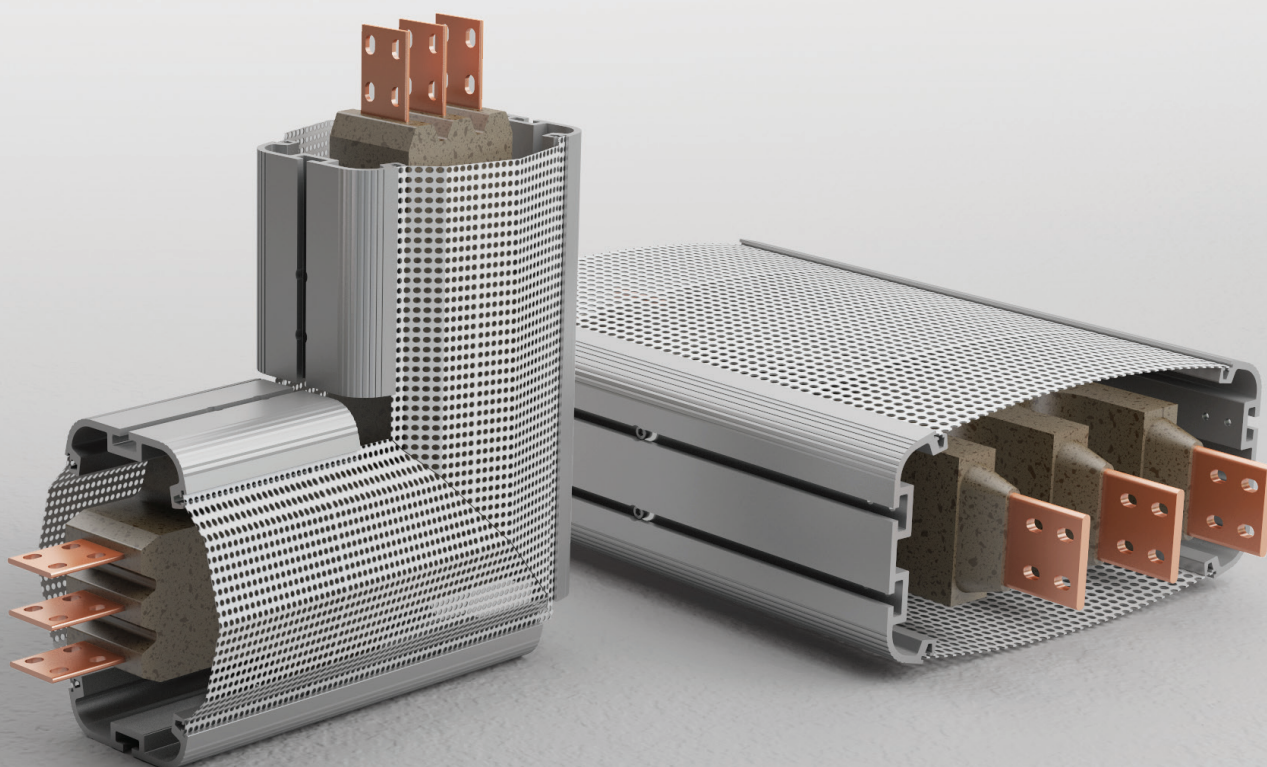




E-LINE MV

Medium Voltage Busbar Systems



E-LINE MV

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www.eaelectric.com



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►► E-LINE MV

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E-LINE MV

General Introduction



Petrochemical Industry

Oil&Gas Industry

Power Generation Industry



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

Medium Voltage busbar systems are designed to operate at voltages of 12 kV and 24 kV. Manufactured as standard up to a rating of 5700 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 aluminum and copper conductors. Contact areas of copper and aluminum 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.

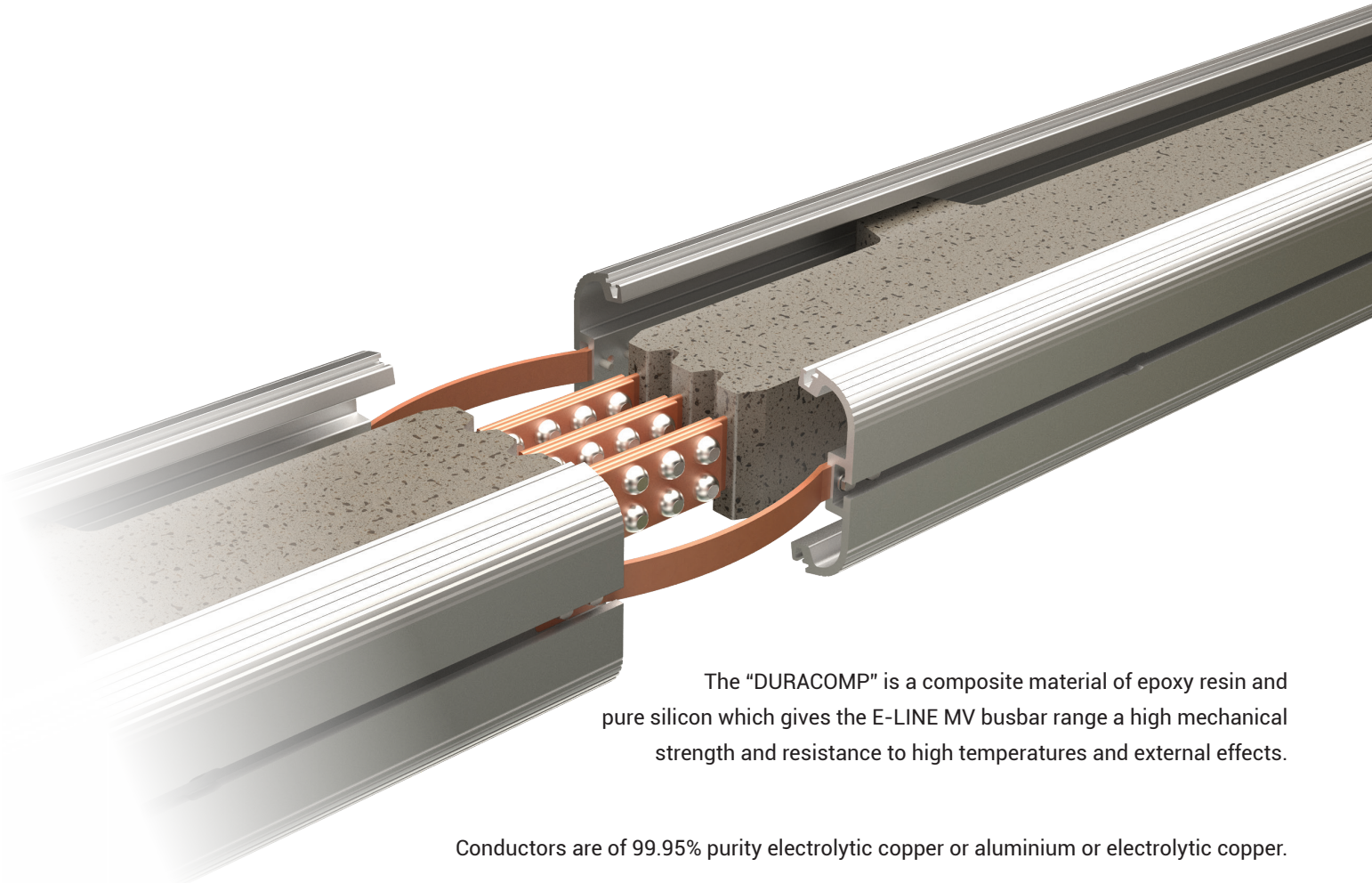
Short-Circuit Withstand

High mechanical and thermal resistance thanks to the DURACOMP material.

Housing:

E-Line MV busbar is produced by combining the Duracomp insulated conductors (Al or CU) within an extruded aluminium housing.

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

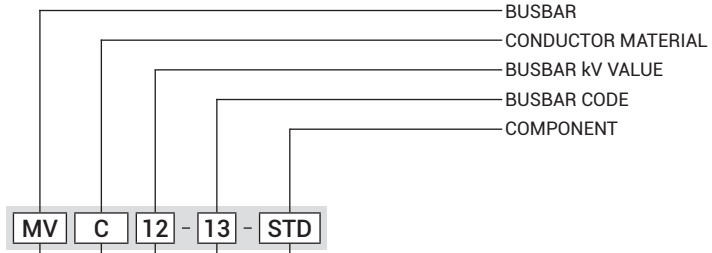


The "DURACOMP" is a composite material of epoxy resin and pure silicon which gives the E-LINE MV busbar range a high mechanical strength and resistance to high temperatures and external effects.

Conductors are of 99.95% purity electrolytic copper or aluminium or electrolytic copper.

E-LINE MV

Order Code System



Busbar Type

Copper (Cu) C

CONDUCTOR MATERIAL

| BUSBAR kV VALUE | Code | Conductor Configuration | | |
|-----------------|------|-------------------------|----|----|
| | | L1 | L2 | L3 |
| 12kV | 12 | ✓ | ✓ | ✓ |

BUSBAR kV VALUE

(* Please call us for different kV values.

| MVC - Cu Conductor | | Conductor Cross Section |
|--------------------|-------------|-------------------------|
| Rated Current | Busbar Code | |
| 950 | 09 | 6x40 |
| 1150 | 11 | 6x55 |
| 1350 | 13 | 6x70 |
| 1650 | 16 | 6x95 |
| 2250 | 22 | 6x140 |
| 2750 | 27 | 6x200 |

BUSBAR CODE

- Standard Straight Length.....STD
- Special Straight Length.....X

- Upwards Elbow.....U
- Downwards Elbow.....D
- Left Elbow.....L
- Right Elbow.....R
- Panel Connection.....P10

Component

► Copper Conductor (Cu)

| Rated Current | I_r | A | 950 | 1150 | 1350 | 1650 | 2250 | 2750 |
|---|--|-----------------|-------|--|-------|--------|--------|--------|
| Busbar Code | | | 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 | | mm ² | 240 | 330 | 420 | 570 | 840 | 1200 |
| PE (Housing) | | mm ² | 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 |

Standards

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

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Standard Straight Length



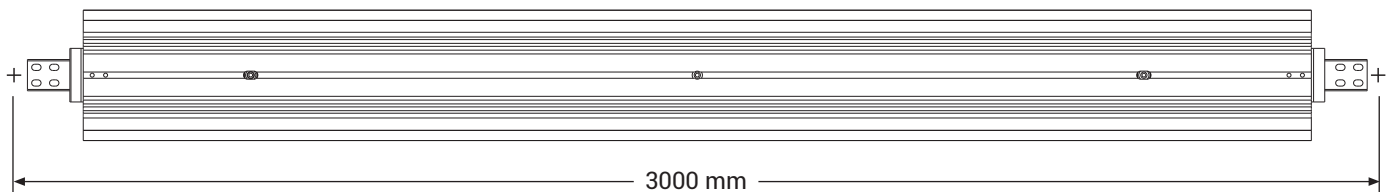
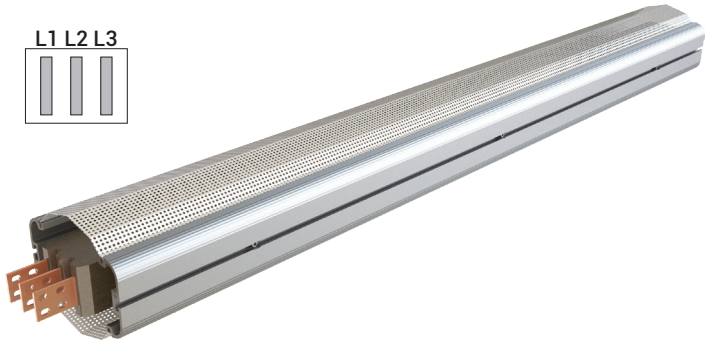
► Standard Feeder Straight Length

STD

Sample Order:

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

L1 L2 L3



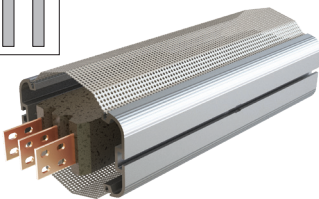
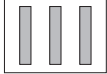
► Special Feeder Straight Length

X

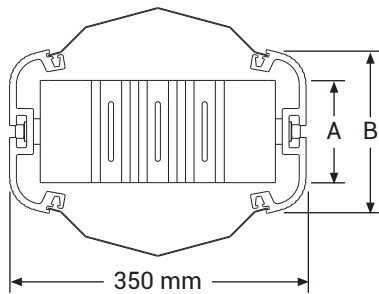
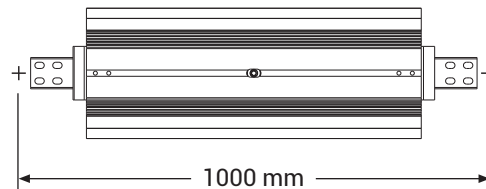
Sample Order:

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

L1 L2 L3



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 |



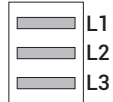
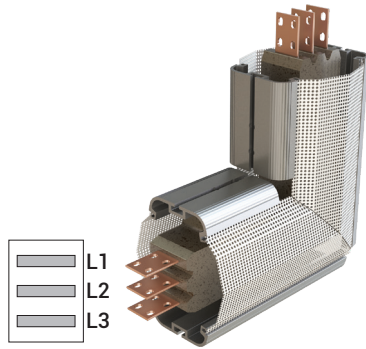
Attention ! The standard mounting of the MV busbar is with the conductors on edge. This allows for the easy application of the resin at the joint.

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Elbows

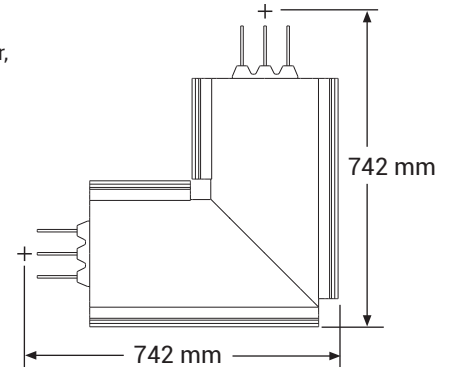


► Upwards Downwards Elbow

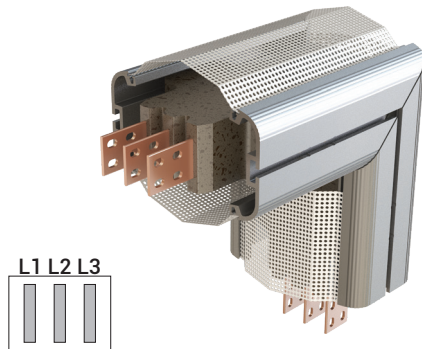


Sample Order:

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

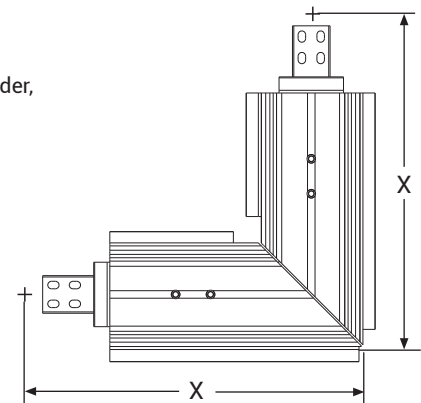


► Left Right Elbow



Sample Order:

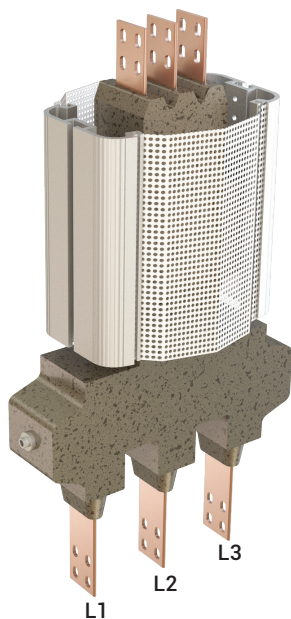
MVC 1209 - R
12 kV 950 A, Copper, Feeder,
3 Conductors



► Table of Busbar Cross Section Sizes

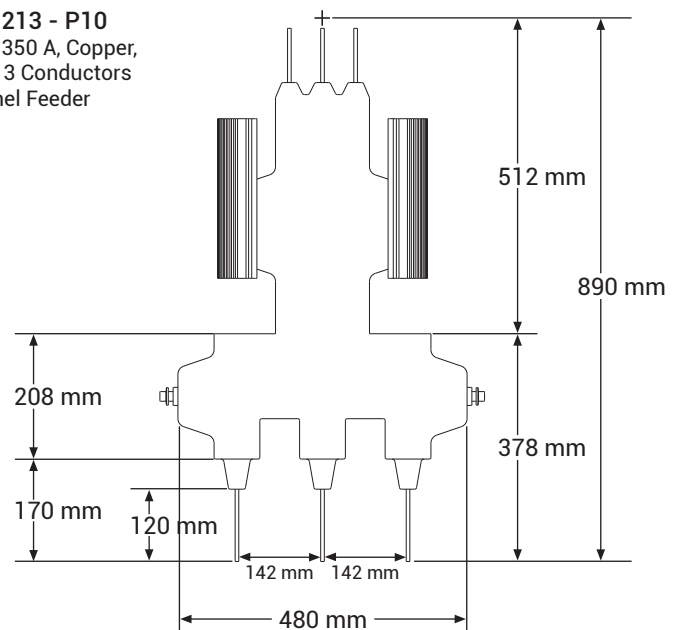
| MVC - Cu Conductor | Rated Current (A) | 950 | 1150 | 1350 | 1650 | 2250 | 2750 |
|-----------------------|----------------------|-----|------|------|------|------|------|
| | Busbar Code | 09 | 11 | 13 | 16 | 22 | 27 |
| X | mm | 580 | 590 | 595 | 635 | 685 | 740 |

► Panel Connection



Sample Order:

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



12 kV

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Horizontal & Vertical Cast Resin Busbar Applications



FIGURE 1 - EDGEWISE APPLICATION

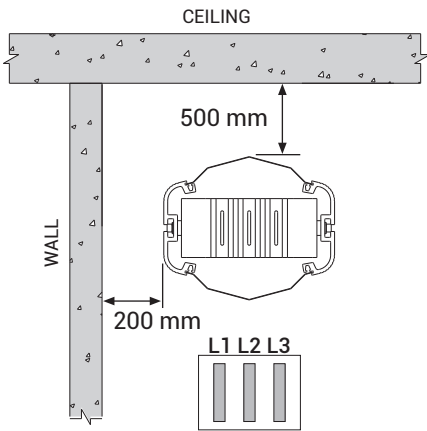


FIGURE 4 - SAMPLE WALL CROSSING WITH FIRE BARRIER

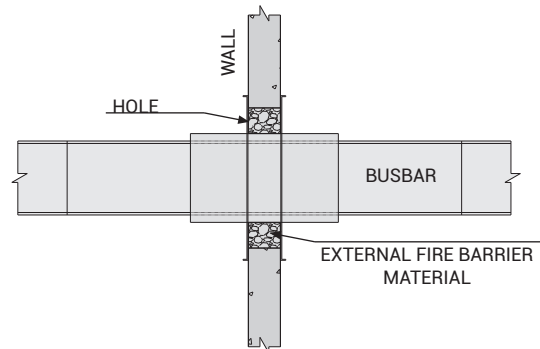
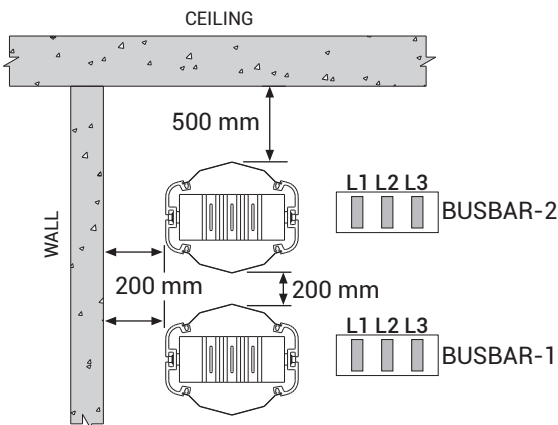


FIGURE 2 - EDGEWISE APPLICATION



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

FIGURE 5 - STANDARD WALL CROSSING

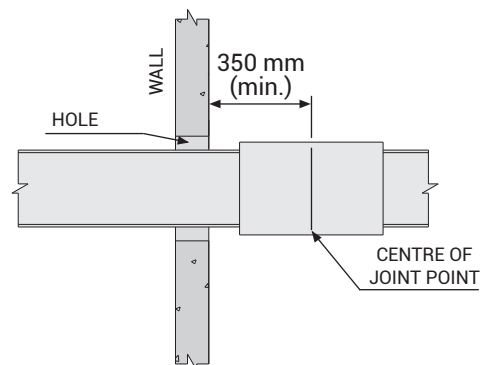
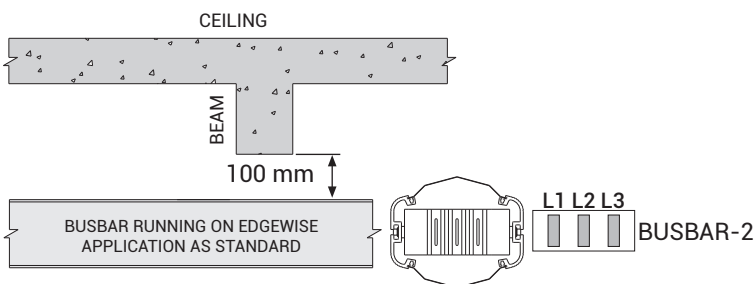


FIGURE 3 - CROSSING UNDER A BEAM ON EDGEWISE APPLICATION



⚠ Attention !

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

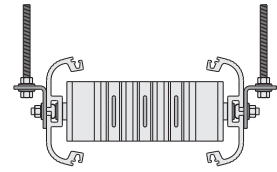
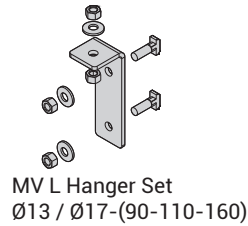
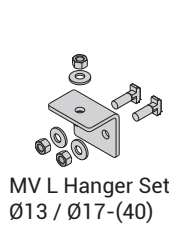
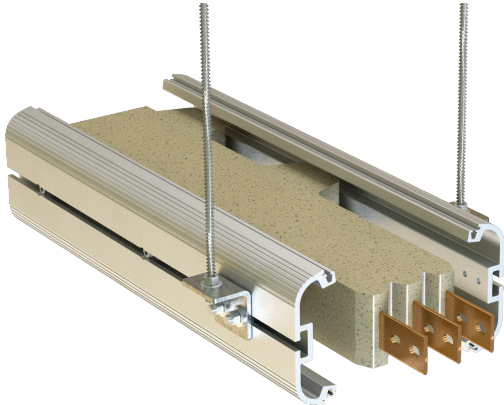
► Cast Resin Installation Tools

| Description | Order Code |
|---------------------|------------|
| CR Joint Area Mixer | 5000132 |
| CR Plastic Hammer | 5000310 |
| CR Spoon Brush | 5000311 |
| MV Allen Torque Set | 5000664 |



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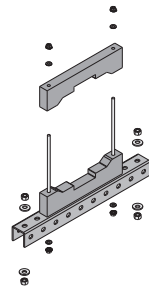
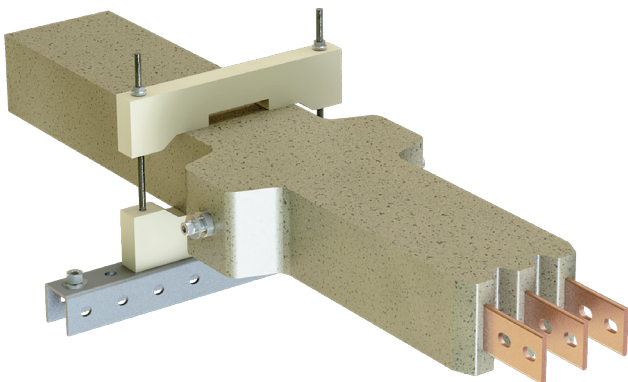
Trunking Support



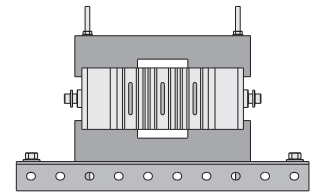
► MV "L" Hanger Set Code

| MVC - Cu Conductor | | Conductor Dimensions | MV "L" Hanger Set Code | | | |
|--------------------|-------------|----------------------|---------------------------|------------|---------------------------|------------|
| Rated Current | Busbar Code | | Description | Order Code | Description | Order Code |
| 950 | 09 | 6x40 | | | | |
| 1150 | 11 | 6x55 | MV L HANGER SET Ø13-(40) | 3191532 | MV L HANGER SET Ø17-(40) | 3191533 |
| 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 12kV Isolated Hanger Set

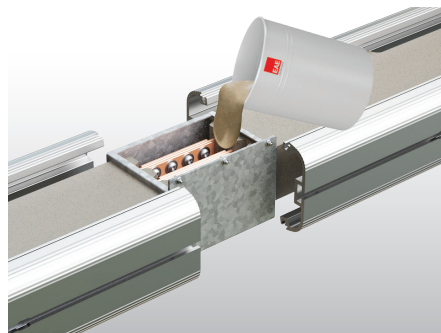


► MV 12kV Isolated Hanger Set Code

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



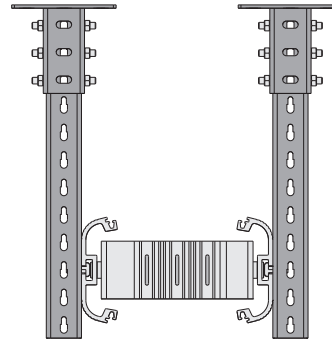
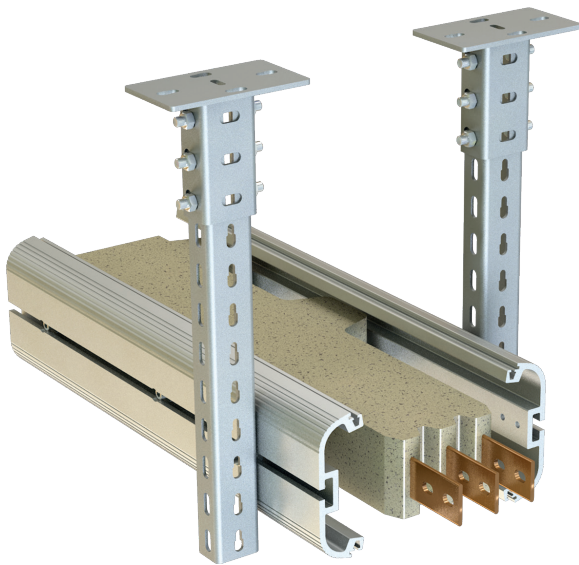
Total mixture weight of 1 Bucket is 15 kg

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.

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Trunking Support



► Ceiling Fixing Element

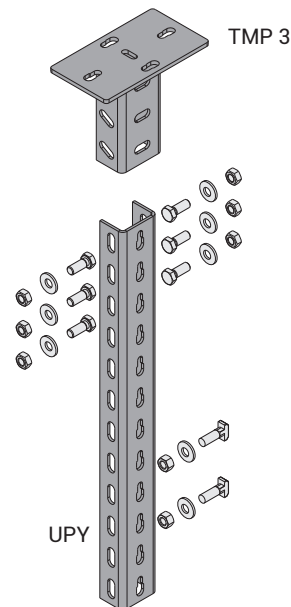
| Description | T (mm) | Tensile Load (kg.) | Weight (kg./pcs) | Order Code | Pack (pcs) |
|-------------|--------|--------------------|------------------|------------|------------|
| TMP 3 | 4 | 900 | 1,689 | 3086554 | 10 |

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 |

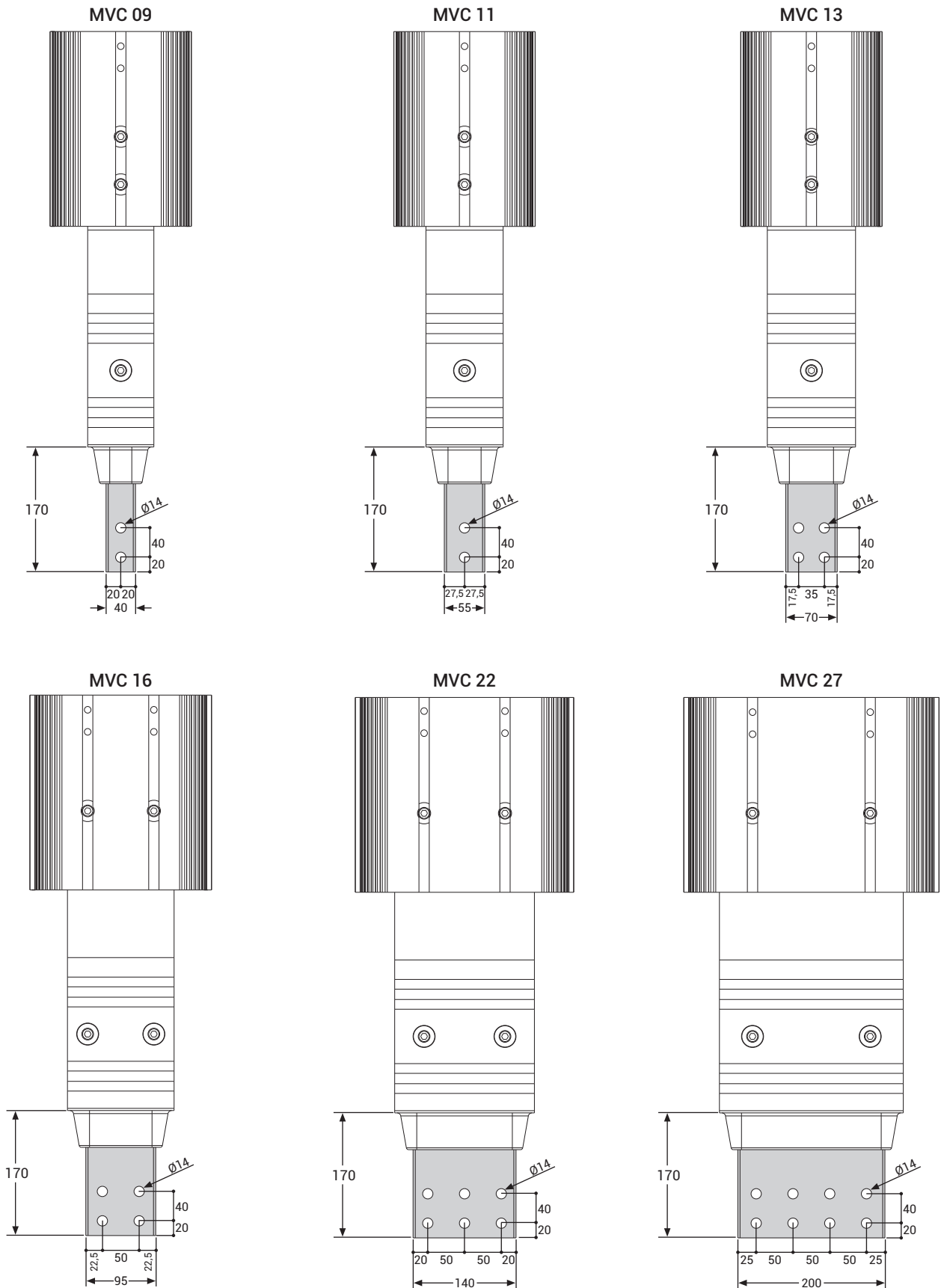


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Panel Connection



► Two Dimensional Drawings of Panel Modules P10 Panel Mounted Modules



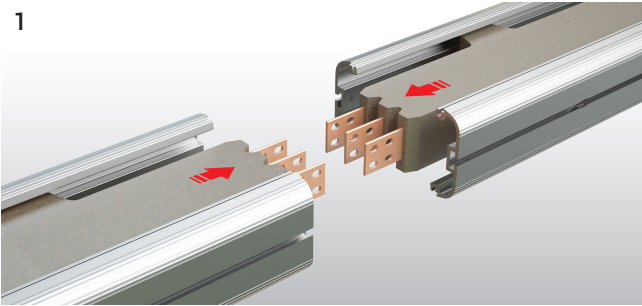
12 kV

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Horizontal Application

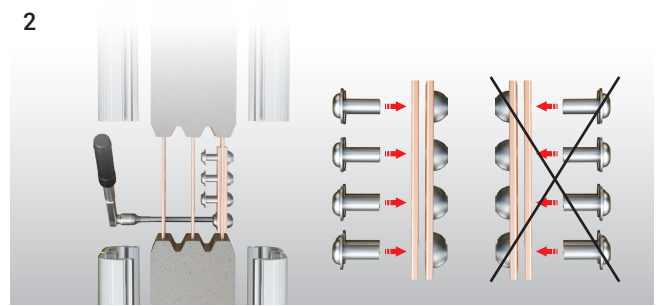


1



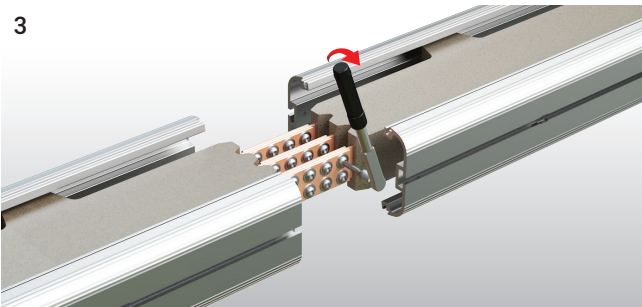
The ends of the conductors of the busbars are cleaned with a clean dry cloth. The busbars have to be fixed in the same axis, with a max. distance of 10 mm between the two conductors.

2



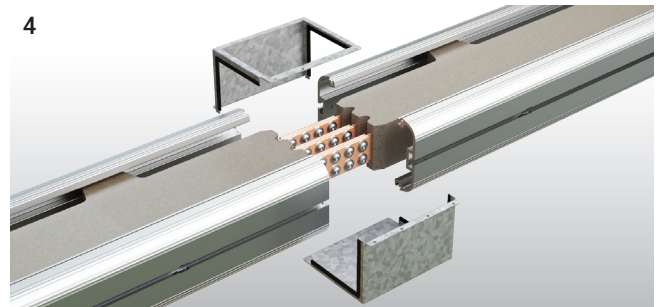
As shown on the figure, junction plates fixed as the bolts face the same direction at all times.

3



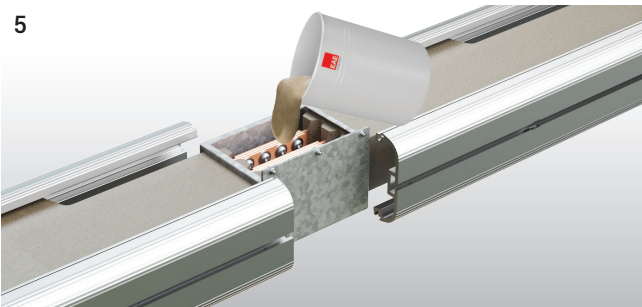
All bolts must be tightened to 72 Nm with torque wrench.

4



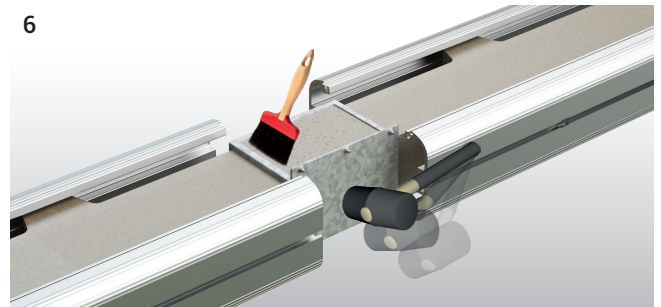
Before assembling the casting moulds, inner surfaces of casting moulds have to be wiped with clean dry cloth.

5



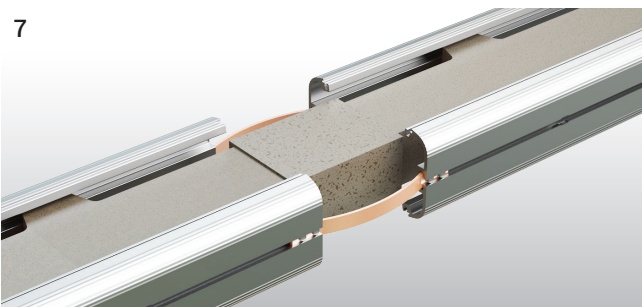
The prepared for casting should be cast from the same spot at all times.

6



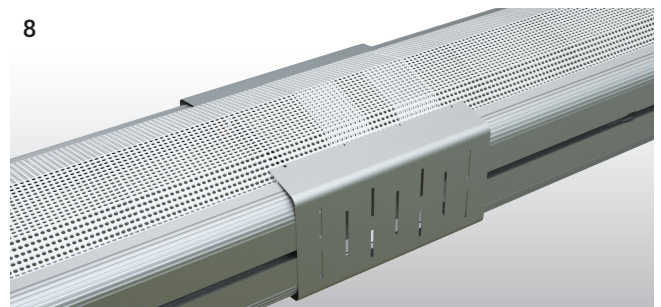
The material should be 'vibrated' with the help of a plastic hammer to remove the air in the material. Then the air bubbles on the surface have to be brushed.

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

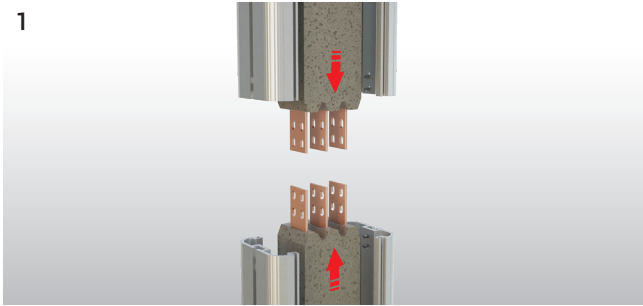


Joint protection pieces of perforated aluminium should be fitted.

E-LINE MV

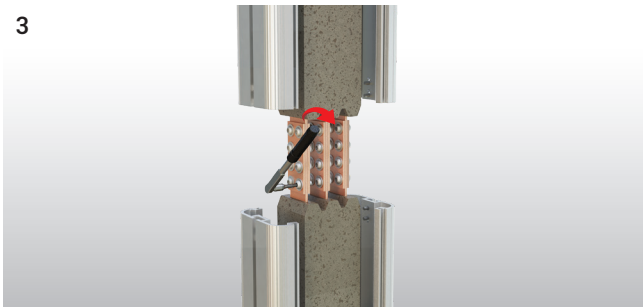
Vertical Application

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.

3



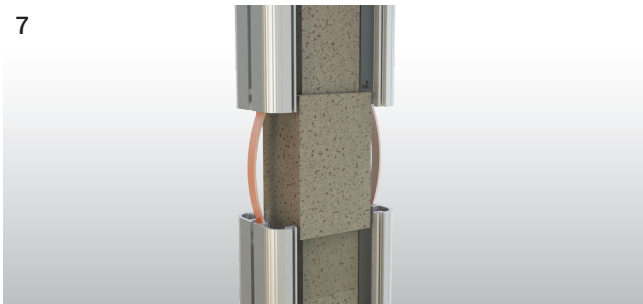
All bolts must be tightened to 72 Nm with torque wrench.

5



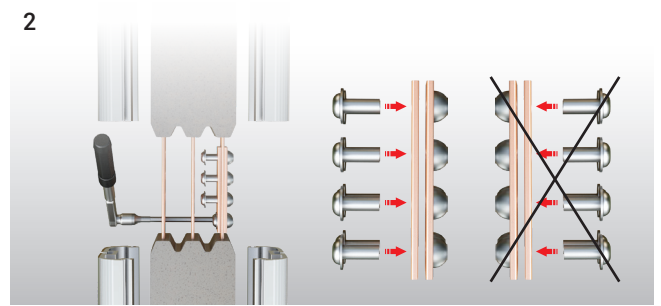
The prepared for casting should be cast from the same spot at all times.

7



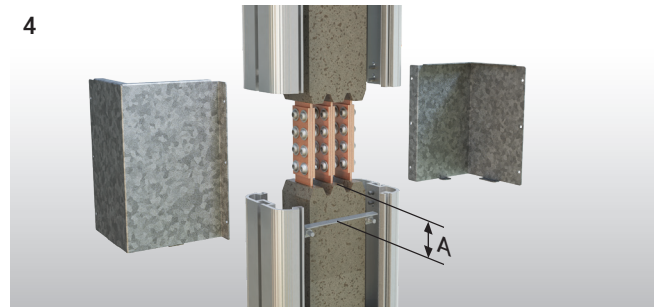
After the curing of the cast material is complete the sheet metal moulds can be removed. (Reaction is completed within 8 - 24 hours based on the air temperature.) The flexibles are fitted to the profiles grooves for earth continuity.

2



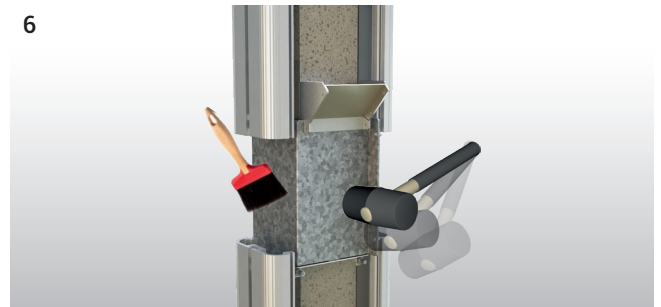
As shown on the figure, junction plates fixed as the bolts face the same direction at all times.

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.

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.

8



Joint protection pieces of perforated aluminium should be fitted.

950 A TO 2750 A MEDIUM VOLTAGE BUSBAR SYSTEMS (E- LINE MV) GENERAL PRODUCT SPECIFICATIONS

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 aluminum or 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. Juncture point bolts should be tightened with torque wrench set to 72 Nm (55 lbft)

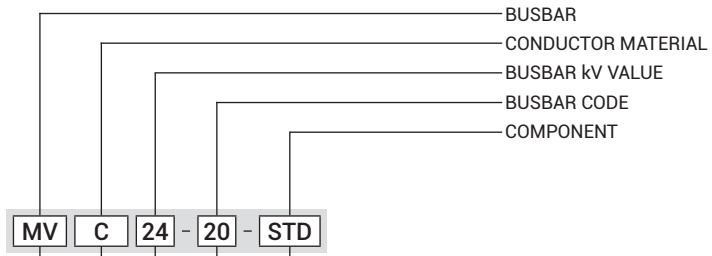
3- Assembly and Commissioning Tests

- 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

Order Code System



Busbar Type

Aluminium (Al) A
Copper (Cu) C

CONDUCTOR MATERIAL

| BUSBAR kV VALUE | Code | Conductor Configuration | | |
|-----------------|------|-------------------------|----|----|
| | | L1 | L2 | L3 |
| 24kV | 24 | √ | √ | √ |

BUSBAR kV VALUE

(* Please call us for different kV values.

Standard Straight Length.....STD
Special Straight Length.....X

Upwards Elbow.....U
Downwards Elbow.....D
Left Elbow.....L
Right Elbow.....R
Panel Connection.....P10

COMPONENT

| MVA - AL Conductor | | MVC - Cu Conductor | | Conductor Cross Section |
|--------------------|-------------|--------------------|-------------|-------------------------|
| Rated Current | Busbar Code | Rated Current | Busbar Code | |
| - | - | 1800 | 18 | 7x70 |
| 1500 | 15 | 2100 | 21 | 7x75 |
| 2000 | 20 | 3200 | 32 | 12x100 |
| 2500 | 25 | 4000 | 40 | 12x150 |
| 3000 | 30 | 5000 | 50 | 12x200 |
| - | - | 5700 | 57 | 15x200 |

BUSBAR CODE

► Aluminium Conductor (Al)

| Rated Current | I_r | A | 1500 | 2000 | 2500 | 3000 |
|---|--|-----------------|--|--------|--------|--------|
| Busbar Code | | | 15 | 20 | 25 | 30 |
| 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 | 24 | 24 | 24 | 24 |
| Rated power frequency withstand voltage | U_d | kV | 50 | 50 | 50 | 50 |
| Rated impulse withstand voltage | U_p | kV | 125 | 125 | 125 | 125 |
| Rated Frequency | f_r | Hz | 50/60 | 50/60 | 50/60 | 50/60 |
| Partial Discharge | | pC | <20 | <20 | <20 | <20 |
| External Mechanical Impacts (IK Code)* | 50J, > IK10 | | | | | |
| Rated Short-time Withstand Current (1s) | I_k | kA_{rms} | 50 | 72 | 72 | 72 |
| Rated Peak Withstand Current | I_{ke} | kA | 130 | 187 | 187 | 187 |
| Rated Short-time Withstand Current for PE Conductor (1s) | I_p | kA | 30 | 43 | 43 | 43 |
| Rated Peak Withstand Current for PE Conductor | I_{pe} | kA | 78 | 112 | 112 | 112 |
| MEAN PHASE CONDUCTOR CHARACTERISTICS AT RATED CURRENT I_n | | | | | | |
| Resistance at a conductor temperature of 20°C | R_{20} | mΩ/m | 0,0608 | 0,0309 | 0,0234 | 0,0170 |
| Resistance at an ambient air temperature of 35°C | R | mΩ/m | 0,0799 | 0,0391 | 0,0309 | 0,0213 |
| Reactance (Independent from Temperature) | X | mΩ/m | 0,1313 | 0,1098 | 0,0884 | 0,0749 |
| Positive and negative sequence impedances at an ambient air temperature of 35°C | Z | mΩ/m | 0,1537 | 0,1165 | 0,0937 | 0,0779 |
| Positive and negative sequence impedances at an ambient air temperature of 20°C | Z_{20} | mΩ/m | 0,1447 | 0,1140 | 0,0915 | 0,0768 |
| Rated Power Loss at 35°C | | Watt | 517,3 | 457,3 | 558 | 554,8 |
| DC Resistance at a conductor temperature of 20 °C for Phases | R_{phdc} | mΩ/m | 0,056 | 0,026 | 0,021 | 0,013 |
| DC Resistance at a conductor temperature of 20°C for PE | R_{PEdc} | mΩ/m | 0,009 | 0,009 | 0,008 | 0,008 |
| SECTIONS | | | | | | |
| Phase Conductor | | mm ² | 525 | 1200 | 1800 | 2400 |
| PE (Housing) | | mm ² | 8515 | 8515 | 9394 | 10194 |
| Conductor Cross Section | | mm x mm | 7x75 | 12x100 | 12x150 | 12x200 |
| Busbar Weight (3 Conductors) | | kg/m | 95 | 100 | 120 | 143 |
| MEAN FAULT-LOOP CHARACTERISTICS | | | | | | |
| Zero-sequence Impedance | | | | | | |
| Zero-sequence impedance at a conductor temperature of 20°C | $Z_{(0)b20phPE}$ | mΩ/m | 0,273 | 0,268 | 0,219 | 0,195 |
| Zero-sequence impedance at an ambient temperature of 35°C | $Z_{(0)bphPE}$ | mΩ/m | 0,293 | 0,283 | 0,231 | 0,201 |
| Mean Resistances and Reactances | | | | | | |
| Resistance at a conductor temperature of 20°C | $R_{b20phph}$ | mΩ/m | 0,132 | 0,068 | 0,059 | 0,037 |
| Resistance at a conductor temperature of 20°C | $R_{b20phPE}$ | mΩ/m | 0,084 | 0,061 | 0,046 | 0,033 |
| Resistance at an ambient air temperature of 35°C | R_{bphph} | mΩ/m | 0,173 | 0,087 | 0,078 | 0,047 |
| Resistance at an ambient air temperature of 35°C | R_{bphPE} | mΩ/m | 0,111 | 0,077 | 0,060 | 0,041 |
| Reactance (Independent from temperature) | X_{bphph} | mΩ/m | 0,258 | 0,215 | 0,174 | 0,146 |
| Reactance (Independent from temperature) | X_{bphPE} | mΩ/m | 0,165 | 0,151 | 0,125 | 0,109 |

Standards

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

► Copper Conductor (Cu)

| Rated Current | I_r | A | 1800 | 2100 | 3200 | 4000 | 5000 | 5700 |
|---|--|-----------------|--|--------|--------|--------|--------|--------|
| Busbar Code | | | 18 | 21 | 32 | 40 | 50 | 57 |
| 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 | 24 | 24 | 24 | 24 | 24 | 24 |
| Rated power frequency withstand voltage | U_d | kV | 50 | 50 | 50 | 50 | 50 | 50 |
| Rated impulse withstand voltage | U_p | kV | 125 | 125 | 125 | 125 | 125 | 125 |
| 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, > IK10 | | | | | | | |
| Rated Short-time Withstand Current (1s) | I_k | kA_{rms} | 65 | 65 | 90,7 | 90,7 | 90,7 | 90,7 |
| Rated Peak Withstand Current | I_{ke} | kA | 169 | 169 | 236 | 236 | 236 | 236 |
| Rated Short-time Withstand Current for PE Conductor (1s) | I_p | kA | 39 | 39 | 55,7 | 55,7 | 55,7 | 55,7 |
| Rated Peak Withstand Current for PE Conductor | I_{pe} | kA | 102 | 102 | 144 | 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 | 0,0103 |
| Resistance at an ambient air temperature of 35°C | R | mΩ/m | 0,0568 | 0,0547 | 0,0289 | 0,0172 | 0,0138 | 0,0142 |
| Reactance (Independent from Temperature) | X | mΩ/m | 0,1343 | 0,1303 | 0,1084 | 0,0879 | 0,0806 | 0,0716 |
| 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 | 0,0730 |
| 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 | 0,0723 |
| Rated Power Loss at 35°C | | Watt | 529 | 703,3 | 867,3 | 797,5 | 1010,5 | 1353,3 |
| 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 | 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 | 0,013 |
| SECTIONS | | | | | | | | |
| Phase Conductor | | mm ² | 490 | 525 | 1200 | 1800 | 2400 | 3000 |
| PE (Housing) | | mm ² | 8515 | 8515 | 8515 | 9394 | 10194 | 10194 |
| Conductor Cross Section | | mm x mm | 7x70 | 7x75 | 12x100 | 12x150 | 12x200 | 15x200 |
| Busbar Weight (3 Conductors) | | kg/m | 104 | 106 | 122 | 152 | 187 | 205 |
| 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 | 0,161 |
| 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 | 0,167 |
| 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 | 0,023 |
| Resistance at a conductor temperature of 20°C | $R_{b20phPE}$ | mΩ/m | 0,062 | 0,056 | 0,041 | 0,033 | 0,026 | 0,025 |
| Resistance at an ambient air temperature of 35°C | R_{bphph} | mΩ/m | 0,119 | 0,075 | 0,046 | 0,044 | 0,035 | 0,032 |
| Resistance at an ambient air temperature of 35°C | R_{bphPE} | mΩ/m | 0,083 | 0,076 | 0,041 | 0,045 | 0,036 | 0,034 |
| Reactance (Independent from temperature) | X_{bphph} | mΩ/m | 0,264 | 0,246 | 0,209 | 0,170 | 0,143 | 0,132 |
| Reactance (Independent from temperature) | X_{bphPE} | mΩ/m | 0,169 | 0,156 | 0,142 | 0,122 | 0,108 | 0,099 |

Standards

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

E-LINE MV

Standard Straight Length

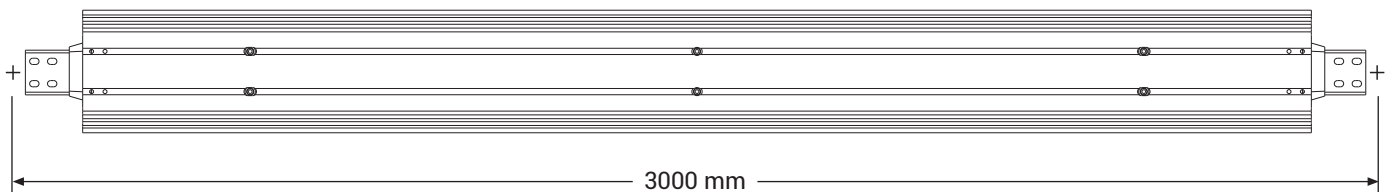
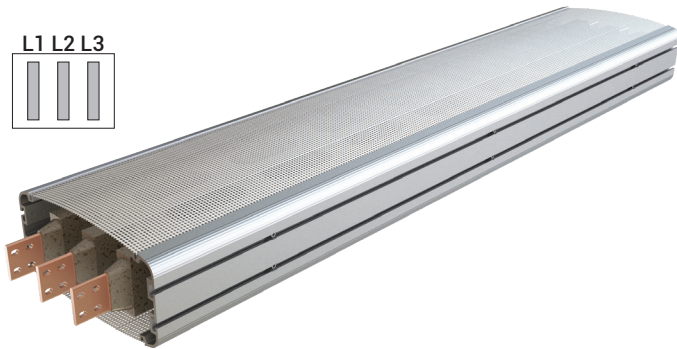
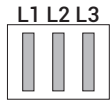


► Standard Feeder Straight Length

STD

Sample Order:

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

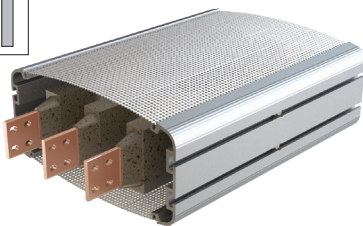
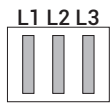


► Special Feeder Straight Length

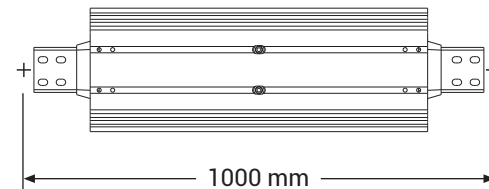
X

Sample Order:

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

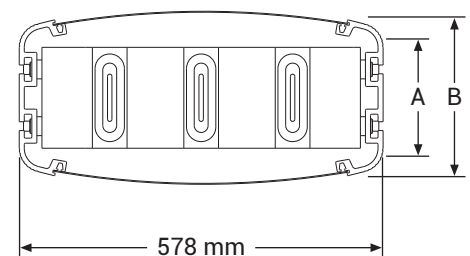


Information:
Feeder Minimum
Special length size = 1000 mm



► Table For Outer Dimension of Busbars

| MVA - Al Conductor | Conductor Cross Section | - | 7x75 | 12x100 | 12x150 | 12x200 | - |
|-----------------------|----------------------------|------|------|--------|--------|--------|--------|
| | Rated Current (A) | - | 1500 | 2000 | 2500 | 3000 | - |
| | Busbar Code | - | 15 | 20 | 25 | 30 | - |
| MVC - Cu Conductor | Conductor Cross Section | 7x70 | 7x75 | 12x100 | 12x150 | 12x200 | 15x200 |
| | Rated Current (A) | 1800 | 2100 | 3200 | 4000 | 5000 | 5700 |
| | Busbar Code | 18 | 21 | 32 | 40 | 50 | 57 |
| A | mm | 160 | 160 | 160 | 210 | 260 | 260 |
| B | mm | 247 | 247 | 247 | 297 | 347 | 347 |



24 kV



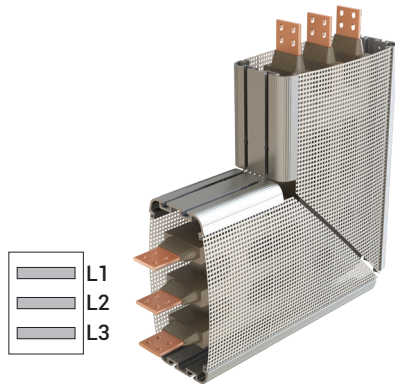
Attention ! The standard mounting of the MV busbar is with the conductors on edge. This allows for the easy application of the resin at the joint.

E-LINE MV

Elbows



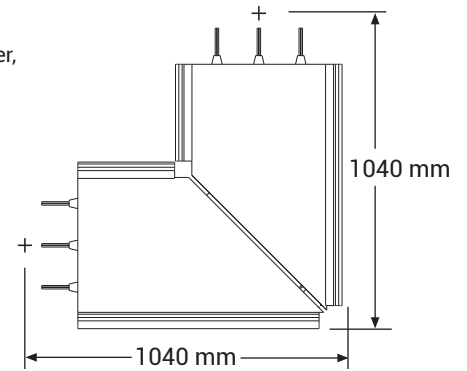
► Upwards Downwards Elbow



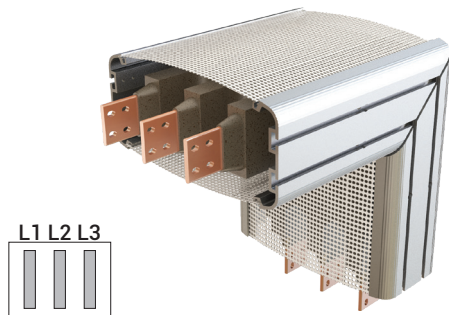
U
D

Sample Order:

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



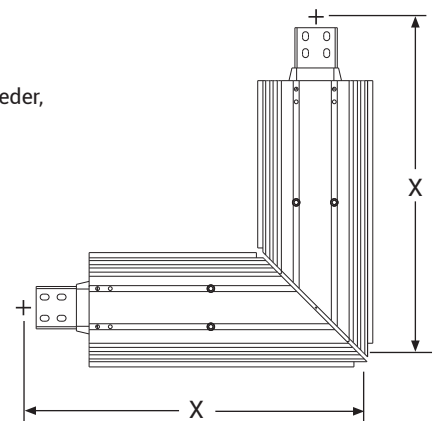
► Left Right Elbow



R
L

Sample Order:

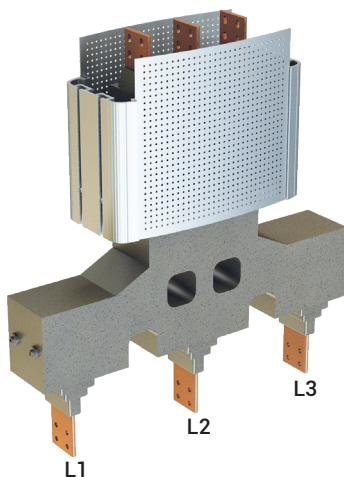
MVC 2432 - R
24 kV 3200 A, Copper, Feeder,
3 Conductors



► Table of Busbar Cross Section Sizes

| | | | | | | | |
|-----------------------|----------------------------|------|------|--------|--------|--------|--------|
| MVA - Al Conductor | Conductor Cross Section | - | 7x75 | 12x100 | 12x150 | 12x200 | - |
| | Rated Current (A) | - | 1500 | 2000 | 2500 | 3000 | - |
| | Busbar Code | - | 15 | 20 | 25 | 30 | - |
| MVC - Cu Conductor | Conductor Cross Section | 7x70 | 7x75 | 12x100 | 12x150 | 12x200 | 15x200 |
| | Rated Current (A) | 1800 | 2100 | 3200 | 4000 | 5000 | 5700 |
| | Busbar Code | 18 | 21 | 32 | 40 | 50 | 57 |
| X | mm | 690 | 690 | 690 | 740 | 790 | 790 |

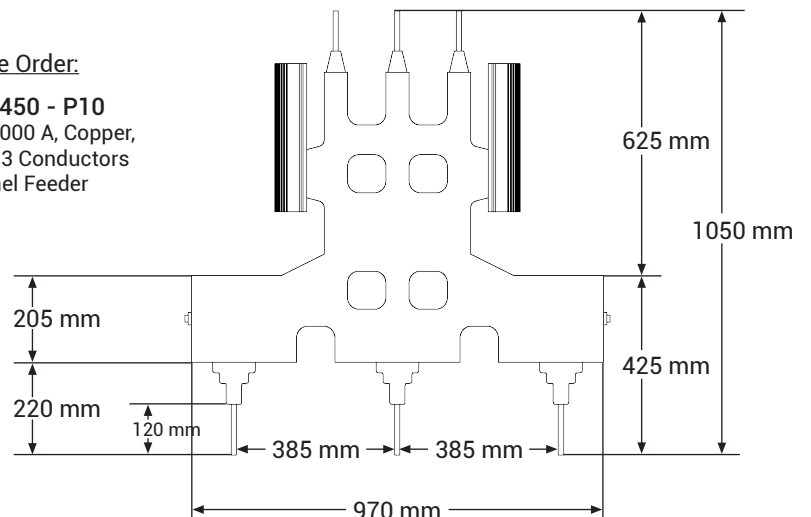
► Panel Connection



P10
T10

Sample Order:

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



E-LINE MV

Horizontal & Vertical Cast Resin Busbar Applications



FIGURE 1 - EDGEWISE APPLICATION

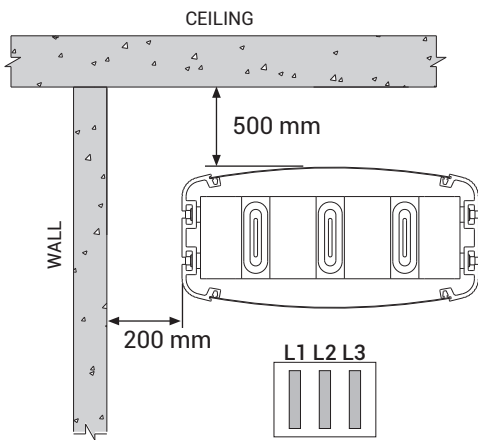


FIGURE 4 - SAMPLE WALL CROSSING WITH FIRE BARRIER

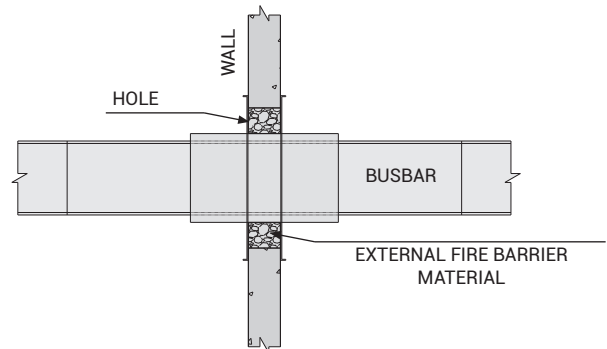


FIGURE 2 - EDGEWISE APPLICATION

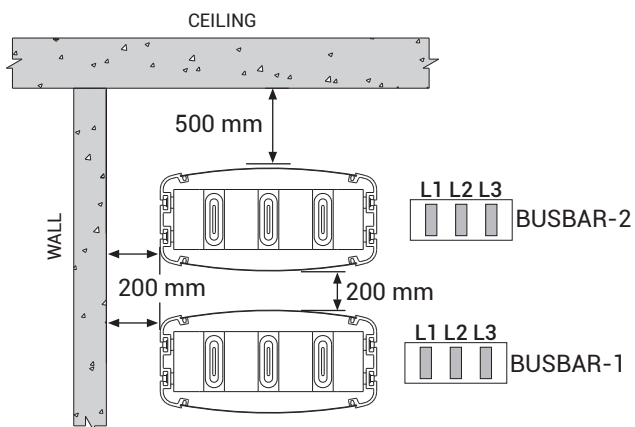
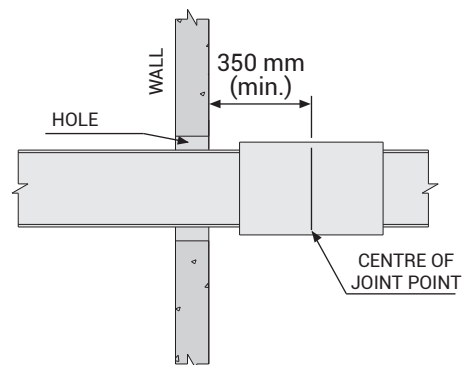
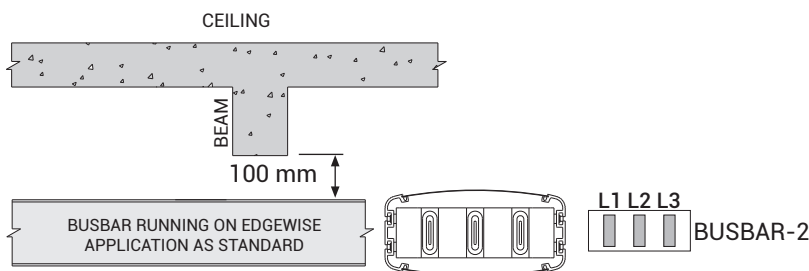


FIGURE 5 - STANDARD WALL CROSSING



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

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 be not come across to Beams.
- The dimensions given above are minimum values.
- All dimensions are given in mm.

► Cast Resin Installation Tools

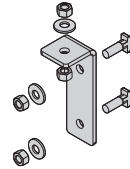
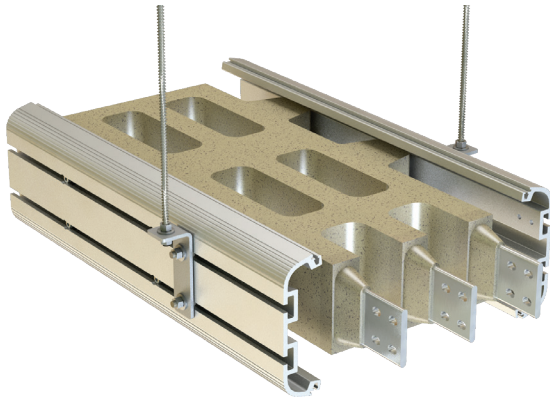
| Description | Order Code |
|---------------------|------------|
| CR Joint Area Mixer | 5000132 |
| CR Plastic Hammer | 5000310 |
| CR Spoon Brush | 5000311 |
| MV Allen Torque Set | 5000664 |



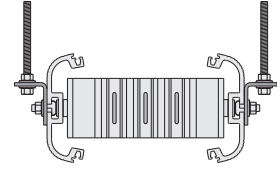
24 kV

E-LINE MV

Trunking Support



MV L Hanger Set
Ø13 / Ø17-(90-110-160)



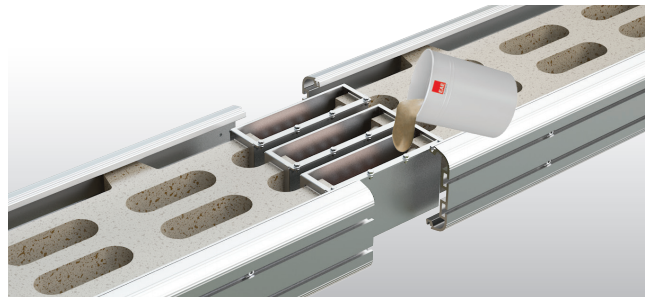
► MV "L" Hanger Set Code

| MVA - Al Conductor | | MVC - Cu Conductor | | Conductor Dimensions | MV "L" Hanger Set Code | | | |
|--------------------|-------------|--------------------|-------------|----------------------|---------------------------|------------|---------------------------|------------|
| Rated Current | Busbar Code | Rated Current | Busbar Code | | Description | Order Code | Description | Order Code |
| - | - | 1800 | 18 | 7x70 | | | | |
| 1500 | 15 | 2100 | 21 | 7x75 | MV L HANGER SET Ø13-(90) | 3180150 | MV L HANGER SET Ø17-(90) | 3180153 |
| 2000 | 20 | 3200 | 32 | 12x100 | | | | |
| 2500 | 25 | 4000 | 40 | 12x150 | MV L HANGER SET Ø13-(110) | 3180151 | MV L HANGER SET Ø17-(110) | 3180154 |
| 3000 | 30 | 5000 | 50 | 12x200 | MV L HANGER SET Ø13-(160) | 3180152 | MV L HANGER SET Ø17-(160) | 3180155 |
| - | - | 5700 | 57 | 15x200 | | | | |

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

► 24kV Additional Zone Weights

| MVA - Al Conductor | | MVC - Cu Conductor | | Conductor Dimensions | Weight (kg) |
|--------------------|-------------|--------------------|-------------|----------------------|-------------|
| Rated Current | Busbar Code | Rated Current | Busbar Code | | |
| - | - | 1800 | 18 | 7x70 | 36,0 |
| 1500 | 15 | 2100 | 21 | 7x75 | 36,0 |
| 2000 | 20 | 3200 | 32 | 12x100 | 34,0 |
| 2500 | 25 | 4000 | 40 | 12x150 | 41,5 |
| 3000 | 30 | 5000 | 50 | 12x200 | 48,0 |
| - | - | 5700 | 57 | 15x200 | 48,0 |



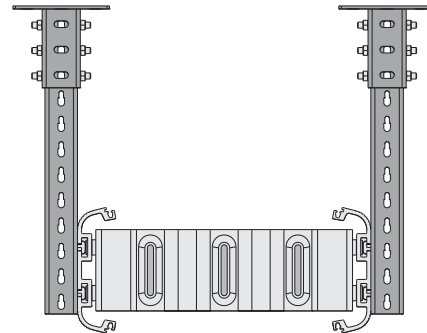
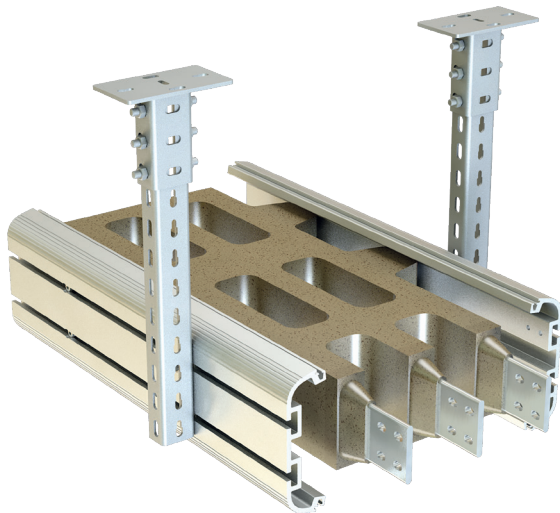
Total mixture weight of 1 Bucket is 15 kg

● 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.



E-LINE MV

Trunking Support



► Ceiling Fixing Element

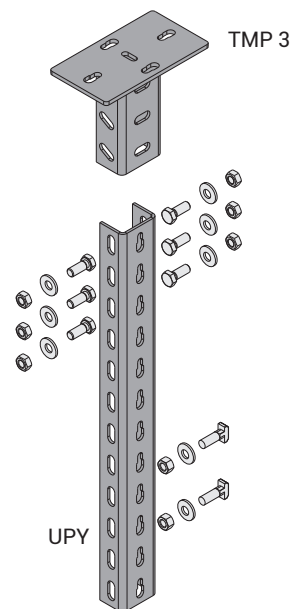
| Description | T (mm) | Tensile Load (kg.) | Weight (kg./pcs) | Order Code | Pack (pcs) |
|-------------|--------|--------------------|------------------|------------|------------|
| TMP 3 | 4 | 900 | 1,689 | 3086554 | 10 |

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 |

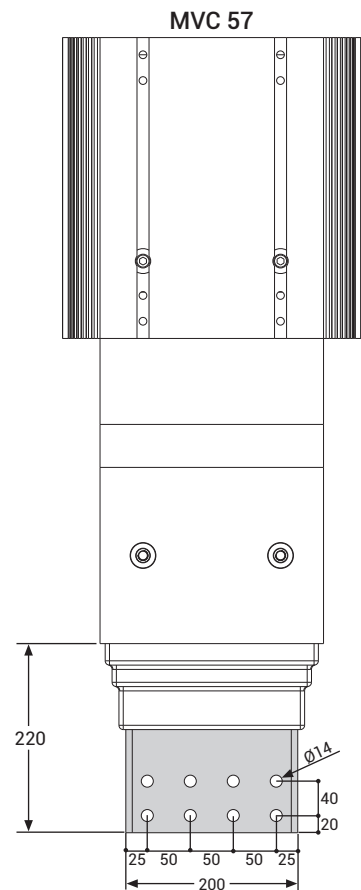
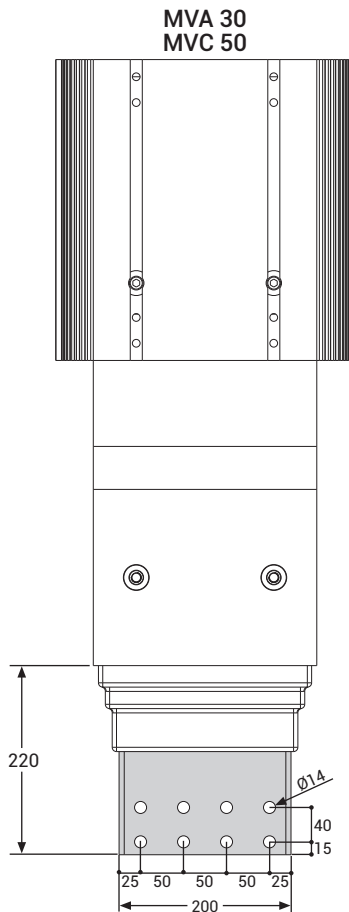
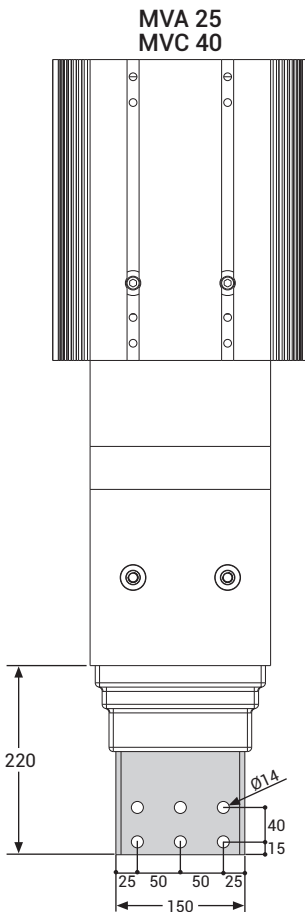
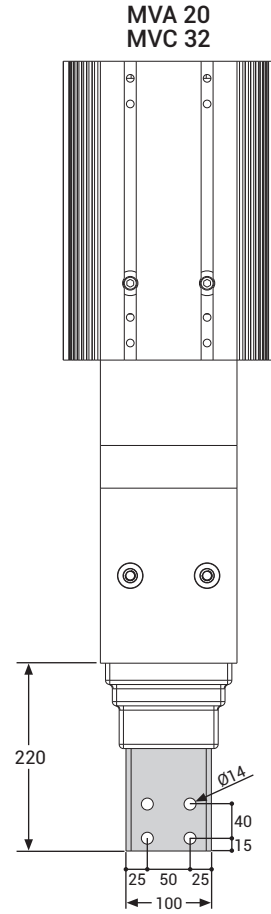
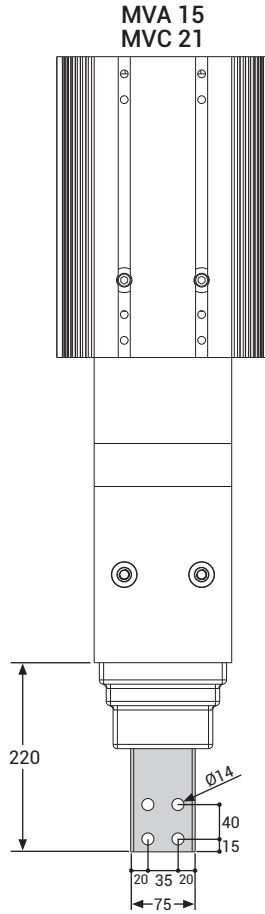
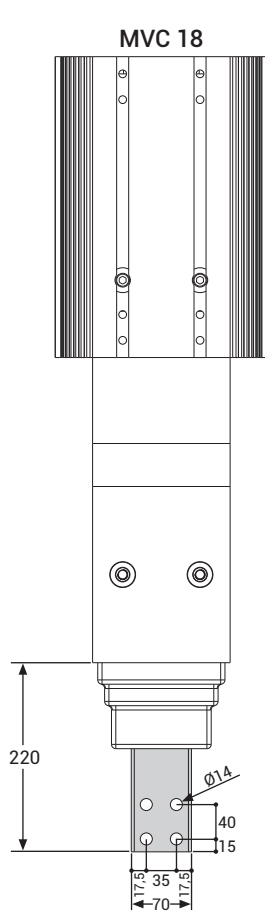


E-LINE MV

Panel Connection



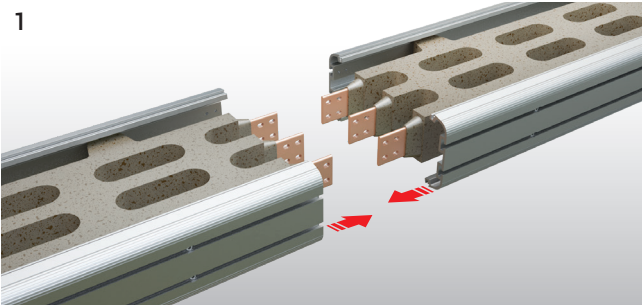
► Two Dimensional Drawings of Panel Modules P10 Panel Mounted Modules



E-LINE MV

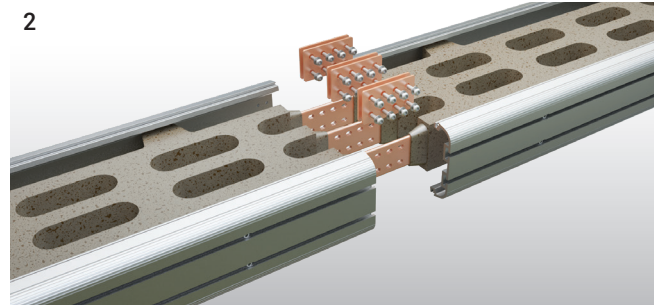
Horizontal Application

1



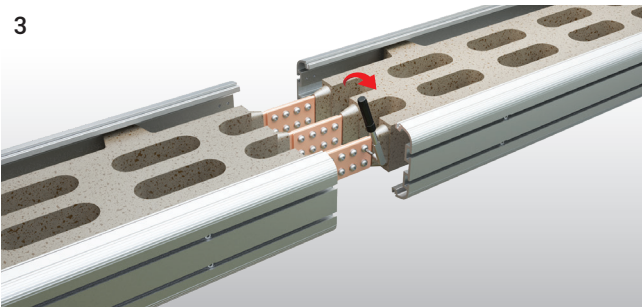
The ends of the conductors of the busbars are cleaned with a clean dry cloth. The busbars have to be fixed in the same axis, with a max. distance of 10 mm between the two conductors.

2



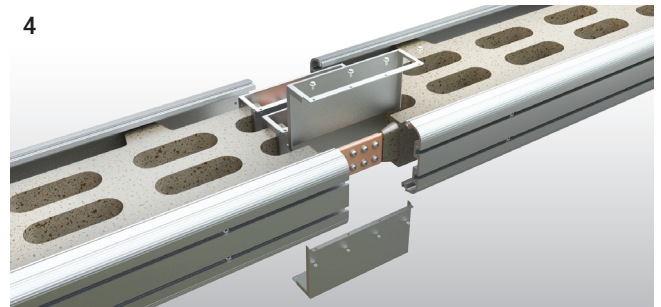
As shown on the figure, junction plates fixed as the bolts face the same direction at all times.

3



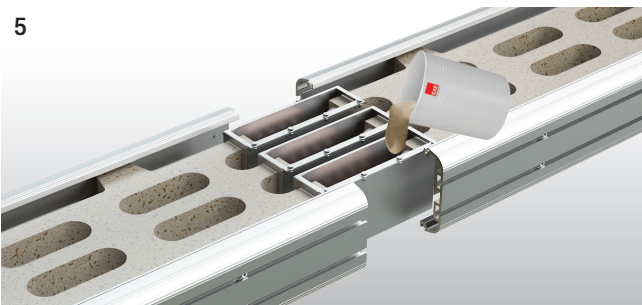
All bolts must be tightened to 72 Nm with torque wrench.

4



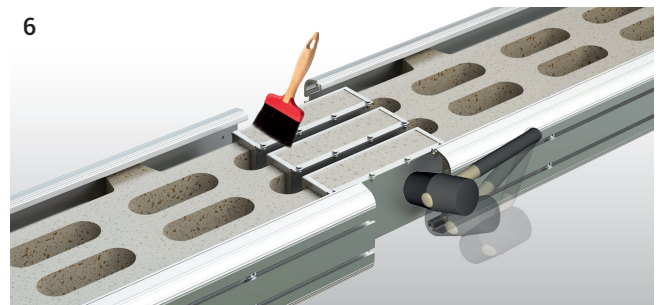
Before assembling the casting moulds, inner surfaces of casting moulds have to be wiped with clean dry cloth.

5



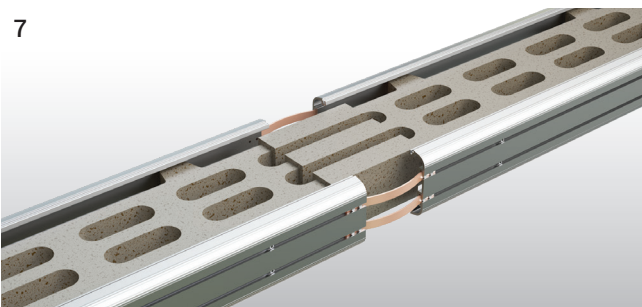
The prepared for casting should be cast from the same spot at all times.

6



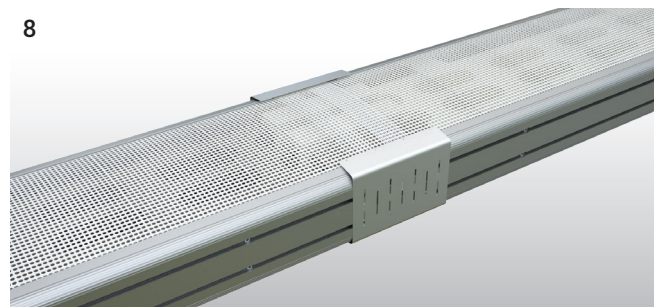
The material should be 'vibrated' with the help of a plastic hammer to remove the air in the material. Then the air bubbles on the surface have to be brushed.

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

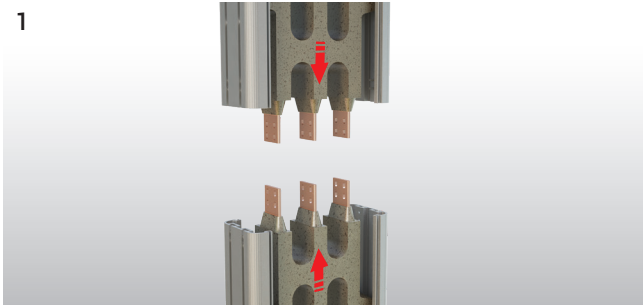


Joint protection pieces of perforated aluminium should be fitted.

E-LINE MV

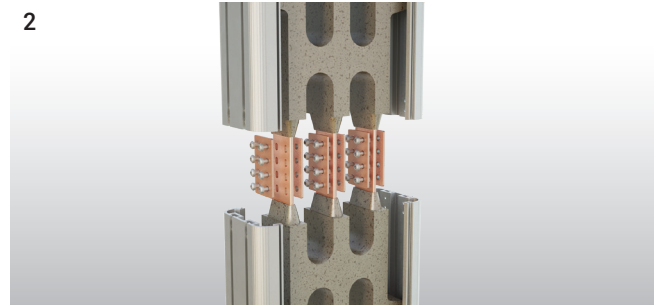
Vertical Application

1



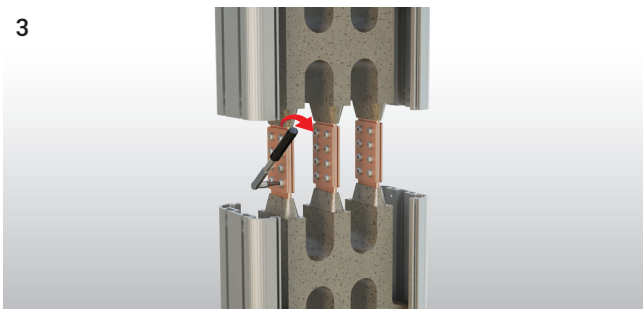
The ends of the conductors of the busbars are cleaned with a clean dry cloth. The busbars have to be fixed in the same axis, with a max. distance of 10 mm between the two conductors.

2



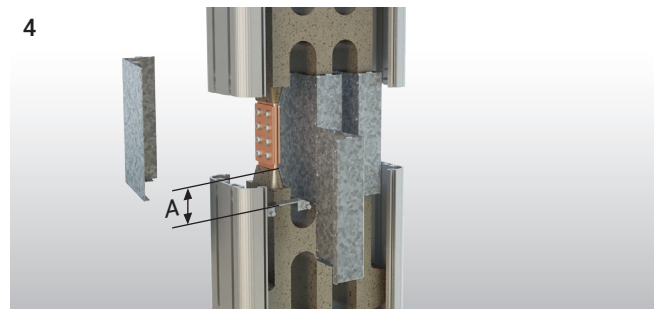
As shown on the figure, junction plates fixed as the bolts face the same direction at all times.

3



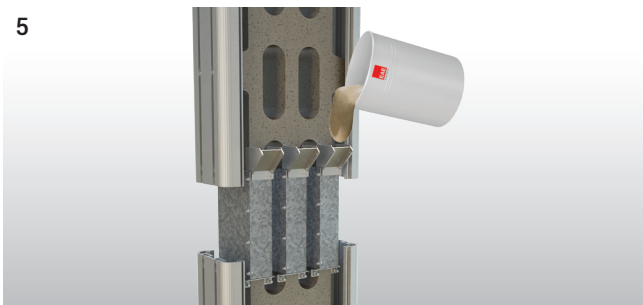
All bolts must be tightened to 72 Nm with torque wrench.

4



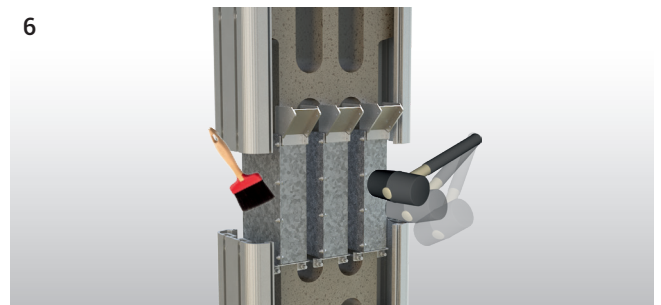
Support sheets are secured on the lower part of junction area by stem bar. A min. 50-60 mm. The joint moulds are affixed on the support sheet by cleaning with a dry and clean piece of cloth.

5



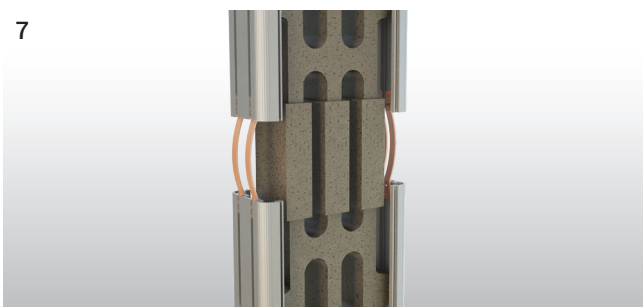
The prepared for casting should be cast from the same spot at all times.

6



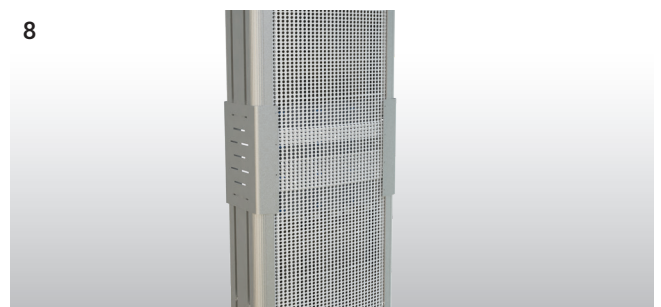
The material should be "vibrated" with the help of a plastic hammer to remove the air in the material. Then the air bubbles on the surface have to be brushed.

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.

1500A TO 5700 A MEDIUM VOLTAGE BUSBAR SYSTEMS (E- LINE MV) GENERAL PRODUCT SPECIFICATIONS

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 24kV busbar trunking system should be 50kV.
- For the tin coated aluminum or 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 Al Conductors;

1500 A : phase-phase 1 sec. value 50 kA, peak value 130 kA
2000-3000 A : phase-phase 1 sec. value 72 kA, peak value 187 kA

For Cu Conductors

1800-2100 A : phase-phase 1 sec. value 65 kA, peak value 169 kA
3200-5700 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 aluminum conductive between 1500-3000A.
- Busbar trunking system should be copper conductive between 1800-5700A.
- Busbar trunking systems conductors shall be high conductivity copper with .

a) 3 Conductors / PE housing

- Aluminum conductors must be in the EC-Grade class. The minimum conductivity must be 34 m/mm².... Entire surfaces of the aluminum conductors should be tin-coated.
- 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.

ПромМашТест

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Test Center

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(119530, город Москва, дом 34, помещение VII, 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, д.2)

APPROVAL
PROMMASHTEST Test Center Director
S.A.Egorov
28.11.2019
(Seal and Stamp)



DEKRA TEST REPORT 2214282,07-MHV Page 1 of 56

28/3ILNVOK issue number and dated 28.11.2019 TEST REPORT

Applicant : EAE Elektrik Asansör End.
Insaat 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.
Insaat 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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Test results indicated on this protocol are only valid for the samples tested.

E-LINE MV

Project Design Form



| Component List | Item | Component | Quantity | | | | |
|----------------|------|-----------|----------|-------------|-----------|--------------|-------------|
| | | | | Company : | Project : | Project No : | |
| | | | | Prepared by | Name : | Date : | Signature : |
| | | | | | | | |

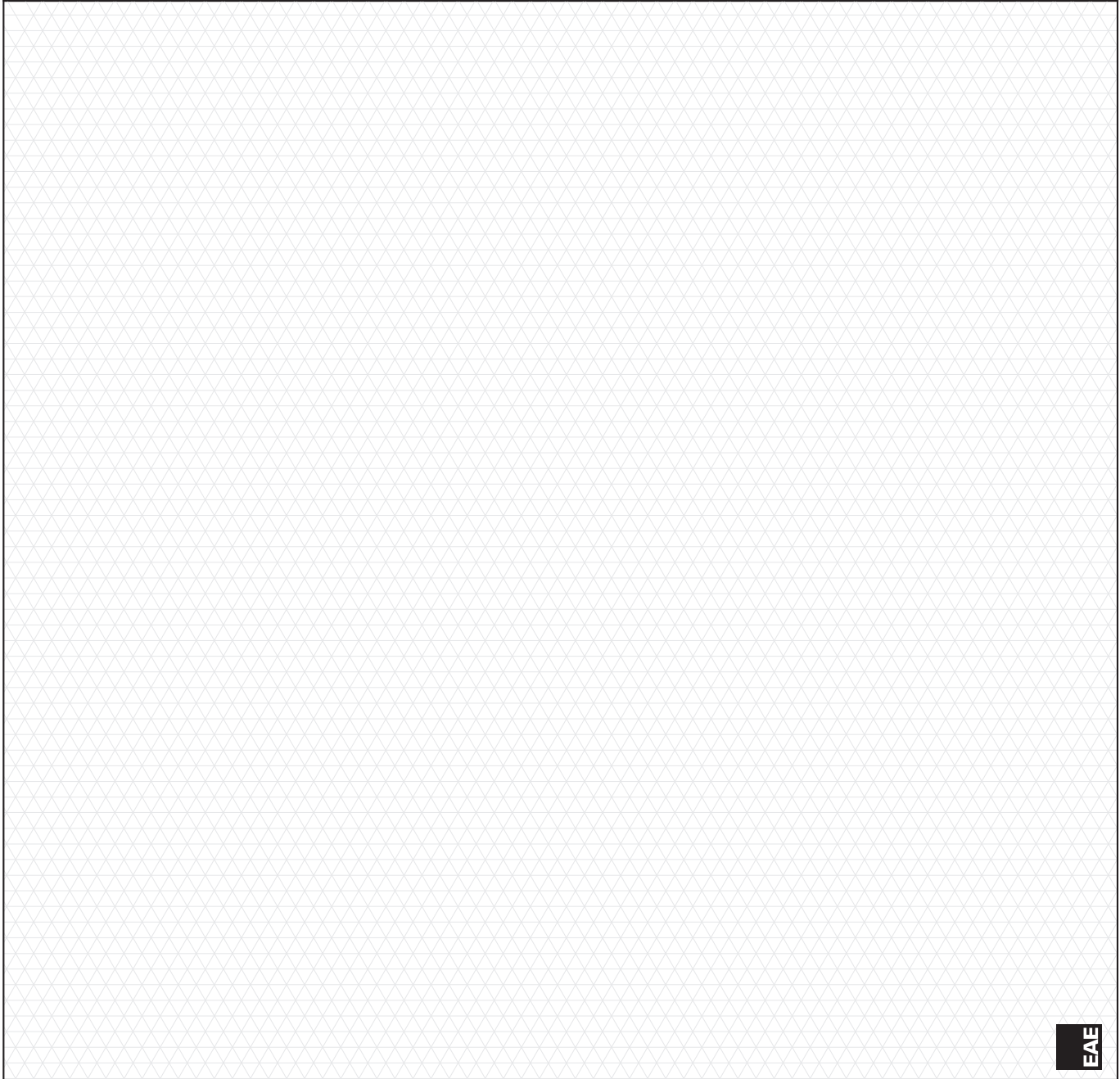
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| Component List | | Quantity |
|----------------|-----------|----------|
| Item | Component | |
| | | |

Company :
Project :
Project No :

Name :
Date :
Signature :

Prepared by



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E-LINE MV

Project Design Form




| Component List | Item | Component | Quantity | | | | |
|----------------|------|-----------|----------|-------------|-----------|--------------|-------------|
| | | | | Company : | Project : | Project No : | |
| | | | | Prepared by | Name : | Date : | Signature : |
| | | | | | | | |

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| Component List | | Quantity |
|----------------|-----------|----------|
| Item | Component | |
| | | |

| | |
|--------------|---------------------------------|
| Company : | |
| Project : | |
| Project No : | |
| Prepared by | Name : Date : Signature : |



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PRODUCT TYPES



BUSBAR ENERGY DISTRIBUTION SYSTEMS



CABLE TRAYS



TROLLEY BUSBAR ENERGY DISTRIBUTION SYSTEMS



INDOOR SOLUTIONS



SUPPORT SYSTEMS

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