP	14@STP	2.6
B(C)	II B	Ethylene Oxide	804	429	-20	-28	3.0	100	1.5
D		Ethylenediamine	725	385	104	40	2.5	12.0	2.1
C		Ethylenimine	608	320	12	-11	3.3	54.8	1.5
C		2-Ethylhexaldehyde	375	191	112	44	0.85@200°F	7.2@275°F	4.4
B	II C	Formaldehyde (Gas)	795	429	gas	gas	7.0	73	1.0
D		Formic Acid [90%]	813	434	122	50	18	57	1.6
B	II B	Fuel and Combustible Process Gas (containing more than 30 percent H2 by volume)	-	-	-	-	-	-	-





Appendix

Explosion Proof Technical Explosion Protection

■ Table 1.6 Flash Point of the Flammable Materials, Auto Ignition Temperature, Vapor Density

NEC500 Class I* Group	IEC 60079	Substance	Auto-Ignition Temp.*		Flash Point**		Flammable Limits** Percent by Volume		Vapor Density** (Air Equals 1.0)
			°F	°C	°F	°C	Lower	Upper	
D	II A	Fuel Oils	410-765	210-407	100-336	38-169	0.7	5	-
C		Furfural	600	316	140	60	2.1	19.3	3.3
C		Furfuryl Alcohol	915	490	167	75	1.8	16.3	3.4
D		Gasoline	536-880	280-471	-36to-50	-38to-46	1.2-1.5	7.1-7.6	3-4
D	II A	Heptane	399	204	25	-4	1.05	6.7	3.5
D		Heptene	500	260	< 32	< 0	-	-	3.39
D	II A	Hexane	437	225	-7	-22	1.1	7.5	3.0
D	II A	Hexanol	-	-	145	63	-	-	3.5
D		2-Hexanone	795	424	77	25	-	8	3.5
D		Hexenes	473	245	< 20	< -7	-	-	3.0
D		sec-Hexyl Acetate	-	-	-	-	-	-	-
C		Hydrazine	74-518	23-270	100	38	2.9	9.8	1.1
B	II C	Hydrogen	968	520	gas	gas	4.0	75	0.1
C		Hydrogen Cyanide	1000	538	0	-18	5.6	40.0	0.9
C		Hydrogen Selenide	-	-	-	-	-	-	-
C	II B	Hydrogen Sulfide	500	260	gas	gas	4.0	44.0	1.2
D		Isoamyl Acetate	680	360	77	25	1.0@212°F	7.5	4.5
D		Isoamyl Alcohol	662	350	109	43	1.2	9.0@212°F	3.0
D		Isobutyl Acrylate	800	427	86	30	-	-	4.42
C		Isobutyraldehyde	385	196	-1	-18	1.6	10.6	2.5
C		Isodecaldehyde	-	-	185	85	-	-	5.4
C		Iso-octyl Alcohol	-	-	180	82	-	-	-
C		Iso-octyl Alcohol	387	197	-	-	-	-	-
D		Isophorone	860	460	184	84	0.8	3.8	-
D	II A	Isoprene	428	220	-65	-54	1.5	8.9	2.4
D		Isopropyl Acetate	860	460	35	2	1.8@100°F	8	3.5
D		Isopropyl Ether	830	443	-18	-28	1.4	7.9	3.5
C		Isopropyl Glycidyl Ether	-	-	-	-	-	-	-
D		Isopropylamine	756	402	-35	-37	-	-	2.0
D	II A	Kerosene	410	210	110-162	43-72	0.7	5	-
D		Liquefied Petroleum Gas	761-842	405-450	-	-	-	-	-
D		Mesityl Oxide	652	344	87	31	1.4	7.2	3.4
D	I A	Methane	999	537	gas	gas	50	15.0	0.6
D	II A	Methanol	725	385	52	11	6.0	36	1.1
D	II B	Methyl Acetate	850	454	14	-10	3.1	16	2.8
D	II A	Methyl Acrylate	875	468	27	-3	2.8	25	3.0
D		Methyl Amyl Alcohol	-	-	106	41	1.0	5.5	-
D		Methyl n-Amyl Ketone	740	393	102	39	1.1@151°F	7.9@250°F	3.9
C		Methyl Ether	662	350	gas	gas	3.4	27.0	1.6
D		Methyl Ethyl Ketone	759	404	16	-9	1.7@200°F	11.4@200°F	2.5
D		2-Methyl-5-Ethyl Pyridine	-	-	155	68	1.1	6.6	4.2
C		Methyl Formal	460	238	-	-	-	-	-
D		Methyl Formate	840	449	-2	-19	4.5	23	2.1
D		Methyl Isocyanate	994	534	19	-7	5.3	26	1.97
C		Methyl Mercaptan	-	-	-	-	3.9	21.8	1.7
D		Methyl Methacrylate	792	422	50	10	1.7	8.2	3.6
D		2-Methyl-1-Propanol	780	416	82	28	1.7@123°F	10.6@202°F	2.6
D		2-Methyl-2-Propanol	892	478	52	11	2.4	8.0	2.6
D		alpha-Methyl Styrene	1066	574	129	54	1.9	6.1	-
C		Methylacetylene	-	-	gas	gas	1.7	-	1.4
C		Methylacetylene-Propadiene (stabilized)	-	-	-	-	-	-	-
D		Methylamine	806	430	gas	gas	4.9	20.7	1.0
D		Methylcyclohexane	482	250	25	-4	1.2	6.7	3.4
D		Methylcyclohexanol	565	296	149	65	-	-	3.9
D		o-Methylcyclohexanone	-	-	118	48	-	-	3.9
D		Monoethanolamine	770	410	185	85	-	-	2.1
D		Monoisopropanolamine	705	374	171	77	-	-	2.6

NEC500 Class I* Group	IEC 60079	Substance	Auto-Ignition Temp.*		Flash Point**		Flammable Limits** Percent by Volume		Vapor Density** (Air Equals 1.0)
			°F	°C	°F	°C	Lower	Upper	
C		Monomethyl Aniline	900	482	185	85	-	-	3.7
C		Monomethyl Hydrazine	382	194	17	-8	2.5	92	1.6
C		Morpholine	590	310	98	37	1.4	11.2	3.0
D	II A	Naphtha (Coal Tar)	531	277	107	42	-	-	-
D	II A	Naphtha (Petroleum)4	550	288	< 0	< -18	1.1	5.9	2.5
D		Nitrobenzene	900	482	190	88	1.8@200°F	-	4.3
C	II A	Nitroethane	778	414	82	28	3.4	-	2.6
C	II A	Nitromethane	785	418	95	35	7.3	-	2.1
C		1-Nitropropane	789	421	96	36	2.2	-	3.1
C		2-Nitropropane	802	428	75	24	2.6	11.0	3.1
D	II A	Nonane	401	205	88	31	0.8	2.9	4.4
D		Nonene	-	-	78	26	-	-	4.35
D		Nonyl Alcohol	-	-	165	74	0.8@212°F	6.1@212°F	5.0
D	II A	Octane	403	206	56	13	1.0	6.5	3.9
D	II A	Octene	446	230	70	21	-	-	3.9
D		n-Octyl Alcohol	-	-	178	81	-	-	4.5
D	II A	Pentane	470	243	< -40	< -40	1.5	7.8	2.5
D		1-Pentanol	572	300	91	33	1.2	10.0@212°F	3.0
D		2-Pentanone	846	452	45	7	1.5	8.2	3.0
D		1-Pentene	527	275	0	-18	1.5	8.7	2.4
D		Phenylhydrazine	-	-	190	88	-	-	-
D		Propane	842	450	gas	gas	2.1	9.5	1.6
D		1-Propanol	775	413	74	23	2.2	13.7	2.1
D		2-Propanol	750	399	53	12	2.0	12.7@200°F	2.1
D		Propiolactone	-	-	165	74	2.9	-	2.5
C		Propionaldehyde	405	207	-22	-30	2.6	17	2.0
D		Propionic Acid	870	466	126	52	2.9	12.1	2.5
D		Propionic Anhydride	545	285	145	63	1.3	9.5	4.5
D		n-Propyl Acetate	842	450	55	13	1.7@100°F	8	3.5
C		n-Propyl Ether	419	215	70	21	1.3	7.0	3.53
B		Propyl Nitrate	347	175	68	20	2	100	-
D		Propylene	851	455	gas	gas	2.0	11.1	1.5
D		Propylene Dichloride	1035	557	60	16	3.4	14.5	3.9
B(C)	II B	Propylene Oxide1	840	449	-35	-37	2.3	36	2.0
D		Pyridine	900	482	68	20	1.8	12.4	2.7
D	II A	Styrene	914	490	88	31	0.9	6.8	3.6
C		Tetrahydrofuran	610	321	6	-14	2.0	11.8	2.5
D		Tetrahydronaphthalene	725	385	160	71	0.8@212°F	5.0@302°F	4.6
C		Tetramethyl Lead	-	-	100	38	-	-	6.5
D	II A	Toluene	896	480	40	4	1.1	7.1	3.1
D		Tridecene	-	-	-	-	-	-	-
C		Triethylamine	480**	249**	16	-9	1.2	8.0	3.5
D		Triethylbenzene	-	-	181	83	-	-	5.6
D		Tripropylamine	-	-	105	41	-	-	4.9
D		Turpentine	488	253	95	35	0.8	-	-
D		Undecene	-	-	-	-	-	-	-
C		Unsymmetrical Dimethyl Hydrazine (UDMH)	480	249	5	-15	2	95	2.0
C		Valeraldehyde	432	222	54	12	-	-	3.0
D	II A	Vinyl Acetate	756	402	18	-8	2.6	13.4	3.0
D		Vinyl Chloride	882	472	-108.4	-78	3.6	33.0	2.2
D		Vinyl Toluene	921	494	127	53	0.8	11.0	4.1
D		Vinylidene Chloride	1058	570	-19	-28	6.5	15.5	3.4
D	II A	Xylenes	867-984	464-529	81-90	27-32	1.0-1.1	7.0	3.7

*Data from NFPA 497 - 2004, Recommended Practice for the Classification of Flammable Liquids, Gases, Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas.

**Data from NFPA 325M-1991, Fire Hazard Properties of Flammable Liquids, Gases, and Volatile Solids.





Appendix

Explosion Proof Technical Explosion Protection

■ Table 1.7 Comparison Between Divisions & Zones

	Gases and Vapors			Dusts			Fibers & Flying
Classification / Country	Zone 0 locations are those where there is a flammable mixture typically more than 1,000 hours per year.	Zone 1 locations are those where there is a flammable mixture more than 10 hours per year and less than 1,000 hours per year.	Zone 2 locations are those where explosive gas atmospheres will exist for less than 10 hours per year.	Zone 20 locations are those where there is a cloud of combustible dust typically more than 1,000 hours per year.	Zone 21 locations are those where there is a cloud of combustible dust more than 10 hours per year and less than 1,000 hours per year.	Zone 22 locations are those where there is a cloud of combustible dust less than 10 hours per year.	-
IEC	Zone 0	Zone 1	Zone 2	Zone 20	Zone 21	Zone 22	mines
Europe CENELEC	Zone 0	Zone 1	Zone 2	Zone 20	Zone 21	Zone 22	mines
North America /NEC505 (USA, Canada, Mexico)	Class I			Class II			Class III
	Zone 0	Zone 1	Zone 2	Zone 20	Zone 21	Zone 22	
North America /NEC500 (USA, Canada, Mexico)	Division 1		Division 2	Division 1		Division 2	-
Germany	Zone 0	Zone 1	Zone 2	Zone 20	Zone 21	Zone 22	-
United Kingdom	Division 0	Division 0	Division 2	-			-
Korea	0종 장소	1종 장소	2종 장소	20종 장소	21종 장소	22종 장소	-
Japan	0종 장소	1종 장소	2종 장소	20종 장소	21종 장소	22종 장소	-
France	Zone E		Zone F	-			-
Italy	Zone E		Zone F	-			-
Netherlands	Increased Hazard		Limited Hazard	-			-

■ Table 1.8 Types of Protection for Gas / Vapour Hazards

Method of Protection	Symbol	Protection Principle	Zone	Standards	
				CENELEC	IEC
Flameproof	d	Withstand and contain the explosion & prevent transmission of explosion to surrounding external atmosphere	1	EN 50 018	60079-1
Increased Safety	C	No arcs, sparks, or hot surfaces	1	EN 50 019	60079-7
Increased Safety	ia	Removes ignition from explosion triangle through prevention of high fault current & voltage	0	EN 50 020	60079-11
	ib		1	EN 50 020	60079-11
	ic		2	EN 50 020	60079-11
Pressurization	p	Removes fuel from explosion triangle by passing protective gas through enclosure	1	EN 50 016	60079-2
	px		1	EN 50 016	60079-2
	py		1	EN 50 016	60079-2
	pz		2	EN 50 016	60079-2
Non-Sparking	nA	No arcs, sparks, or hot surfaces	2	EN 50 021	60079-15
	nC		2	EN 50 021	60079-15
	nR		2	EN 50 021	60079-15
Powder Filled	q	Electrical components are covered with a filling medium, preventing presence of explosive gas-air mixtures	1	EN 50 017	60079-5
Oil Immersion	o	Electrical parts are immersed in oil, preventing exposure of arc or spark to explosive atmosphere	1	EN 50 015	60079-6
Encapsulation	m	Component parts which could ignite an explosive atmosphere are enclosed in resin compound	1	EN 50 028	60079-18
	ma		0	EN 50 028	60079-18
	mb		1	EN 50 028	60079-18
Special Protection	S	Special protective techniques not covered by Protection standards	1	National	-----
			2		

■ Table 1.9 Types of Protection for Equipment for Dust Hazards

Equipment Code	Description	Suitable for Zones
tDA 20	Protection by enclosure	20, 21, 22
tDB 20	Protection by enclosure	20, 21, 22
iaD	Intrinsic Safety	20, 21, 22
maD	Encapsulation	20, 21, 22
tDA 21	Protection by enclosure	21, 22
tDB 21	Protection by enclosure	21, 22
ibD	Intrinsic Safety	21, 22
mbD	Encapsulation	21, 22
pD	Encapsulation	21, 22
tDA 22	Protection by enclosure	22
tDB 22	Protection by enclosure	22
icD	Intrinsic Safety	22

■ Table 1.10 Comparison of Protection Between NEC Article 500 & NEC Article 505

Area	Ignition Protection Type	Area	Ignition Protection Type
Class I	ZONE 0 Intrinsically Safe, ia(2 fault)Class, Div.1 intrinsically Safe (2 fault)	Class II	DIVISION 1 Dust-ignition Proof Intrinsically Safe Pressurized
	ZONE 1 Encapsulation, m Flameproof, d Increased Safety, e Intrinsically Safe, i bOil Immersion, o Powder Filling, q Purged Pressurized, p Any Class I, Zone 0 method Any Class I, Div. 1 method		DIVISION 2 Dust Tight Non-incendive Non-sparking Pressurized
	ZONE 2 Non-incendive, nC Non-sparking Device, nA Restricted Breathing, nR Hermetically Sealed, nC Any Class I, Zone 0 method Any Class I, Div. 1 method	Class III	Any Class II, Div.1 method
	DIVISION 1 Explosion-proof Intrinsically Safe, e Purged/Pressurized (Type X or Y)		DIVISION 1 Dust Tight Intrinsically Safe
	DIVISION 2 Non-incendive, nC Non-sparking Device, nA Restricted Breathing, nR Hermetically Sealed, nC Any Class I, Zone 0 method Any Class I, Div. 1 method		DIVISION 2 Dust Tight Any Class II, Div. 1 and Class III method

■ Table 1.11 Condition of Hazardous Area

Area	Classification of The Explosion Hazard	Required Marking For Installation	
		Equipment Group	Category
Methane dust	OPERATION W/EXPLOSION HAZARD	I	M1
	SHUT DOWN W/EXPLOSION HAZARD	I	M2 & M1
Gas or Vapour	ZONE 0	II	1G
	ZONE 1	II	2G+1G
	ZONE 2	II	3G+2G+1G
Dust	ZONE 20	II	1D
	ZONE 21	II	2D+1D
	ZONE 22	II	3D+2D+1D

Note : UNDERGROUND I, OTHER AREA II, GAS & VAPOR-G, DUST-D, MINE-M





Appendix

Explosion Proof Technical Explosion Protection















■ Table 1.12 Normal Relationship Between EPL And Zone.

	EQUIPMENT PROTECTION LEVEL (EPL)	NORMAL APPLICABLE ZONE(S)
GAS & VAPOUR	Ga	ZONE 0 (& ZONE 1 & ZONE 2)
	Gb	ZONE 1(& ZONE 2)
	Gc	ZONE 2
DUST	Da	ZONE 20 (& ZONE 21 & ZONE 22)
	Db	ZONE 21(& ZONE 22)
	Dc	ZONE 22

■ Table 1.13 The EPL Awarded to Each Type Of Protection.

EQUIPMENT CODE	DESCRIPTION	EPL CODE
Ex ia	Intrinsic safety " ia"	Ga
Ex ib	Intrinsic safety " ib"	Gb
Ex ic	Intrinsic safety " ic"	Bc
Ex d	Flame-proof protection	Gb
Ex p	Purge/pressurized protection	Gb
Ex px	Purge/pressurized protection "px"	Gb
Ex py	Purge/pressurized protection "py"	Gb
Ex pz	Purge/pressurized protection "pz"	Gc
Ex e	Increased safety	Gb
Ex m	Encapsulation	Gb
Ex ma	Encapsulation	Ga
Ex mb	Encapsulation	Gb
Ex o	Oil immersion	Gb
Ex q	Sand / powder (quartz) filling	Gb
Ex n	Type – n protection	Gc
Ex s	Special protection	Refer to equipment marking and documentation

■ Table 1.10 Comparison of Protection Between NEC Article 500 & NEC Article 505

First Digit	Protection against Solid Foreign Objects and Access to Hazardous Parts			Second Digit	Protection Against Liquids	
	Illustration	Method	Explanation		Illustration	Method
0	-	Non-protected	Non-protected	0	-	Non-protected
1		Protected against solid foreign objects of 50mm diameter and greater	Protected against Access to hazardous parts with the back of a hand	1		Protected against drops of water falling vertically
2		Protected against solid foreign objects of 12.5mm diameter and greater	Protected against access to hazardous parts with a finger	2		Protected against drops of water falling at up to 15° from the vertical
3		Protected against solid foreign objects of 2.5mm diameter and greater	Protected against access to hazardous parts with a tool	3		Protected against spraying water at up to 60° from the vertical
4		Protected against solid foreign objects of 1.0mm diameter and greater	Protected against access to hazardous parts with a wire	4		Protected against splashing water from all directions
5		Dust-protected	Protected against access to hazardous parts with a wire	5		Protected against jet of water from all directions
6		Dust-tight	Protected against access to hazardous parts with a wire	6		Protected against jet of water of similar force to heavy seas
				7		Protected against the effects of immersion
				8		Protected against prolonged effects of immersion under pressure to a specified depth

■ Table 1.15 NEMA vs IP Ratings

NEMA Code	1	2	3	3R	3S	4	4X	5	6	6P	12	12K	13
Incidental contact with the enclosed equipment	○	○	○	○	○	○	○	○	○	○	○	○	○
Falling dirt	○	○	○	○	○	○	○	○	○	○	○	○	○
Falling liquids and light splashing		○				○	○	○	○	○	○	○	○
Circulating just, lint, fibers, and flyings *						○	○		○	○	○	○	○
Settling airborne dust, lint, fibers, and flyings *						○	○	○	○	○	○	○	○
Hosedown and splashing water						○	○		○	○			
Oil and coolant seepage											○	○	
Oil or coolant spraying and splashing												○	
Corrosive agents						○				○			
Occasional temporary submersion									○	○			
Occasional prolonged submersion										○			
Rain, snow, and sleet **			○	○	○	○	○		○	○			
Sleet ***					○								
Windblown dust, lint fibers, and flyings			○		○	○	○		○	○			
For Indoor	○	○				○	○	○	○	○	○	○	○
For Outdoor			○	○	○	○	○		○	○			
Markings	General	Driptight	Raintight Dusttight	Weather- Resistant	Raintight Dusttight	Raintight Watertight Corrosion Resistant	Driptight Dusttight	Submersible Corrosion Resistant	Driptight Dusttight	Oiltight Dusttight			
IEC IP Code	10	11	54	14	54	65	65	52	67	68	52	54	

NEMA 250 Enclosure for Electrical Equipment (1000V Maximum)

* These fibers and flyings are nonhazardous materials and are not considered Class III type ignitable fibers or combustible flyings. For Class III type ignitable fibers or combustible flyings see the National Electrical Code, Article 500.

** External operating mechanisms are not required to be operable when the enclosure is ice covered.

*** External operating mechanisms are operable when the enclosure is ice covered. See 5.6.

■ Table 1.16 Comparison Enclosure Between NEC Code & NEMA Code

	Enclosure Type 7 and 8, Class 1 **				Enclosure Type 9, Class II			Enclosure Type 10
	Group A	Group B	Group C	Group D	Group E	Group F	Group G	-
Class I	Acetylene	Hydrogen Manufactured gas	Diethyl ether, Ethylene Cyclo-propane	Gasoline, Hexane Butane, Naphtha Propane, Acetone Toluene, Isoprene				
Class II					Metal dust	Carbon black, coal dust, coke dust	Flour, starch, grain dust	
Class III							Fibers, flyings *	
MSHA								Metane with or without coal dust
Marking	Type 7	Explosion-proof			Dust - Ignition Proof.			
	Type 8	Explosion-proof & Oil - filled.						

* For Class III Type ignitable fibers or combustible flyings see the National Electrical Code, Article 500.

* Due to the characteristics of the gas, vapor, or dust, a product suitable for one Class or Group may not be suitable for another Class or Group unless marked on the product.





Appendix

Explosion Proof Technical Explosion Protection

■ Table 1.17 General Guide for Product Material

Chemical Atmosphere		Copper-Free Aluminum	Cast Iron	Corro-Free Epoxy Coating	Brass	316 Stainless Steel	Chemical Atmosphere		Copper-Free Aluminum	Cast Iron	Corro-Free Epoxy Coating	Brass	316 Stainless Steel
1	Acetic Acid	C	C	C	C	A	57	Formic Acid	B	D	A	A	B
2	Acetic Anhydride	A	D	C	C	A	58	Freons, Dry	A	A	A	A	B
3	Acetone	A	A	C	A	A	59	Fuel Oil	A	A	A	A	B
4	Acetylene	A	A	A	D	A	60	Furfural	A	A	C	A	B
5	Aluminum Chloride	D	D	A	C	D	61	Gasoline	A	A	A	A	A
6	Aluminum Sulfate	C	D	A	C	B	62	Glue	A	A	A	A	B
7	Ammonium Carbonate	A	A	A	D	A	63	Glycerine	A	A	A	A	A
8	Ammonium Chloride	D	D	A	D	D	64	Concd. Hydrochloric Acid	D	D	C	D	D
9	Ammonium Hydroxide	A	B	A	D	B	65	Hydrofluoric Acid	D	D	C	D	D
10	Ammonium Nitrate	A	B	A	D	A	66	Hydrogen	A	A	A	A	A
11	Ammonium Phosphate	C	B	A	D	B	67	Hydrogen Peroxide	A	D	C	C	B
12	Amyl Acetate	A	B	C	A	A	68	Hydrogen Sulfide	A	C	A	B	B
13	Amyl Alcohol	A	A	A	A	B	69	Kerosene	A	A	A	A	B
14	Aniline	B	D	B	C	A	70	Ketones	A	A	C	A	B
15	Arsenious Acid	A	D	A	C	B	71	Lacquers	A	B	A	A	A
16	Asphalt	A	A	A	A	A	72	Lacquer Solvents	A	B	C	A	A
17	Barium Carbonate	D	A	A	A	B	73	Lactic Acid	B	D	B	B	B
18	Barium Chloride	D	D	A	C	B	74	Lime	B	A	B	A	B
19	Barium Hydroxide	D	A	A	A	A	75	Linseed Oil	A	A	A	A	B
20	Beer	A	A	A	A	A	76	Magnesium Chloride	B	D	A	A	B
21	Beet Sugar Liquors	A	A	A	A	A	77	Magnesium Hydroxide	D	A	A	A	A
22	Benzene	A	A	C	A	A	78	Magnesium Sulfate	A	A	A	A	B
23	Benzoic Acid	A	D	A	A	A	79	Marine Atmosphere	A	D	A	A	B
24	Borax	B	A	A	A	A	80	Mercuric Chloride	D	D	A	D	D
25	Boric Acid	B	A	A	A	B	81	Mercury	D	B	A	D	A
26	Bromine, Wet	D	D	C	C	D	82	Methyl Alcohol	A	A	A	A	B
27	Butane	A	A	A	A	B	83	Methyl Chloride	D	B	D	B	A
28	Butyl Alcohol	A	B	A	A	A	84	Methyl Ethyl Ketone	A	B	B	A	B
29	Butyric Acid	A	D	C	A	B	85	Mine Waters	B	D	B	B	A
30	Calcium Bisulfite	A	D	A	C	D	86	Motor Oil	A	A	A	A	B
31	Calcium Chloride	C	B	A	A	D	87	Nickel Chloride	D	D	A	D	D
32	Calcium Hydroxide	D	A	A	A	B	88	Nickel Sulfate	D	D	A	C	B
33	Calcium Hypochlorite	B	D	A	C	D	89	Nitric Acid	A	D	A	D	B
34	Calcium Sulfate	A	A	A	A	B	90	Oleic Acid	A	B	A	B	B
35	Cane Sugar Liquors	A	A	A	A	A	91	Oxalic Acid	B	B	A	A	D
36	Carbon Dioxide, Dry	A	A	A	A	A	92	Oxygen	A	A	A	A	B
37	Carbon Dioxide, Wet	A	B	A	C	A	93	Perchloric Acid	D	D	C	D	D
38	Carbon Disulfide	A	B	C	C	B	94	Phenol	A	B	B	A	A
39	Carbon Tetrachloride	A	B	C	A	A	95	Phosphoric Acid	D	C	B	B	C
40	Carbonic Acid	A	B	A	C	B	96	Picric Acid	A	B	B	D	B
41	Castor Oil	A	A	A	A	B	97	Potassium Carbonate	B	A	A	A	A

A – Excellent B – Good C – Adequate D – Unsatisfactory

Chemical Atmosphere		Copper-Free Aluminum	Cast Iron	Corro-Free Epoxy Coating	Brass	316 Stainless Steel	Chemical Atmosphere		Copper-Free Aluminum	Cast Iron	Corro-Free Epoxy Coating	Brass	316 Stainless Steel
42	Chlorine	D	A	B	D	B	98	Potassium Chloride	D	B	A	B	B
43	Chloroform	B	C	B	A	C	99	Potassium Cyanide	D	B	A	D	B
44	Citric Acid	A	D	A	A	B	100	Potassium Hydroxide	D	A	B	C	B
45	Cottonseed Oil	A	A	A	A	B	101	Potassium Nitrate	A	A	A	B	B
46	Chromic Acid	B	B	C	D	C	102	Potassium Sulfate	A	A	A	A	A
47	Crude Oil	A	A	A	A	A	103	Propane	A	A	A	A	B
48	Ethyl Acetate	A	A	C	A	B	104	Rosin	A	B	A	A	A
49	Ethyl Alcohol	A	A	A	A	A	105	Sea Water	B	D	A	A	B
50	Ethyl Chloride	B	B	B	A	A	106	Sodium Bicarbonate	A	B	A	A	A
51	Ethylene Dichloride	A	A	C	A	B	107	Sodium Bisulfate	B	D	A	A	B
52	Ethylene Glycol	A	A	A	A	B	108	Sodium Bisulfite	B	D	A	B	B
53	Fatty Acids	A	B	A	C	B	109	Sodium Carbonate	C	A	A	A	B
54	Ferric Chloride	D	D	A	D	D	110	Sodium Chloride	D	B	A	A	B
55	Ferric Sulfate	D	D	A	D	B	111	Sodium Cyanide	D	B	A	D	A
56	Formaldehyde	A	B	A	A	B	112	Sodium Hydroxide	D	A	B	B	B
113	Sodium Hypochlorite	D	D	B	B	C	126	Tannic Acid	A	B	A	A	B
114	Sodium Nitrate	A	A	A	B	B	127	Tar	A	A	A	A	A
115	Sodium Phosphate	D	A	A	B	B	128	Tartaric Acid	A	B	B	B	A
116	Sodium Silicate	B	A	A	A	A	129	Toluene	A	A	C	A	A
117	Sodium Sulfate	A	A	A	A	A	130	Trichloroethylene	A	B	C	A	B
118	Sodium Sulfite	A	B	A	A	B	131	Turpentine	A	A	A	A	A
119	Stearic Acid	A	B	A	B	A	132	Vegetable Oils	A	A	A	A	B
120	Sulfur	A	A	A	D	A	133	Vinegar	B	B	A	A	B
121	Sulfur Dioxide, Dry	B	A	A	A	B	134	Vinyl Chloride	B	B	B	D	B
122	Sulfur Trioxide, Dry	A	A	A	A	B	135	Waxes	A	A	A	A	B
123	Sulfur Trioxide, Wet	D	D	B	B	C	136	Xylene	A	A	C	A	B
124	Sulfuric Acid	A	D	B	C	D	137	Zinc Chloride	B	B	A	D	B
125	Sulfurous Acid	B	D	B	B	D	138	Zinc Sulfate	B	B	A	C	A

A – Excellent B – Good C – Adequate D – Unsatisfactory





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BCP					*			E34
BCW				*				D18
BP					*			E38
BW				*				D11
C101						*		F13
C103						*		F13
C104						*		F14
C105						*		F14
CAS						*		F9
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CCP					*			E33
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CSM					*			E30
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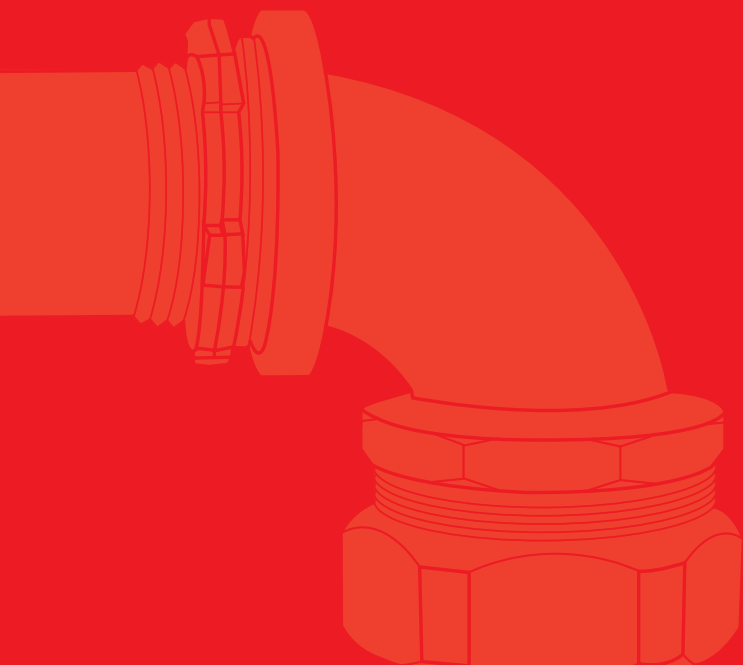
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