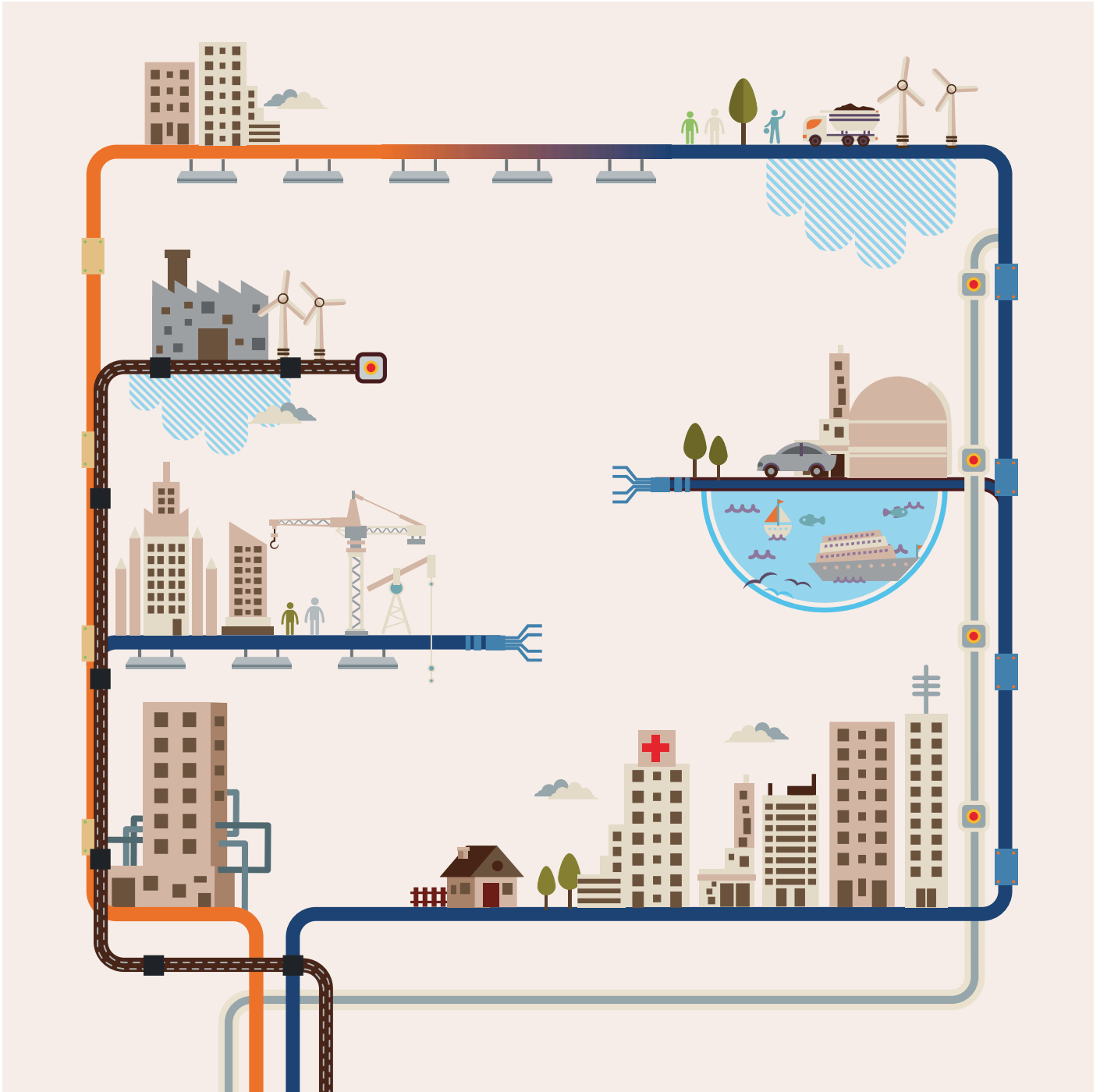


CR-LV/MV

Total Busduct Solution for Reliable and Efficient Energy Distribution



THE WORLD BEST CABLE SOLUTION LEADER

LS Cable & System supplies various cables and materials used for power grids and communication networks around the world across all industries providing its top class technology and excellent quality. The company has also developed state of the art products, such as superconductors, HVDC and submarine cables that will lead the future energy industry.

LS spun off from LG in 2003 as a group specializing in electronics, electrical systems, energy and materials.



LS Cable & System

Transmission Cable
Distribution Cable
Submarine Cable
Telecommunication Cable
Industrial Cable
Industrial Material

LSELECTRIC

Electric & Automatic Equipments

LS-Nikko Copper

Copper Refinement

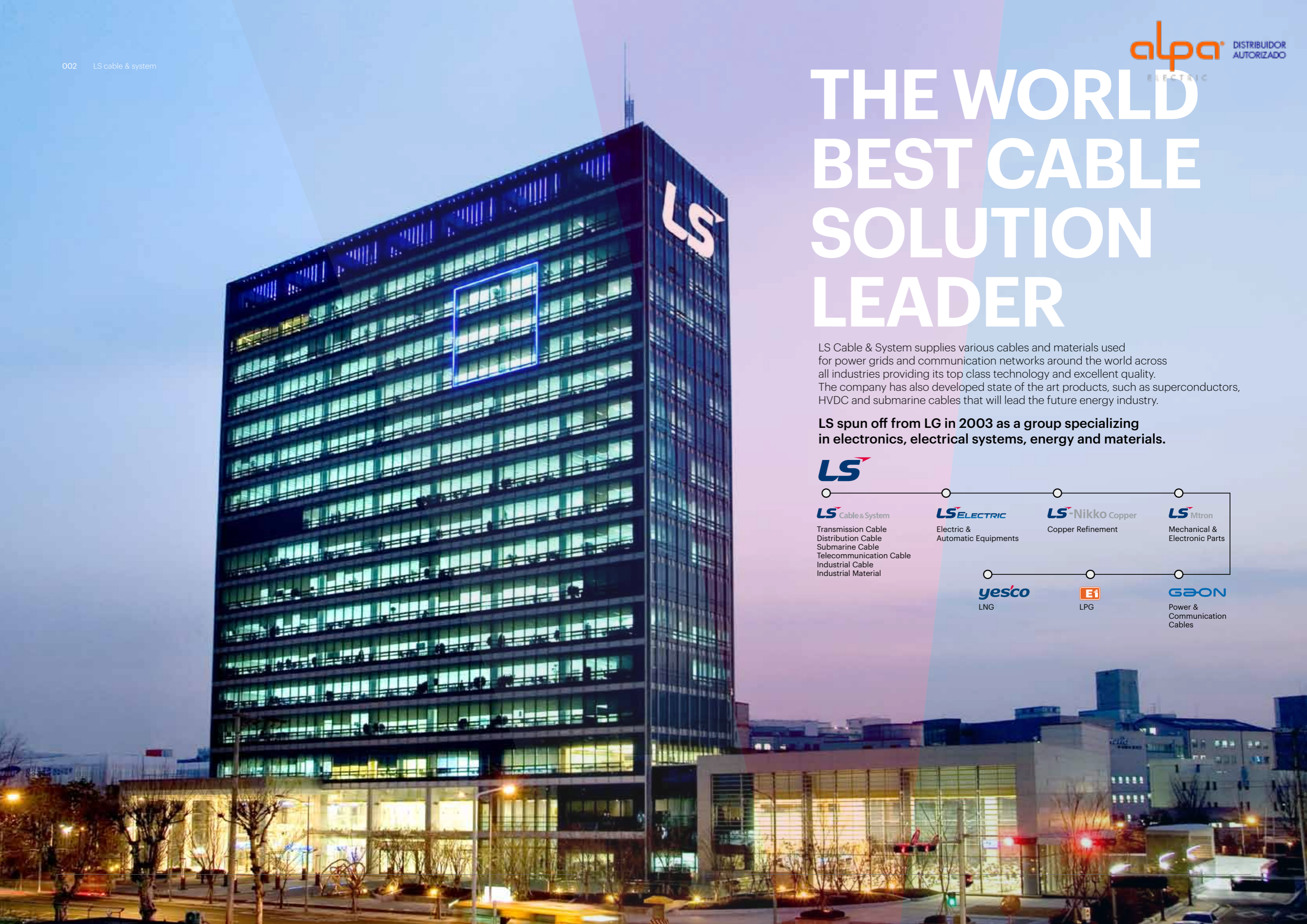
LS Mitron

Mechanical & Electronic Parts

yesco
LNG

E1
LPG

GBON
Power & Communication Cables



LS Cable & System Busduct System Solution



Buildings

The LS C&S Busduct system is easy to install, and ensures large capacity of energy transmission while providing space efficiency which makes the bus duct system ideal for high-rise buildings, office buildings, data centers and apartment complexes.



Plants

The full lineup is consisting of NSPB, CAST RESIN and SIB that can cover up to 27kv, and the lineup thus enables us to provide our clients customized designs. The system is suitable for electrical rooms and power lines, and it features a real time monitoring system using the temperature and power monitoring system.



Data Center

The flexibility and expandability as well as easy maintenance property of the busduct system provides the best alternative to improve the existing problems of the conventional power cable system of data centers, which requires constant extension, reinstallation and capacity modification of loads.



Apartment Buildings

Although the demands for more electricity for families are growing, the space for EPS area has reduced. Due to the change, the need for busducts and multi boxes have increased.



Hospitals

The stability of the power supply in the hospitals is perhaps the most vital element, because its failure could threaten the safety of patients. The Busduct system distributes larger capacity of electric power, and provides stability of the loads which make it an ideal choice to satisfy the requirements of systematization of hospital complexes and larger hospital equipments.



Airports

In order to secure the stable power supply of the airport, the busduct system provides the best customized solutions by installing high voltage busducts at the transmission, transformation and power distribution lines, and by installing low voltage busducts at the cargo, the control tower and general commercial buildings.



Stadiums

The needs for a busducts system has been growing for its benefit such as large capacity of power transmission, providing a stable power supply for various loads and an eco friendly property as well as economical quality.

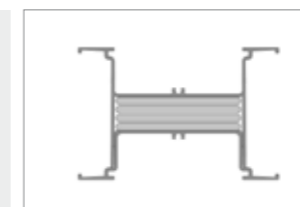
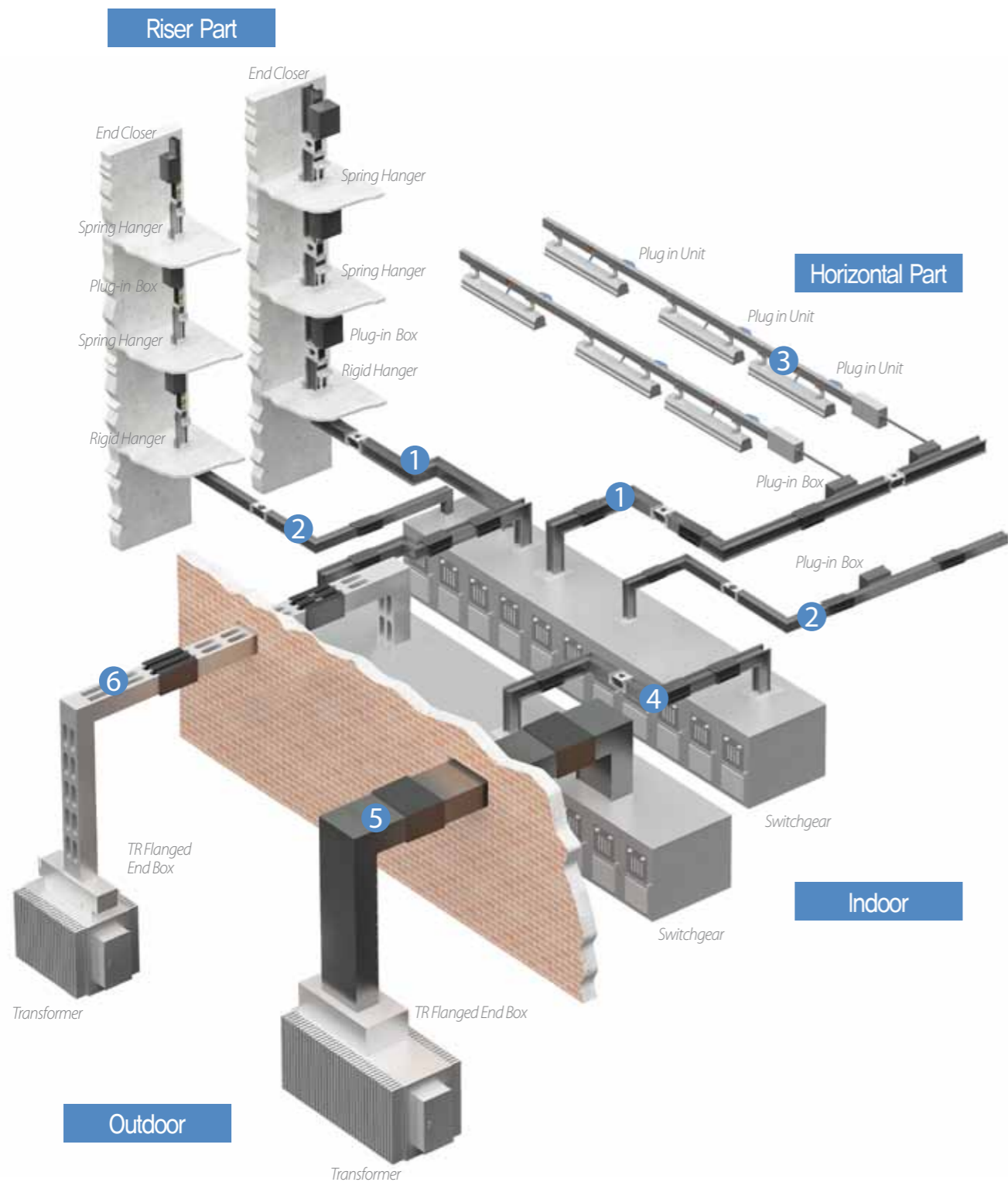


Marine & Wind

The compact and light weight design of the busduct satisfies the demands of the clients, and comes with an outstanding quack resistance property. The busduct provides stability to the operation of the facilities through a real-time monitoring system using a temperature and power monitoring system. As the needs for renewable energy grows, the demand for our busduct has been increasing steadily.

LS Cable & System Busduct Product Line-up

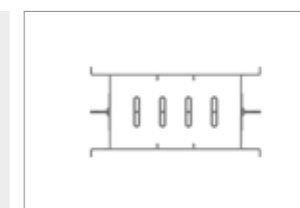
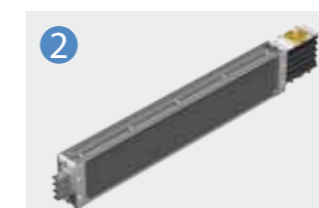
The LS Cable & System Busducts are available in a wide range of products from low current capacity LT-way (25A~63A) to large current capacity (630A~7500A), and the products enable the supply of proper capacity of power for factories and the distribution system. Our products such as the air insulated bus conducts with enhanced safety property and the cast resin busducts with resistance for high temperature, humidity and dusty environment will satisfy various application needs and provide a customized engineering service.



Ez/Ex/Ef-way

Sandwich Type (PET Film, Epoxy Coating, MICA)/AL Extrusion Housing/Standard IP54/Joint Kit

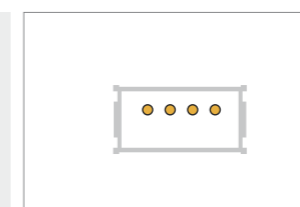
- Designed for low voltage products below AC 1000V, and between 630A to 7500A.
- The most widely used conventional model.



Mini-way

Air Insulated Type/AL Extrusion Housing/Standard IP54/Joint Kit

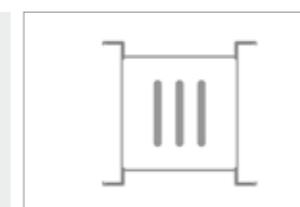
- Designed for low voltage products below AC 1000V, and between 160A and 800A.
- Ideal for small distribution system with multi distribution loads (Vertical areas of buildings, data centers, assemble factories)



LT-way

Flat Wire Type/Copper Conductor with PVC Extruded Insulation/AL Extrusion Housing/Various Plug Types/Joint Brush (It can be installed with a live wire.)

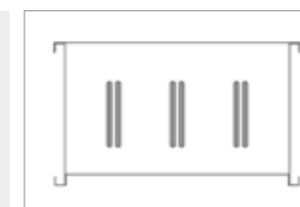
- Designed for low voltage products below AC 690V, and between 25A and 63A
- Suitable for Light bulbs, FFU and distribution for small equipments



MS/Wind-way

Air Insulated Type/ Compact NSPB Type / One-Bolting Type
Designed for low voltage products below AC 1000V, and between 1000A and 5000A

- A Hybrid incorporating NSPB and sandwich type
- Ideal for ships, wind towers and chemical plants where stability is required.



NSPB-LV/MV

Air Insulated Type/Insulated conductors separated by phase/AL, STS and Steel Housing (optional)/Indoor Type/Outdoor Type

- NSPB-LV: Designed for low voltage products below AC 1000V, and below 4000A
- NSPB-MV: Designed for high voltage products below AC 27kV, and below 4000A
- Suitable for plants where high stability is required.



CR-LV/MV

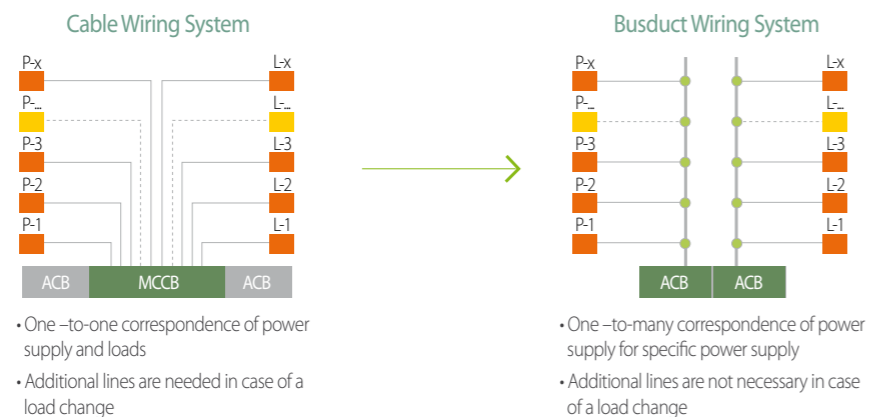
Cast Resin Type/IP 68/FR(MICA) Molding between Conductors

- CR-LV: Designed for low voltage products below AC 1000V, and between 630A and 7500A.
- CR-MV: Designed for high voltage products below AC 27KV, and below 5000A.
- The most safe bus duct suitable for plants where high stability is required.

Why Busduct?

Easy Distribution of Loads

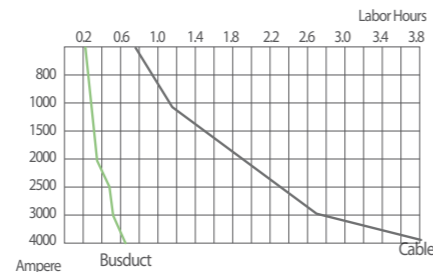
When supplying power using cables, each load has to be connected individually to cables which waste space, and an additional distribution panel is also required. On the other hand, busducts are separated from a single line at a plug box which simplifies the electric power system. A MCCB can be installed at the plug box to effectively shut off fault current.



ACB: Air Circuit Breaker, MCCB: Molded Case Circuit Breaker

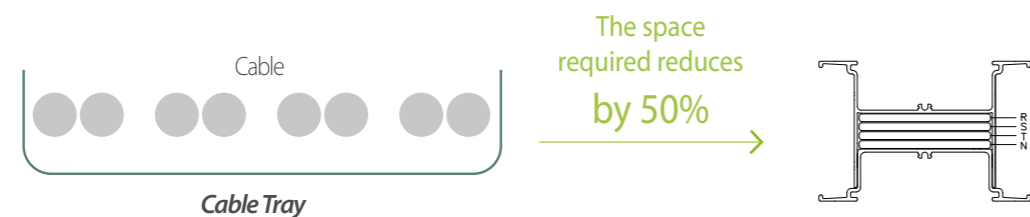
Easy Installation

Pulling and cable tray installation for cables can be difficult, and requires a longer construction period, therefore increases the cost. On the other hand, the busducts use a simple installation method to connect specific length of products, which requires a shorter installation period, and is economically friendly.



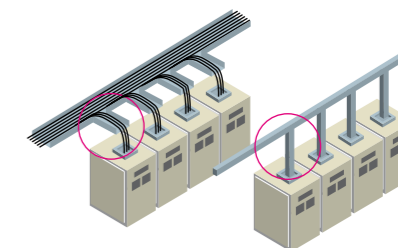
Compact

The compact design of the busduct system provides high space efficiency at up to 50% compared to the cables. While cables require larger space to install multi lines as well as additional space for coiling areas, the busducts use proper fittings to maximize space efficiency.



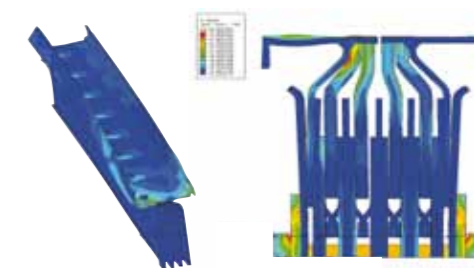
Adaptability to various installation environment with convenience

The busduct system is a power distribution system and can be applied to various complex routes. The busduct system comes with various fittings such as elbow, off-set and tee, and can transmit high capacity currents without electrical and mechanical loss.



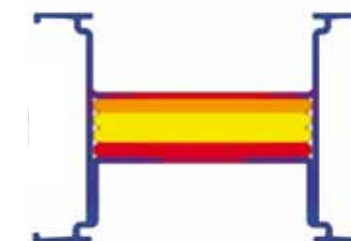
Excellent short circuit

The busduct system has a high tolerance for short circuit. Its stability and reliability make it perfect for a high capacity energy transmission system.



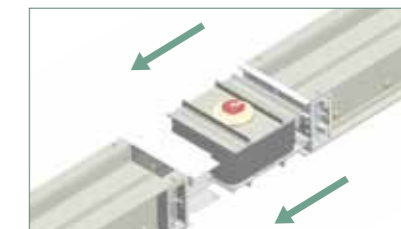
High current density

Cables are connected directly to electric loads using racks. Its maximum allowable current ampacity limit is 1000A, and requires additional lines for a higher current. Each line of the busduct system can transmit up to 7500A, and provides high current density.



Easy maintenance

The design of the busduct system makes it easy to detect abnormalities during installations, and ensures easy maintenance. When humidity or dust causes a malfunction on the system, the easy-to-maintain design allows replacing only the damaged part.



Outstanding features of EMC and EMI

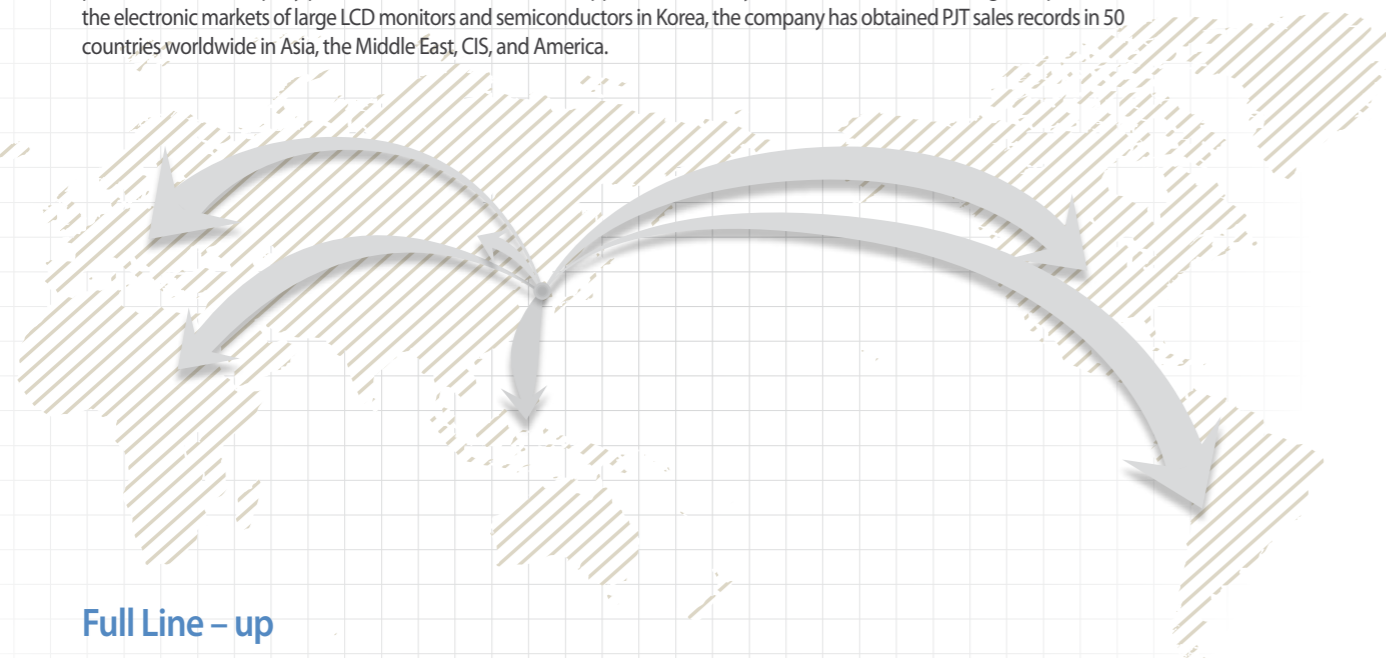
Unlike cables, the busduct system does not require a shield, instead Busduct, the housing itself performs as a shield which enhances the features of EMC and EMI.



Why LS Cable & System Busduct

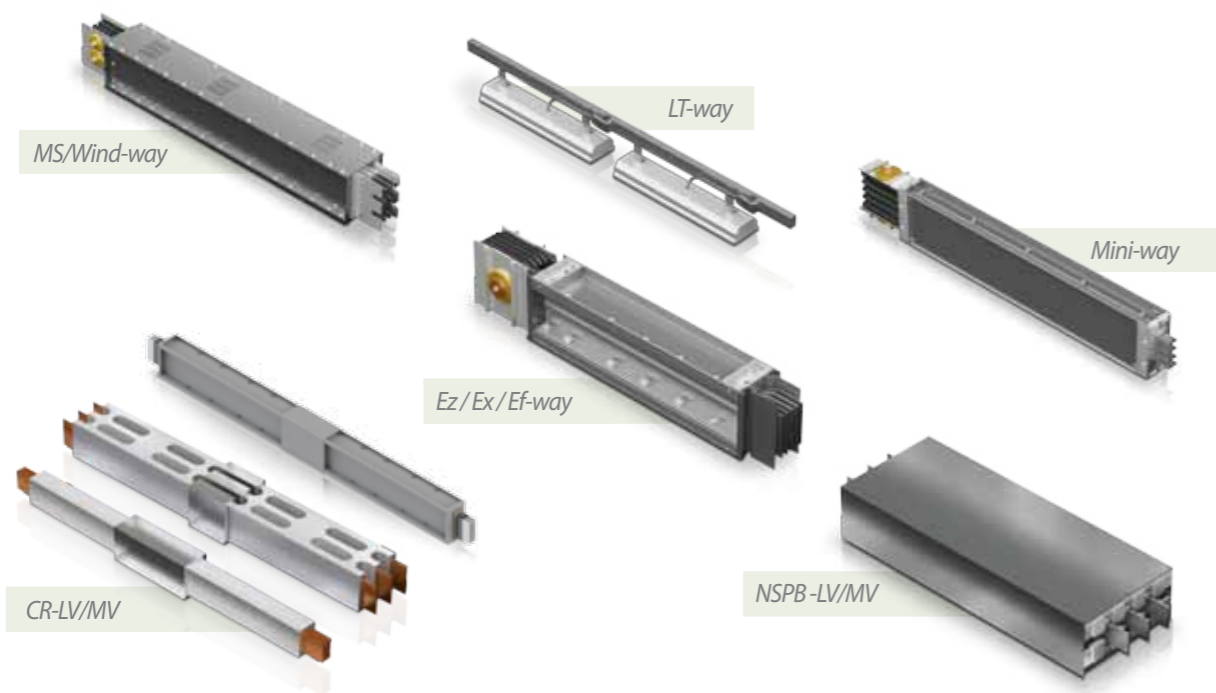
Global Top Tier

LS Cable & System has been a long-time leading Busduct provider in Korea. With extensive experience and product line competitiveness, the company provides total solutions for each application to satisfy the needs of its clients. Using its expertise in the electronic markets of large LCD monitors and semiconductors in Korea, the company has obtained PJT sales records in 50 countries worldwide in Asia, the Middle East, CIS, and America.



Full Line – up

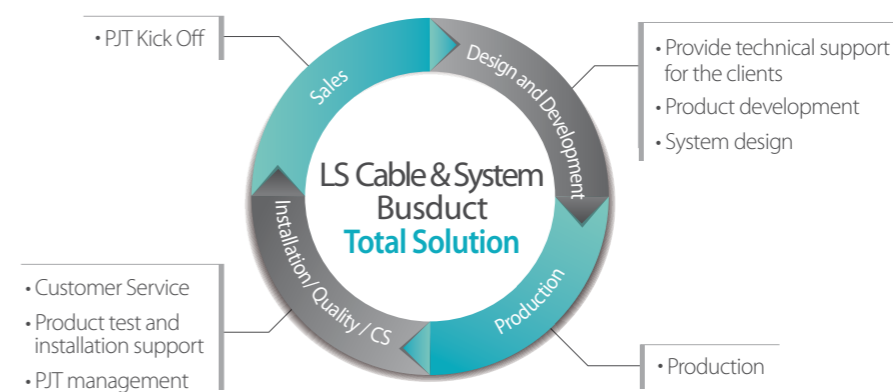
LS Cable & System is the only global company that provides a full line-up of busducts, from low to high voltage and from low to high capacity, to satisfy every need of its clients and provide an optimized solution for each PJT.



Total Solution

- Once PJT launches, our engineer will participate to guide the clients from the initial period in order to produce the best system for our clients, and to respond quickly when the system is changed.
- Our engineers from each department provide full support in design, production, installation and testing at in-bound to satisfy our clients.
- We operate the CS Team, a task force for the busduct system, to make sure efficient after-sale service and maintenance service.

Process



Technical Excellence

Unparalleled Reliability

- Provides standardized design, and owns numerous certifications such as UL Certification, Quack Proof Certification, and Impact Resistance Certification
- The CS team, a task force for the busduct system, provides efficient after-sale service
- Safe use in hazardous zones
- Manage the system using a unique temperature monitor sensor
- Semi-permanent service life
- Used qualified insulation such as epoxy and PET film for efficient insulation

Eco friendly

- Fully recyclable
- Halogen free
- Does not contain RoHS 6 hazardous substance
- No toxicity in fire & Fire-Retardant
- Non Explosive

Total Engineering Technology

- Provide the optimal design by experienced engineers
- Design following analysis and inspection of CAE
- Unique and exclusive design program for the busduct system
- Design based on structure stability inspection
- The excellent heat –radiating property of the aluminum housing, which ensures large capacity of power transmission
- Low Weight & Low cost
- Easy installation
- Deployable where access is difficult
- Automated epoxy insulation facility
- Unique joint kit connections
- Reduce electromagnetic
- BPMS (Busduct Power Monitoring system)
- BTMS (Busduct Temperature Monitoring system)

Overview

The CR-way

The LS C&S CR-way is available from a low voltage of AC 1000V or less, up to a high voltage of 27kV. It is suitable for current capacities between 630A to 7500A (high voltage product 120~5000A). The epoxy resin molding performs as insulation and housing with an IP68 rating. The CR-way is suitable for plants and factories where large capacity of power is required. It is an ideal distribution wiring system for outdoors, humid and dusty areas and any place where chemicals are frequently used.



Anticorrosion

The epoxy insulation of the CR-way is highly resistant to erosion and corrosion. Additional housing can be applied to maximize.



Waterproof

The CR-way comes with a standard IP68 rating, and is protected completely against water and particles. It is safe to use in an inadequate environment.



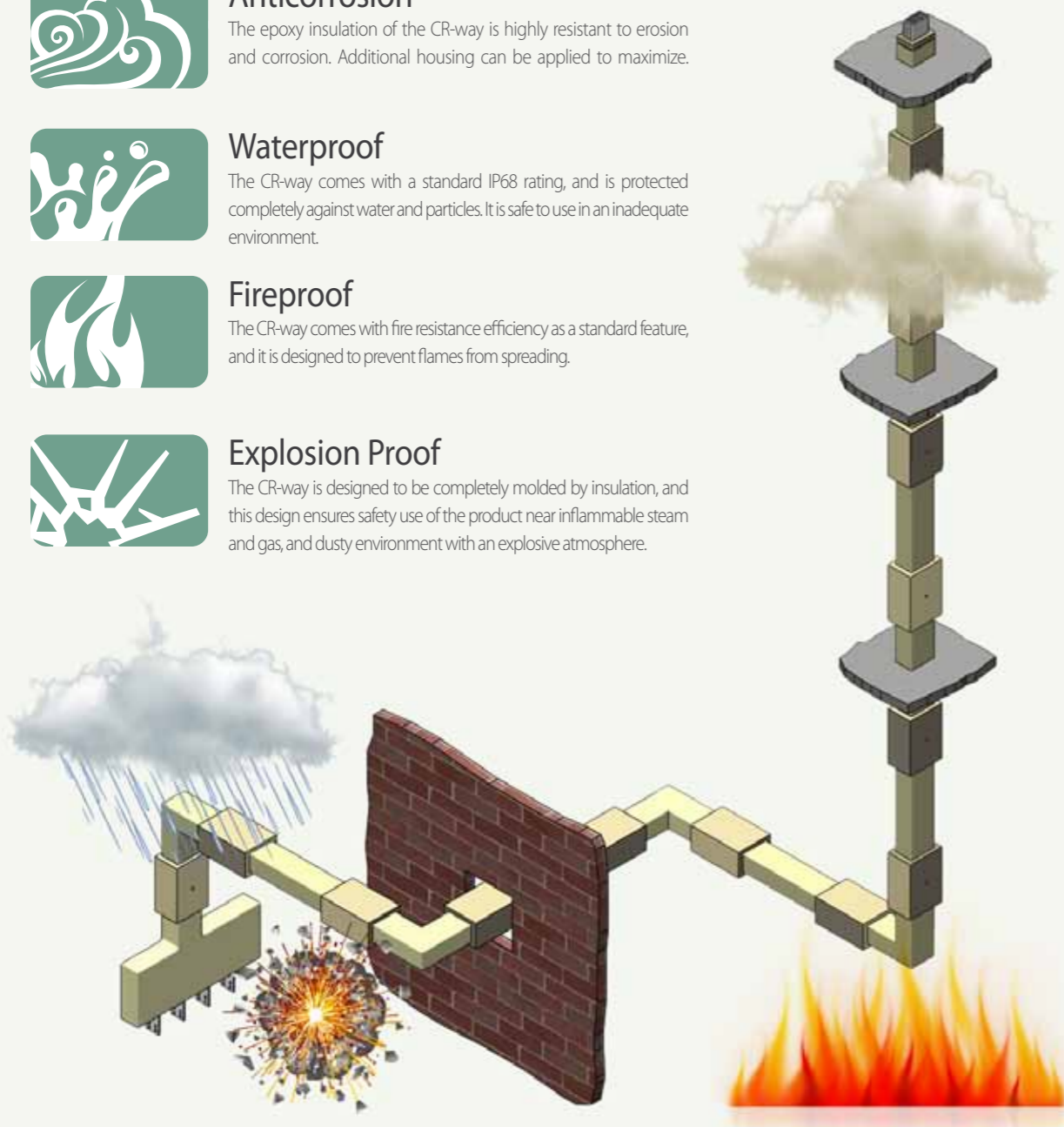
Fireproof

The CR-way comes with fire resistance efficiency as a standard feature, and it is designed to prevent flames from spreading.



Explosion Proof

The CR-way is designed to be completely molded by insulation, and this design ensures safety use of the product near inflammable steam and gas, and dusty environment with an explosive atmosphere.

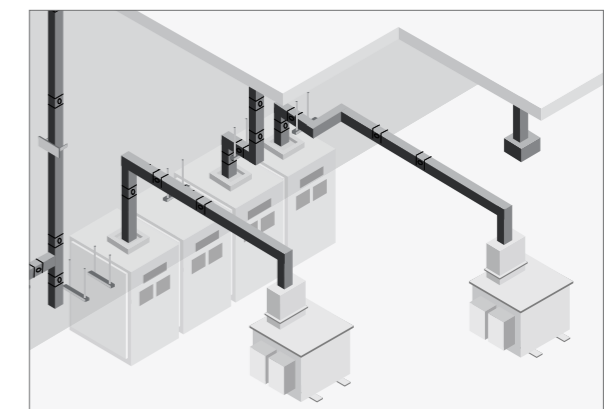


Application



Plant, oil & gas etc.

- Suitable for indoor and outdoor installation, and areas where high degree of protection is required
- Petrochemical plants



Ships etc.

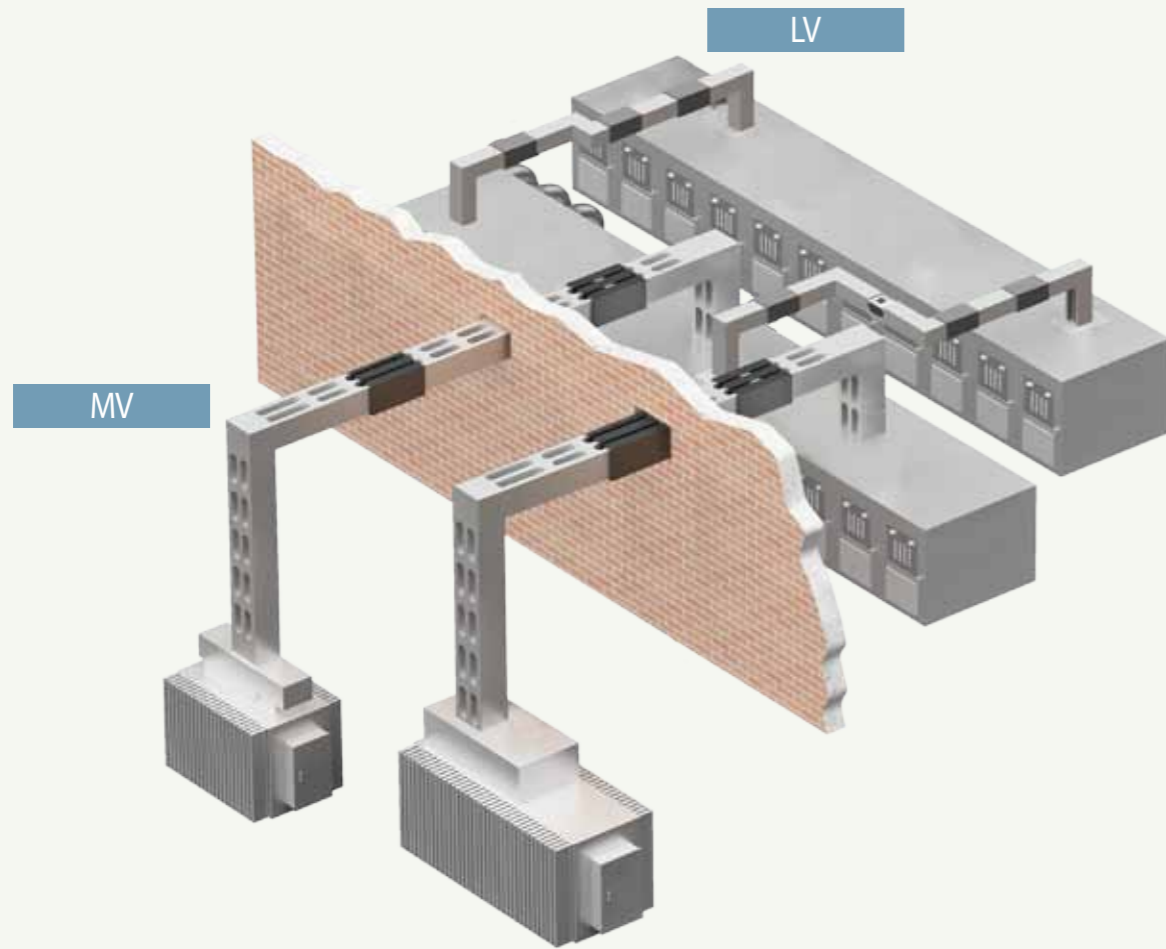
- Can be applied where salt concentration is high including sea water
- Electrical room on a ship



Underground Utility Tunnels etc.

- Guaranteed to provide stable supply of power in an extreme environment of dust and other foreign substances
- Exposing the installation environment increases stability for the user
- No possibility of getting damaged or destroyed.





Excellent Stability

The CR-way is designed to be completely molded by insulation. This design provides explosion resistance as well as excellent fire resistance capacity by preventing flames from spreading.



Eco Friendly

The CR-way has acquired an RoHS certification, and only uses components without hazardous substances such as lead, cadmium, mercury, chrome, PBBs and PBDEs.



High Degree of Protection

Thanks to the epoxy resin molding, the CR-way comes with a standard IP68 rating. The product is completely protected against water and particles, and highly resistant to erosion and corrosion.



Standard

- CR LV
 - IEC 61439-1 [(previous standard)]IEC 60439-1] Low-voltage Switchgear & Controlgear Assemblies
 - IEC 61439-6 [(previous standard)]IEC 60439-2] Busbar Trunking Systems
- CR MV
 - IEC 62271- Part 201 AC insulation-enclosed switchgear and controlgear for rated voltages above 1kV and up to and including 52kV



Permissible Operating Temperature

The cross-section areas of the conductor and housing profile are designed to meet the standard permissible operating temperature of IEC 61439-1, 6 (LV), and IEC62271 (MV). Therefore the temperature rise limit of the housing is within LV-55K or less, and MV-50K or less of the ambient temperature.



Service Condition

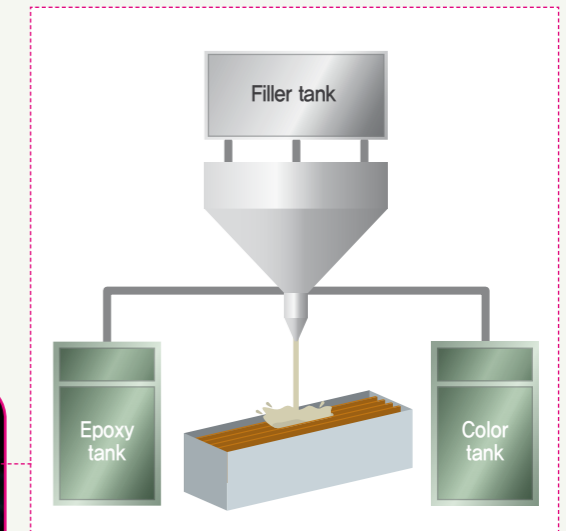
- Ambient Temperature: -15° C to 55° C
 - Relative Humidity: 95% or below
- (When the service condition of the environment does not meet the requirements listed above, please contact our design team.)

The LS C&S CR-way is produced by an automated molding system, therefore, the electrical and mechanical property of the CR-way is excellent. By applying the required amount of resin and filler using an automatic measuring system does it ensure superb quality of the product.

[01. Assembly of Molding Flasks and Booth Bars]



[02. Epoxy Resin Molding]



[03. Curing and Removing]



[04. Inspections and Shipping]



The LS C&S CR-way is produced by highly experienced engineers. The company performs electrical tests, design tests and in site tests on the finished products in order to provide the best quality products to its clients.



Conductors

The CR-way uses either copper conductors with conductivity over 98% and purity over 99.9%, or aluminum conductors with conductivity over 61% and purity over 99.6%. The connection of the conductors is tin-plated in order to reduce contact resistance and to prevent corrosion of the connection. (A silver plated option is available.)



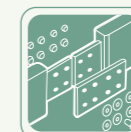
Joint Kit (CR-LV)

The CR-way LV uses the joint kits. In order to ensure easy maintenance and reliability, double-headed bolts and visible labels (Red tags) are used to check the application. A disc spring allows even connection of the contact surface. (Connecting torque 800~1000kgfcm) CR-LV joint kit is compatible with I-series, E-series Busduct using.



Insulation Properties

The CR-way uses epoxy resin molding which works as insulation as well as housing, and it comes with a Class B (130°C) rating. For outdoor installation, metal housing and a sun shade are applied to prevent corrosion of the molding.



Joint (CR-MV)

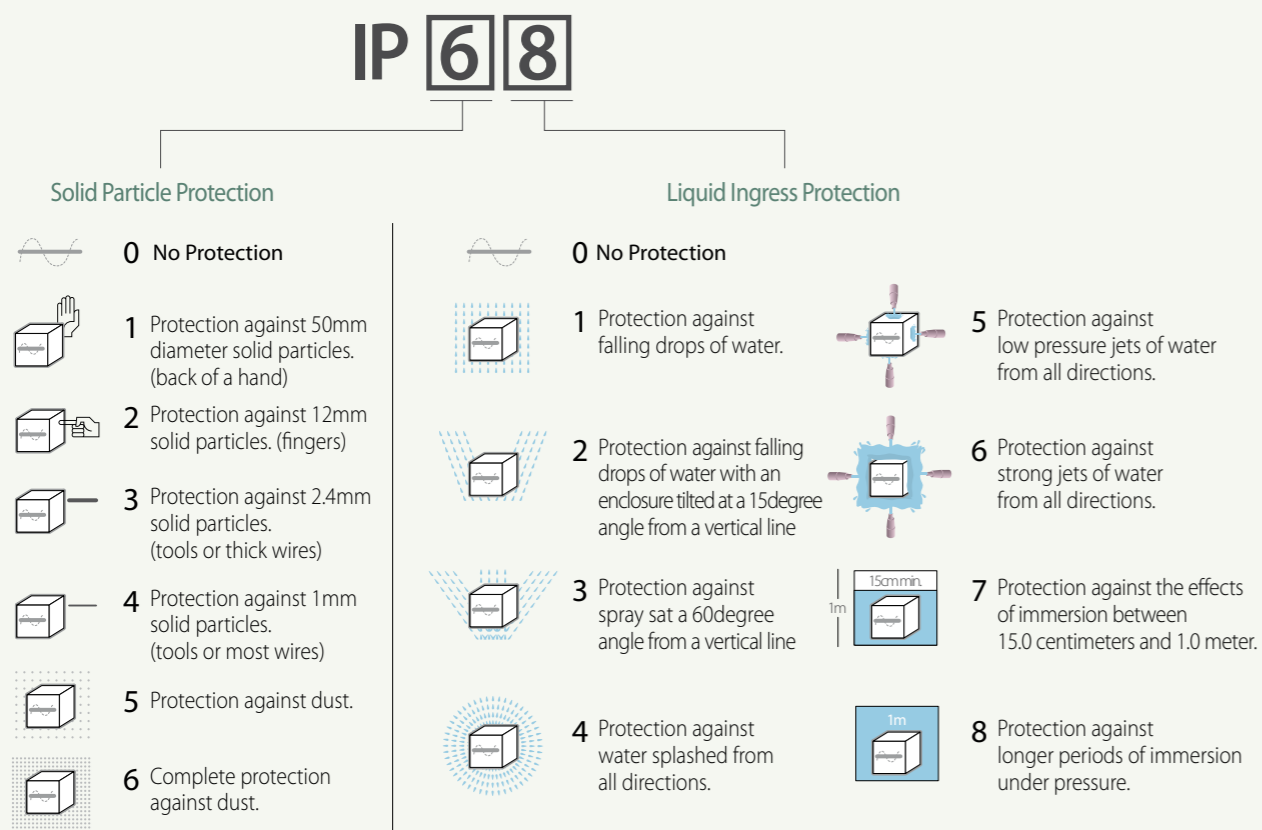
The joint plate of each phase is used to connect and mold, and the design of the joint provides stable performance of the system.

IP Code (Degree of Protection)

IP Code is an international protection degree code provided by IEC 60529(Degree of Protection Provided by Enclosure-IP Code)

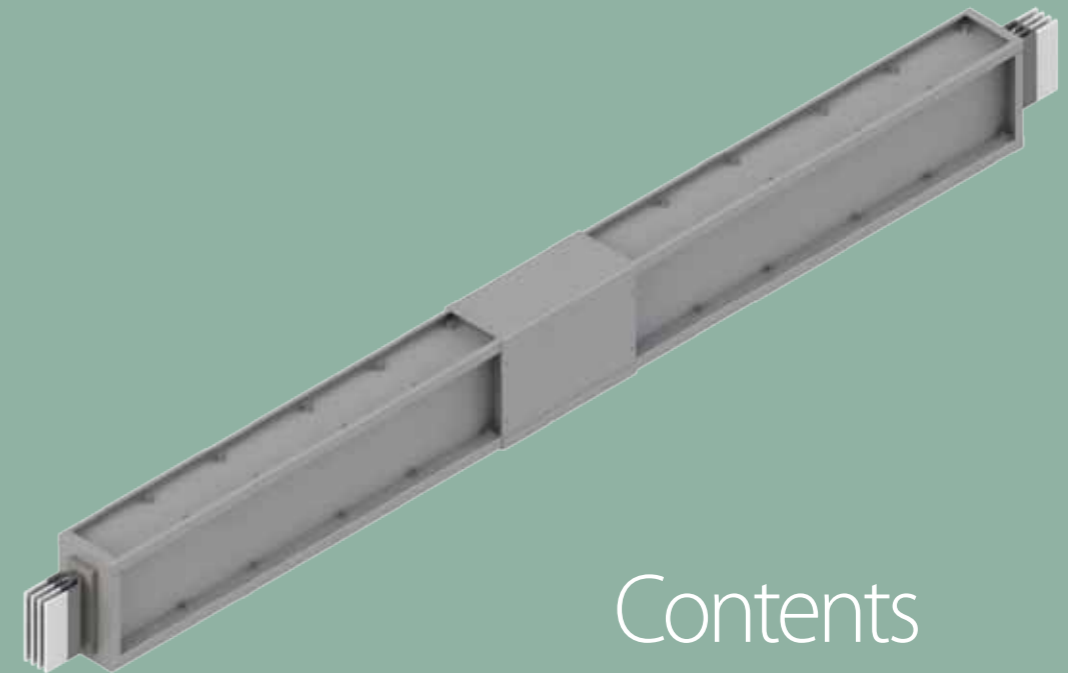
[NEMA STANDARD: • IP54=NEMA 12, 12K, 13 • IP55=NEMA 3, 3X, 3S, 3SX • IP66=NEMA 4.4X • IP67=NEMA 6
 * As the standard differs, it is a similar substitution, nota 1:1 substitution.]

The standard feature of the CR-way comes with a standard IP68 rating. The CR-way is suitable for humid and dusty areas, chemical plants and areas where condensation may occur (exposed section between indoors and outdoors).



CR-LV-II

LS C&S Busduct System Catalogue



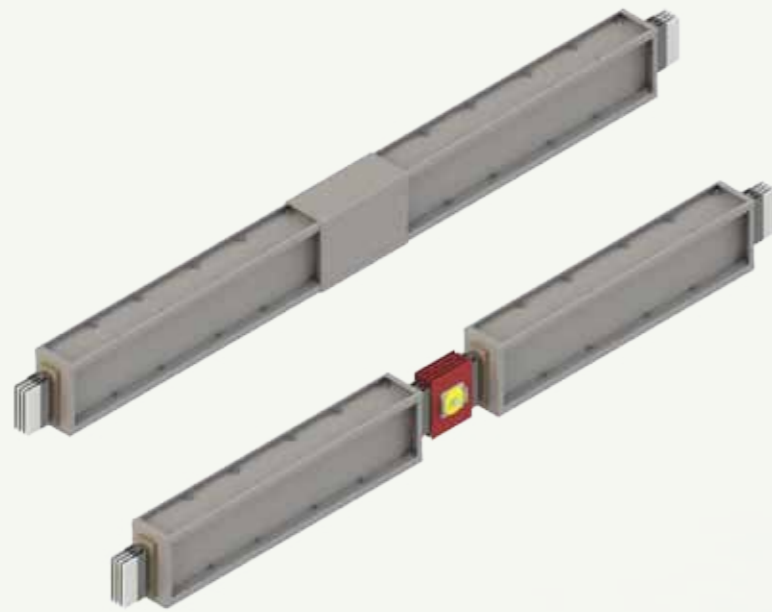
Contents

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 - Hanger 24
 - Plug-in Unit 25
 - Etc 27
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 - Temperature Rise 29
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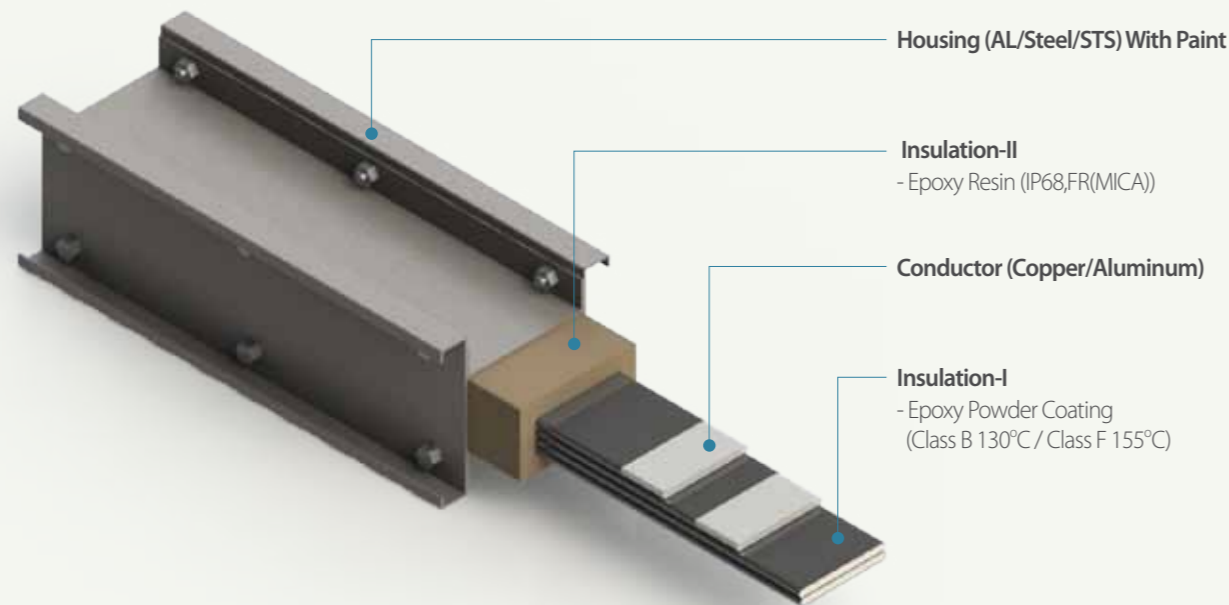
Basic Structure

CR-LV-II consists of conductors insulated using Class B rated(130°C) epoxy powder coating(Fluidized bed epoxy; over 500um), metal housing and epoxy resin; thickness over 11mm, molded between the insulated bus bars and the housing.

- Improved waterproof, fireproof, and explosion-proof function, which allows electrical stability and durability than Sandwich type Busduct.
- Improved insulation performance, better impact-resistant, and lightweight which provides easier installation and better performance compared to other typical cast resin Busduct without metal housing.



Configuration



Joint Kit

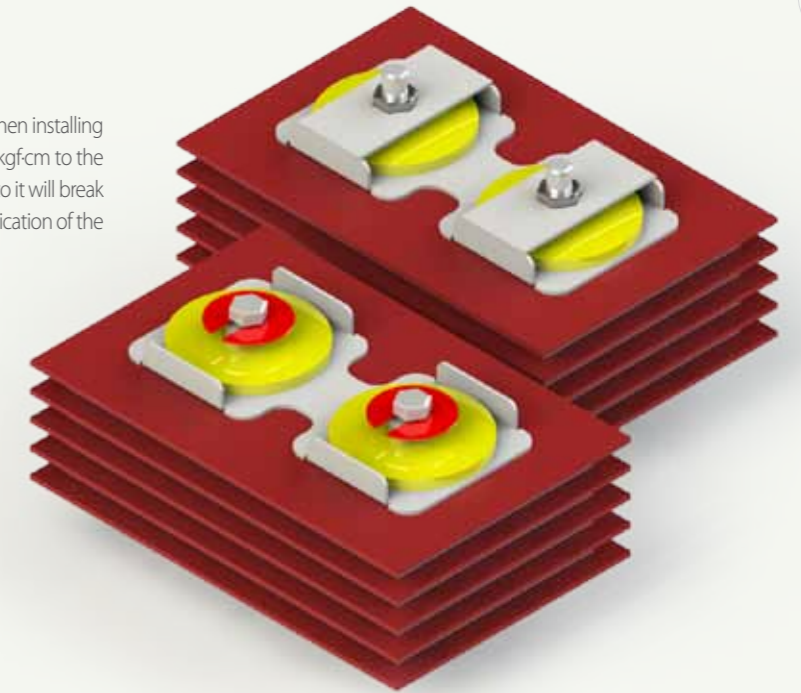
The CR-way uses a joint kit method.

Feature

Both joint plates of the joint kit and the conductors are tin plated. (A silver plated option is available.) It prevents discoloration and corrosion of the joint plates. In order to ensure easy maintenance and reliability, double-headed bolts and visible labels are used to check the application, and a disc spring allows an even connection of the contact surface.

Double Head Bolts

Double-headed bolts are used to ensure a proper torque level when installing the joint kit. If a torque wrench applies a pressure of 800 to 1000kgf-cm to the outer bolt head, the head of the outer bolt and the tag attached to it will break off on its own. Thus, it allows visual inspection for the proper application of the bolts at the connection.



The number of double-headed bolts required for each joint kit specifics

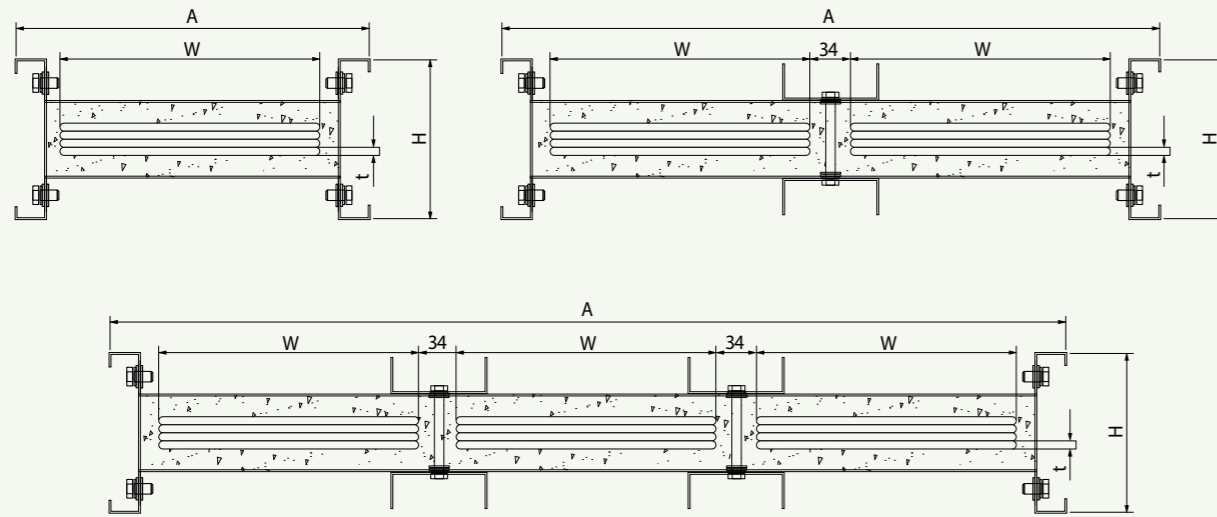
Number of DH bolts		1	2	3	4
Ampere (A)	AL	630, 800, 1000, 1250	1600, 2000, 2500	3200, 3600, 4000	5000, 6300
	CU	630, 800, 1000, 1250, 1600, 2000	2500, 3200, 3600, 4000	5000	6300, 7500

! Precaution

Be sure to clean the interior of the connections prior to installation. Use caution not to twist the joint kit while inserting it, and after it is inserted. An excessive pressure during installation may break the kit. Make sure that the double-headed bolts and red tags are cut off. If a proper torque is not applied at the connection, it may cause heat during operation.

Feeder

Although the standard length of the LS C&S CR-LV Busduct feeder is 3 meters, it can be adjusted to the installation environment, or on request.

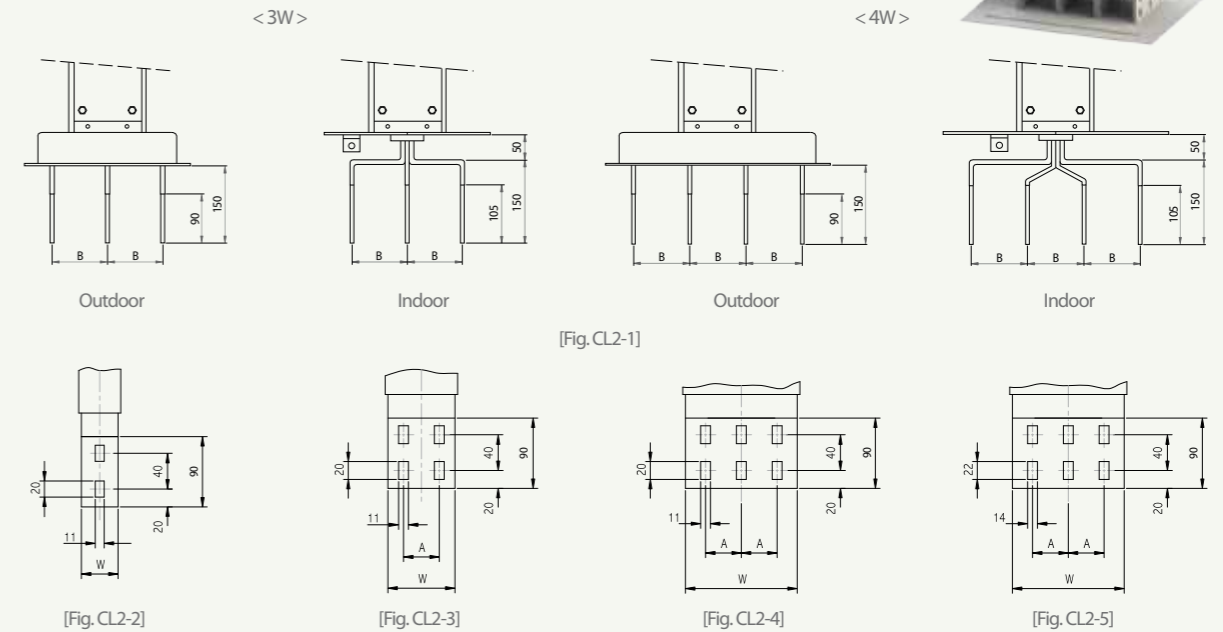


3W					4W								
Amper(A)	Dimension(mm)				Amper(A)	Dimension(mm)							
	t	W	A	WGT		t	W	A	WGT				
AL	6.35	41	121	21.8	AL	6.35	41	121	22.8				
		62	142	25.6			62	142	26.8				
		86	166	29.7			86	166	31.3				
		108	188	33.6			108	188	35.5				
		164	244	43.6			164	244	46.4				
		210	290	51.8			210	290	55.3				
		(2)126	386	67.1			(2)126	386	71.7				
		(2)164	442	80.8			(2)164	442	86.5				
		(2)184	482	87.9			(2)184	482	94.2				
		(2)210	534	97.7			(2)210	534	104.9				
		(3)184	700	128.7			(3)184	700	138.3				
		(3)210	778	142.6			(3)210	778	153.3				
		CU	6.35	41			121	27.1	CU	6.35	41	121	29.7
				57			137	31.8			57	137	35.3
73	153			36.9	73	153	41.5						
108	188			47.7	108	188	54.3						
145	225			59.0	145	225	67.6						
195	275			73.9	195	275	85.4						
(2)108	330			89.4	(2)108	330	102.6						
(2)126	366			100.1	(2)126	366	115.3						
(2)145	404			111.5	(2)145	404	128.9						
(2)195	504			143.6	(2)195	504	166.9						
(3)164	640			182.6	(3)164	640	212.1						
(3)195	733			210.9	(3)195	733	245.7						

* 5W (4W+50%E or 4W+100%E or 3W+200%N) is also available with the same dimension of 3W/4W.
* H: 3W, 4W, 5W = 140mm

Flanged End

The flanged end is connected to either a transformer or a panel. Dimension details are shown below.



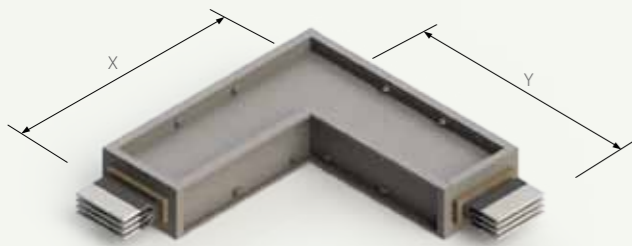
Amper(A)	Dimension(mm)				Fig.				
	t	W	A	B					
AL	6.35	41	~	100	CL2-2				
		62	~						
		86	40		CL2-3				
		108	50						
		164	60		CL2-5				
		210	70						
		(2)126	40		130	CL2-4			
		(2)164	60						
		(2)184	60						
		(2)210	70						
		(3)184	60						
		(3)210	70						
		CU	6.35			41	~	100	CL2-2
						41	~		
57	~			CL2-3					
73	40								
108	50			CL2-4					
145	50								
195	70			CL2-5					
(2)108	50								
(2)126	40			130	CL2-3				
(2)145	50								
(2)195	70								
(3)164	60								
(3)195	70								

Fittings

Fittings including the elbow and tee are designed to adapt to any change made to the direction of the busduct installation. The same features have been applied to the fittings of the CR-way, and the size specifications are shown below. (The standard dimension of each fitting is the same as the dimension shown in the table below. Please contact our design team for information about the minimum dimension.)

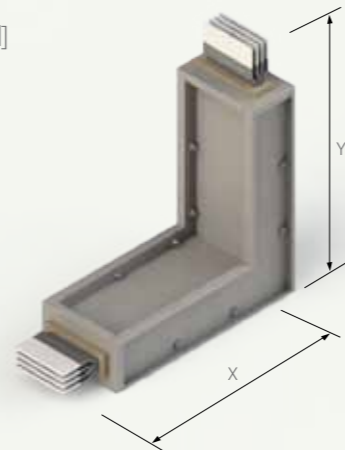
Elbow

[Vertical]



Ampere(A)	Dimension(mm)		
	X	Y	Z
1 table	500	500	500
2 tables	600	600	600
3 tables	700	700	700

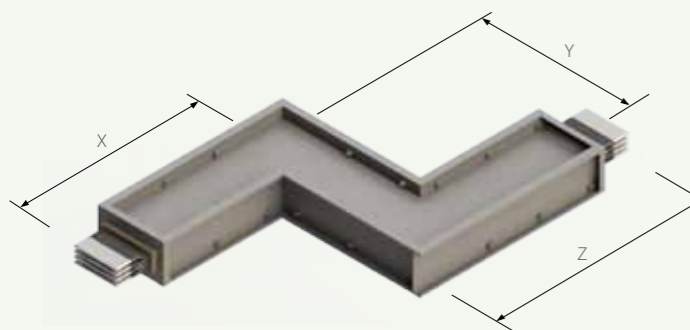
[Horizontal]



Ampere(A)	Dimension(mm)		
	X	Y	Z
1 table	500	500	500
2 tables	500	500	500
3 tables	500	500	500

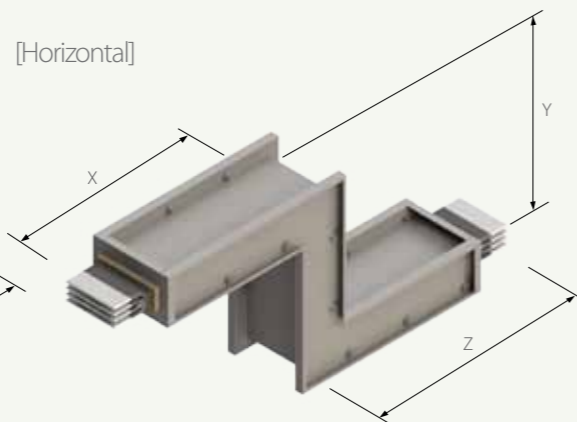
Offset

[Vertical]



Ampere(A)	Dimension(mm)		
	X	Y	Z
1 table	500	500	500
2 tables	600	500	600
3 tables	700	500	700

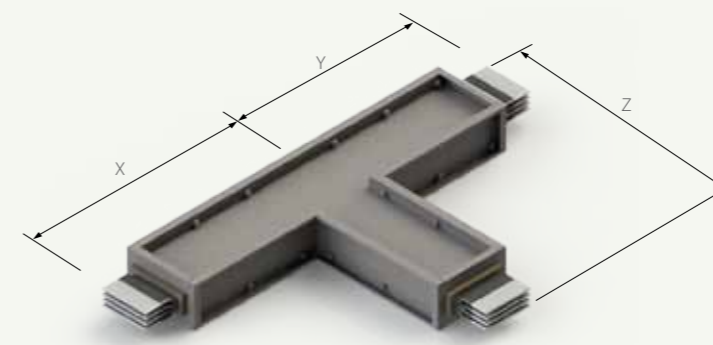
[Horizontal]



Ampere(A)	Dimension(mm)		
	X	Y	Z
1 table	500	500	500
2 tables	500	500	500
3 tables	500	500	500

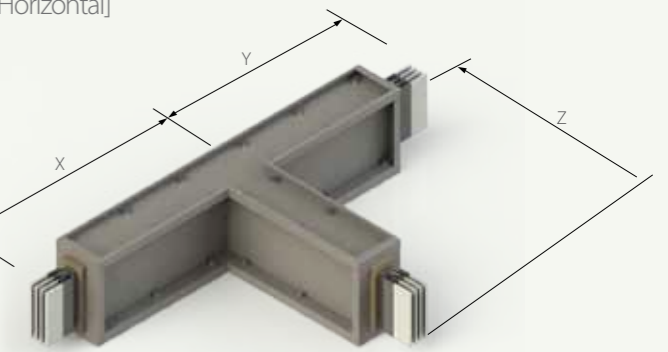
Tee

[Vertical]



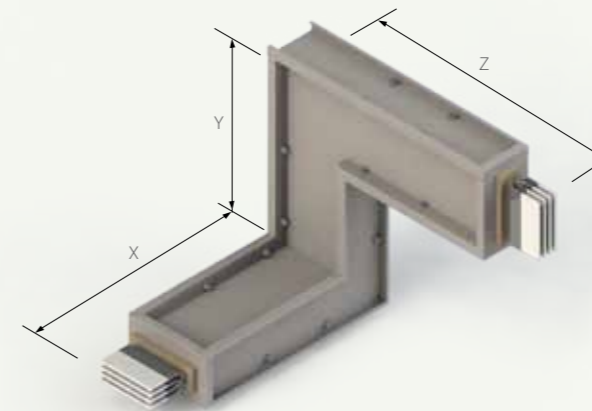
Ampere(A)	Dimension(mm)		
	X	Y	Z
1 table	500	500	500

[Horizontal]



Ampere(A)	Dimension(mm)		
	X	Y	Z
1 table	500	500	500
2 tables	500	500	500
3 tables	500	500	500

Combination



Ampere(A)	Dimension(mm)		
	X	Y	Z
1 table	500	500	500
2 tables	500	600	600
3 tables	500	700	700

Flanged End Box

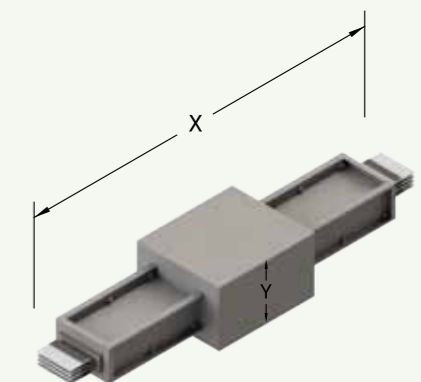


Expansion

The fitting is designed to allow a 60mm extension of a straight line.

Rating	Standard Dimension(mm)	
	X	Y
630~6,300A	1,500	360

* Flexible bars installed inside

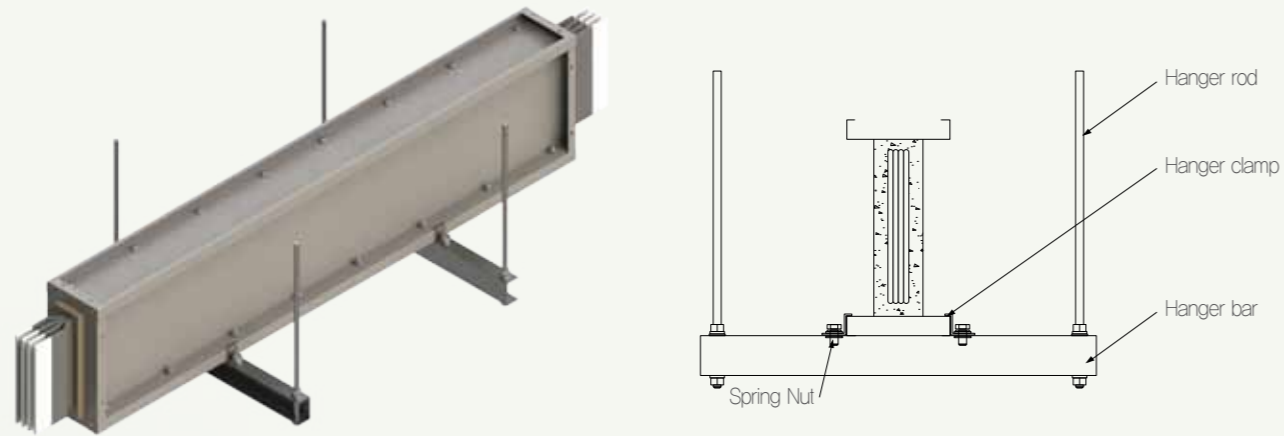


Hangers

Both horizontal and vertical hangers are available for the CR-LV-II depending on the installation environment.

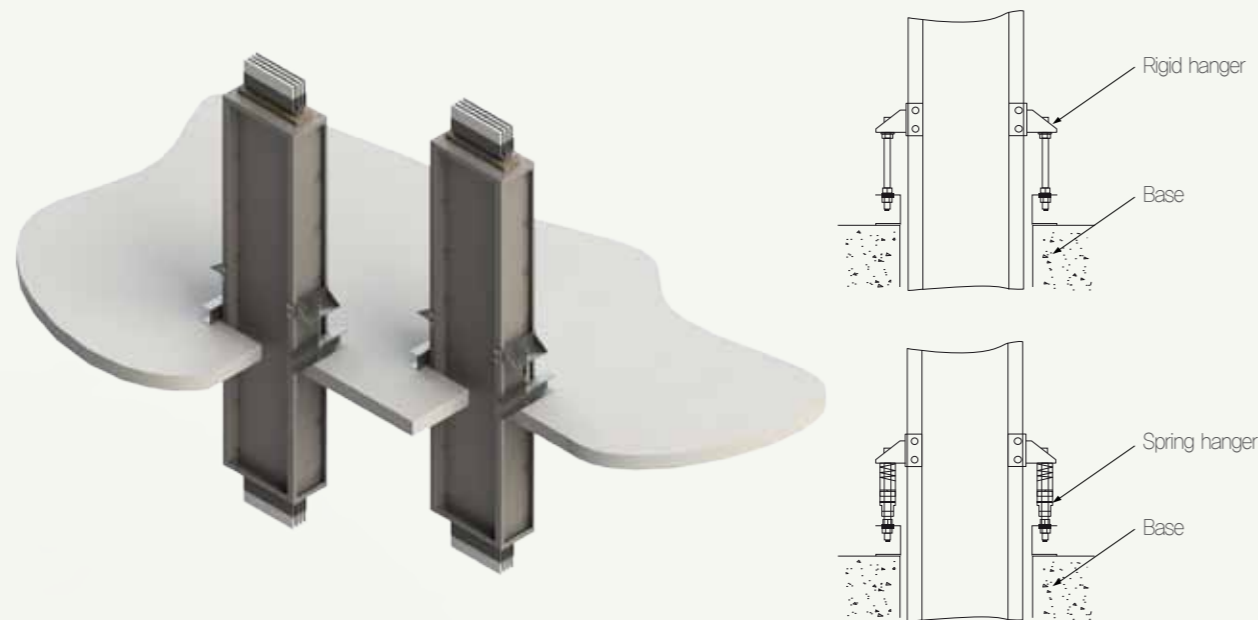
Horizontal Hangers

The standard horizontal installation method of the CR-LV-II requires two supports for each product. The standard 3 meter busducts are designed to be installed at 1.5-meter intervals, and the space between the hangers should not surpass 2 meters at the most. (Please contact the design team for further information.)



Vertical Hangers

For vertical installation of The CR-LV-II, install the vertical hangers first, and fix the Busducts on the hangers for better support.



Plug-in Unit

Straight Lengths: Plug-in / Tap-off Intervals

This busduct comes with an overcurrent blocking device (MCCB, fuse) in order to protect the wires while distributing loads. The required minimum intervals of a plug-in(800A or less) and a tap-off(1000A, 1250A, 1600A) are shown below. A length longer than the required minimum intervals can be predestinated on request.

Plug-in Feeder

MCCB Frame (AF)	Plug-in Hole Intervals(P) (mm)
50, 125, 250	650
400	900
630, 800	1,000
1000, 1250	1,300

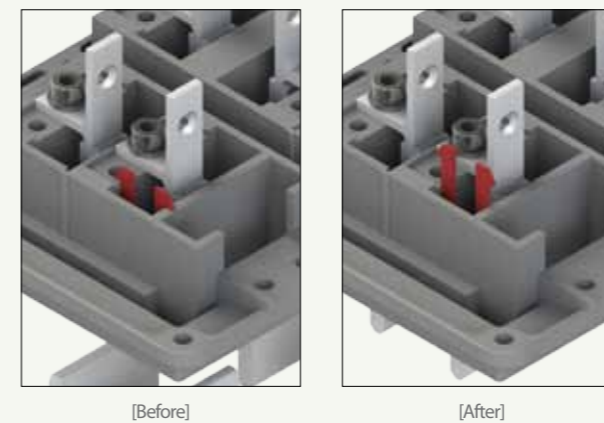
Plug-in Box

MCCB Frame (AF)	Dimensions(mm)				Fig.
	W		D	H	
125	200	230	200	360	E5-1
250	200	230	200	360	
400	230	280	200	800	
630, 800	300	370	200	800	E5-2
1000, 1250, 1600	400	450	230	1200	



Inspection Pin

This pin is used to check the insertion of the box. *Available from 400AF box



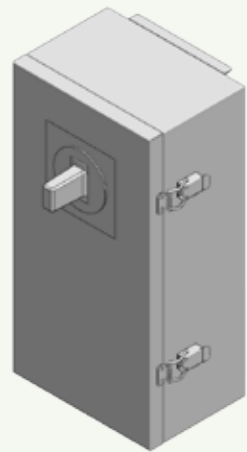
Plug-in Unit

Plug-in Box Attachments

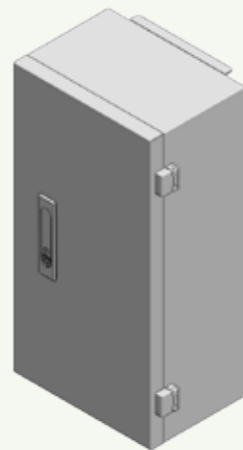
Attachments such as CT, TD and PT can be installed in a plug-in box to control and to supervise the current, voltage and wattage remotely.

Door Types of the Plug-in Unit

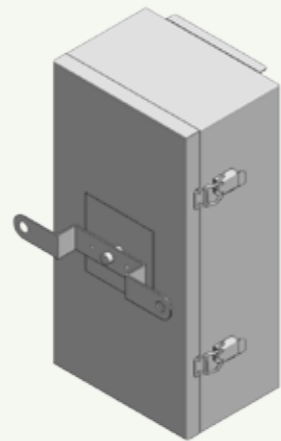
Various design of doors for the plug-in box is available to satisfy the demands of our clients. The available types are shown below.



External handle



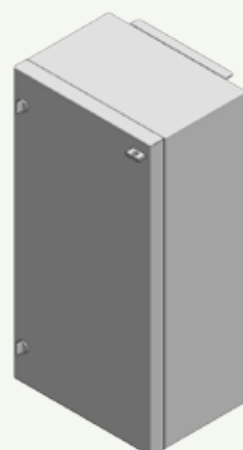
Push Button



External lever interlock



Bolt Fastening



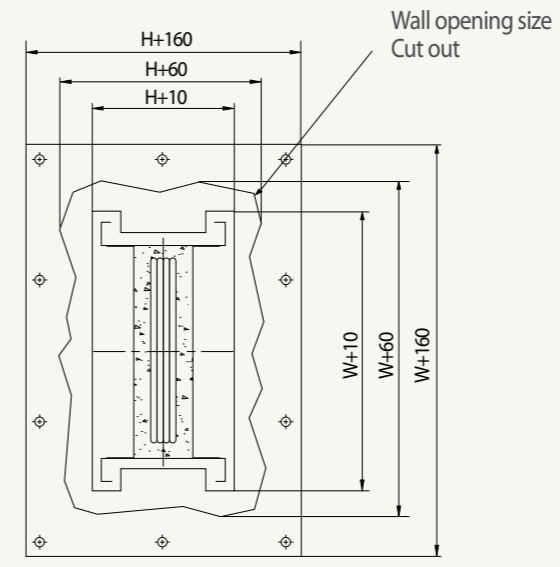
Key Lock



Outlet

Etc.

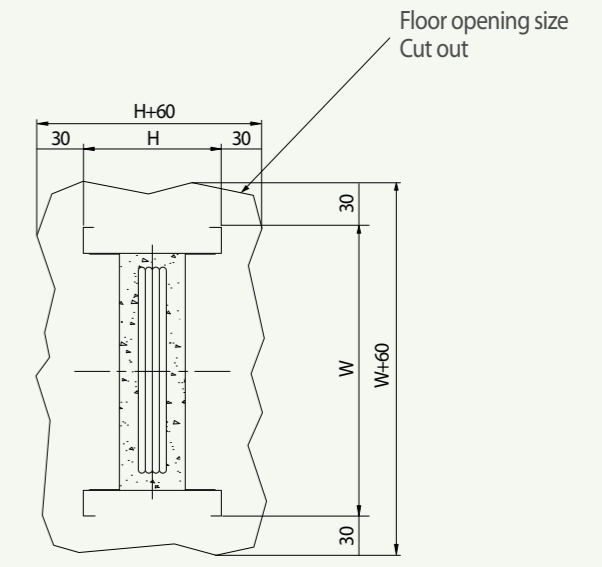
Wall Flange



A wall flange is used to seal the gaps produced during installation of busducts at the walls, ceilings and floors. The company does not provide glass wool or fire forms.

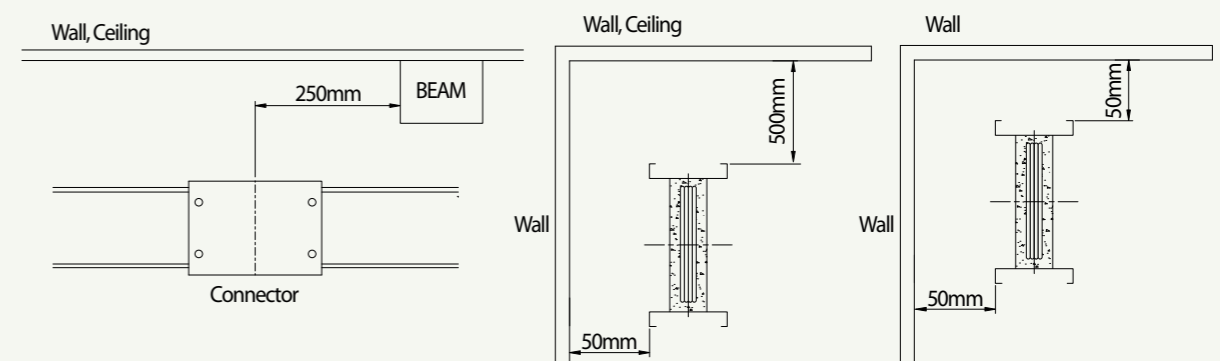
- W : The width of the product
- H : The height of the product

Floor Opening



- W : The width of the product
- H : The height of the product

The required minimum distances from a wall for heat dissipation and maintenance



Technical Data

Impedance and Voltage Drop

The formula to measure the voltage drop of a Busduct is shown below. The impedance and voltage drop values for aluminum and copper conductors are shown in the table below.

The values listed are measured between upper and middle lines at 60Hz. For a 50Hz installation, multiply the reactance (X) by 0.83.

$$V_d = I \times \sqrt{3(R \cos\theta + X \sin\theta)}$$

V_d = voltage drop[V] · I = rated road amperes[A] · R = resistance[Ω] · X = reactance[Ω] / cos = power factor / sin = reactive factor

$$\text{Real Voltage Descend} = \alpha \times V_d \times \frac{\text{Actual load current}}{\text{Rated load current}} \times \frac{\text{Actual length of the line (m)}}{100m}$$

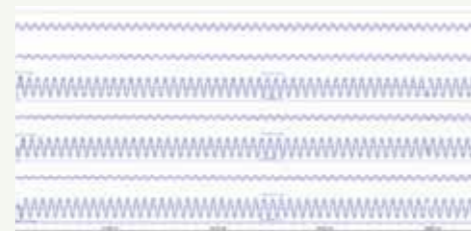


• F: Flanged End (panel connections) • P: Plug-in Unit

Ampere(A)	10 ⁻³ Ω / 100m, 60Hz			Voltage Drop(V/100m)				
	R	X	Z	0.7	0.8	0.9	1	
AL	630	13.98	4.07	14.56	13.85	14.87	15.66	15.25
	800	7.97	2.62	8.39	10.32	11.01	11.52	11.04
	1,000	6.83	2.21	7.18	11.02	11.77	12.32	11.84
	1,250	5.55	1.82	5.84	11.22	11.97	12.52	12.01
	1,600	3.82	1.23	4.02	9.85	10.52	11.02	10.60
	2,000	3.08	1.00	3.24	9.96	10.63	11.12	10.67
	2,500	2.40	0.80	2.53	9.74	10.39	10.86	10.40
	3,200	1.91	0.61	2.00	9.82	10.48	10.98	10.56
	3,600	1.72	0.55	1.81	9.99	10.67	11.18	10.74
	4,000	1.54	0.50	1.62	9.93	10.60	11.09	10.64
5,000	1.15	0.37	1.21	9.24	9.87	10.34	9.94	
6,300	1.02	0.33	1.08	10.41	11.11	11.63	11.16	
CU	630	7.49	4.07	8.53	8.90	9.21	9.30	8.18
	800	7.49	3.84	8.42	11.07	11.50	11.67	10.38
	1,000	5.49	2.99	6.25	10.35	10.72	10.82	9.52
	1,250	4.39	2.45	5.03	10.44	10.78	10.86	9.50
	1,600	3.10	1.71	3.54	9.40	9.72	9.80	8.60
	2,000	2.40	1.35	2.76	9.17	9.46	9.53	8.32
	2,500	1.86	1.05	2.13	8.87	9.16	9.22	8.06
	3,200	1.54	0.85	1.76	9.34	9.66	9.75	8.55
	3,600	1.35	0.74	1.54	9.20	9.51	9.60	8.42
	4,000	1.20	0.67	1.37	9.13	9.42	9.49	8.29
5,000	0.93	0.52	1.06	8.84	9.13	9.19	8.03	
6,300	0.73	0.39	0.83	8.62	8.93	9.02	7.97	
7,500	0.62	0.35	0.71	8.83	9.12	9.18	8.02	

Short Circuit Strength

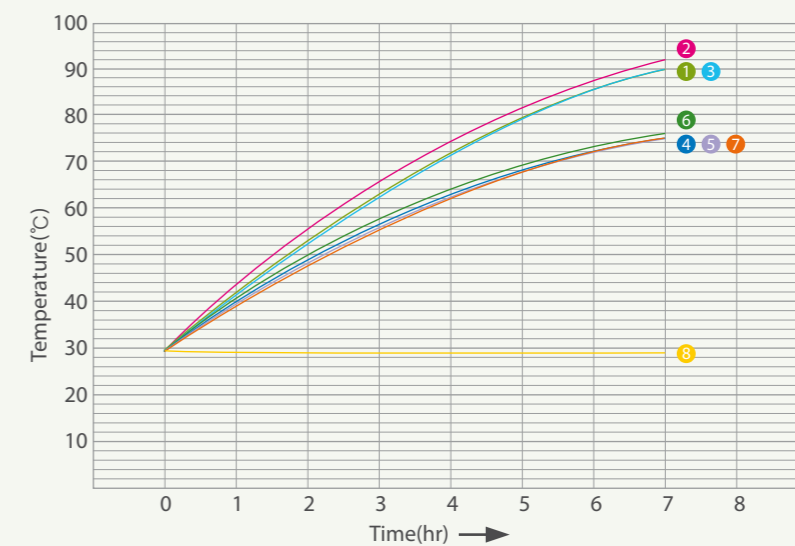
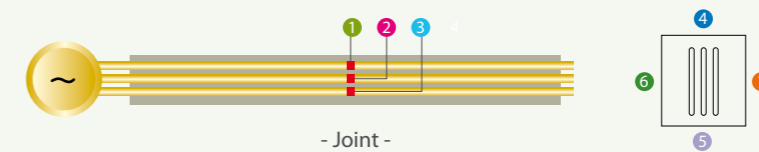
The short circuit strength of the CL-LV-II has been tested as specified in IEC 61439-1, 6 [(previous standard) IEC 60439-1, 2], and certified by KEMA.



Ampere(A)	630	800	1000	1250	1600	2000	2500	3200	3600	4000	5000	6300	7500
AL	1sec	24	40	50	50	80	80	80	80	100	100	100	-
	3sec	14	23	29	29	46	46	46	46	58	58	58	-
CU	1sec	40	40	50	50	80	80	80	80	100	100	100	100
	3sec	23	23	29	29	46	46	46	46	58	58	58	58

Temperature Rise

The temperature rise limit is an important property which determines the performance of busducts. The temperature rise limit of the busduct is designed so that when a busduct is operated with a rated current, the temperature limit values of the housing are within 55K as specified in IEC61439-1 and 6 [(previous standard) IEC 60439-1 and 2].



Classification	1	2	3	4	5	6	7	8
Censer Location	Joint Conductor			Exterior of Epoxy			Ambient Temperature	
Temperature Rise Value	61K	63K	61K	46K	46K	47K	46K	29.4°C

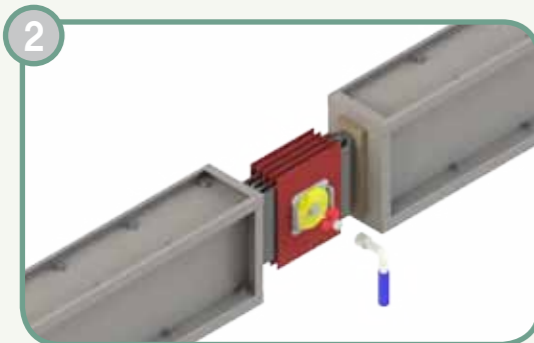
CR – LV (Joint Kit)



Before connecting the busducts, be sure to align them at the top and the bottom and the left and the right as well as horizontally and vertically. (This applies for joint connection of the horizontal and vertical ducts.) Make sure that the joint kit is not tilted. Be sure that the surface is clear of particles before connecting them.

Check List

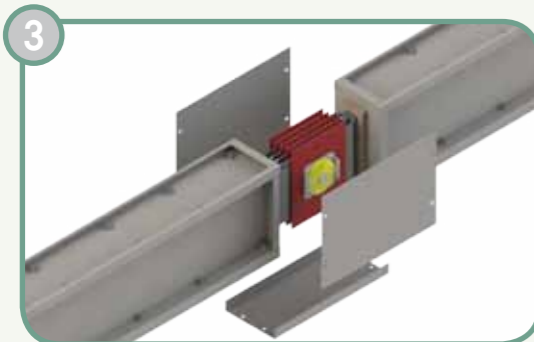
- The alignment of the busducts.
- The surface of the joint must be clear of dust or particles.



Using a torque wrench, slowly tighten the exposed bolt head of a double head bolt. Connect the busducts temporarily first, and check the function of the insulation (100MΩ or higher) by checking the insulation resistance. Make sure the insulation is working normally before breaking off the double-head bolt head. The double-head bolt head is designed to break off at 800~1000Kgf·cm, therefore tighten the exposed head until it breaks off. Once the exposed head and the red tag attached to it have been cut off, the state of the joint connection should be visible, which means they are properly connected.

Check List

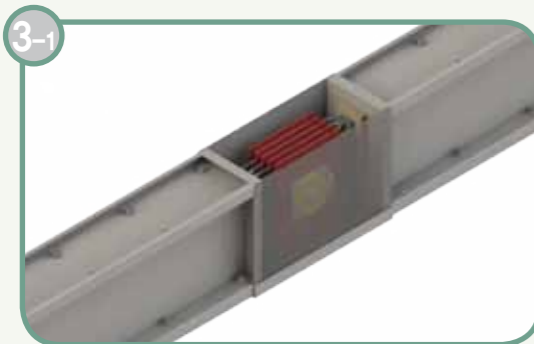
- Check the connection of the joint: The head of the double-head bolt and the red tag should be cut off.



Assemble joint cover plates using M6 bolt. Top side should be open along with the direction where epoxy mixture is poured as the picture.

Check List

- Assorting the edgewise, flatwise, and riser type cover while installation because the shapes of each joint covers are different.



! Precaution

Make sure to remove all the dirt or moisture inside the joint cover as it can be a cause of deterioration of insulation or accident.



Be sure to keep the ambient temperature at 25°C or higher before mixing the epoxy resin and filler. When mixing the epoxy resin in a cool environment, be sure to cover the mixing container to keep warm. It is to maintain the temperature of the container at 25°C or higher. In order of filler, epoxy resin and hardener, add them into the mixing container, and mix it for 15 minutes using a hand drill. (Please contact our design team for information about how to maintain the temperature of the container when mixing the epoxy resin in a cool environment.)

Check List

- The ambient temperature: 25° C or higher
- Mix filler, epoxy resin and hardener for 15 minutes



Pour the mixture into the molding flask. Maintain the ambient temperature at 25° C. When molding in a cool environment, cover the molding flask to keep warm to maintain the temperature at the molding flask. Remove foams on the surface of the mixture for about 1 hour. Mold only three joints out of a total of four, and continue molding the entire line following the same procedure. Wait for 8 hours, and check the function of the insulation by checking the insulation resistance. When it is normal, finish molding the remaining joint. (Please contact our design team for information about covering the container when molding the epoxy resin in a cool environment.)

Check List

- Ambient temperature: 25°C or higher
- Removing foams on the surface of the mixture for 1 hour

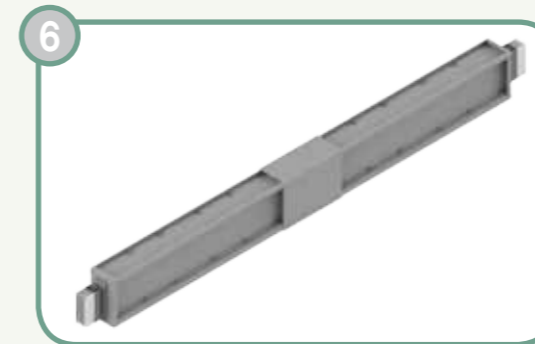


Perform the final inspection to check the performance of the joint.

Check List

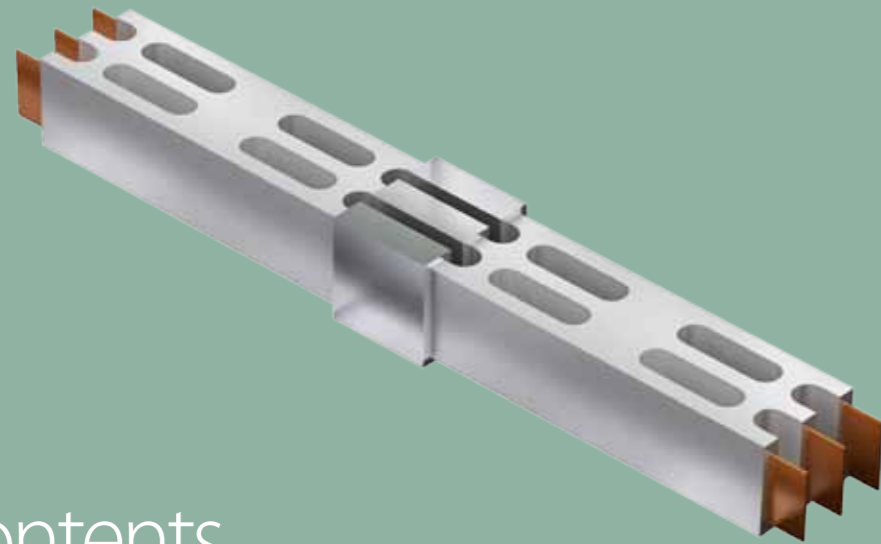
- Final inspection of the joint

! As it is not possible to make any change caused by route change, mechanical shock or insulation defectiveness after pouring epoxy mixture, make sure to conduct a electrical and mechanical inspection to every piece beforehand.



CR-MV

LS C&S Busduct System Catalogue



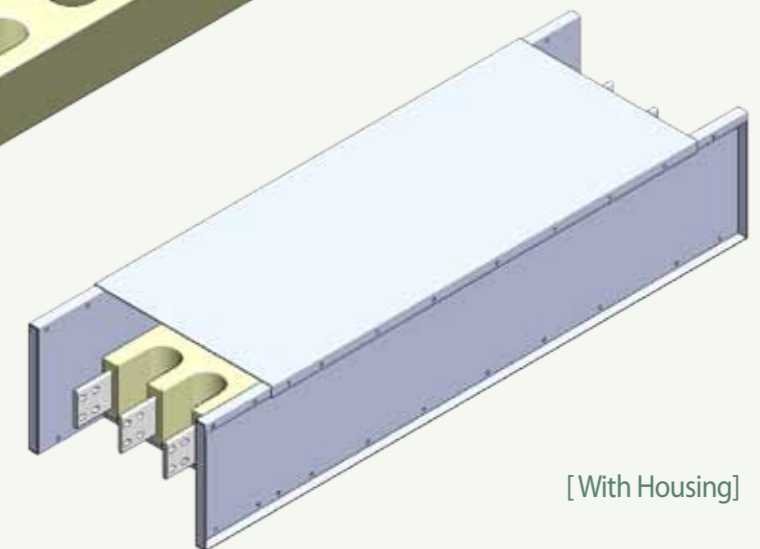
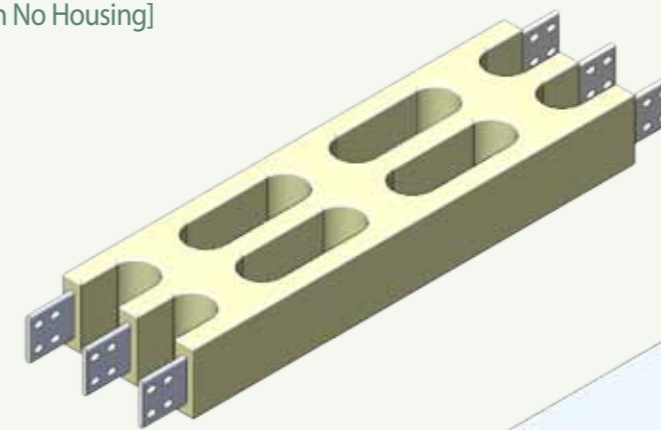
Contents

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Basic Structure

The CR-MV is compact in comparison with the air insulated types. It is completely covered with epoxy insulation molding and provides high stability. The CR-MV is designed for 27kV or less, and 1250A up to 5000A. The standard IP68 rating of the CR-MV is suitable for the exposed section of both indoor and outdoor installation, and inadequate environments including humid areas.

[With No Housing]



[With Housing]

Specifics	Indoor Type	Outdoor Type
7.2kV below	With No Housing	With Housing
7.2kV excess	With Housing	With Housing

✓ Note

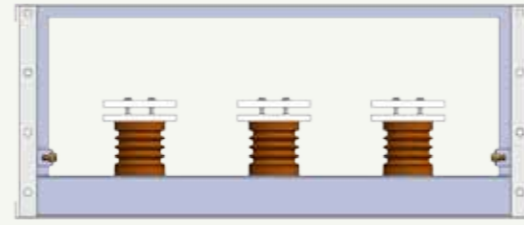
Either aluminum or copper conductors will be applied. Housing will be applied for both outdoor types and the busducts over 10kV for grounding and shielding.

Basic Structure

In comparison with other NSPB type busducts for high voltage (27kV or less), the conductors and joints of the CR-MV are completely molded with epoxy resin which provides a standard IP68 rating. The CR-MV is suitable for inadequate environments including chemical plants, areas prone to flood, an exposed section of indoor and outdoor installation and areas where condensation may occur.



[CR-MV]



[NSPB-MV]

Conductors	CR-MV	NSPB-MV
Insulation Type	Epoxy Resin Molding	Air Insulation
Installation Location	Special Plant (chemical plants, humid areas)	General plants
Features	<ul style="list-style-type: none"> • IP68 • Complete molding system provides safety at any environment • Replacement and repair can be relatively difficult 	<ul style="list-style-type: none"> • IP42, 54, 65 • The air inside of the housing can cause condensation • Relatively easy repair and replacement

In addition to the regular, design and in-site test that the company performs for all the products, the CM-MV has also been tested for partial discharge tests to inspect the interior foams to provide stability. Using mobile defoamers to remove foams from joint moldings at construction sites provides quality as good as factory-manufactured moldings.

Regular test : Structure and visual inspection, dielectric test (AC), partial discharge test

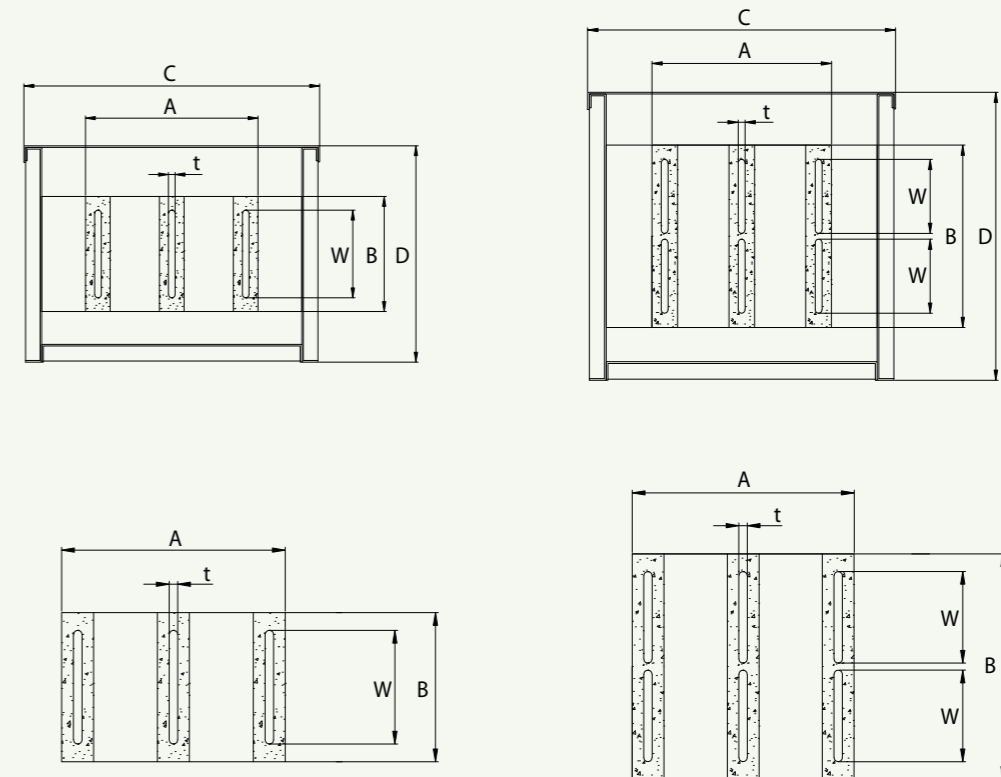
Design test : Temperature rise test, short circuit test, requested tests by clients

In site test : Structure test, Insulation resistance test, dielectric test (DC)



Feeder

Although the standard length of the LS C&S CR-MV Busduct feeder is 3 meters, it can be adjusted to the installation environment, or on request.



Ampere(A)	Conductor		7.2kV						17.5kV					
	t	W	A	B	C	D	weight (kg/m)		A	B	C	D	weight (kg/m)	
							Indoor	Outdoor						
CU	1250	4	276	130	500	315	89	113	315	150	540	335	119	
	1600	6					98	122					127	143
	2000	8					103	127					138	143
	2500	12					114	138					143	143
	3200	10					157	183					199	199
	3600	12					166	192					207	207
	4000	10					247	278					286	286
5000	12	260	292	299	299									
AL	1250	5	276	130	500	315	83	107	315	150	540	335	113	
	1600	9					86	110					115	115
	2000	8					87	111					116	116
	2500	12					89	113					118	118
	3200	6					124	151					166	166
	3600	8					126	152					167	167
	4000	10					193	225					232	232

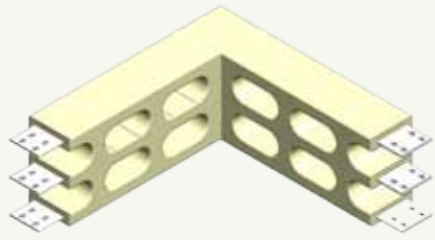
* Further discussion is required with our design team for product with 17.5kV or higher.

Fittings

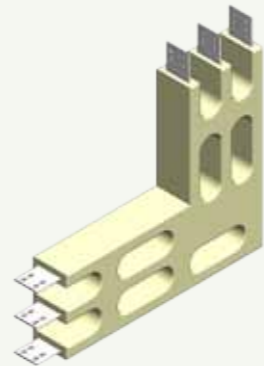
Fittings including the elbow and tee are designed to adapt to any change made to the direction of the busducts. The same features have been applied to the fittings of the CR-MV, and the size specifications are shown below. (Please contact our design team for detailed information of the dimension.)

Elbow

[Vertical]

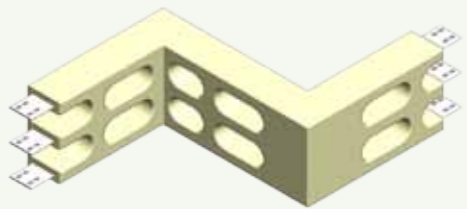


[Horizontal]

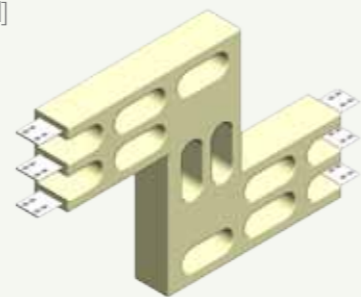


Offset

[Vertical]

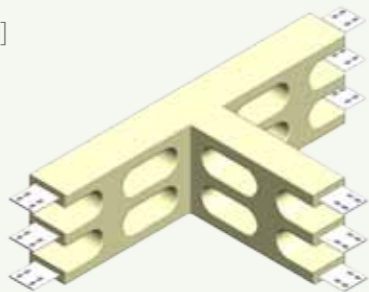


[Horizontal]

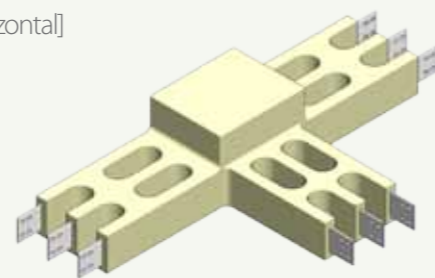


Tee

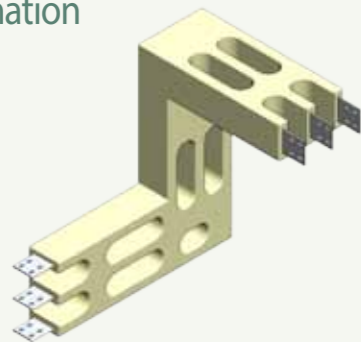
[Vertical]



[Horizontal]



Combination



Terminal

Terminals are connected to the transformers or MV panels. The types of products are shown below. (Please contact our design team for detailed information of the dimension.)

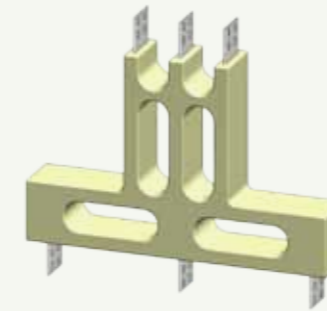
[Type1]



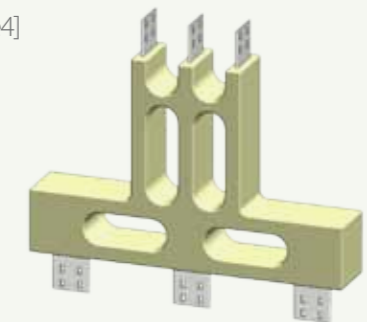
[Type2]



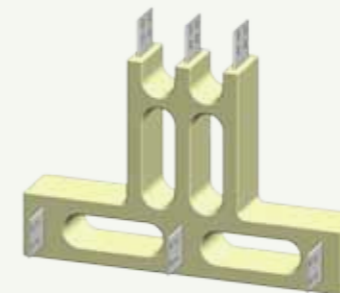
[Type3]



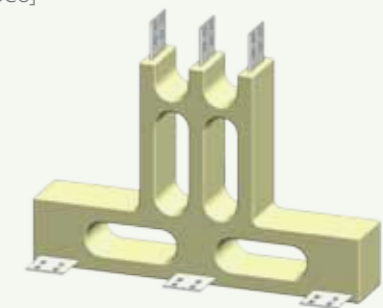
[Type4]



[Type5]



[Type6]

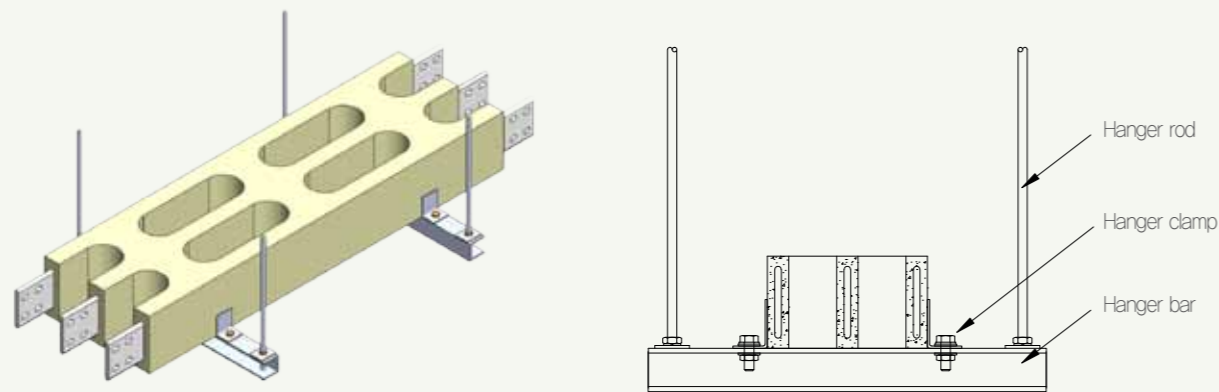


Hangers

Both horizontal and vertical hangers are available for the CR-MV depending on the installation environment.

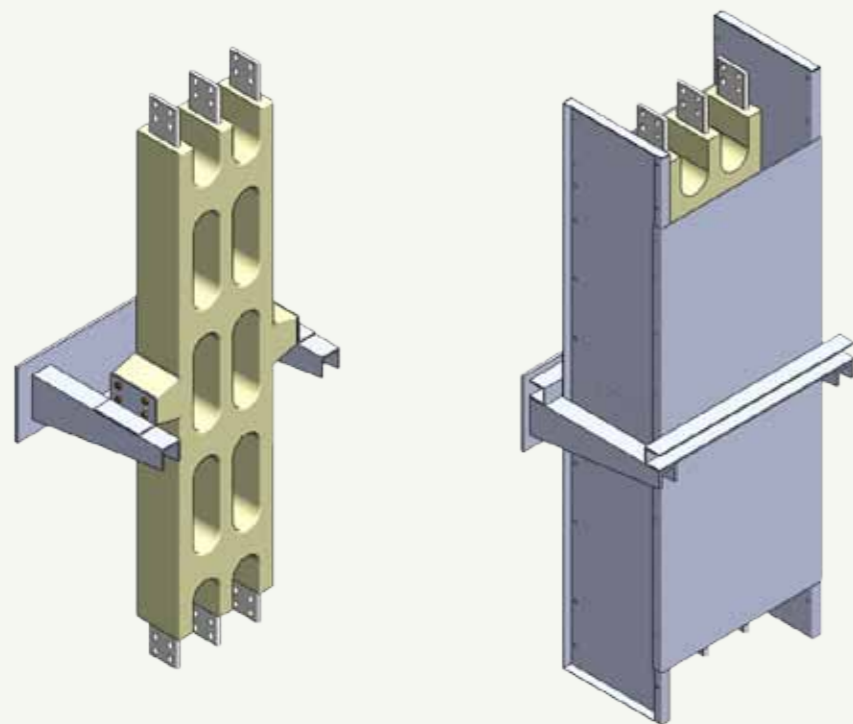
Horizontal Hangers

The standard horizontal installation method of the CR-MV requires two supports for each product. The standard 3 meter busducts are designed to be installed at 1.5-meter intervals, and the space between the hangers should not surpass 2 meters at the most. (Please contact the design team for further information.)



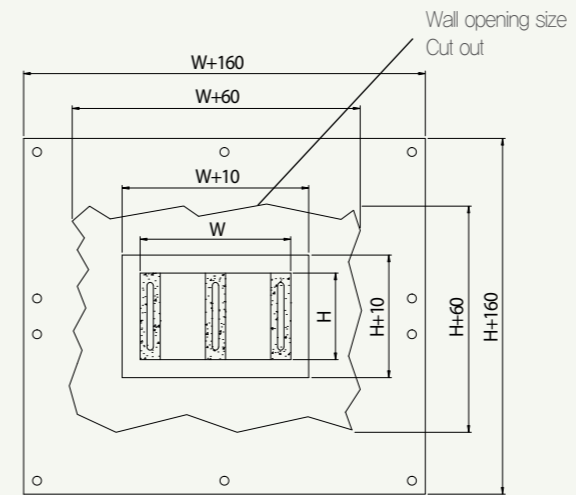
Vertical Hangers

For vertical installation of The CR-MV, install the vertical hangers first, and fix the Busducts on the hangers for better support.



Etc.

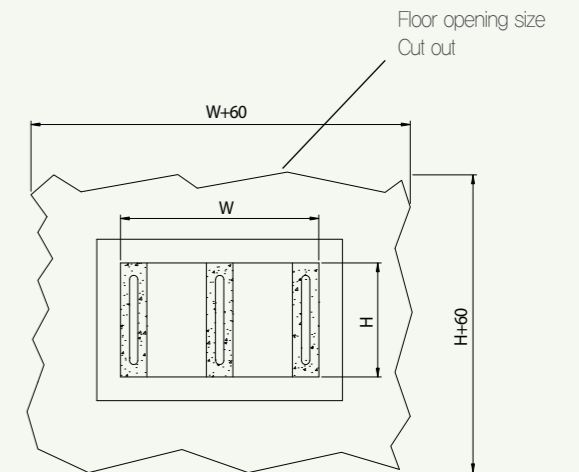
Wall Flange



A wall flange is used to seal the gaps produced during installation of busducts at the walls, ceilings and floors. The company does not provide glass wool or fire forms.

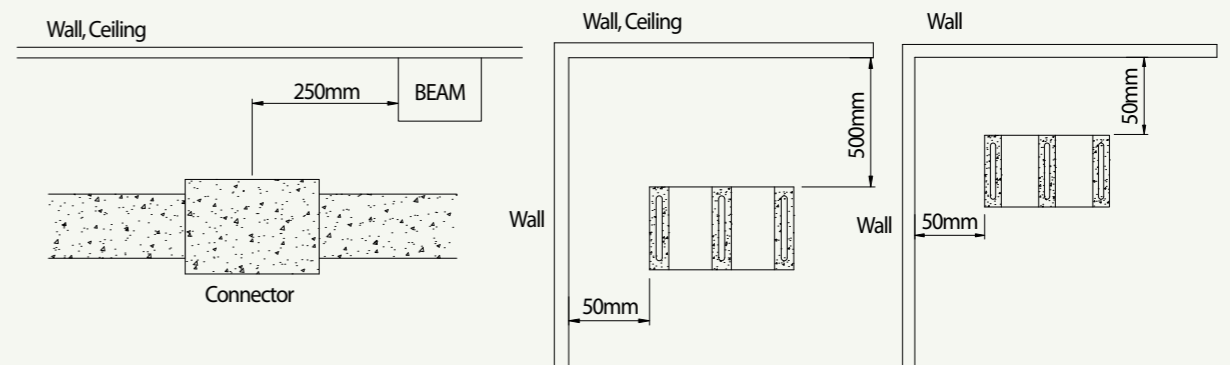
- W : The width of the product
- H : The height of the product

Floor Opening



- W : The width of the product
- H : The height of the product

The required minimum distances from a wall for heat



Technical Data

Impedance and Voltage Drop

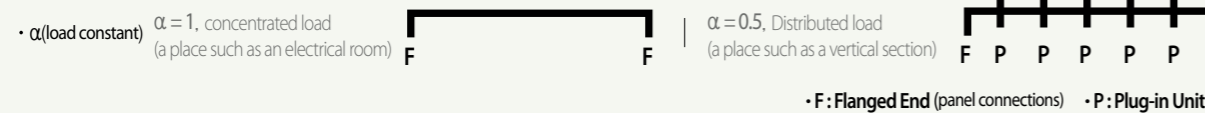
The formula to measure the voltage drop of a Busduct is shown below. The impedance and voltage drop values for aluminum and copper conductors are shown in the table below.

The values listed are measured between upper and middle lines at 60Hz. For a 50Hz installation, multiply the reactance (X) by 0.83.

$$V_d = I \times \sqrt{3(R \cos\theta + X \sin\theta)}$$

V_d = voltage drop[V] · I = rated load amperes[A] · R = resistance[Ω] · X = reactance[Ω] / cos = power factor / sin = reactive factor

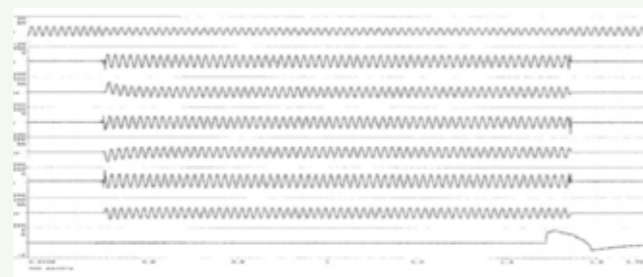
$$\text{Real Voltage Descend} = \alpha \times V_d \times \frac{\text{Actual load current}}{\text{Rated load current}} \times \frac{\text{Actual length of the line (m)}}{100m}$$



Ampere(A)	Impedance $\times 10^{-3} \Omega$ (uΩ/100m, 60Hz)			Voltage Drop (V/100m)				
	R	X	Z	0.7	0.8	0.9	1	
AL	1250	5.76	3.61	6.80	14.32	14.67	14.64	12.47
	1600	3.92	2.57	4.69	12.70	12.98	12.89	10.87
	2000	3.14	2.09	3.77	12.78	13.04	12.95	10.89
	2500	2.68	1.78	3.21	13.60	13.88	13.78	11.58
	3200	2.13	1.40	2.55	13.81	14.10	14.00	11.79
	3600	1.58	1.26	2.03	12.54	12.63	12.32	9.88
	4000	1.39	1.12	1.78	12.26	12.34	12.03	9.62
CU	1250	5.09	4.85	7.03	15.21	15.12	14.50	11.02
	1600	3.56	3.61	5.07	14.06	13.90	13.25	9.87
	2000	2.74	2.85	3.96	13.71	13.53	12.86	9.50
	2500	2.12	2.22	3.07	13.30	13.12	12.46	9.18
	3200	1.94	2.03	2.81	15.59	15.38	14.60	10.76
	3600	1.70	1.78	2.46	15.34	15.14	14.38	10.61
	4000	1.51	1.57	2.18	15.08	14.89	14.15	10.46
5000	0.88	1.20	1.48	12.72	12.30	11.35	7.60	

Short Circuit Strength

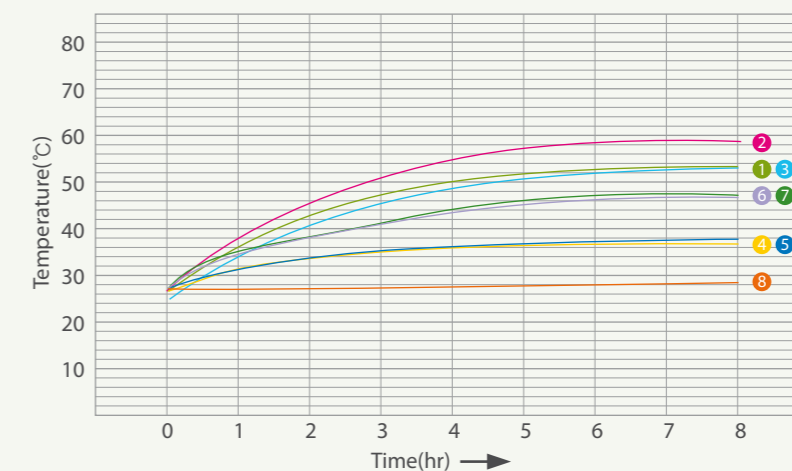
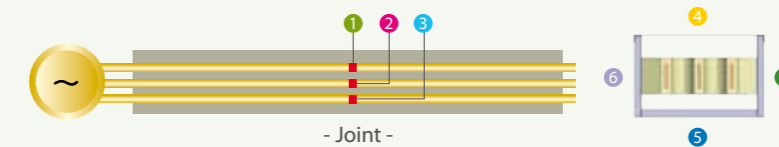
The short circuit strength of the CL-MV has been tested as specified in IEC 62271-Part 201.



Ampere(A)		1250	1600	2000	2500	3200	3600	4000	5000
AL	1sec	40	50	50	50	50	50	50	
	3sec	23	29	29	29	29	29	29	
CU	1sec	40	50	50	50	50	50	50	50
	3sec	23	29	29	29	29	29	29	29

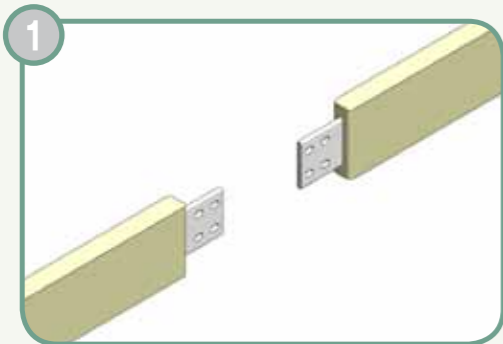
Temperature Rise

The temperature rise limit is an important property which determines the performance of Busducts. The temperature rise limit of the busduct is designed so that when a Busduct is operated with a rated current, the temperature limit values of the housing are within 50K as specified in IEC62271-Part 201.



Classification	1	2	3	4	5	6	7	8
Censer Location	Joint Conductor			Housing				Ambient Temperature
Temperature Rise Value	51K	54K	51K	35K	35K	43K	43K	27°C

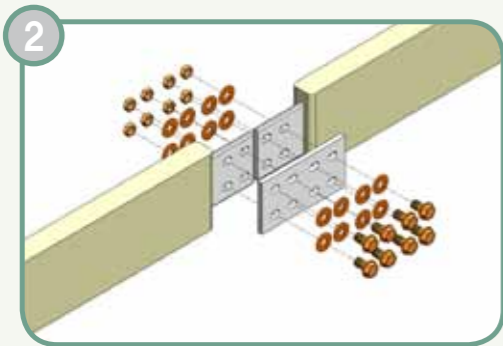
CR-MV (Phase to Phase Joint)



Before connecting the busducts, be sure to align them at the top and the bottom and the left and the right as well as horizontally and vertically. (This applies for joint connection of the horizontal and vertical ducts.) Make sure that the joint kit is not tilted. Be sure that the surface is clear of particles before connecting them.

Check List

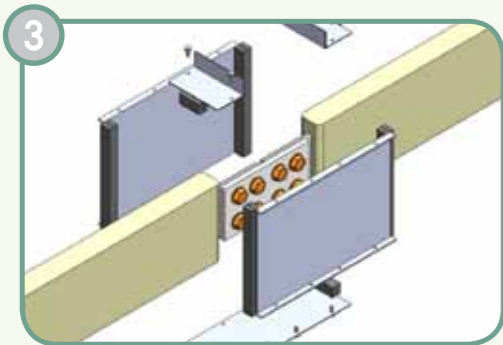
- The alignment of the busducts.
- The surface of the joint must be clear of dust or particles.



Connect the Busducts using the provided joint plates and bolts as shown in the image.

Check List

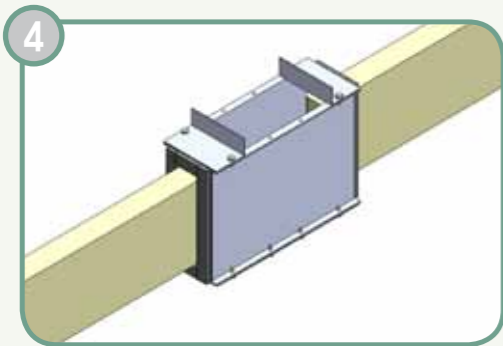
- Inspect the joint connection



Assemble the ducts using the molding flask and rubber packing. Spray plenty of release agent inside of the molding flask when the assembly is finished.

Check List

- Assembling the molding flask
- Spraying the release agent
- Assorting vertical type and horizontal type



While assembling the molding flask, be sure to position the rubber packing of the molding flask at 40 mm from the block end. Make sure there are no gaps between the rubber packing and the busducts.

Check List

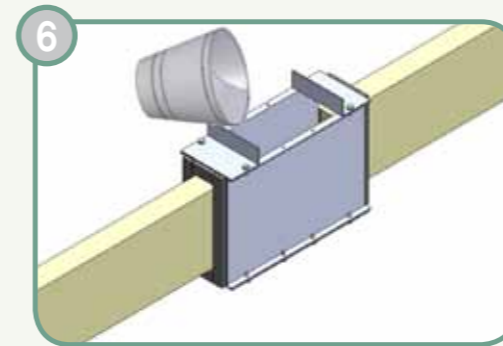
- The location of the rubber packing : 40mm from the block end



Be sure to keep the ambient temperature at 25°C or higher before mixing the mixture. When mixing in a cool environment, be sure to cover the mixing container to keep warm. It is to maintain the temperature of the container at 25°C or higher. In order of filler, epoxy resin and hardener, add them into the mixing container, and mix it for 15 minutes using a hand drill. Pour the mixture into the provided vacuum chamber, and whisk it for 30 minutes to remove foams.

Check List

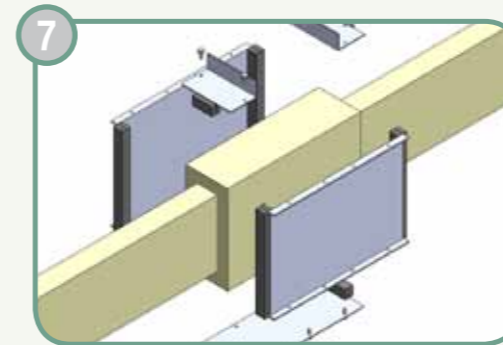
- The ambient temperature: 25° C or higher
- Mix filler, epoxy resin and hardener for 15 minutes
- Using mobile vacuum chamber to remove foams



Pour the mixture into the molding flask. Maintain the ambient temperature at 25°C. When molding in a cool environment, cover the molding flask to keep warm to maintain 25°C at the molding flask. Remove foams on the surface of the mixture for about 1 hour. Mold only three joints out of a total of four, and continue molding the entire line following the same procedure. Wait for 8 hours, and check the function of the insulation by checking the insulation resistance. When it is normal, finish molding the remaining joint.

Check List

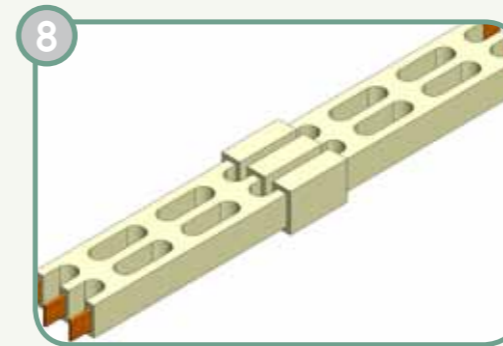
- Ambient temperature: 25°C or higher
- Removing foams on the surface of the mixture for 1 hour



Remove the mixture from the molding flask, and polish the rough surface with sandpaper.

Check List

- When to remove the molding flask: 8 hours after molding



Perform the final inspection to check the performance of the joint.

Certification & Specification



KEMA Certification (CR-LV)



KEMA Certification (CR-MV)



Short Circuit Test KERI Certification (CR-LV)



Temperature Rise Test KERI Certification (CR-LV)



Fireproof Certification (CR-LV)



Wall Opening Fireproof Certification (CR-LV)



Flame Resistance Certification (CR-LV)



Structural Loading Certification (CR-LV)



Vibration Resistance Certification (CR-LV)



UL CERTIFIED (CR-LV-II AL) IEC61439-6



UL CERTIFIED (CR-LV-II CU) IEC61439-6



ISO9001



ISO14001



OHSAS18001

Busduct Major References



Ruwais Refinery Expansion
Abudhabi, UAE, 2012 completed
Investor : Takreer
Construction Period : 2011 ~ 2013



Base Oil Production
Abudhabi, UAE, 2013 Will be completed
Investor : Takreer
Construction Period : 2011 ~ 2013



Borough 3 XLPE
Abudhabi, UAE,
2012~2013 Will be completed
Investor : Borouge
Construction Period : 2011 ~ 2013



Adamant Data Center
Petersburg, Russia, 2012 completed
Investor : ADAMANT GROUP
Construction Period : 2011 ~ 2012



Raganskiy Lyad
Yekaterinburg, Russia, 2012 completed
Investor : TAGANSKIY LYAD LTD
Construction Period : 2011 ~ 2012

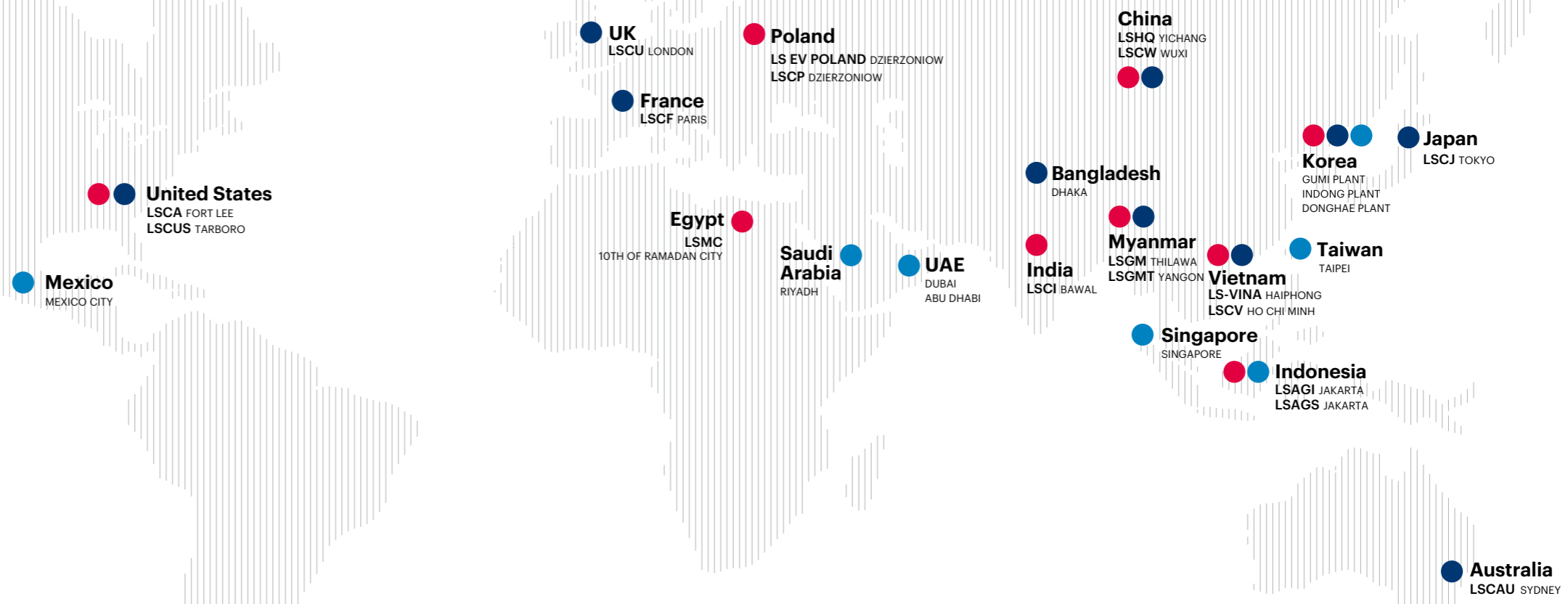


Gyron Data Center
Hemel Hempstead, UK,
2012~2013 completed
Construction Period : 2012 ~ 2013


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