

E-LINE MV

Medium Voltage Busbar Systems

EAE GROUP IN NUMBERS



Since 1973

EAE Group of Companies started its journey in the electrical sector in 1973 with the establishment of EAE Elektrik. Since its founding, EAE has grown rapidly, expanding its production and areas of operation by incorporating EAE Lighting in 1983, EAE Machinery in 1996, EAE Electrotechnics in 2004, and EAE Technology in 2009.

EAE carries out its production activities in accordance with ISO 9001 Quality Management, ISO 14001 Environmental Management, ISO 14064-1 Greenhouse Gas Management System, ISO 45001 Occupational Health and Safety Management, ISO 10002 Customer Satisfaction Management, ISO 50001 Energy Management System, and ISO 27001 Information Security Management System standards.



50+
Years Experience



7
Active Factories



360.000m²
Enclosed Space



3
R&D Centers



150+
Countries Exported To

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Medium Voltage (MV) is manufactured within a single housing, the conductor copper are embedded in DURACOMP insulation which is a composite material of epoxy resin and pure silica minerals with Cu conductors specially selected and the epoxy resin.

Medium Voltage busbar systems are designed to operate at voltages of 12kV and 17,5kV. Manufactured as standard up to a rating of 5000 A. Please contact us for higher amperage applications.

Areas of Use

Exterior environments, industrial buildings, petrochemical buildings, regions with flood risk, oil and natural gas industry.

MV System Benefits

- Products tested in accordance with international standards
- Corrosion-resistant
- Chemical-resistant
- Resistance against insects and rodents
- Usable in tropical environments
- High mechanical strength
- Without stack effect
- Highly resistant to short circuit
- Low voltage drop when compared with cable
- Special design for occupying minimum space based on ampere level.
- Electroerosion resistant
- UV resistant
- Designed to improve heat loss
- Maintenance-free busbar
- Easy Assembly
- An ideal high temperature environments

Short-Circuit Withstand

Short-circuit resistance values tested are presented on the table. High busbar resistance can be seen based on the short-circuit values to be calculated.

Busbar Drawings

You may receive professional assistance is available to our clients by contacting our nearest dealer, distributor or our Project & Design departments for Busbar drawings Blueprints and calculating cost estimates.

* Modules required for special situations can be manufactured in a short time.

E-LINE MV

General Introduction



High IP Insulation

DURACOMP is a composite material of epoxy resin and pure silicon which gives the E-LINE MV busbar range a high mechanical strength and resistance to high temperatures and external effects as listed on Page 2

EAE Medium voltage busbar systems are manufactured using high density and high conductivity copper conductors. Contact areas of copper conductors can be coated by tin or optionally silver.

Ease of Heat Transfer

Heat forming on the additives used in the system with high heat transfer is easily dissipated to the environment by means of the housing.

Short-Circuit Withstand

High mechanical and thermal resistance thanks to the DURACOMP material.

Housing

E-Line MV busbar is produced by combining the Duracomp insulated conductor within an extruded aluminium housing.

- Light aluminium case
- High Mechanical Strength and Chemical Resistance
- Adjustable support system
- Safety earth continuity
- Very less magnetic field

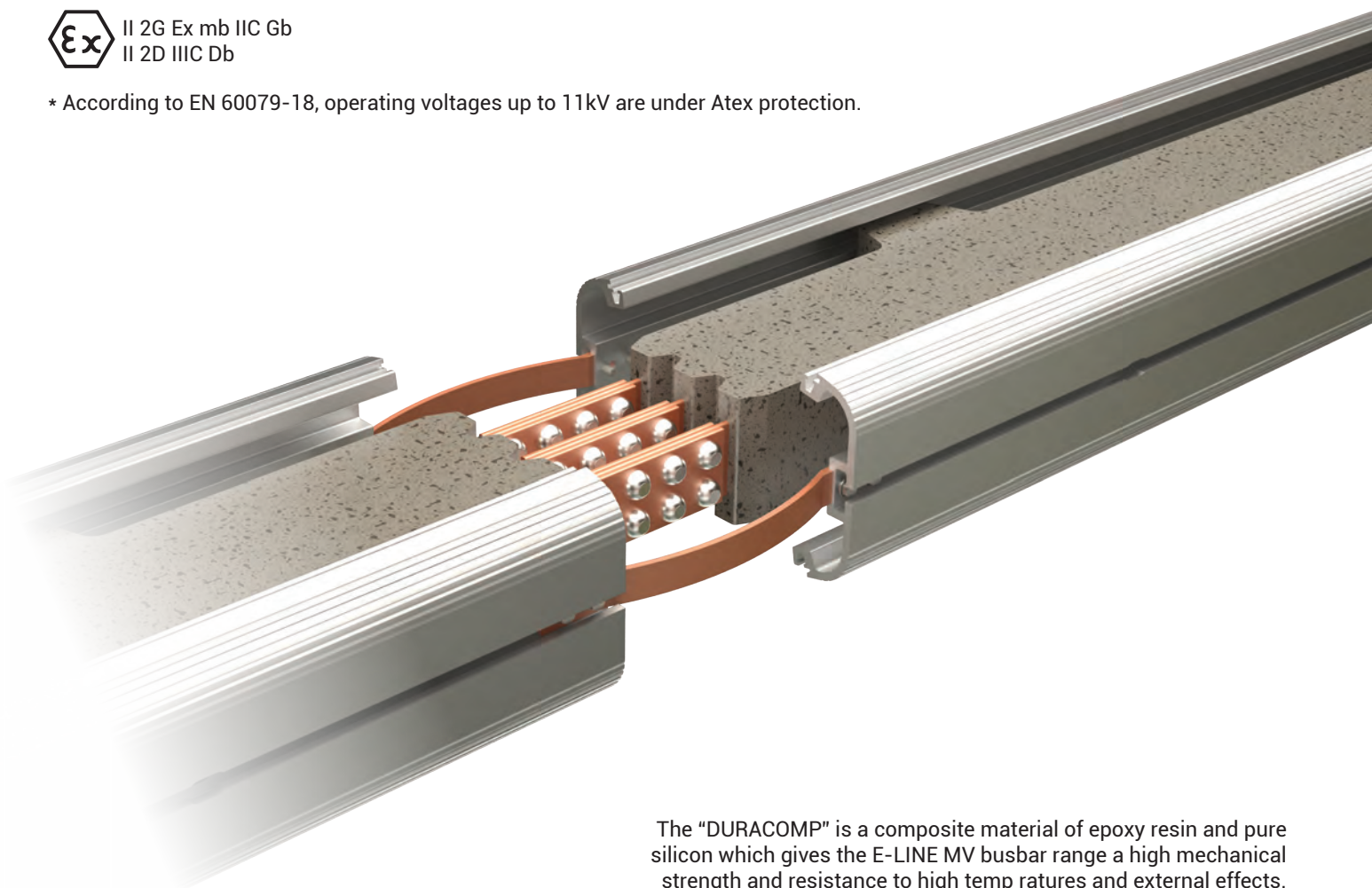
EX - Protected

ATEX as per EN 60079-0:2009, EN 60079-18:2009, EN60079-31:2009



II 2G Ex mb IIC Gb
II 2D IIIC Db

* According to EN 60079-18, operating voltages up to 11kV are under ATEX protection.

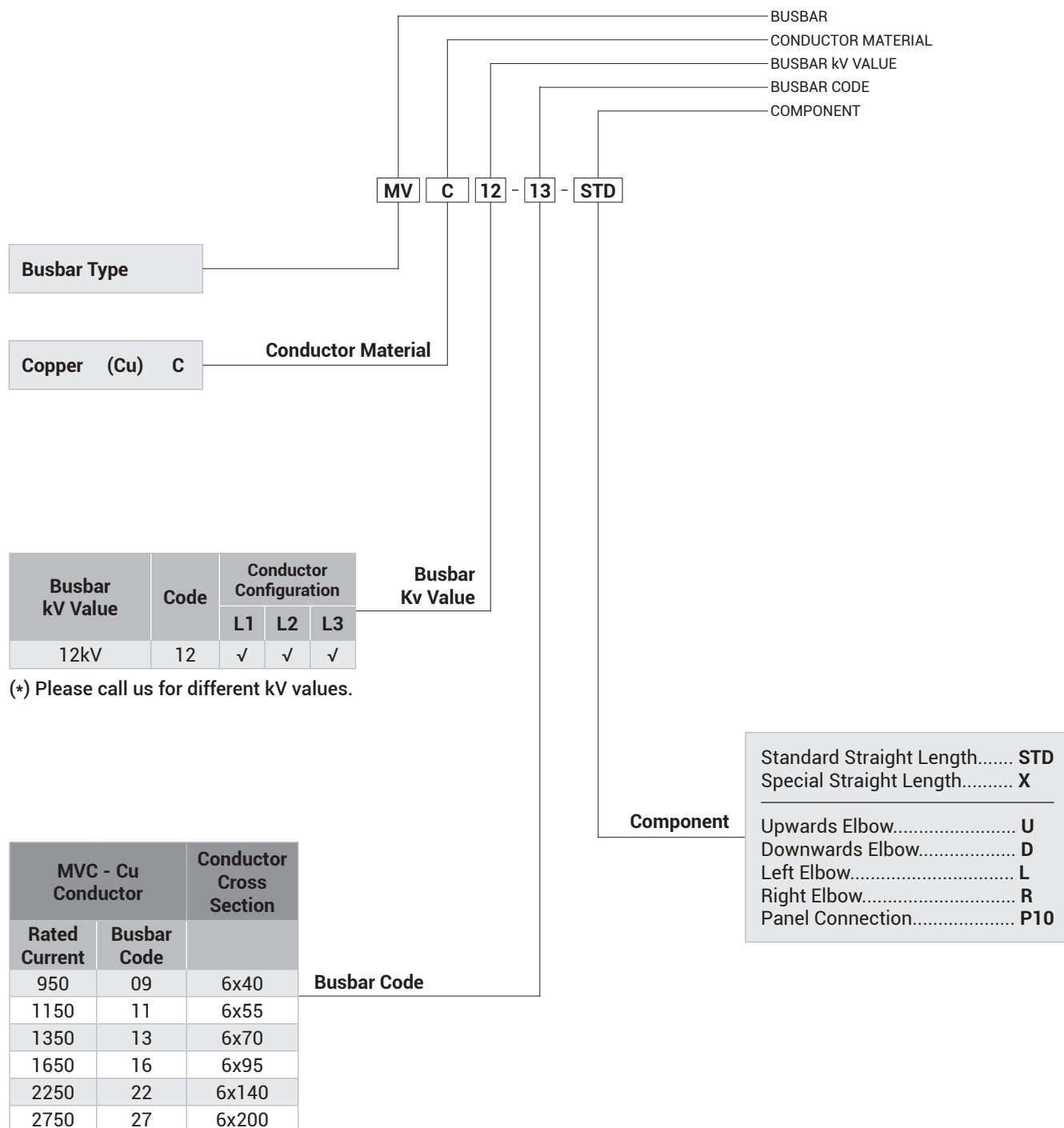


The "DURACOMP" is a composite material of epoxy resin and pure silicon which gives the E-LINE MV busbar range a high mechanical strength and resistance to high temperatures and external effects.

Conductors are of 99.95% purity electrolytic copper.

E-LINE MV

Order Code System



Rated Current	I_r	A	950	1150	1350	1650	2250	2750
Busbar Kodu			09	11	13	16	22	27
Standards	IEC 62271-200 Edition 2.0 2011-10; IEC 62271-307 Edition 1.0 2015-09;				IEC 61439-6 Edition 1.0 2012-05; STL Guide to IEC 62271-200			
Rated Voltage	U_r	kV	12	12	12	12	12	12
Rated power frequency withstand voltage	U_d	kV	28	28	28	38	38	38
Rated impulse withstand voltage	U_p	kV	75	75	75	95	95	95
Rated Frequency	f_r	Hz	50	50	50	50	50	50
Partial Discharge		pC	< 20	< 20	< 20	< 20	< 20	< 20
External Mechanical Impacts (IK Code)*	50J, greater than IK10							
Rated Short-time Withstand Current (1s)	I_k	kA_{rms}	25	25	43	43	71,3	71,3
Rated Peak Withstand Current	I_{ke}	kA	65	65	112	112	185,5	185,5
Rated Short-time Withstand Current for PE Conductor (1s)	I_p	kA	15	15	26,3	26,3	42,4	42,4
Rated Peak Withstand Current for PE Conductor	I_{pe}	kA	39	39	72,4	72,4	110,2	110,2
MEAN PHASE CONDUCTOR CHARACTERISTICS AT RATED CURRENT I_n								
Resistance at a conductor temperature of 20°C	R_{20}	mΩ/m	0,077	0,057	0,045	0,0352	0,0223	0,0162
Resistance at an ambient air temperature of 35°C	R	mΩ/m	0,104	0,078	0,061	0,0474	0,0304	0,0224
Reactance (Independent from Temperature)	X	mΩ/m	0,116	0,097	0,084	0,0788	0,0576	0,0442
Positive and negative sequence impedances at an ambient air temperature of 35°C	Z	mΩ/m	0,156	0,125	0,104	0,0919	0,0651	0,0496
Positive and negative sequence impedances at an ambient air temperature of 20°C	Z_{20}	mΩ/m	0,139	0,113	0,096	0,0863	0,0618	0,0471
Rated Power Loss at 35°C		Watt	278	297,1	324	370,3	443,3	491,7
DC Resistance at a conductor temperature of 20 °C for Phases	R_{phdc}	mΩ/m	0,071	0,050	0,039	0,030	0,019	0,013
DC Resistance at a conductor temperature of 20°C for PE	R_{PEdc}	mΩ/m	0,012	0,012	0,012	0,009	0,006	0,013
SECTIONS								
Phase Conductor		mm²	240	330	420	570	840	1200
PE (Housing)		mm²	5944	5944	5944	8105	8905	9704
Conductor Cross Section		mm x mm	6x40	6x55	6x70	6x95	6x140	6x200
Busbar Weight (3 Conductors)		kg/m	48,32	56,85	63,89	76,18	97,13	124,54
MEAN FAULT-LOOP CHARACTERISTICS								
Zero-sequence Impedance								
Zero-sequence impedance at a conductor temperature of 20°C	$Z_{(0)b20phPE}$	mΩ/m	0,309	0,292	0,271	0,248	0,203	0,176
Zero-sequence impedance at an ambient temperature of 35°C	$Z_{(0)bphPE}$	mΩ/m	0,328	0,307	0,285	0,258	0,210	0,182
Mean Resistances and Reactances								
Resistance at a conductor temperature of 20°C	$R_{b20phph}$	mΩ/m	0,150	0,112	0,088	0,073	0,049	0,035
Resistance at a conductor temperature of 20°C	$R_{b20phPE}$	mΩ/m	0,089	0,071	0,059	0,049	0,035	0,028
Resistance at an ambient air temperature of 35°C	R_{bphph}	mΩ/m	0,203	0,153	0,121	0,099	0,067	0,048
Resistance at an ambient air temperature of 35°C	R_{bphPE}	mΩ/m	0,120	0,096	0,081	0,065	0,048	0,038
Reactance (Independent from temperature)	X_{bphph}	mΩ/m	0,221	0,184	0,160	0,150	0,115	0,084
Reactance (Independent from temperature)	X_{bphPE}	mΩ/m	0,170	0,153	0,140	0,129	0,106	0,087

(1) Standards

The weight per metre provided in table includes 1/3 of the weight of one block joint.

E-LINE MV

Standard Straight Length

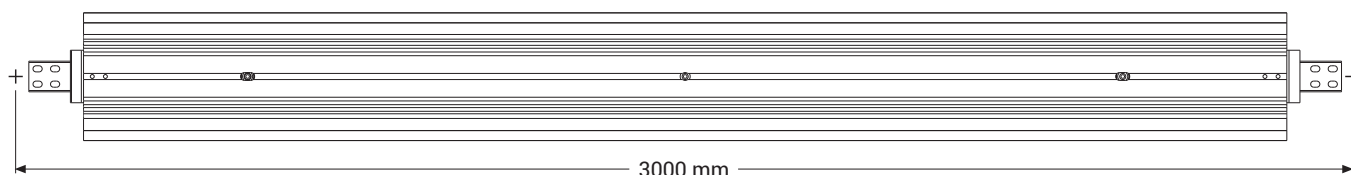
Standard Feeder Straight Length



STD

Sample Order:

MVC 1213 - STD
12 kV 1350 A, Copper,
Feeder, 3 Conductors



Special Feeder Straight Length

X

Sample Order:

MVC 1209 - X - 150
12 kV 950 A, Copper, Feeder,
3 Conductors, 1500 mm Special Length

Information:
Feeder Minimum
Special length size = 1000 mm

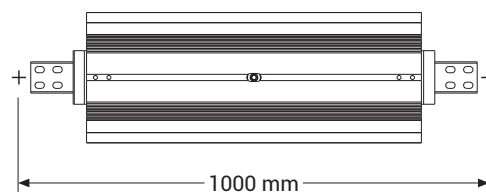
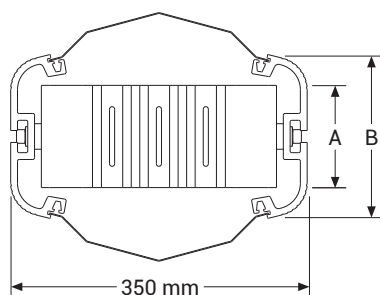
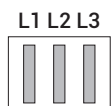


Table of Busbar Cross Section Sizes

MVC - Cu Conductor	Rated Current (A)	950	1150	1350	1650	2250	2750
	Busbar Code	09	11	13	16	22	27
A	mm	90	105	120	145	190	250
B	mm	192	192	192	247	297	347

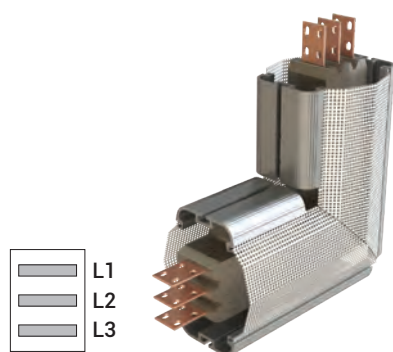


Attention! The standard mounting of the MV busbar is with the conductors on edge. This allows for the easy application of the resin at the joint.

E-LINE MV

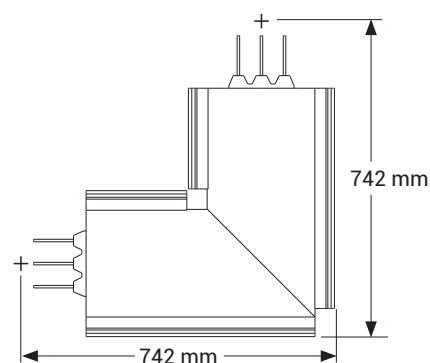
Elbows

Upwards Downwards Elbow

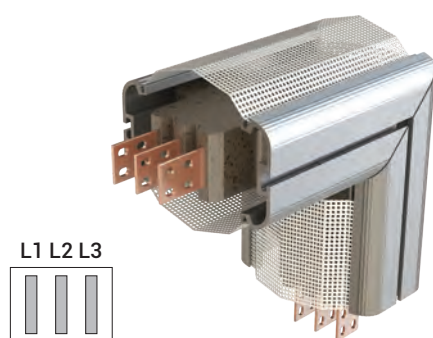


Sample Order:

MVC 1211 - U
12 kV 1150 A, Copper, Feeder,
3 Conductors



Left Right Elbow



Sample Order:

MVC 1209 - R
12 kV 950 A, Copper, Feeder,
3 Conductors

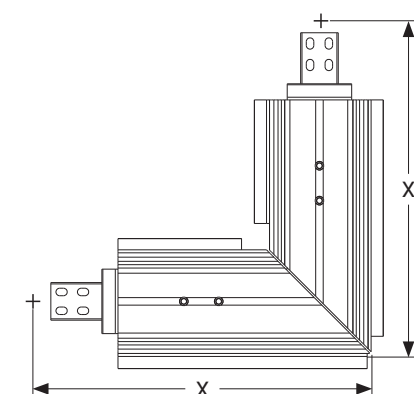


Table of Busbar Cross Section Sizes

MVC - Cu Conductor	Rated Current (A)	950	1150	1350	1650	2250	2750
	Busbar Code	09	11	13	16	22	27
X	mm	580	590	595	635	685	740

Panel Connection



Sample Order:

MVC 1213 - P10
12 kV 1350 A, Copper,
Feeder, 3 Conductors
For Panel Feeder

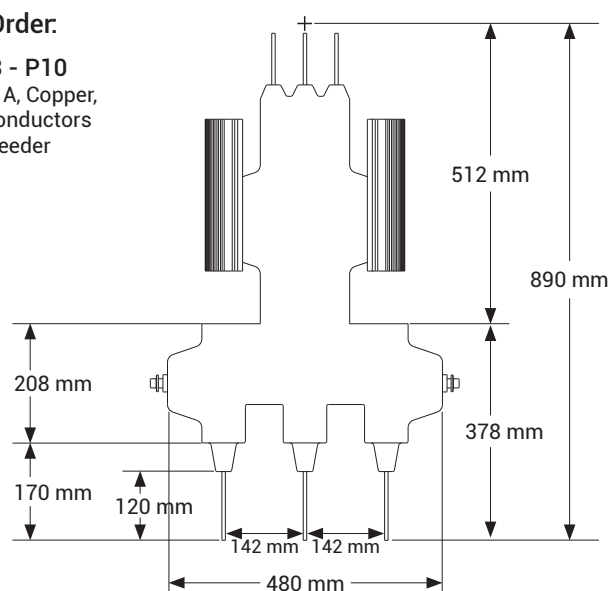


Figure 1 - Edgewise Application

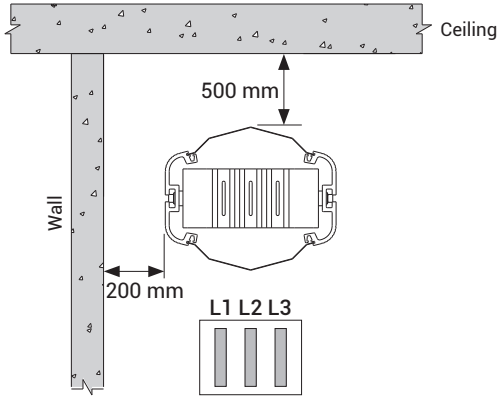


Figure 4 - Sample Wall Crossing with Fire Barrier

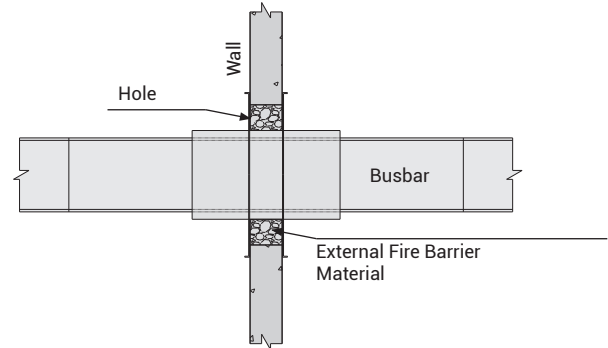
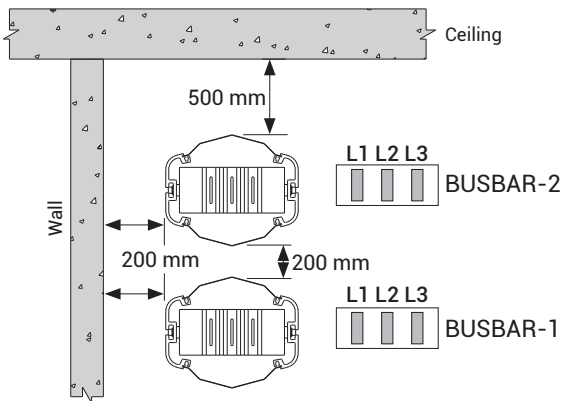


Figure 2 - Edgewise Application



Primarily on the installation phase;
BUSBAR-1 line should be installed before BUSBAR-2 line.

Figure 5 - Standard Wall Crossing

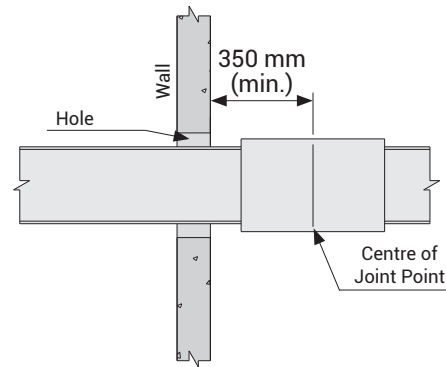
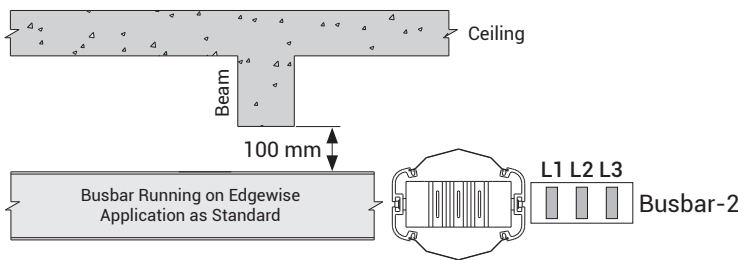


Figure 3 - Crossing Under a Beam On Edgewise Application



Attention!

- For correct installation, the dimension from the busbar to the ceiling should not be less than 500mm.
- The joint should not come across to Beams.
- The dimensions given above are minimum values.
- All dimensions are given in mm.

Cast Resin Installation Tools

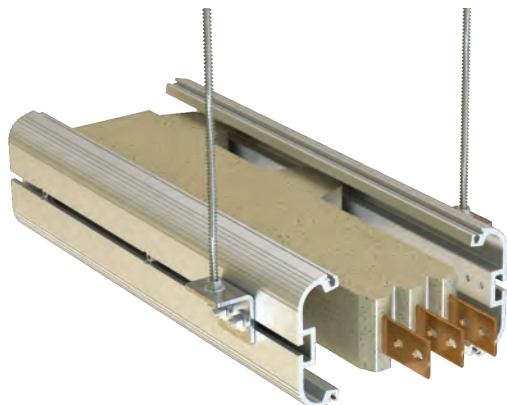
Açıklama	Sipariş Kodu
CR Joint Area Mixer	5000132
CR Plastic Hammer	5000310
CR Spoon Brush	5000311
MV Allen Torque Set	5000664
Disposable Coverall	5003622



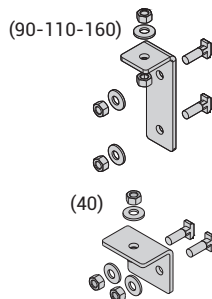
E-LINE MV

Trunking Support

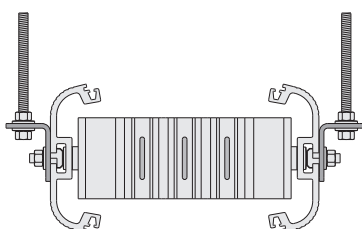
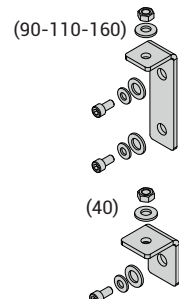
MV "L" Hanger Set Code



MV L Hanger Set
Ø13



MV L Hanger Set
Ø17



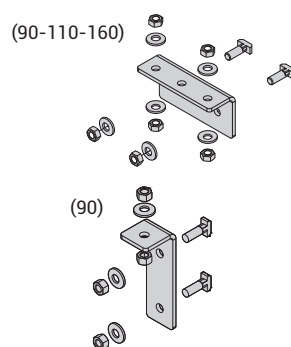
MVC - Cu Conductor		Conductor Dimensions	MV "L" Hanger Set Code			
Rated Current	Busbar Code		Description	Order Code	Description	Order Code
950	09	6x40	MV L Hanger Set Ø13-(40)	3191532	MV L Hanger Set Ø17-(40)	3191533
1150	11	6x55				
1350	13	6x70				
1650	16	6x95	MV L Hanger Set Ø13-(90)	3180150	MV L Hanger Set Ø17-(90)	3180153
2250	22	6x140	MV L Hanger Set Ø13-(110)	3180151	MV L Hanger Set Ø17-(110)	3180154
2750	27	6x200	MV L Hanger Set Ø13-(160)	3180152	MV L Hanger Set Ø17-(160)	3180155

Note: Ø17 Panel Connection for Special Suspension. It is not included in the rod hanger set.

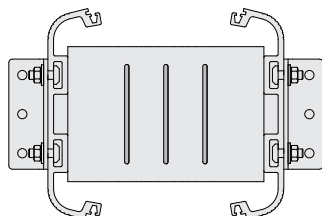
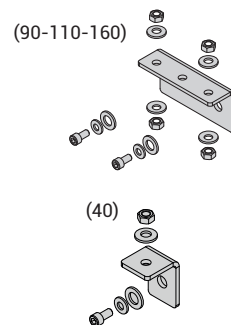
MV "L" Vertical Hanger Set Code



MV L Hanger Set
Ø13



MV L Hanger Set
Ø17



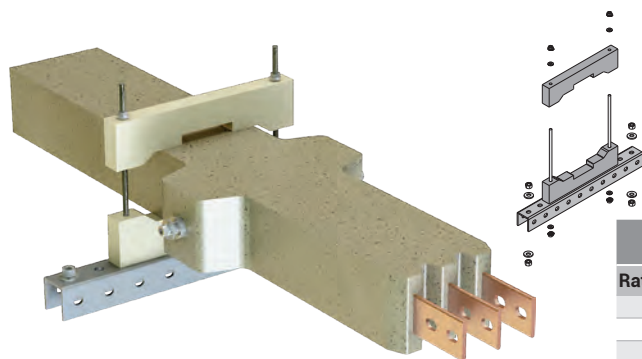
MVC - Cu Conductor		Conductor Dimensions	MV "L" Hanger Set Code			
Rated Current	Busbar Code		Description	Order Code	Description	Order Code
950	09	6x40	MV L Hanger Set Ø13-(90)	3180150	MV L Hanger Set Ø17-(40)	3191533
1150	11	6x55				
1350	13	6x70				
1650	16	6x95	MV DIKEY L Hanger Set Ø13-(90)	3389123	MV Dikey L Hanger Set Ø17-(90)	3389127
2250	22	6x140	MV DIKEY L Hanger Set Ø13-(110)	3388857	MV Dikey L Hanger Set Ø17-(110)	3389124
2750	27	6x200	MV DIKEY L Hanger Set Ø13-(160)	3389121	MV Dikey L Hanger Set Ø17-(160)	3389125

Note: Ø17 Panel Connection for Special Suspension. It is not included in the rod hanger set.

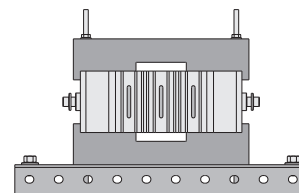
E-LINE MV

Trunking Support

MV 12kV Isolated Hanger Set Code



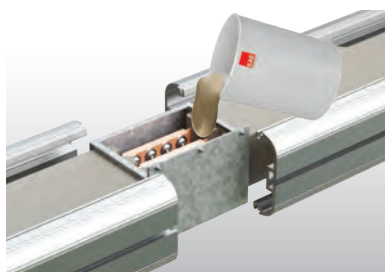
MV 12kV Isolated Hanger Set



MVC - Cu Conductor		Conductor Dimensions	MV 12kV Isolated Hanger Set Code	
Rated Current	Busbar Code		Description	Order Code
950	09	6x40	MV 12kV Isolated Hanger Set	3195616
1150	11	6x55		
1350	13	6x70		
1650	16	6x95	MV 12kV Isolated Hanger Set	3195562
2250	22	6x140		
2750	27	6x200		

12kV Additional Zone Weights

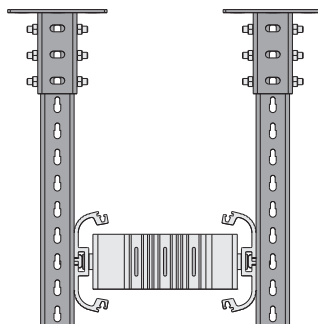
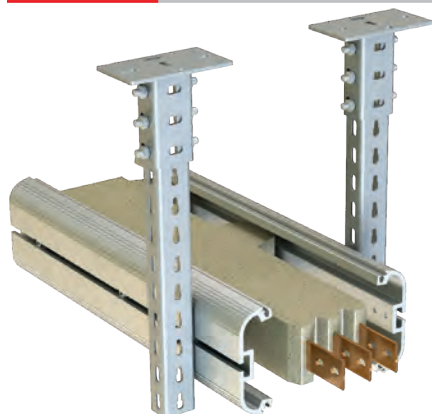
MVC - Cu Conductor		Conductor Dimensions	Weight (kg)
Rated Current	Busbar Code		
950	09	6x40	12,0
1150	11	6x55	13,5
1350	13	6x70	14,0
1650	16	6x95	15,5
2250	22	6x140	18,5
2750	27	6x200	22,5



Total mixture weight of 1 Bucket is 15 kg.

When determining the material to be consumed for joint point, the installation of joint point weighing 15 kg and its multiples should be included in the work plan for the same day. Otherwise, since the remaining material will happen a curing reaction, it cannot be used in another day's work plan and will be scrapped. Material planning should be done taking this detail into consideration.

Ceiling Fixing Element



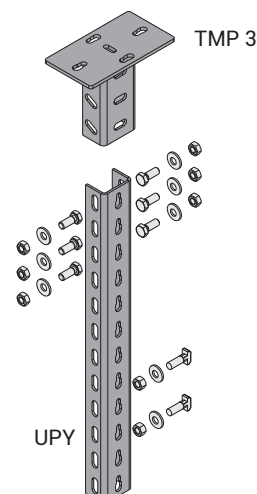
Description	T (mm)	Tensile Load (kg.)	Weight (kg./pcs)	Order Code	Pack (pcs)
TMP 3	4	900	1,689	3086554	10

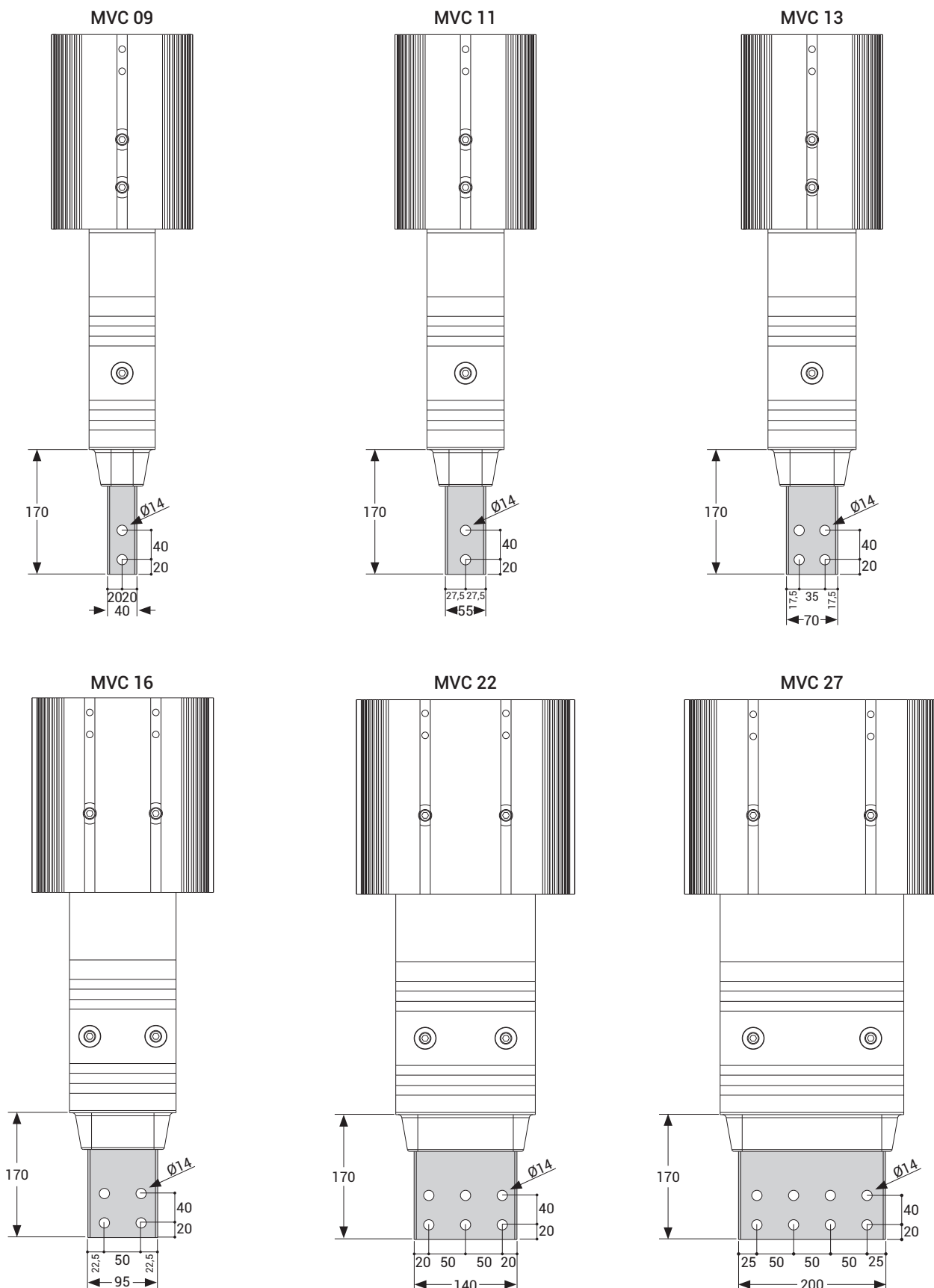
Note: The bolt set is not included in the product. Please order separately.

TMP 3 Fixing Element Mounting:
6 pcs M10x30 Bolt,
12 pcs M10 Washers,
6 pcs M10 Spring Washers,
6 pcs M10 Nuts
should be used.

Heavy Duty Supports (U)

Description	T (mm)	L (mm)	Weight (kg./pcs)	Order Code
UPY 150	4	150	0,586	3004486
UPY 300	4	300	1,172	3004487
UPY 400	4	400	1,562	3004489
UPY 500	4	500	1,956	3004491
UPY 600	4	600	2,343	3004493
UPY 700	4	700	2,728	3004495
UPY 800	4	800	3,124	3004496
UPY 900	4	900	3,515	3004497
UPY 1000	4	1000	3,945	3004498
UPY 1100	4	1100	4,296	3004499
UPY 1200	4	1200	4,686	3004500
UPY 1300	4	1300	5,071	3004501
UPY 1400	4	1400	5,467	3004502
UPY 1500	4	1500	5,917	3004503
UPY 1600	4	1600	6,248	3004504
UPY 1700	4	1700	6,633	3004505
UPY 1800	4	1800	7,029	3004506
UPY 1900	4	1900	7,414	3004507
UPY 2000	4	2000	7,811	3004508
UPY 3000	4	3000	11,716	3001954

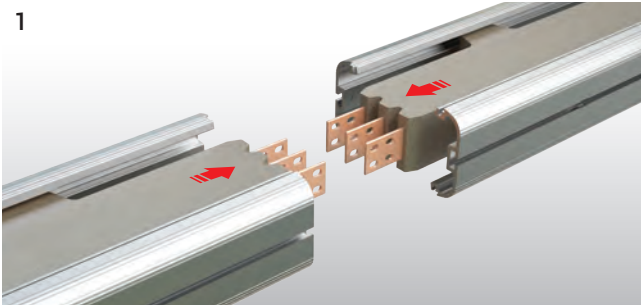




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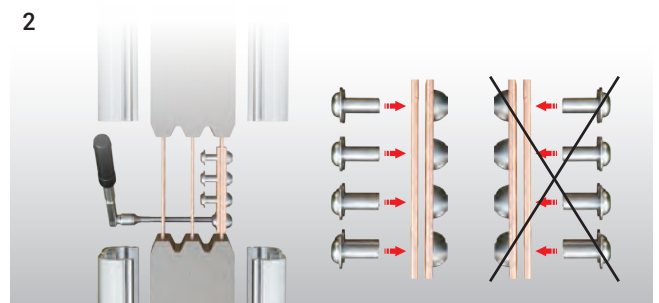
Horizontal Application

1



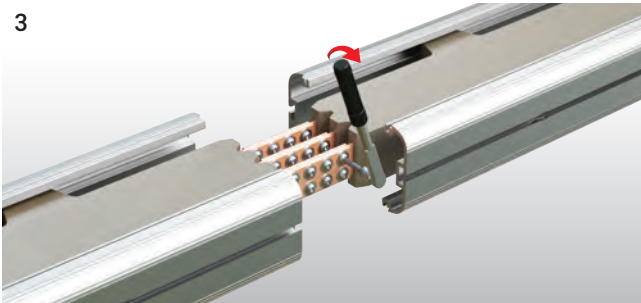
The ends of the conductors of the busbars are cleaned with a clean dry cloth. The busbars have to be fixed in the same axis, with a max. distance of 10 mm between the two conductors.

2



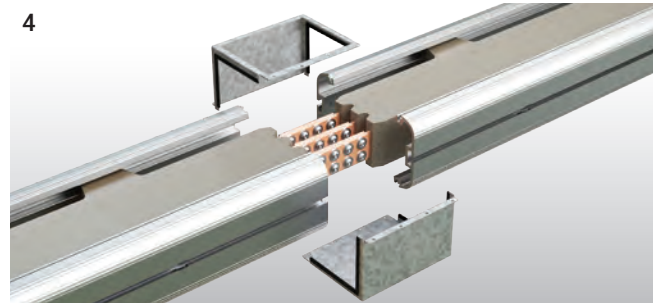
As shown on the figure, junction plates fixed as the bolts face the same direction at all times.

3



All bolts must be tightened to 72 Nm with torque wrench.

4



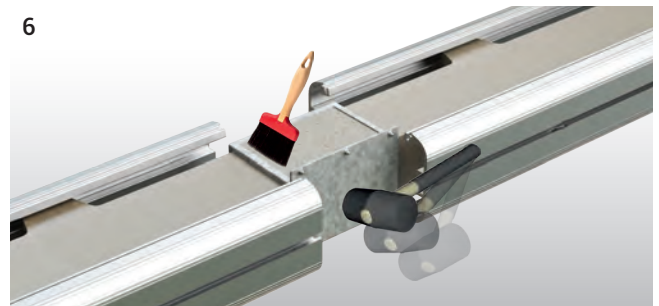
Before assembling the casting moulds, inner surfaces of casting moulds have to be wiped with clean dry cloth.

5



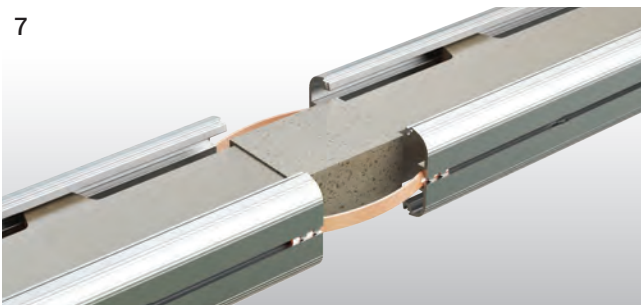
The prepared for casting should be cast from the same spot at all times.

6



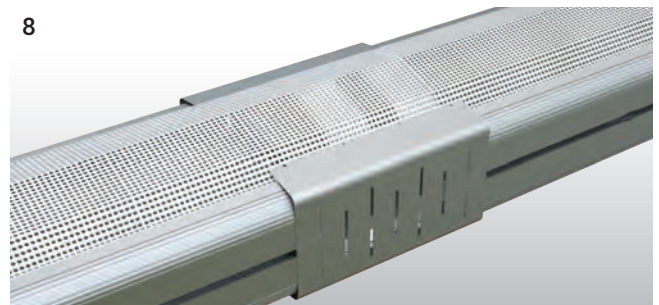
The material should be 'vibrated' with the help of a plastic hammer to remove the air in the material. Then the air bubbles on the surface have to be brushed.

7



After the curing of the cast material is completed the sheet metal moulds can be removed. (Reaction is completed within 8 - 24 hours based on the air temperature.) The flexibles are fitted to the profiles grooves for earth continuity.

8

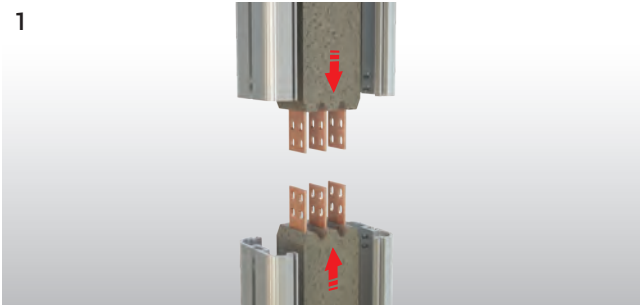


Joint protection pieces of perforated aluminium should be fitted.

E-LINE MV

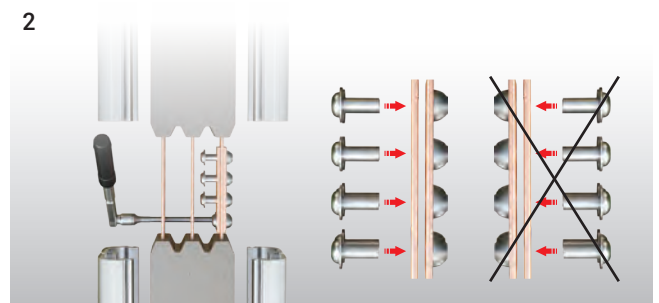
Vertical Application

1



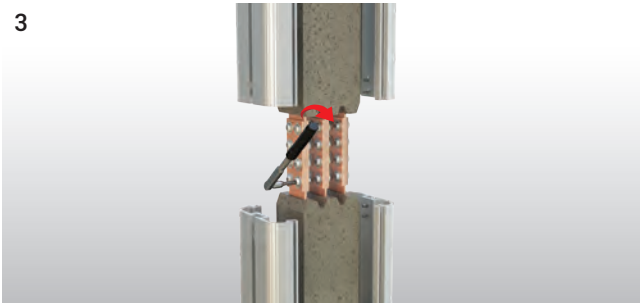
The ends of the conductors of the busbars are cleaned with a clean dry cloth. The busbars have to be fixed in the same axis, with a max. distance of 10 mm between the two conductors.

2



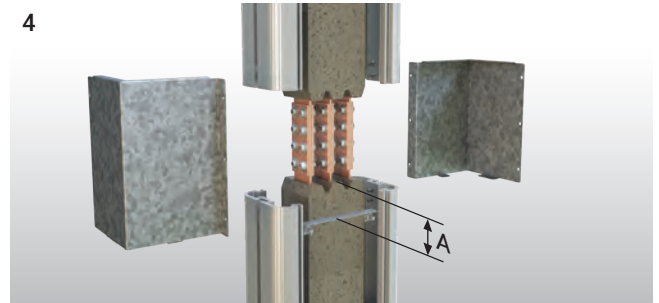
As shown on the figure, junction plates fixed as the bolts face the same direction at all times.

3



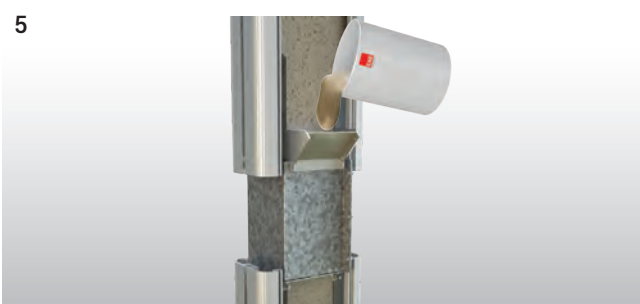
All bolts must be tightened to 72 Nm with torque wrench.

4



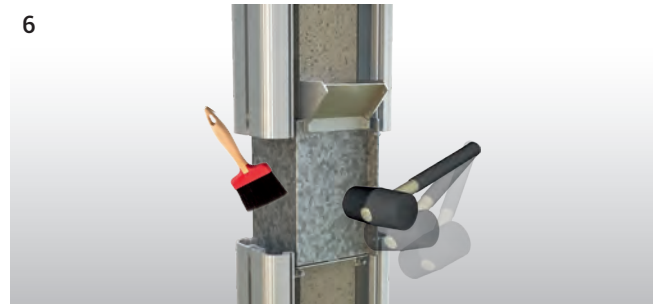
Support sheets are secured on the lower part of juncture area by stem bar. A min. 50-60 mm. The joint moulds are affixed on the support sheet by cleaning with a dry and clean piece of cloth.

5



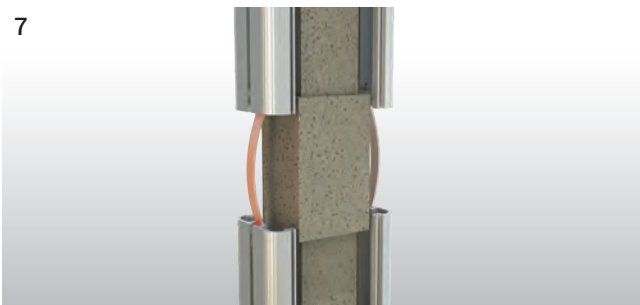
The prepared for casting should be cast from the same spot at all times.

6



The material should be "vibrated" with the help of a plastic hammer to remove the air in the material. Then the air bubbles on the surface have to be brushed.

7



After the curing of the cast material is complete the sheet metal moulds can be removed. (Reaction is completed within 8 - 24 hours based on the air temperature.) The flexibles are fitted to the profiles grooves for earth continuity.

8



Joint protection pieces of perforated aluminium should be fitted.

1- Standards & Certification:

-Busbar trunking system shall be designed in accordance with the international standards IEC 62271-200 and IEC 61439-6, type tests thereof shall be conducted and manufactured in accordance with the standard. Type tests shall be conducted by independent and accredited testing and certification bodies with international validity and certified accordingly. Short-circuit type tests and the following 3 main type tests shall be conducted for each current rating of busbar system and conformity certificate for the standards shall be obtained.

2- Overall System Structure

Busbar system should be with low impedance complying with the following specifications. This should be accomplished by placement of the tin coated conductors within the material with no entrapped air within.

2.1- Electrical Values

- Nominal insulation voltage of 12kV busbar trunking system should be 28kV.
- For the tin coated copper, the environmental temperature should be maximum 40 °C while the maximum temperature rise should be 90 K.
- Busbar trunking 3 sec. encryption must be required.
- Minimum short circuit values of busbar should be as follows

For Cu Conductors;

950-2750A : phase-phase 1 sec. value 25kA, peak value 65kA

2.2- Housing and Overall Structure

- Housing of busbar lengths is a special design and should be manufactured from a cast material.
- The structure of the busbar lengths shall have tin plated conductors along their complete length within the housing.
- In the busbar trunking system, there should be down-up and right-left turning elements, panel, transformer and cable connection elements, closure, horizontal and vertical expansion elements as a standard. Special modules and special size busbar lengths that may be required during the implementation of the project should be able to be manufactured within a short time and in accordance with the standard specification and technique.
- If busbar runs pass through the building expansion joint a horizontal expansion element shall be used in the run. Besides, horizontal dilatation element should be used at each 40 m on the horizontal lines.

2.3- Conductors and Phase Configuration

- Busbar trunking systems conductors shall be high conductivity copper with 99.95% / 99.99% between 950-2750A.
- Busbar trunking system should be in the following conductor number and phase configuration

a) 3 Conductors / PE housing

- Copper conductors should be 99.95% electrolytic copper. Minimum conductivity value should be 56 m/mm². Entire surfaces of the electrolytic copper conductors should be tin-coated.

2.4- Insulation Structure

- High conductivity bars; It must be insulated with a special composite material formed by a mixture of specially selected sand, calcite and epoxy resin. This material should be suitable for temperature changes and thermal expansion. High protection should be provided against external impacts.
- Insulation structure must be such that it can operate at -70 + 150 ° C.

2.5- Modular Joint Structure

- The phase conductors shall be joined using two junction plates per phase of suitable cross section to maintain the rating integrity of the conductors. These plates shall be secured using bolts with non-sharp tips torqued to 72 Nm. The joint shall be completed using a mixture of epoxy and silicon to match the material of the busbar lengths. This material should be compliant with temperature changes and thermal expansion. It should ensure high protection against external impacts. Junction point bolts should be tightened with torque wrench set to 72 Nm (55 lbft)

3- Assembly and Commissioning Tests

- The assembly of the busbar trunking system should be performed in accordance with the electrical project , electrical single line diagram, layout plans and detailed busbar application projects in line with the type and current values indicated on these plans, instructions provided by the manufacturer should be strictly abided with during the assembly process. Joint bolts shall definitely be tightened by the torque wrench set to correct values and insulated accordingly.
 - Upon the completion of the assembly of the busbar system and controlling of the compliance to the project thereof and assembly instructions;
- a) Di-Electric test with very low frequency should be conducted.
- b) Joint resistances and Line resistances should be measured.
- c) Phase sequences should be checked.

ПромМаш Тест

PROMMASHTEST LIMITED COMPANY
Test Center

Principal Place of Business of the Legal Entity: 119530, Moscow city, Ochakovskoy Road, Apt 34, Office VII/5
(119530, город Москва, дом 34, подъездный VII, комната 5)

Low-Voltage Equipment Test Laboratory
Address in where the accreditation activity is executed: 142300 Moscow city, Chehovskiy District, Chehov town,
Simferopol road, Apt.2
(142300 Московская область, Чеховский район, Симферопольское шоссе, 2.2)

APPROVAL
PROMMASHTEST Test Center Director
S.A. Egorov
28.11.2019
(Date and Signature)

28/31LNVOK issue number and dated 28.11.2019
TEST REPORT

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DEKRA
TEST REPORT

2221727.05-MHV

Applicant : EAE Elektrik Asansör End.
İnsaat San. ve Tic. A.Ş.
Akçaburgaz Mahallesi 119, Sokak No: 10
34510 Esenyurt / İstanbul
Turkey

Application Date : 23 October 2017

Order Number : 222172700

Product : Medium-voltage busbar trunking system (busway)

Trade name : EAE

Type/Model : MVC 1211

Amhem, 26 February 2018

Manufacturer : EAE Elektrik Asansör End.
İnsaat San. ve Tic. A.Ş.
Akçaburgaz Mahallesi 119, Sokak No: 10
34510 Esenyurt / İstanbul
Turkey

Subject : Design verification

Requirements : IEC 62271-1:2000 Edition 2.0 2011-10
IEC 61439-4 Edition 1.0 2012-05
IEC 62271-307 Edition 1.0 2015-09
STL Guide to IEC 62271-200 Edition 2.0 2011-10

Conclusion : The product complies with the specified requirements

Tested by : M. Lusing

Checked by : A.D.J. Baas

MLu : 0011-18



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222962.05-MHV

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İnsaat San. ve Tic. A.Ş.
Akçaburgaz Mahallesi 119, Sokak No: 10
34510 Esenyurt / İstanbul
Turkey

Application Date : 26 June 2018

Order Number : 222962100

Product : Medium-voltage busbar trunking system (busway)

Amhem, 26 February 2018

Manufacturer : EAE Elektrik Asansör End.
İnsaat San. ve Tic. A.Ş.
Akçaburgaz Mahallesi 119, Sokak No: 10
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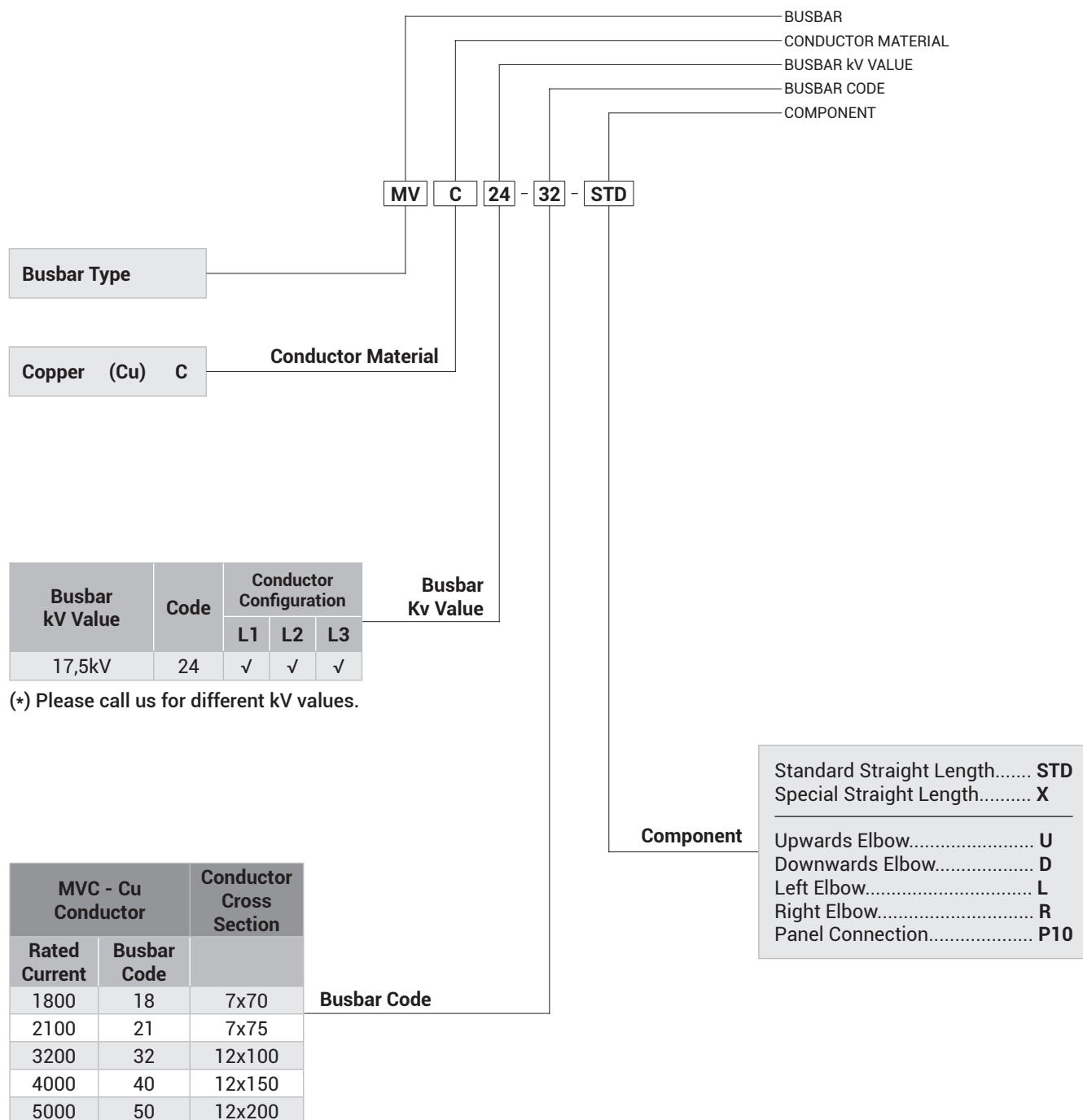
Tested by : M. Lusing

Checked by : A.D.J. Baas

MLu : 0011-18

E-LINE MV

Order Code System



Rated Current	I_r	A	1800	2100	3200	4000	5000
Busbar Kodu			18	21	32	40	50
Standards	IEC 62271-200 Edition 2.0 2011-10; IEC 62271-307 Edition 1.0 2015-09;		IEC 61439-6 Edition 1.0 2012-05; STL Guide to IEC 62271-200 Edition 2.0 2011-10				
Rated Voltage	U_r	kV	17,5	17,5	17,5	17,5	17,5
Rated power frequency withstand voltage	U_d	kV	50	50	50	50	50
Rated impulse withstand voltage	U_p	kV	125	125	125	125	125
Rated Frequency	f_r	Hz	50	50	50	50	50
Partial Discharge		pC	< 20	< 20	< 20	< 20	< 20
External Mechanical Impacts (IK Code)*	50J, > IK10						
Rated Short-time Withstand Current (1s)	I_k	kA_{rms}	65	65	90,7	90,7	90,7
Rated Peak Withstand Current	I_{ke}	kA	169	169	236	236	236
Rated Short-time Withstand Current for PE Conductor (1s)	I_p	kA	39	39	55,7	55,7	55,7
Rated Peak Withstand Current for PE Conductor	I_{pe}	kA	102	102	144	144	144
MEAN PHASE CONDUCTOR CHARACTERISTICS AT RATED CURRENT I_n							
Resistance at a conductor temperature of 20°C	R_{20}	mΩ/m	0,0425	0,0401	0,0210	0,0126	0,0100
Resistance at an ambient air temperature of 35°C	R	mΩ/m	0,0568	0,0547	0,0289	0,0172	0,0138
Reactance (Independent from Temperature)	X	mΩ/m	0,1343	0,1303	0,1084	0,0879	0,0806
Positive and negative sequence impedances at an ambient air temperature of 35°C	Z	mΩ/m	0,1458	0,1413	0,1121	0,0896	0,0818
Positive and negative sequence impedances at an ambient air temperature of 20°C	Z_{20}	mΩ/m	0,1408	0,1363	0,1104	0,0888	0,0813
Rated Power Loss at 35°C		Watt	529	703,3	867,3	797,5	1010,5
DC Resistance at a conductor temperature of 20 °C for Phases	R_{phdc}	mΩ/m	0,034	0,034	0,017	0,012	0,009
DC Resistance at a conductor temperature of 20°C for PE	R_{PEdc}	mΩ/m	0,009	0,009	0,009	0,006	0,013
SECTIONS							
Phase Conductor		mm²	490	525	1200	1800	2400
PE (Housing)		mm²	8515	8515	8515	9394	10194
Conductor Cross Section		mm x mm	7x70	7x75	12x100	12x150	12x200
Busbar Weight (3 Conductors)		kg/m	104	106	122	152	187
MEAN FAULT-LOOP CHARACTERISTICS							
Zero-sequence Impedance							
Zero-sequence impedance at a conductor temperature of 20°C	$Z_{(0)b20phPE}$	mΩ/m	0,269	0,253	0,220	0,211	0,192
Zero-sequence impedance at an ambient temperature of 35°C	$Z_{(0)bphPE}$	mΩ/m	0,284	0,253	0,230	0,220	0,199
Mean Resistances and Reactances							
Resistance at a conductor temperature of 20°C	$R_{b20phph}$	mΩ/m	0,089	0,055	0,047	0,032	0,025
Resistance at a conductor temperature of 20°C	$R_{b20phPE}$	mΩ/m	0,062	0,056	0,041	0,033	0,026
Resistance at an ambient air temperature of 35°C	R_{bphph}	mΩ/m	0,119	0,075	0,046	0,044	0,035
Resistance at an ambient air temperature of 35°C	R_{bphPE}	mΩ/m	0,083	0,076	0,041	0,045	0,036
Reactance (Independent from temperature)	X_{bphph}	mΩ/m	0,264	0,246	0,209	0,170	0,143
Reactance (Independent from temperature)	X_{bphPE}	mΩ/m	0,169	0,156	0,142	0,122	0,108

(1) Standards

The weight per metre provided in table includes 1/3 of the weight of one block joint.

E-LINE MV

Standard Straight Length

Standard Feeder Straight Length

STD

Sample Order:

MVC 2418 - STD
17,5kV 1800 A, Copper,
Feeder, 3 Conductors

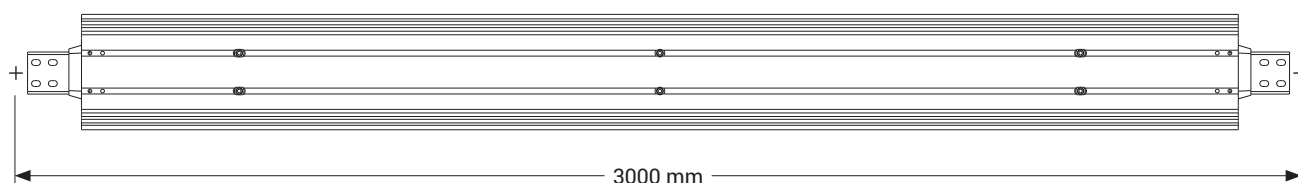


Table For Outer Dimension of Busbars

MVC - Cu Conductor	Conductor Cross Section	7x70	7x75	12x100	12x150	12x200
	Rated Current (A)	1800	2100	3200	4000	5000
	Busbar Code	18	21	32	40	50
A	mm	160	160	160	210	260
B	mm	247	247	247	297	347

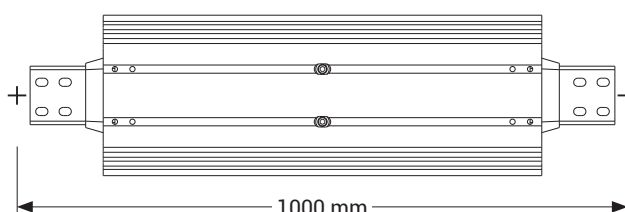
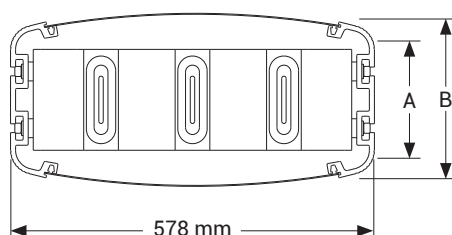
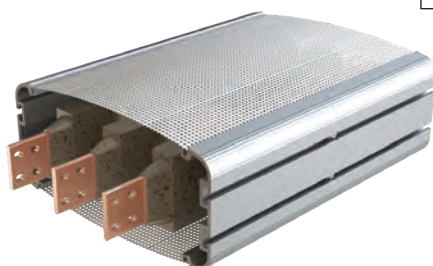
Special Feeder Straight Length

X

Sample Order:

MVC 2432 - X - 150
17,5kV 3200 A, Copper, Feeder,
3 Conductors, 1500 mm Special Length

Information:
Feeder Minimum
Special length size = 1000 mm

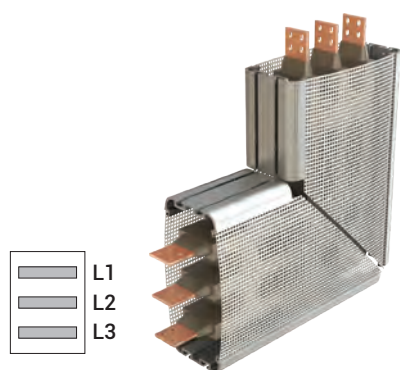


Attention! The standard mounting of the MV busbar is with the conductors on edge.
This allows for the easy application of the resin at the joint.

E-LINE MV

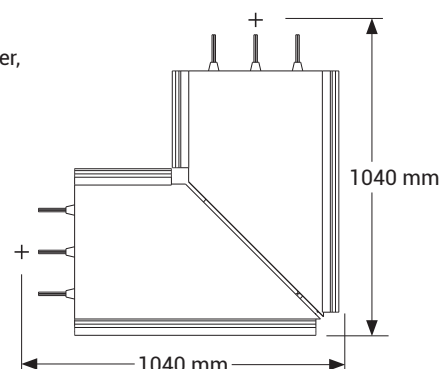
Elbows

Upwards Downwards Elbow

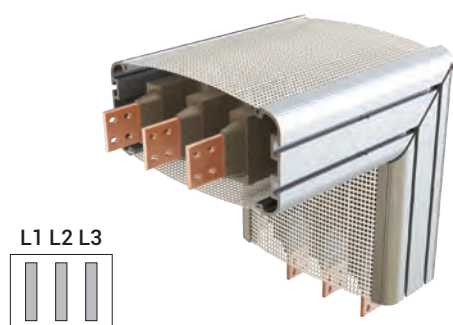


Sample Order:

MVC 2421 - U
17,5kV 2100 A, Copper, Feeder,
3 Conductors



Left Right Elbow



Sample Order:

MVC 2432 - R
17,5kV 3200 A, Copper, Feeder,
3 Conductors

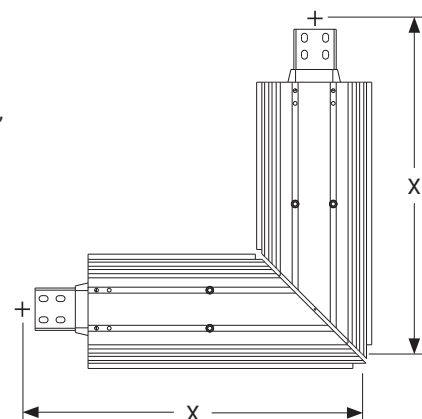


Table of Busbar Cross Section Sizes

MVC - Cu Conductor	Conductor Cross Section	7x70	7x75	12x100	12x150	12x200
	Rated Current (A)	1800	2100	3200	4000	5000
	Busbar Code	18	21	32	40	50
X	mm	690	690	690	740	790

Panel Connection



Sample Order:

MVC 2450 - P10
17,5kV 5000 A, Copper,
Feeder, 3 Conductors
For Panel Feeder

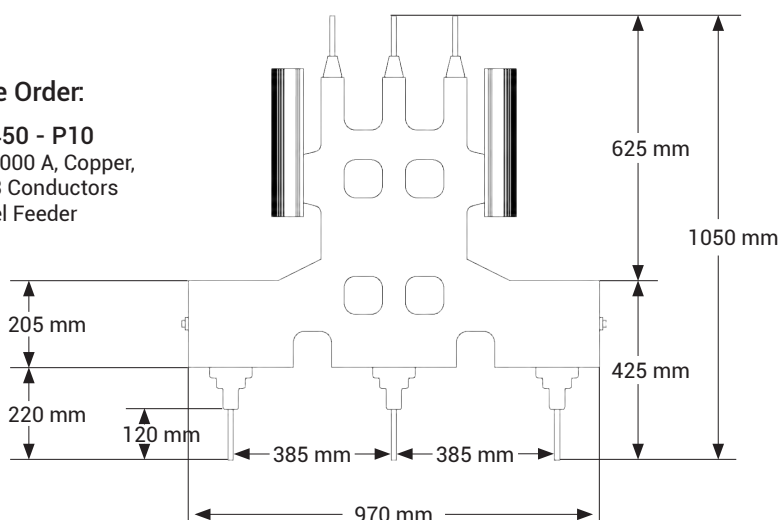
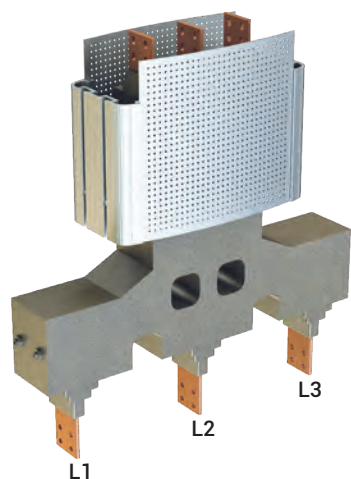


Figure 1 - Edgewise Application

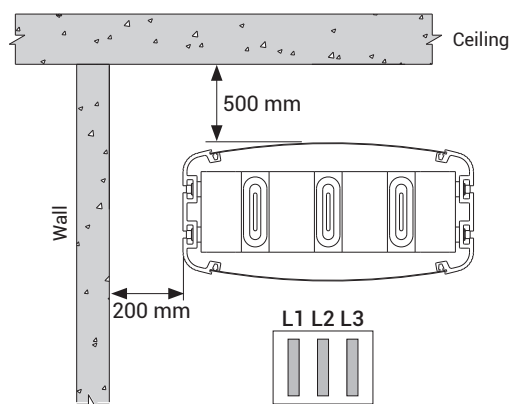
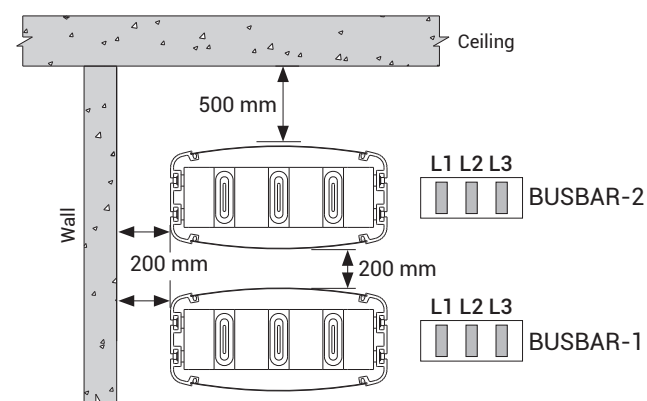


Figure 2 - Edgewise Application



Primarily on the installation phase;
BUSBAR-1 line should be installed before BUSBAR-2 line.

Figure 3 - Crossing Under a Beam On Edgewise Application

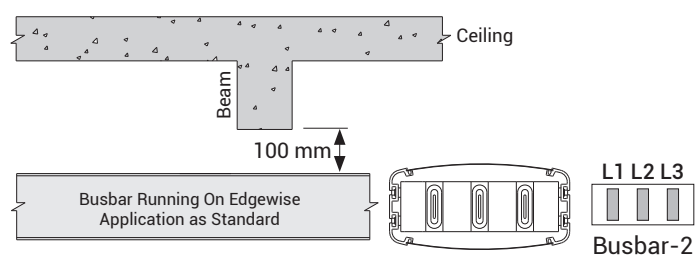


Figure 4 - Sample Wall Crossing with Fire Barrier

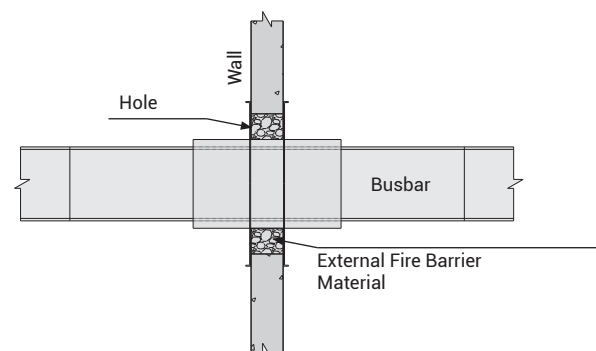
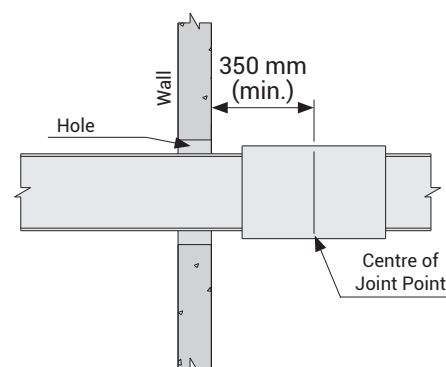


Figure 5 - Standard Wall Crossing



Attention!

- For correct installation, the dimension from the busbar to the ceiling should not be less than 500mm.
- The joint should not come across to Beams.
- The dimensions given above are minimum values.
- All dimensions are given in mm.

Cast Resin Installation Tools

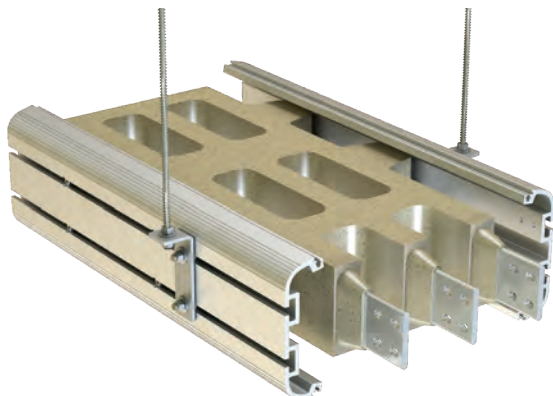
Description	Order Code
CR Joint Area Mixer	5000132
CR Plastic Hammer	5000310
CR Spoon Brush	5000311
MV Allen Torque Set	5000664
Disposable Coverall	5003622



E-LINE MV

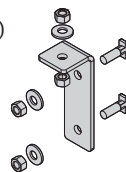
Trunking Support

MV "L" Hanger Set Code



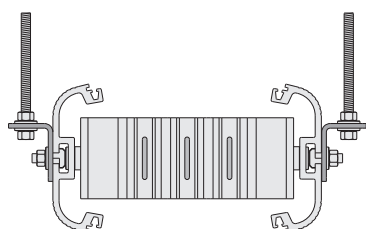
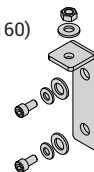
MV L Hanger Set
Ø13

(90-110-160)



MV L Hanger Set
Ø17

(90-110-160)



MVC - Cu Conductor		Conductor Dimensions	MV "L" Hanger Set Code			
Rated Current	Busbar Code		Description	Order Code	Description	Order Code
1800	18	7x70	MV L Hanger Set Ø13-(90)	3180150	MV L Hanger Set Ø17-(90)	3180153
2100	21	7x75				
3200	32	12x100	MV L Hanger Set Ø13-(110)	3180151	MV L Hanger Set Ø17-(110)	3180154
4000	40	12x150				
5000	50	12x200	MV L Hanger Set Ø13-(160)	3180152	MV L Hanger Set Ø17-(160)	3180155

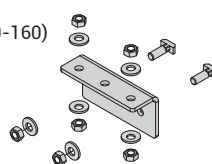
Note: Ø17 Panel Connection for Special Suspension. It is not included in the rod hanger set.

MV "L" Vertical Hanger Set Code



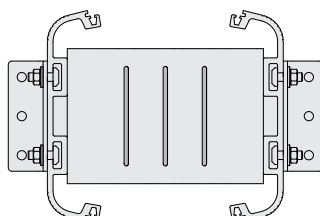
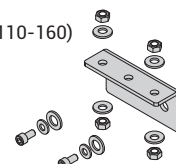
MV L Hanger Set
Ø13

(90-110-160)



MV L Hanger Set
Ø17

(90-110-160)



MVC - Cu Conductor		Conductor Dimensions	MV "L" Hanger Set Code			
Rated Current	Busbar Code		Description	Order Code	Description	Order Code
1800	18	7x70	MV L Hanger Set Ø13-(90)	3389123	MV L Hanger Set Ø17-(90)	3389127
2100	21	7x75				
3200	32	12x100	MV L Hanger Set Ø13-(110)	3388857	MV L Hanger Set Ø17-(110)	3389124
4000	40	12x150				
5000	50	12x200	MV L Hanger Set Ø13-(160)	3389121	MV L Hanger Set Ø17-(160)	3389125

Note: Ø17 Panel Connection for Special Suspension. It is not included in the rod hanger set.

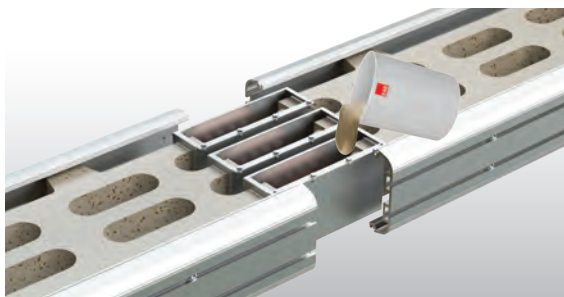
E-LINE MV

Trunking Support

17,5kV Additional Zone Weights



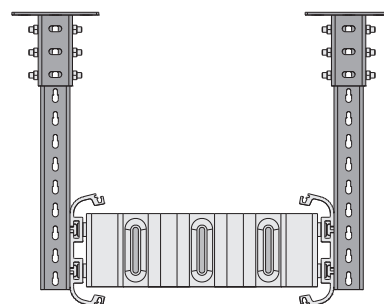
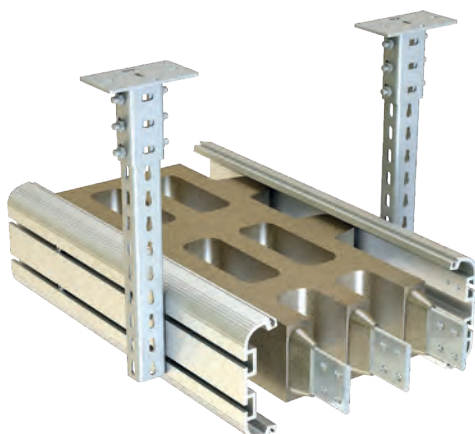
MVC - Cu Conductor		Conductor Dimensions	Weight (kg)
Rated Current	Busbar Code		
1800	18	7x70	36,0
2100	21	7x75	36,0
3200	32	12x100	34,0
4000	40	12x150	41,5
5000	50	12x200	48,0
5700	57	15x200	48,0



Total mixture weight of 1 Bucket is 15 kg.

When determining the material to be consumed for joint point, the installation of joint point weighing 15 kg and its multiples should be included in the work plan for the same day. Otherwise, since the remaining material will happen a curing reaction, it cannot be used in another day's work plan and will be scrapped. Material planning should be done taking this detail into consideration.

Ceiling Flexing Element



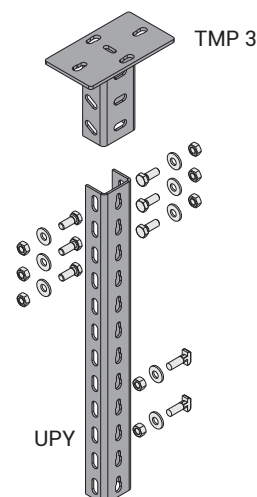
Description	T (mm)	Tensile Load (kg.)	Weight (kg./pcs)	Order Code	Pack (pcs)
TMP 3	4	900	1,689	3086554	10

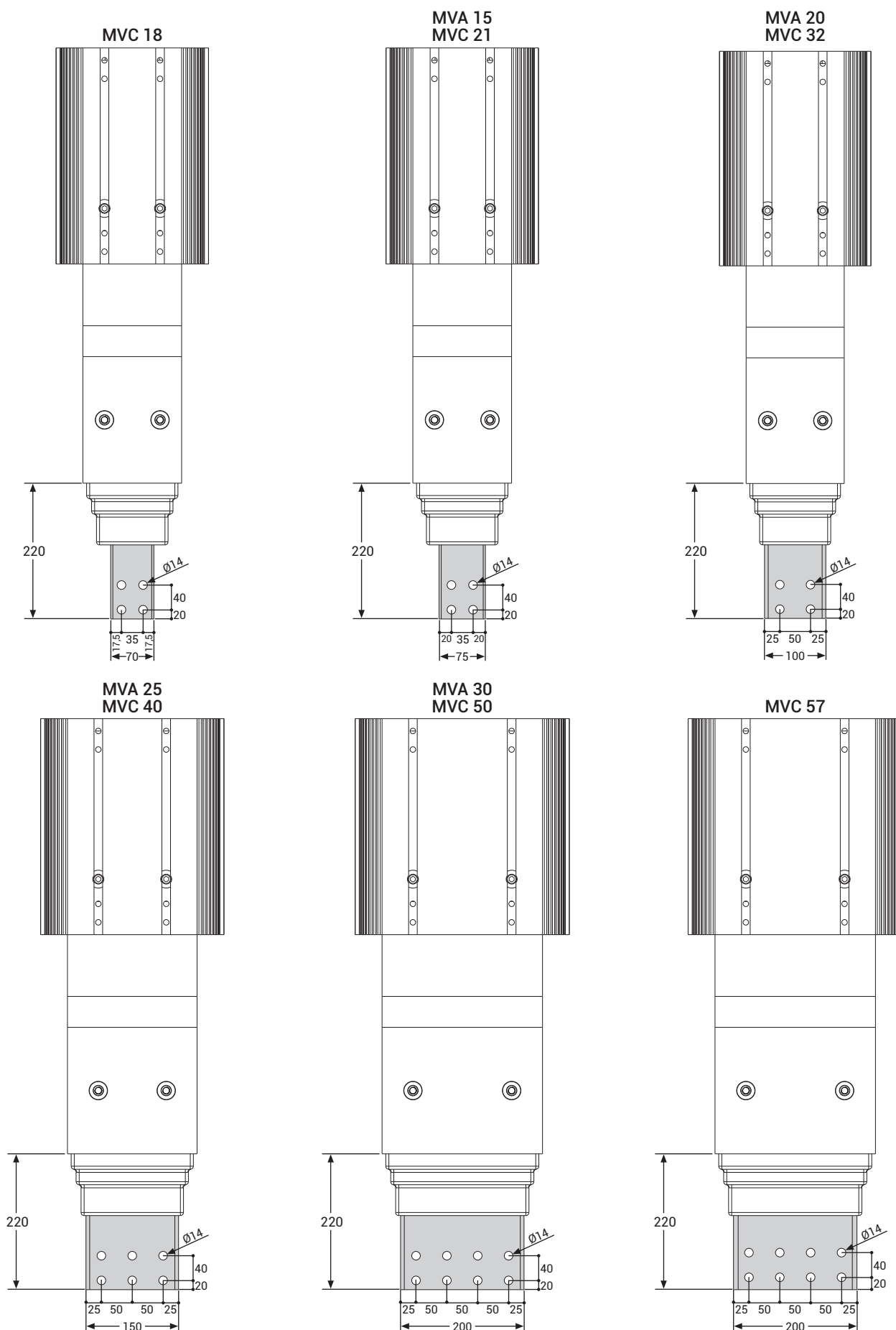
Note: The bolt set is not included in the product. Please order separately.

TMP 3 Fixing Element Mounting;
6 pcs M10x30 Bolt,
12 pcs M10 Washers,
6 pcs M10 Spring Washers,
6 pcs M10 Nuts
should be used.

Heavy Duty Supports (U)

Description	T (mm)	L (mm)	Weight (kg./pcs)	Order Code
UPY 150	4	150	0,586	3004486
UPY 300	4	300	1,172	3004487
UPY 400	4	400	1,562	3004489
UPY 500	4	500	1,956	3004491
UPY 600	4	600	2,343	3004493
UPY 700	4	700	2,728	3004495
UPY 800	4	800	3,124	3004496
UPY 900	4	900	3,515	3004497
UPY 1000	4	1000	3,945	3004498
UPY 1100	4	1100	4,296	3004499
UPY 1200	4	1200	4,686	3004500
UPY 1300	4	1300	5,071	3004501
UPY 1400	4	1400	5,467	3004502
UPY 1500	4	1500	5,917	3004503
UPY 1600	4	1600	6,248	3004504
UPY 1700	4	1700	6,633	3004505
UPY 1800	4	1800	7,029	3004506
UPY 1900	4	1900	7,414	3004507
UPY 2000	4	2000	7,811	3004508
UPY 3000	4	3000	11,716	3001954

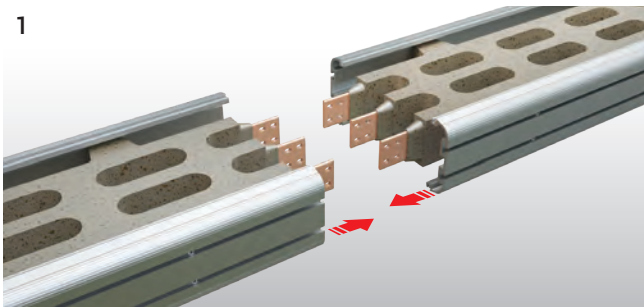




E-LINE MV

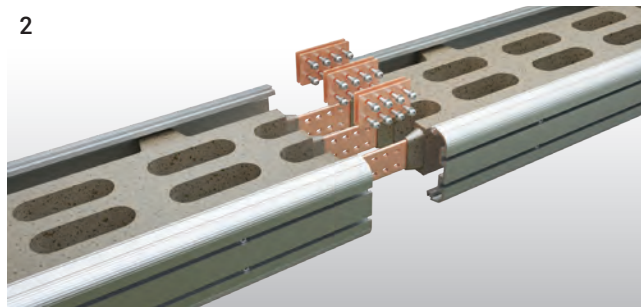
Horizontal Application

1



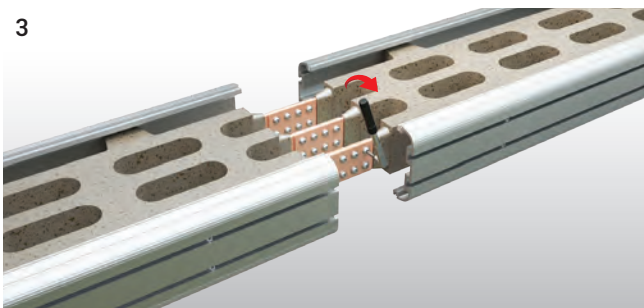
The ends of the conductors of the busbars are cleaned with a clean dry cloth. The busbars have to be fixed in the same axis, with a max. distance of 10 mm between the two conductors.

2



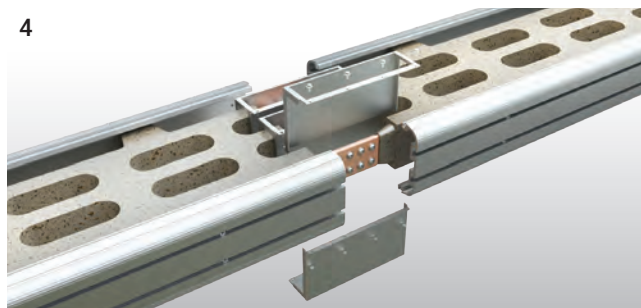
As shown on the figure, junction plates fixed as the bolts face the same direction at all times.

3



All bolts must be tightened to 72 Nm with torque wrench.

4



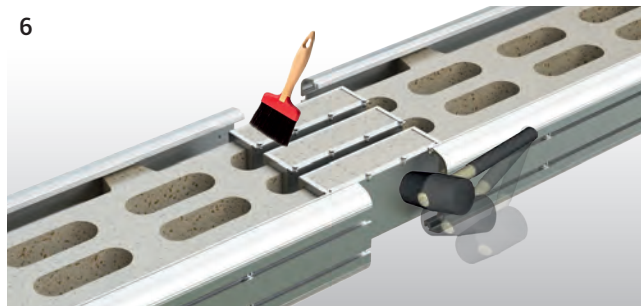
Before assembling the casting moulds, inner surfaces of casting moulds have to be wiped with clean dry cloth.

5



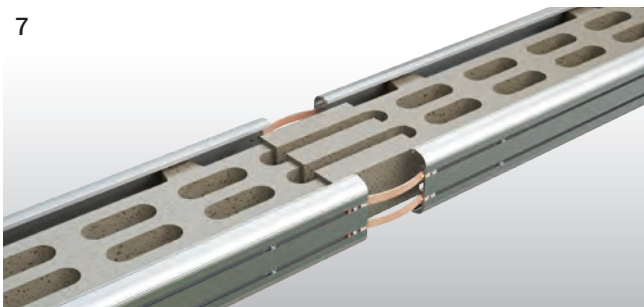
The prepared for casting should be cast from the same spot at all times.

6



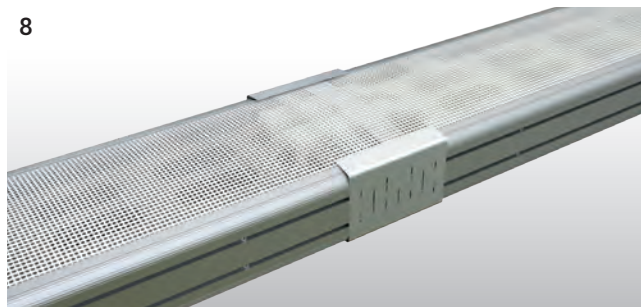
The material should be 'vibrated' with the help of a plastic hammer to remove the air in the material. Then the air bubbles on the surface have to be brushed.

7



After the curing of the cast material is completed the sheet metal moulds can be removed. (Reaction is completed within 8 - 24 hours based on the air temperature.) The flexibles are fitted to the profiles grooves for earth continuity.

8

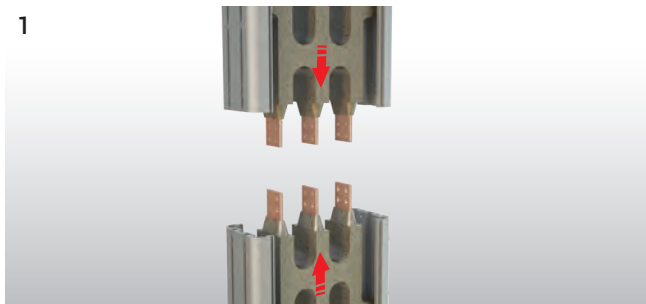


Joint protection pieces of perforated aluminium should be fitted.

E-LINE MV

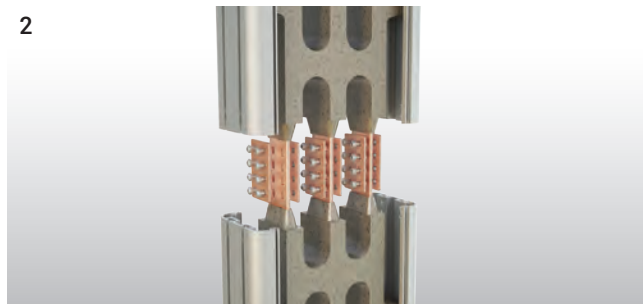
Vertical Application

1



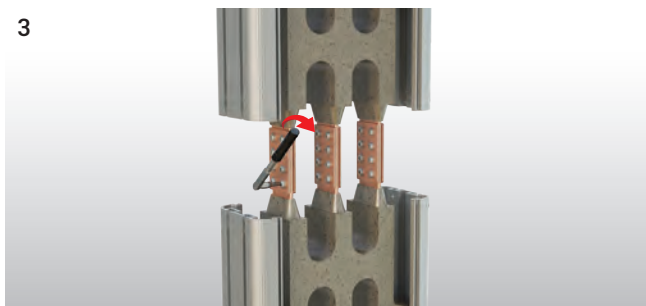
The ends of the conductors of the busbars are cleaned with a clean dry cloth. The busbars have to be fixed in the same axis, with a max. distance of 10 mm between the two conductors.

2



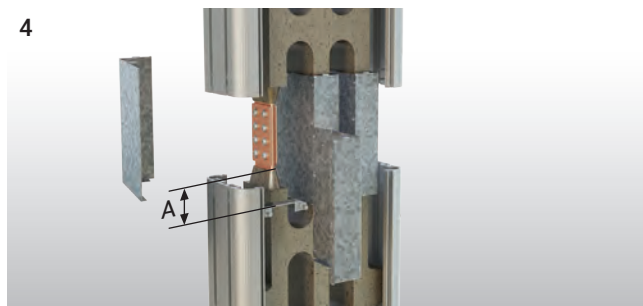
As shown on the figure, junction plates fixed as the bolts face the same direction at all times.

3



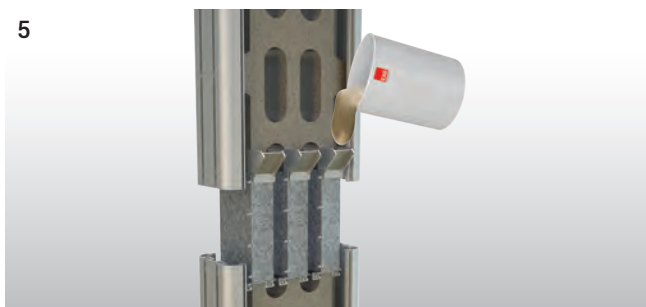
All bolts must be tightened to 72 Nm with torque wrench.

4



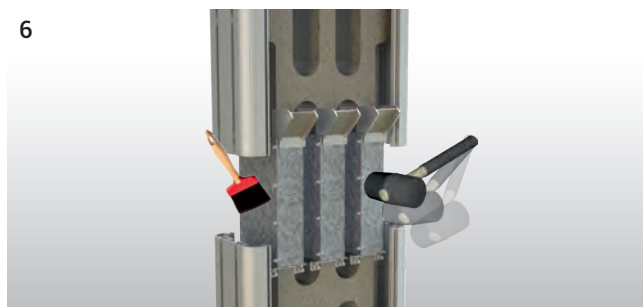
Support sheets are secured on the lower part of juncture area by stem bar. A min. 50-60 mm. The joint moulds are affixed on the support sheet by cleaning with a dry and clean piece of cloth.

5



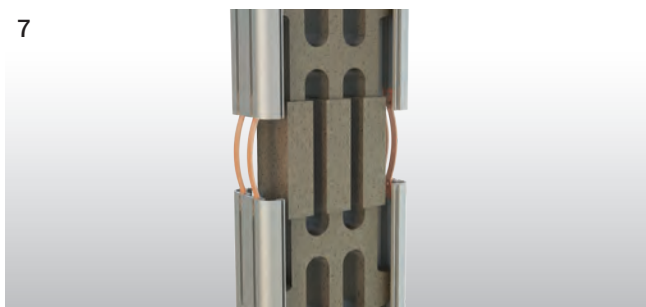
The prepared for casting should be cast from the same spot at all times.

6



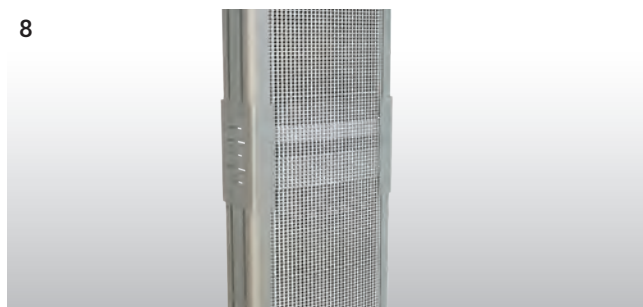
The material should be "vibrated" with the help of a plastic hammer to remove the air in the material. Then the air bubbles on the surface have to be brushed.

7



After the curing of the cast material is complete the sheet metal moulds can be removed. (Reaction is completed within 8 - 24 hours based on the air temperature.) The flexibles are fitted to the profiles grooves for earth continuity.

8



Joint protection pieces of perforated aluminium should be fitted.

1-Standards & Certification:

- Busbar trunking system shall be designed in accordance with international standards IEC 62271-200 and IEC 61439-6, type tests thereof shall be conducted and manufactured in accordance with the standard. Type tests shall be conducted by independent and accredited testing and certification bodies with international validity and certified accordingly. Short-circuit type tests and the following 3 main type tests shall be conducted for each current rating of busbar system and conformity certificate for the standards shall be obtained.

2-Overall System Structure

Busbar system should be with low impedance complying with the following specifications. This should be accomplished by placement of the tin coated conductors within the material with no entrapped air within.

2.1-Electrical Values

- Nominal insulation voltage of 17,5kV busbar trunking system should be 50kV.
- For the tin coated copper, the environmental temperature should be maximum 40 °C while the maximum temperature rise should be 90 K.
- Busbar channels 3 sec. encryption must be required.
- Minimum short circuit busbar lengths should be as follows.

For Cu Conductors

800-2100 A : phase-phase 1 sec. value 65 kA, peak value 169 kA

3200-5000 A : phase-phase 1 sec. value 72 kA, peak value 187 kA

2.2-Housing and Overall Structure

- Housing of busbar lengths is a special design and should be manufactured from a cast material.
- The structure of the busbar lengths shall have tin plated conductors along their complete length within the housing.
- In the busbar trunking system, there should be down-up and right-left turning elements, panel, transformer and cable connection elements, closure, horizontal and vertical expansion elements as a standard. Special modules and special size busbar lengths that may be required during the implementation of the project should be able to be manufactured within a short time and in accordance with the standard specification and technique.
- If busbar runs pass through the building expansion joint a horizontal expansion element shall be used in the run. In addition horizontal expansion elements should be used at each 40 m on the horizontal lines.

2.3-Conductors and Phase Configuration

- Busbar trunking system should be copper conductive between 1800-5700A.
- Busbar trunking systems conductors shall be high conductivity copper.

a) 3 Conductors / PE housing

- Copper conductors should be 99.99% electrolytic copper. Minimum conductivity value should be 56 m/mm². Entire surfaces of the electrolytic copper conductors should be tin-coated.

2.4- Insulation Structure

- High conductivity bars; It must be insulated with a special composite material formed by a mixture of specially selected sand, calcite and epoxy resin. This material should be suitable for temperature changes and thermal expansion. High protection should be provided against external impacts.
- Insulation structure must be such that it can operate at -70 + 150 ° C.

2.5-Modular Joint Structure

The phase conductors shall be joined using two junction plates per phase of suitable cross section to maintain the rating integrity of the conductors. These plates shall be secured using bolts with non-sharp tips torqued to 72 Nm. The joint shall be completed using a mixture of epoxy and silicon to match the material of the busbar lengths. This material should be compliant with temperature changes and thermal expansion. It should ensure high protection against external impacts. Juncture point bolts should be tightened with torque wrench set to 72 Nm (55 lbft)

3-Assembly and Commissioning Tests

- The assembly of the busbar trunking system should be performed in accordance with the electrical project , electrical single line diagram, layout plans and detailed busbar application projects in line with the type and current values indicated on these plans, instructions provided by the manufacturer should be strictly abided with during the assembly process. Joint bolts shall definitely be tightened by the torque wrench set to correct values and insulated accordingly.
- Upon the completion of the assembly of the busbar system and controlling of the compliance to the project thereof and assembly instructions;
 - a) Di-Electric test with very low frequency should be conducted.
 - b) Joint resistances and Line resistances should be measured.
 - c) Phase sequences should be checked.

E-LINE MV

Certificate



ПромМашТест

PROMMASHTEST LIMITED COMPANY

Test Center

Principal Place of Business of the Legal Entity: 119530, Moscow city, Ochakovsky Road, Apt 34, Office VI/6
(119530, город Москва, дом 34, офисные В/6, комната 6)

Low-Voltage Equipment Test Laboratory

Address in where the accreditation activity is executed: 142300 Moscow city, Chehovskiy District, Chehov town,
Simferopol road, Apt.2
(142300 Московская область, Чеховский район, Симферопольское шоссе, 8.2)

APPROVAL
PROMMASHTEST Test Center Director
S.A. Egorov
28.11.2019
(Date and Signature)

28/3ILNVOK issue number and dated 28.11.2019

TEST REPORT

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Test results indicated on this protocol are only valid for the samples tested.

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Applicant : EAE Elektrik Asansör End.
İnsaat San. ve Tic. A.Ş.
Akçaburgaz Mahallesi 119. Sokak No: 10
34510 Esenyurt / İstanbul
Turkey

Application Date : 25 January 2017

Order Number : 219326000-INC

Product : Medium-voltage busbar trunking system (busway)

Trade name : EAE

Type/Model : MVA 2415

Amhem, 6 June 2017

Manufacturer : EAE Elektrik Asansör End.
İnsaat San. ve Tic. A.Ş.
Akçaburgaz Mahallesi 119. Sokak No: 10
34510 Esenyurt / İstanbul
Turkey

Subject : Design verification

Requirements : IEC 62271-200 Edition 2.0 2011-10
IEC 61439-6 Edition 1.0 2012-05
IEC 62271-307 Edition 1.0 2015-09
STL Guide to IEC 62271-200 Edition 2.0 2011-10

Conclusion : The product complies with the specified requirements

Tested by : M. Lusing

Checked by : A.D.J. Baas

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Product : Medium-voltage busbar trunking system

Trade name : EAE

Type/Model : MVA 2415

Amhem, 6 June 2017

Manufacturer : EAE Elektrik Asansör End.
İnsaat San. ve Tic. A.Ş.
Akçaburgaz Mahallesi 119. Sokak No: 10
34510 Esenyurt / İstanbul
Turkey

DEKRA

TEST REPORT 2214282-07-MHV Page 1 of 56

Applicant : EAE Elektrik Asansör End.
İnsaat San. ve Tic. A.Ş.
Akçaburgaz Mahallesi 119. Sokak No: 10
34510 Esenyurt / İstanbul
Turkey

Application Date : 25 January 2017

Order Number : 219326000-INC

Product : Medium-voltage busbar trunking system (busway)

Trade name : EAE

Type/Model : MVA 2415

Amhem, 6 June 2017

Manufacturer : EAE Elektrik Asansör End.
İnsaat San. ve Tic. A.Ş.
Akçaburgaz Mahallesi 119. Sokak No: 10
34510 Esenyurt / İstanbul
Turkey

DEKRA

TEST REPORT 2214282-07-MHV Page 1 of 56

Applicant : EAE Elektrik Asansör End.
İnsaat San. ve Tic. A.Ş.
Akçaburgaz Mahallesi 119. Sokak No: 10
34510 Esenyurt / İstanbul
Turkey

Application Date : 25 January 2017

Order Number : 2217070

Product : Medium-voltage busbar trunking system

Trade name : EAE

Type/Model : MVA 2415

Amhem, 6 June 2017

Manufacturer : EAE Elektrik Asansör End.
İnsaat San. ve Tic. A.Ş.
Akçaburgaz Mahallesi 119. Sokak No: 10
34510 Esenyurt / İstanbul
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Applicant : EAE Elektrik Asansör End.
İnsaat San. ve Tic. A.Ş.
Akçaburgaz Mahallesi 119. Sokak No: 10
34510 Esenyurt / İstanbul
Turkey

Application Date : 25 January 2017

Order Number : 219326000-INC

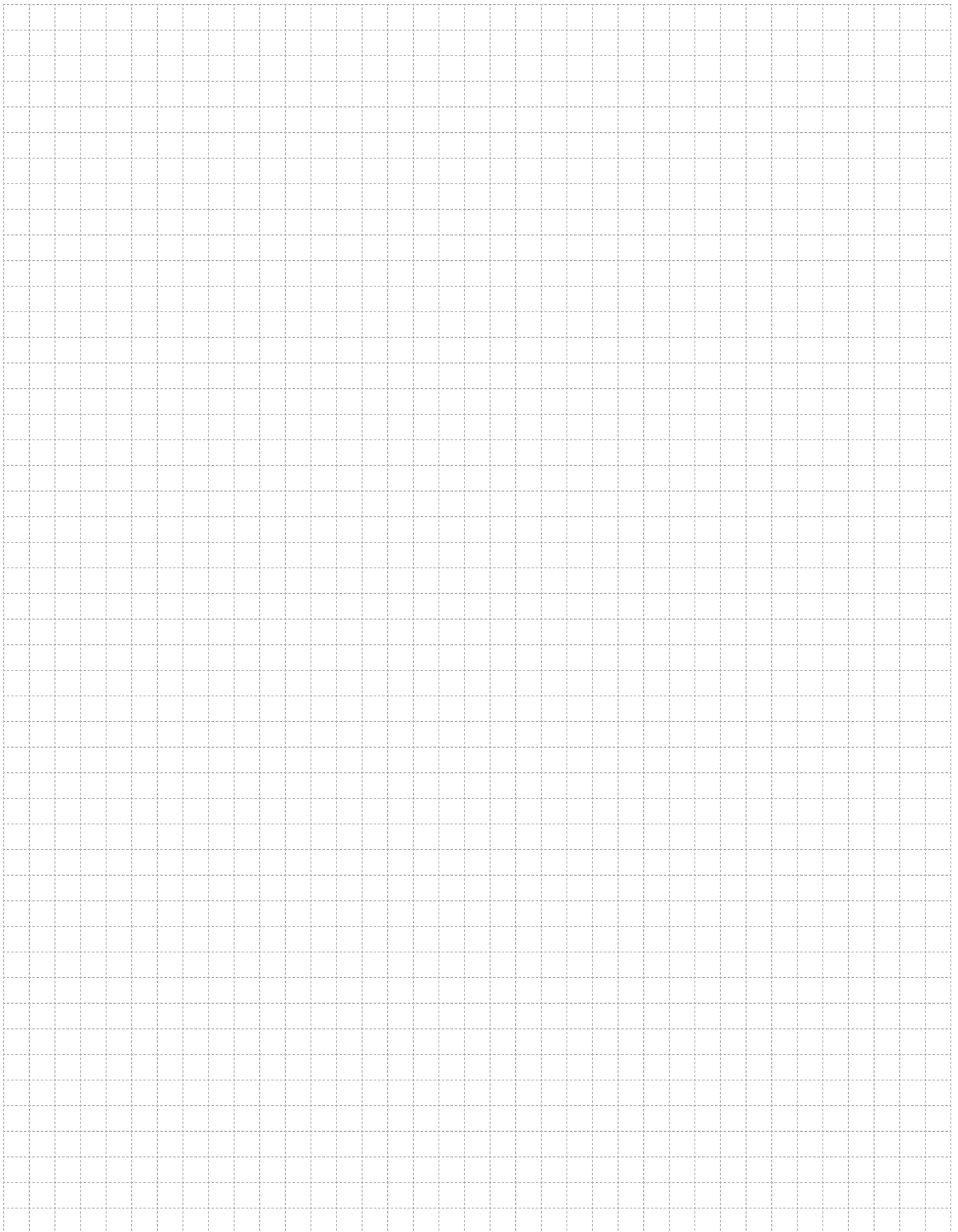
Product : Medium-voltage busbar trunking system (busway)

Trade name : EAE

Type/Model : MVA 2415

Amhem, 6 June 2017

Manufacturer : EAE Elektrik Asansör End.
İnsaat San. ve Tic. A.Ş.
Akçaburgaz Mahallesi 119. Sokak No: 10
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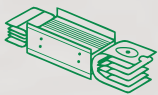
A large rectangular area filled with a fine grid of dashed lines, intended for taking notes or drawing diagrams.

SUSTAINABLE FUTURE

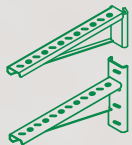
Sustainability Management at EAE Elektrik



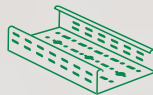
As part of our goal to support sustainable development and green transformation, measuring, evaluating, and managing all economic, environmental, and social impacts resulting from our sustainability practices is a key governance priority for EAE Elektrik. We act with great care in analyzing, monitoring, and managing the economic, environmental, and social impacts and risks that arise throughout our value chain in both our national and global operations.



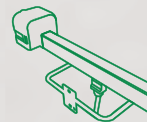
Busbar
Systems



Support
Systems



Cable Tray
Systems



Trolley Busbar
Systems



Fit-Out
Solutions

"We are working together with all our stakeholders to develop the electrical technologies that will build the future."

You can visit our sustainability website at
surdurulebilirlik.eae.com.tr



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EAE DL 3 Factory
Busbar

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