31-SDMS-02A

REV. 2.3

SPECIFICATION

FOR

LOW-VOLTAGE DISTRIBUTION PILLAR (MINI-PILLAR) WITH STEEL ENCLOSURES

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Revision History

#	Date	Revision No.	Major Revision Description
1	09-01-2023	0	1st Published Edition (Prepared By: Edilfredo R. Tarenio)
2	09-04-2023	1	ERT: Updated all drawings
3	15-08-2023	2	ERT: Unify enclosure material to stainless steel (grade 304)
4	20-11-2023	2.1	ERT: Change enclosure material from stainless steel (grade 304) to Aluzinc
5	15-09-2024	2.2	ERT: This version replaces revision 2.1 with the following notes: - Change enclosure material to galvanized steel sheets (GI) G90 - Specify paint system corrosivity category to C5 (Durability: Very High) - Delete grey finish color combinations - Provision for lifting facility - Provision for arc-flash & shock hazard warning plate - Provision for maintenance info ID tags - Provision for source/consumer ID tags - Provision for traffolyte MCCB ID tags - Provide details for the locking mechanism of camlocks with padlocking provisions - Update concrete base design parameters - Drawing updates
6	23-09-2024	2.3	ERT: This version replaces revision 2.2 with the following notes: - Provision to verify tin-coating thickness to applicable parts/components using x-ray spectrometry in routine tests. - Drawing updates

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1 SCOPE

This specification defines the minimum technical requirements for the design, engineering, fabrication, testing, inspection, and performance of low-voltage distribution pillar (mini-pillar) with steel enclosures including all its components designed for outdoor installations, intended to be used in the distribution system of Saudi Electricity Company (SEC) in Saudi Arabia.

2 CROSS REFERENCES

This specification shall always be read in conjunction with the latest revisions of SEC specifications 01-SDMS-01, 12-SDMS-02, and 37-SDMS-03 titled "General Requirements for all Equipment/Materials," "Specification for Lugs and Connectors for Low-Voltage and Medium-Voltage Distribution System ", and "Specification for Molded Case Circuit Breaker for Low-Voltage PMT Cabinets", respectively, which shall be considered as an integral part of this specification. It shall also be read in conjunction with SEC purchase order and/or contract schedules, and scope of work/technical specifications for projects, as applicable.

3 APPLICABLE CODES AND STANDARDS

The latest revision of the following codes and standards shall be applicable for the equipment/materials covered in this specification. In case of any deviation, the vendor/manufacturer may propose equipment/materials conforming to alternate codes or standards. However, the provisions of SEC standards shall supersede the provisions of these alternate standards in case of any difference.

IEC	International Electro-technical Commission
IEC 60114	Recommendations for Heat-Treated Aluminum Busbar Material of the Aluminum-Magnesium-Silicon Type
IEC 60309-1	Plugs, Fixed or Portable Socket-Outlets and Appliance Inlets for Industrial Purposes – Part 1: General Requirements
IEC 60529	Degrees of Protection Provided by Enclosures (IP Code)
IEC 60695-11-10	Fire Hazard Testing – Part 11-10: Test Flames – 50 W Horizontal and Vertical Flame Test Methods

IEC	International Electro-technical Commission
IEC 60947-1	Low-Voltage Switchgear and Controlgear - Part 1: General Rules
IEC 60947-2	Low-Voltage Switchgear and Controlgear – Part 2: Circuit-Breakers
IEC 61439-1	Low Voltage Switchgear and Controlgear Assemblies – Part 1: General Rules
IEC 61439-2	Low Voltage Switchgear and Controlgear Assemblies – Part 2: Power Switchgear and Controlgear Assemblies
IEC 61439-5	Low Voltage Switchgear and Controlgear Assemblies – Part 5: Assemblies for Power Distribution in Public Networks
IEC 61439-6	Low Voltage Switchgear and Controlgear Assemblies – Part 6: Busbar Trunking Systems (Busways)

Table 1: Applicable Codes and standards (IEC).

ASTM	American Society for Testing and Materials
ASTM A90/A90M	Standard Test Method for Weight (Mass) of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings
ASTM A370	Standard Test Methods and Definitions for Mechanical Testing of Steel Products
ASTM A568/A568M	Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for
ASTM A653/A653M	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A902	Standard Terminology Relating to Metallic Coated Steel Products
ASTM A924/A924M	Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM A1122/A1122M	Standard Test Method for Bend Testing of Metallic-Coated Steel Sheet to Evaluate Coating Adhesion
ASTM B6	Standard Specification for Zinc

ASTM	American Society for Testing and Materials
ASTM B852	Standard Specification for Continuous Galvanizing Grade CGG Zinc Alloys for Hot-Dip Galvanizing of Sheet Steel
ASTM B117	Standard Practice for Operating Salt-Spray (Fog) Apparatus
ASTM B221	Standard Specification for Aluminum Alloy Extruded Bus
ASTM B236M	Standard Specification for Aluminum Bars for Electrical Purposes (Bus Bars) (Metric)
ASTM B317	Standard Specification for Aluminum Bars for Electrical Purposes (Bus Bars)
ASTM B545	Standard Specification for Electrodeposited Coatings of Tin
ASTM D1535	Standard Practice for Specifying Color by the Munsell System
ASTM D1654	Standard Test Methods for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
ASTM D3359	Standard Test Methods for Measuring Adhesion by Tape Test
ASTM D7396	Stadard Guide for Preparation of New, Continuous Zinc-Coated (Galvanized) Steel Surfaces for Painting
ASTM E517	Standard Test Method for Plastic Strain Ratio *r* for Sheet Metal
ASTM E646	Standard Test Method for Tensile Strain-Hardening Exponents (*n*-Values) of Metallic Sheet Materials

Table 2: Applicable Codes and standards (ASTM)

ISO	The International Organization for Standardization
ISO 12944	Paints and Varnishes – Corrosion Protection of Steel Structures by Protective Paint Systems – (All Parts)
ISO 4628	Paints and Varnishes – Evaluation of Degradation of Coatings – Designation of Quantity and Size Defects, and of Intensity of Uniform Changes in Appearance – (All Parts)
ISO 8501-3	Preparation of Steel Substrates Before Application of Paints and Related Products – Visual Assessment of Surface Cleanliness – Part 3: Preparation Grades of Welds, Edges, and Other Areas with Surface Imperfections

ISO	The International Organization for Standardization
ISO 8504	Preparation of Steel Substrates Before Application of Paints and Related Products – Surface Preparation Methods – (All Parts)
ISO 16276	Corrosion Protection of Steel Structures by Protective Paint Systems – Assessment of, and Acceptance Criteria for, the Adhesion/Cohesion (Fracture Strength) of a Coating – (All Parts)
ISO 16474-2	Paints and Varnishes – Methods of Exposure to Laboratory Light Sources – Part 2: Xenon-Arc Lamps
ISO 1513	Paints and Varnishes – Examination and Preparation of Test Samples
ISO 2409	Paints and Varnishes – Cross-cut Test
ISO 2808	Paints and Varnishes – Determination of Film Thickness
ISO 2812-2	Paints and Varnishes – Determination of Resistance to Liquids – Part 2: Water Immersion Method
ISO 3270	Paints and Varnishes and Their Raw Materials – Temperatures and Humidities for Conditioning and Testing
ISO 4624	Paints and Varnishes – Pull-Off Test for Adhesion
ISO 6270-1	Paints and Varnishes – Determination of Resistance to Humidity – Part 1: Condensation (Single-Sided Exposure)
ISO 7384	Corrosion Tests in Artificial Atmosphere – General Requirements
ISO 9227	Corrosion Tests in Artificial Atmosphere – Salt Spray Tests
ISO15528	Paints, Varnishes, ad Raw Materials for Paints and Varnishes - Sampling

Table 3: Applicable Codes and standards (ISO)

4 SERVICE CONDITIONS

The low-voltage distribution pillar (mini-pillar) with steel enclosure shall be suitable for outdoor operation under the service conditions specified in the latest revision of SEC specification 01-SDMS-01. The mini-pillar with all its components, fittings, and attachments shall withstand the effects of direct solar radiation at their installed locations. The temperature of exposed surfaces shall be regarded as 75°C plus the effects of internal heating.

5 DESIGN AND CONSTRUCTION REQUIREMENTS

5.1 General

The low-voltage distribution pillar (mini-pillar) with steel enclosure and all its components shall meet all applicable electrical and environmental requirements of low-voltage systems for outdoor applications stipulated in the latest revision of 01-SDMS-01.

5.1.1 It shall meet or exceed the requirements of this specification in all respects and shall be manufactured in conformance with international standards and best engineering practices.

5.1.2 All cable terminations shall be accessible from the front, and have sufficient workspace for technicians to use applicable tools to prepare and maneuver the cables for termination.

5.1.3 It shall allow up to 2 incoming 4Cx300 mm^2 aluminum cables, 3 or 5 outgoing cables of either 70 mm^2 or 185 mm^2 aluminum cables, and 1 earthing/grounding conductor size 35 mm^2 bare copper.

5.1.4 All metallic parts like fasteners, fittings, and components of the enclosure shall be stainless-steel of grade 304.

5.1.5 All tin-coated current-carrying parts of the electrical parts/components shall be of bright tin-electroplated with an overall average coating thickness between 15µm to 20µm and has very smooth surface finish. Coating thickness at any point shall not be less than 15µm.

5.1.6 In fabrication, all threaded studs provided in the enclosure or in any of its parts shall be welded using stud welders.

5.1.7 Design of the mini-pillar shall ensure that all electrical conducting parts/components are sufficiently insulated and have safe clearance with non-current carrying metallic parts of the enclosure at any point.

5.1.8 Any clarifications shall be addressed to SEC authorized technical personnel for interpretations.

5.2 Design Criteria

5.2.1 The low-voltage distribution pillar (mini-pillar) with steel enclosure shall be fabricated and assembled as per the following schedule:

Component	w/o Generator Plug-in						w/ Generator Plug-in					
	3-Way			5-Way			3-Way			5-Way		
Enclosure Overall Size	***l***	***h***	***w***	***l***	***h***	***w***	***l***	***h***	***w***	***l***	***h***	***w***
	734	1000	335	947	1000	335	734	1300	335	947	1300	335
Precast Concrete Base Size	***l***	***h***	***w***	***l***	***h***	***w***	***l***	***h***	***w***	***l***	***h***	***w***
	740	1000	310	953	1000	310	740	1000	310	953	1000	310
No. of Outgoing MCCBs	3			5			3			5		
MCCB Ratings	200 A			200 A			200 A			200 A		
Pan Assembly Main (Horizontal) Busbar Size, mm	30 x 15			30 x 15			30 x 15			30 x 15		
Pan Assembly Main (Vertical) Busbar Size, mm	40 x 10			40 x 10			40 x 10			40 x 10		
Pan Assembly Tap-off Busbar Size, mm	20 x 10			20 x 10			20 x 10			20 x 10		
Neutral Busbar Size, mm	40 x 10			40 x 10			40 x 10			40 x 10		
Max. No. of Incoming Cables	2 (Back-to-Back)			2 (Back-to-Back)			2 (Back-to-Back)			2 (Back-to-Back)		
Max. Incoming Cable Size	4Cx300 mm^2 AL			4Cx300 mm^2 AL			4Cx300 mm^2 AL			4Cx300 mm^2 AL		
Outgoing Cable Size	4Cx70 mm^2 AL or 4Cx185 mm^2 AL			4Cx70 mm^2 AL or 4Cx185 mm^2 AL			4Cx70 mm^2 AL or 4Cx185 mm^2 AL			4Cx70 mm^2 AL or 4Cx185 mm^2 AL		
Earthing	35 mm^2 Bare CU			35 mm^2 Bare CU			35 mm^2 Bare CU			35 mm^2 Bare CU		

Note:
All sizes are in (mm).

Table 4: Schedules of Mini-Pillar with Steel Enclosures

5.3 Enclosure

5.3.1 The enclosure shall be made of galvanized steel sheet (GI) with G90 coating designation as per ASTM A653/A653M with minimum thickness of 2.0 mm.

5.3.2 The enclosure shall be floor-mounted, weather-proof, IP54 with watershed top.

5.3.3 It must allow adequate ventilation by natural air circulation through louvers on the sides or on the canopy or both. Ventilation shall be screened to prevent entry of vermin and foreign bodies. Screen material shall be stainless steel guaranteed to last with the lifetime of the mini-pillar.

5.3.4 Lifting facility shall be provided with the mini-pillar.

The lifting facility shall be fit for M10 eyebolts and shall be provided with silicone rubber plugs. It shall be supported by a stainless-steel cylindrical rod with M10 threaded hole and is full welded on the enclosures to prevent ingress through it. Details of the stainless-steel cylindrical rod lifting support are provided in the drawings.

The M10 eyebolts are not included in the scope of supply of this specification.

5.3.5 The enclosure main door shall be hinged (welded) with 3 heavy-duty stainless-steel spring-return concealed-type hinges, as illustrated in *Drawing No. 6.3.*

5.3.6 The enclosure main door shall be provided with heavy-duty mirror finish spring-loaded pull-out door lock with welded stud fasteners. Rubber gasket shall be provided to prevent water ingress.

5.3.7 The enclosure main door shall be provided with two (2) camlocks with padlocking provision. Details of the camlock with padlocking provision and its locking mechanism are provided in the drawings.

5.3.8 The enclosure main door shall be openable up to 120° open position with stainless-steel locking elbow-type door-stopper as shown in the drawings.

5.3.9 Facility to detach the enclosure main door shall be made available only from the inside.

5.3.10 The enclosure main door shall be equipped with stiffeners to add rigidity.

5.3.11 The enclosure main door shall be gasketed to prevent ingress. Gasket shall be extruded bulb-shape trim edge seal with strength wear-resistant composite material seal strip, i.e. EPDM, foam, and metal.

5.3.12 Feeder source ID tags, 2-pieces of size 150.0 $mm_{(length)}$ x 70.0 $mm_{(height)}$ x 3.2 $mm_{(thickness)}$ x 8.0 $mm_{(corner\ radius)}$ with 2 x 4.0 mm∅ holes, and maintenance info ID tags of 150.0 $mm_{(length)}$ x 100.0 $mm_{(height)}$ x 3.2 $mm_{(thickness)}$ x 10.0 $mm_{(corner\ radius)}$ with 2 x 4.0 mm∅ holes together with 6-pieces M3 x 12.0 $mm_{(length)}$ stainless-steel blind rivets shall be supplied as loose accessories.

The dedicated holes for the feeder source ID tags shall be provided silicone rubber plugs.

Positions of the maintenance info ID tag and feeder source ID tags and its dedicated mounting holes shall be as shown in each of the mini-pillars respective drawings.

5.3.13 Maintenance info ID tags and feeder source ID tags shall be 2-ply acrylic based material and laser engravable cap with authentic brushed metallic finish *(samples shall be submitted to SEC for selection and approval)*, UV-resistant, and suitable for outdoor use. Engraving depth shall be 0.08 mm.

ID tags finish: Cap is Brushed Stainless Steel, Base is Black.

It shall be supplied pre-cut to specified dimensions using laser or saw cutting method and shall be provided with a removable clear protective film on the cap to prevent nicks and scratches.

5.3.14 The back side of the main door shall be provided with a pocket to store documents like drawings and test reports of the mini-pillar. Manufacturer nameplate shall be provided on the document pocket. Stiffeners shall be provided to add rigidity to the main door.

For mini-pillar with generator quick-connect plugin compartment, a parking (holder) for the isolation switch operating handle shall also be provided at the back of the main door.

5.3.15 The enclosure shall have a dead-front hinged removable secondary door. It shall be provided with sealing provisions using a minimum of 1.6 mm∅ single-piece metallic high-security cable seals as specified in the latest version of SEC specification SEC-03-01.

Cut-outs shall be provided to expose the operating handles of the MCCBs. Each MCCBs shall be identified using traffolyte board, size 25.0 $mm_{(height)}$

x 50.0 $mm_{(length)}$ x 1.5 $mm_{(thickness)}$ color black base and almond cap, positioned 20.0 mm below the MCCB cut-out holes and shall be secured in position using two (2) stainless-steel blind rivets. The MCCB ID tags provided shall be blank and without any markings.

An arc-flash and shock hazard warning plate as specified in latest version of SEC specification SEC-04-01 shall be provided on center-bottom front-face of the inner door.

5.3.16 The enclosure shall be provided with a removable vermin-proof bottom-plate with cables and grounding wire entry holes. Bottom-plate shall be in two halves. Each entry hole shall be provided with a rubber grommet.

5.3.17 Range-taking cable clamps with rubber sleeves shall be provided on the bottom section inside the enclosure.

Cable clamps shall be round shape, and each cable shall be clamped individually.

5.3.18 All normally non-current-carrying metallic parts or components of the enclosure shall be effectively bonded (grounded) together.

5.3.19 Mounting holes shall be provided at the bottom frame of the enclosure to match the anchor bolts of the precast concrete base as specified in the drawings.

5.4 Busbar Pan Assembly

5.4.1 The pan assembly shall be 3-phase with aluminum busbars and has a rated insulation voltage of 1000 volts. It shall be with either 3-way or 5-way tap-off busbars sized to fit perfectly for direct-bolt terminations on a 3-phase 200 ampere MCCB per latest revision of SEC specification 37-SDMS-03. Provision shall be made available that at least 3 SEC approved MCCB manufacturers are interchangeable.

5.4.2 Main busbars (horizontal and vertical) shall be rated 400 amperes, made of electrical grade aluminum alloy conforming to ASTM B236M and shall be tin-coated in conformance with ASTM B545 or approved equivalent. The minimum tin-coating thickness shall be 20µm.

5.4.3 Tin-coating process shall be carried out after all busbar profiles are set i.e., cutting, punching, deburring, etc.

5.4.4 The incoming terminals either on the main (vertical) busbars or on terminals of the isolation switch shall allow a provision to connect 2 incoming 300 mm^2 aluminum cables with terminal lugs to be bolted back-to-back.

5.4.5 Any exposed sections of the main busbars shall be properly insulated.

5.4.6 Busbar cross-sections shall be as per schedules shown in Table 3.

5.4.7 The back of the pan assembly shall be provided with an insulating board prior mounting to its mounting plate.

5.5 Neutral Busbar

5.5.1 The neutral busbar size shall be as per Table 3 of this specification.

5.5.2 It shall be rated 400 amperes, made of electrical grade aluminum alloy conforming to ASTM B236M and shall be tin-coated in conformance with ASTM B545 or approved equivalent. The minimum tin-coating thickness shall be 20µm.

5.5.3 It shall be mounted horizontally using busbar (standoff) insulators secured by bolts at both ends. Minimum height in relation to the horizontal centerline of the cable clamps shall be 300 mm (tolerance maybe considered to achieve optimal clearance and ease of termination of cables).

5.5.4 At each end of the neutral busbar shall be terminated with a 35 mm^2 tin-coated braided copper wires connected on the left-and-right side earthing studs, see clause 5.11.

5.5.5 2 x M12 holes shall be made available to terminate the neutrals of maximum 2 x 300 mm^2 incoming aluminum cables, 3 or 5 x M8 holes to facilitate connection of the neutral wires of the outgoing cables either 70 mm^2 or 185 mm^2 aluminum cables, and 2 x M10 holes (one on each end of the neutral busbar per clause 5.5.4) to facilitate termination of the 35 mm^2 tin-coated braided copper wires. Each hole shall be provided with a set of fasteners, grade 8.8 (1 x bolt, 2 x flat-washer, 1 x lock-washer, and 1 x nut) of sufficient length and size. Extra holes may be provided as per advice of SEC authorized personnel during inspection prior to approval of mass production.

5.6 MCCBs

5.6.1 Molded-Case Circuit-Breaker (MCCB) shall be rated 200 amperes in conformance with the latest requirements of SEC specifications 37-SDMS-03 and 37-SDMS-01.

5.6.2 MCCB incoming terminals shall be bolted directly on the tap-off busbar branches of the pan assembly.

5.6.3 MCCB outgoing terminals shall be terminated with the outgoing cables (size either 70mm^2 or 185mm^2 aluminum cables) with the use of custom-sized 70 mm^2 and 185 mm^2 aluminum terminal lugs (SEC Item No. 908122056 and 908122055, respectively) with 20.0 mm palm width as per latest revision of 12-SDMS-02.

5.7 Precast Concrete Base

5.7.1 It shall be designed and constructed to support the overall weight of the mini-pillar (complete assembly).

5.7.2 It shall be provided with 4 x M12 anchor bolts (Grade 8.8) on the top surface with 40 mm exposed thread length. Each anchor bolt shall be provided with flat-washer, lock-washer, and a nut. Further details are provided in the drawings, as applicable.

5.7.3 It shall be fully coated with concrete waterproofing emulsified bitumen minimum number of coats shall be two (2). Minimum overall thickness when fully cured shall be 600µm. Top section as specified in the drawings shall be painted with RAL 1019.

5.8 Generator Plug-in Compartment

5.8.1 For mini-pillars equipped with quick-connect generator plugins, it shall be provided with a separate compartment on the top section dedicated for the female socket outlets of the quick-connect generator plugins. Details are provided in the drawings.

5.8.2 The generator plug-in compartment shall have an awning-type cover with 2 welded heavy-duty stainless-steel hinges on the top. It shall be provided with a heavy-duty door-stopper on both sides to hold the cover at 90° open position. The cover shall be secured with 2 heavy-duty stainless steel camlocks with locking/sealing provision.

5.8.3 The mini-pillar main enclosure and the generator plug-in compartment shall be separated by a water-tight steel plate.

5.8.4 Facility for water drainage in the generator plug-in compartment shall be made available.

5.8.5 The generator plug-in compartment shall have 4 single-pole female socket outlets with removable inlet cap/cover. Each phase plus the neutral (R-Y-B-N) shall be separate, aligned and spaced uniformly on a mounting plate, and must be identified legibly with an indelible markings or paint. Use of decal stickers is not allowed.

5.8.6 The male plugs/inserts and female sockets shall be as per standard design details provided in the drawings of this specification.

5.8.7 Electrical connection of each female sockets on the pan assembly shall be done using a 240 mm^2 single-core flexible insulated copper wires with voltage rating of up to 1000 volts. One end of the wire shall be terminated on the female socket while the other end shall be bolted on the vertical busbar of the pan assembly using tinned-copper lugs. The flexible wires shall pass through the water-tight steel plate mentioned in clause 5.8.3. via dedicated holes with stainless steel water-tight cable glands.

5.8.8 Each set of generator quick-connect plugin (both male plug and female socket) shall have a minimum rating of 400 amperes, IP66 with rated operating voltage of up to 1000 volts.

5.9 Isolation Switch

Mini-pillars with generator plug-in compartments shall be equipped with an isolation switch with minimum current rating of 400 amperes and short-circuit rating of 25kA for 1.0 second. The main purpose of the isolation switch is to ensure that the mini-pillar is totally isolated from the main (incoming) power source while connected to an emergency generator without physically disconnecting the incoming cables.

5.10 Internal Lighting

The enclosure shall be fitted with an LED enclosure light controlled via door-operated switch by the inner door. The auxiliary circuit supplying the lamp shall have a separate miniature circuit breaker located at an accessible position.

5.11 Earthing

5.11.1 Internal Earthing

Provision shall be made to connect earthing internally at positions close to each side bottom inside the enclosure. Earthing terminals shall be

connected to the neutral busbar by a 35 mm^2 tin-coated braided copper wire links with 35 mm^2 tin-coated copper terminal lugs on both ends.

Earthing/grounding terminals/studs shall be size M10 full-thread stainless steel. It shall be welded on the enclosure body to provide a rigid termination point for 35 mm^2 bare copper ground wire.

5.12 Dimensions

The maximum allowable dimensions of the mini-pillar with steel enclosure and its precast concrete base shall be as shown in Table 3. Full details are provided in the drawings, as applicable.

5.13 Finishing Color

5.13.1 The enclosure shall be powder coated using adequate super durable UV resistant paint and protected against corrosion with atmospheric-corrosivity category classification of C5 with very high durability in conformance with ISO 12944.

5.13.2 It is mandatory that the C5 category paint finish shall be done in-house at the manufacturer's facility where the production line is completely capable of handling from surface preparation of the substrate (base material), application and curing of the base coat (primer), and up to application and curing of the topcoat (finish) in one complete cycle.

5.13.3 Manufacturers' facilities that can provide a batch of single coat (primer) processes then recalibrate the same facility or proceed to another facility to apply the 2nd coat (topcoat) is not acceptable.

5.13.4 Laboratory performance test results as per applicable tests and methods stipulated in ISO 12944-6 with SST requirement of 1440 hours minimum shall be submitted and regarded as an integral part of the submittals of type test reports submitted to SEC for approval.

5.13.5 All surfaces of the enclosure shall be painted with RAL 1019 (textured grain finish) color except the main door, dead-front (secondary door), and/or the cover of the generator plugin compartment.

5.13.6 The enclosure main door, dead-front (secondary door) and/or the cover of the generator plugin compartment shall be painted with RAL 9001 with smooth finish.

5.13.7 The color combination of the mini-pillars shall be as per Table-5.

Enclosure Surface	Color Combination
Body (Inside & Out)	RAL 1019
Main Door, Dead-Front (Secondary Door) and/or Cover of Gen. Plugin Compartment	RAL 9001

Table 5: Finishing color combination of mini-pillar.

5.13.8 The front of the enclosure main door shall also be provided with a silk-screen print (or better printing technology) of SEC logo, SEC themed graphic designs, and warning sign that is guaranteed full adhesion on the base paint finish of the main door, and shall not fade, peel, or crack for at least 10 years.

5.13.9 Accelerated aging test may be requested on a sample to represent the whole batch of the issued purchase orders to verify the performance of the printed graphics.

5.13.10 Printed graphics shall be allowed to cure on a preheated oven at 150°C for 5 to 10 minutes and leave to rest to cool down for at ambient temperature for 20 minutes or until it reaches touch temperature prior to preparation for application of clear topcoat for UV protection.

6 MARKING

6.1 Nameplate Information

6.1.1 Nameplate shall be placed inside the enclosure, on the documents pocket only. It is not allowed to attach the nameplate at the outer surface of the enclosure. For each requested mini-pillar with steel enclosure, the supplier shall give the following data:

- Manufacturer Name
- Manufacturer Serial Number
- SEC Serial Number (Information shall be filled by SEC)
- Year/Month of Manufacture
- SEC Issued PO Number
- Reference SEC Specification
- SEC Item Code
- Rated frequency (hertz)

- Protection degree (IP)
- Length (mm)
- Width (mm)
- Height (mm)
- Total weight (kg)

6.1.2 Nameplate information/entries that are not fixed shall either be engraved or stamped legibly on the blank entries on the nameplate. Blank fillable entries on the nameplates shall have a black background.

7 TESTING AND INSPECTION

The low-voltage distribution pillar (mini-pillar) with steel enclosures shall be tested in conformance with the applicable standards.

7.1 Type Tests

7.1.1 The mini-pillar with steel enclosures shall be type tested in conformance with applicable tests requirements per IEC 61439-5.

7.1.2 Pan assembly shall be type tested in conformance with IEC 60947-7-1.

7.1.3 Corrosion protection (paint protective system) laboratory performance tests shall be performed in conformance with ISO 12944-6.

7.1.4 Performance of printed graphics shall be verified by accelerated aging test in conformance with ISO 16474-2.

7.1.5 Chemical analysis shall be performed on all metallic parts, fittings, fasteners, and components to verify conformance with the composition of stainless-steel grade 304.

7.1.6 Type test shall be performed at SEC approved laboratories. SEC reserves the right to attend and witness the tests. SEC reserves the right to request the supplier/manufacturer to repeat the type test every five (5) years, or as needed should the supplied mini-pillar with steel enclosures have frequent faults and failures or non-compliance.

7.2 Routine Tests

The following tests shall be carried out on a randomly selected sample after fabrication and assembly, enabling an official test certificate to be produced for the whole batch provided it is conducted under the supervision of SEC authorized technical personnel.

a. Insulation Test
b. Temperature Rise Test
c. Design Verification Tests
d. Paints (Corrosion Protection) Performance Tests
e. Verification of Tin-coating Thickness by X-Ray Spectrometry per ASTM B568

7.3 Sample Inspection and Acceptance Testing

7.3.1 Samples together with actual CAD drawings, design assembly STEP file, user manuals and routine test reports shall be subject for inspection/evaluation prior to issuance of approval for mass production.

7.3.2 Sample inspection/evaluation shall be conducted at the manufacturer facilities. The following attributes shall be checked:

a. Dimensional Verification
b. Routine Tests
c. Markings
d. Accessories
e. Conformity with the requirements of this specification

7.3.3 Acceptance testing shall be performed to sample selected by SEC authorized personnel prior to issuance of release of the requested batch.

8 PACKING AND SHIPPING

8.1 Packing and shipping requirement shall generally be as per latest revision of SEC General Requirements for Equipment/Materials, 01-SDMS-01 or as per purchase order requirements.

8.2 Each mini-pillar with steel enclosure shall be covered by a durable cling plastic film to protect the surface finish from nicks and scratches. It shall then be packed as a complete unit and shall be delivered ready for use.

8.3 Packing shall protect the mini-pillar against damage during shipment and site handling.

8.4 Suppliers/manufacturers shall coordinate with SEC Warehousing Department for additional packing, handling, and or shipping instructions, as applicable.

8.5 Packing crates shall be marked with the following information:

a. Manufacturer's Name and Model/Type
b. Country of Origin
c. SEC Purchase Order Number / Tender Number
d. SEC Item Code
e. Gross Weight, (kg)
f. Handling Instructions
g. Destination (SEC Warehouse)

9 GUARANTEE

9.1 The supplier/manufacturer shall guarantee that the mini-pillar including all its internal parts and components against all defects arising out of faulty design, misinterpretation of the requirements or manufacturing defects or defective materials for a period of five (5) years from the date of delivery.

9.2 The supplier/manufacturer shall guarantee the uniformity of the products delivered with the approved samples and drawings.

9.3 The supplier/manufacturer shall guarantee that all the materials, parts, and components used in the fabrication and assembly of the mini-pillar shall be the same as to what have been declared in the prequalification files. Any changes on the supplier and sources of any parts of the mini-pillar must be technically evaluated and have written approval from SEC authorized technical representative.

9.4 The supplier/manufacturer shall guarantee that the mini-pillar with steel enclosures manufactured under this specification are designed to operate normally outdoor at an ambient temperature of 50°C in Saudi Arabia environmental conditions.

9.5 The supplier/manufacturer shall guarantee full compliance with the requirements of this specification. Any clarifications shall be addressed to SEC authorized technical personnel. SEC reserves the sole right to interpret all subject matters involving this specification.

9.6 Any deviations or modifications must have written approval from SEC authorized technical representative. Should any unauthorized deviations or modifications be discovered that could potentially compromise the quality, safety, and security of

the equipment, SEC reserves the right to blacklist the supplier/manufacturer and impose legal actions effective immediately.

9.7 The supplier/manufacturer shall guarantee upon request of SEC personnel the full disclosure of the documents related to purchase, shipping, conformance testing, and QA & QC processes of all the materials, parts, components, fittings, etc., related directly or indirectly on the fabrication and assembly of mini-pillar with steel enclosures. Copies of the documents shall be submitted upon request of SEC authorized personnel, and presentation of the original documents shall be done if requested.

10 SUBMITTALS

10.1 Submittals required with tender/inquiry

10.1.1 Summary in table form with the following information: list of items offered, B.O.Q. for each unit offered, manufacturer, origin, catalogue number, and quantity.

10.1.2 Clause-by-clause compliance with the latest revision of this specification.

10.1.3 General arrangement of the mini-pillar with steel enclosure showing all important dimensions, together with mountings/accessories.

10.1.4 General arrangement showing masses, main dimensions, arrangement of auxiliary components and the minimum clearances required for ventilation and safety during operation and maintenance.

10.1.5 Foundation plan, including foundation loading

10.1.6 Schematic and connection diagrams

10.1.7 Details of cable terminations

10.1.8 Technical manual giving installation, operation, and maintenance instructions

10.1.9 Detailed summary of deviations from the specification, if any.

10.1.10 Certificate stating that the raw material has been sampled, tested and inspected in accordance with relevant standard specifications

10.1.11 Product type test and special test reports and certificates carried out from SEC approved laboratories

10.1.12 Filled-up technical data schedule on each of the items offered, e-copy in Excel (*.xlsx) format

10.1.13 Manufacturer CAD drawings like: mini-pillar with steel enclosure outlines showing the position of the fittings and attachments, mounting arrangements, lifting arrangements, cable clamps, etc. E-copies of design assembly STEP files with portable viewers or SolidWorks, and AutoCAD 2013 (*.dwg) format, for each of the items offered

10.1.14 USB Flash Drive containing e-copy of all the documents mentioned above

10.2 Submittals required following award of contract

10.2.1 Fabrication CAD drawings.

10.2.2 Quality assurance tests.

10.2.3 Manufacturing and routine test schedules.

10.2.4 Special tests, if applicable.

10.2.5 USB Flash Drive containing e-copy of all the documents mentioned above.

11 TECHNICAL DATA SCHEDULE:

11.1 The vendor shall complete and return one copy of the attached data schedule with quotation. In addition to data Schedule, clause-by-clause compliance to this specification shall be confirmed/ submitted.

11.2 Detail dimensional drawing of each item shall be submitted.

11.3 Type test certificates.

TECHNICAL DATA SCHEDULE

LOW-VOLTAGE DISTRIBUTION PILLAR (MINI-PILLAR) WITH STEEL ENCLOSURE

SEC Inquiry No. _____ *Item No.* _____

No	Description	SEC Specified Values (*)	Vendor Proposed Values (**)
1	**General**		
1.1	Reference Standard	IEC 61439-5	
2	**Design Requirements**		
2.1	Type	Mini-Pillar w/ Steel Enclosure	
2.2	Generator Plug-in Compartment	Yes / No	
2.3	Number of Outgoing Circuit	3-Way / 5-way	
2.4	Steel Enclosure Material (Sheet Metal)	GI: G90	
2.5	Enclosure Thickness, mm	2.0	
2.6	Rated Frequency, Hz	60	
2.7	Nominal Voltage, volts	400 volts	
2.8	No. of Phases	3-Phase + N	
2.9	Short-Circuit Withstand for 1 second, kA	25	
2.10	Degree of Protection (IP Code), Enclosure	IP54	
3	**Busbar Pan Assembly**		
3.1	No. of Tap-Off Circuits	3-Way / 5-Way	

TECHNICAL DATA SCHEDULE

LOW-VOLTAGE DISTRIBUTION PILLAR (MINI-PILLAR) WITH STEEL ENCLOSURE

SEC Inquiry No. _____ *Item No.* _____

No	Description	SEC Specified Values (*)	Vendor Proposed Values (**)
3.2	Busbar Material	Aluminum	
3.3	Main Busbar Current Rating (Horizontal & Vertical)	400 Amperes	
3.4	Main Busbar $Size_{(Horizontal)}$, mm	30 x 15	
3.5	Main Busbar $Size_{(Vertical)}$, mm	40 x 10	
3.6	Tap-Off Busbar Rating	200 Amperes	
3.7	Tap-Off Busbar Size, mm	20 x 10	
3.8	Rated Operational Voltage, volts	400 volts	
3.9	Rated Insulation Voltage, volts	1000 volts	
3.10	Busbar Tin-Coating Thickness	20 µm	
4	**Generator Quick-Connect Plug-ins**		
4.1	Reference Standard	IEC 60309	
4.2	No. of Poles	4-Single Pole (R-Y-B-N)	
4.3	Minimum Current Rating	400 Amperes	
4.4	Rated Operating Voltage	1000 volts	
4.5	Degree of Protection	IP66	
4.6	Type of Terminal	Screw less	
4.7	Type of Conductor	Flexible Copper	
4.8	Type of Cable Exit	Straight	
4.9	Design Conformance	SEC Unified Design	
5	**Isolation Switch**		
5.1	Nominal Voltage, volts	400	
5.2	No. Phases	3-Phase	
5.3	Minimum Current Rating	400 Amperes	

TECHNICAL DATA SCHEDULE

LOW-VOLTAGE DISTRIBUTION PILLAR (MINI-PILLAR) WITH STEEL ENCLOSURE

SEC Inquiry No. _____ *Item No.* _____

No	Description	SEC Specified Values (*)	Vendor Proposed Values (**)
5.4	Short-Circuit Current Rating	25 kA – 1.0 sec	
6	**Precast Concrete Base**		
6.1	Sized for Enclosure	3-Way / 5-Way	
6.2	Anchor Bolts (Grade 8.8)	4 x M12 x 40mm	
6.3	Center-to-Center Distance of Anchor Bolts, mm	690 x 170 / 903 x 170	
6.4	Coal-Tar Epoxy Coating Thickness + RAL 1019 Top Coat Finish (on Concrete Base Upper Section)	600 µm	
7	**Supplementary Fittings**		
7.1	Is the mini-pillar with steel enclosure fitted with all the components and accessories mentioned in this specification?	Yes	
8	**Testing**		
8.1	Product is Type Tested	Yes	
8.2	SEC Approved Laboratory	**	
8.3	Date Tested	**	
8.4	Manufacturer	**	
8.5	Model/Type	**	
8.6	Country of Origin	**	
8.7	Submittals Required with Tender/Inquiry Included or Not?	**	

TECHNICAL DATA SCHEDULE

LOW-VOLTAGE DISTRIBUTION PILLAR (MINI-PILLAR) WITH STEEL ENCLOSURE

SEC Inquiry No. _____ *Item No.* _____

Additional Technical Information or Features Specified by SEC

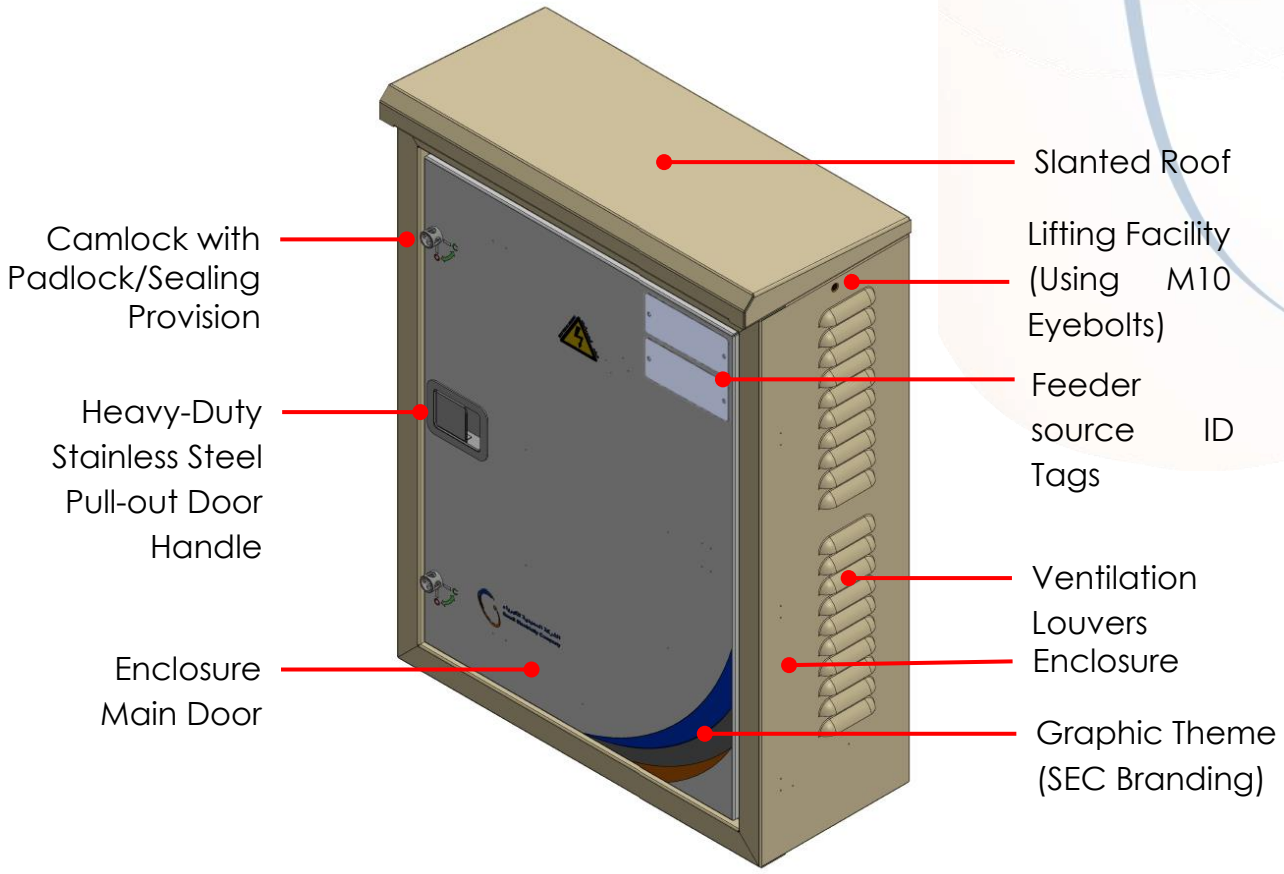
Additional Supplementary Data or Features Proposed by Bidder/Vendor/Supplier.

Other Particulars to be filled-up by the Bidder/Vendor/Supplier.

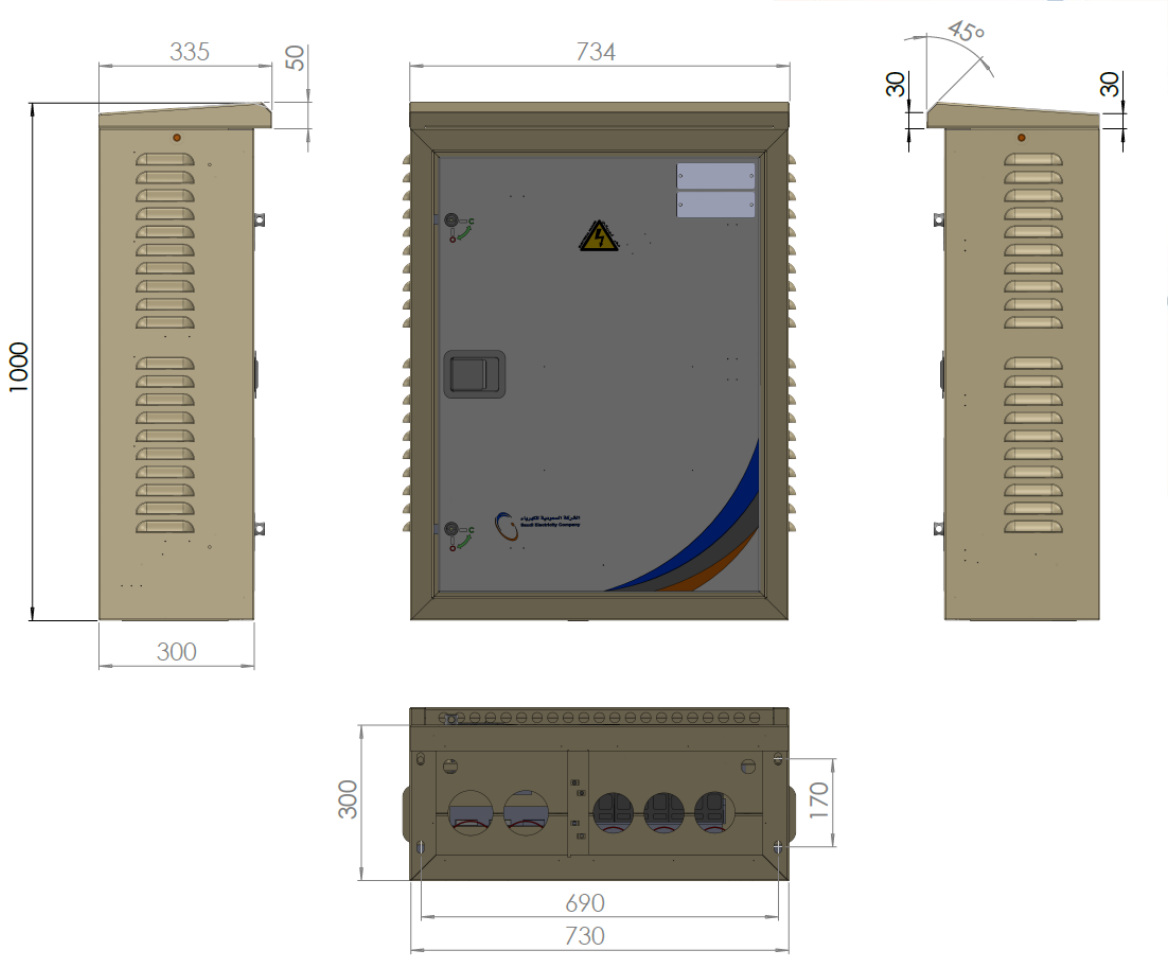
List of Deviations and Clauses to which exception is taken by the Bidder/Vendor/Supplier. (Use separate sheet, if necessary).

Description	Manufacturer of Material/Equipment	Vendor/Supplier
Name of Company		
Location and Office Address		
Name and Signature of Authorized Representative with Date		
Official Seal / Stamp		

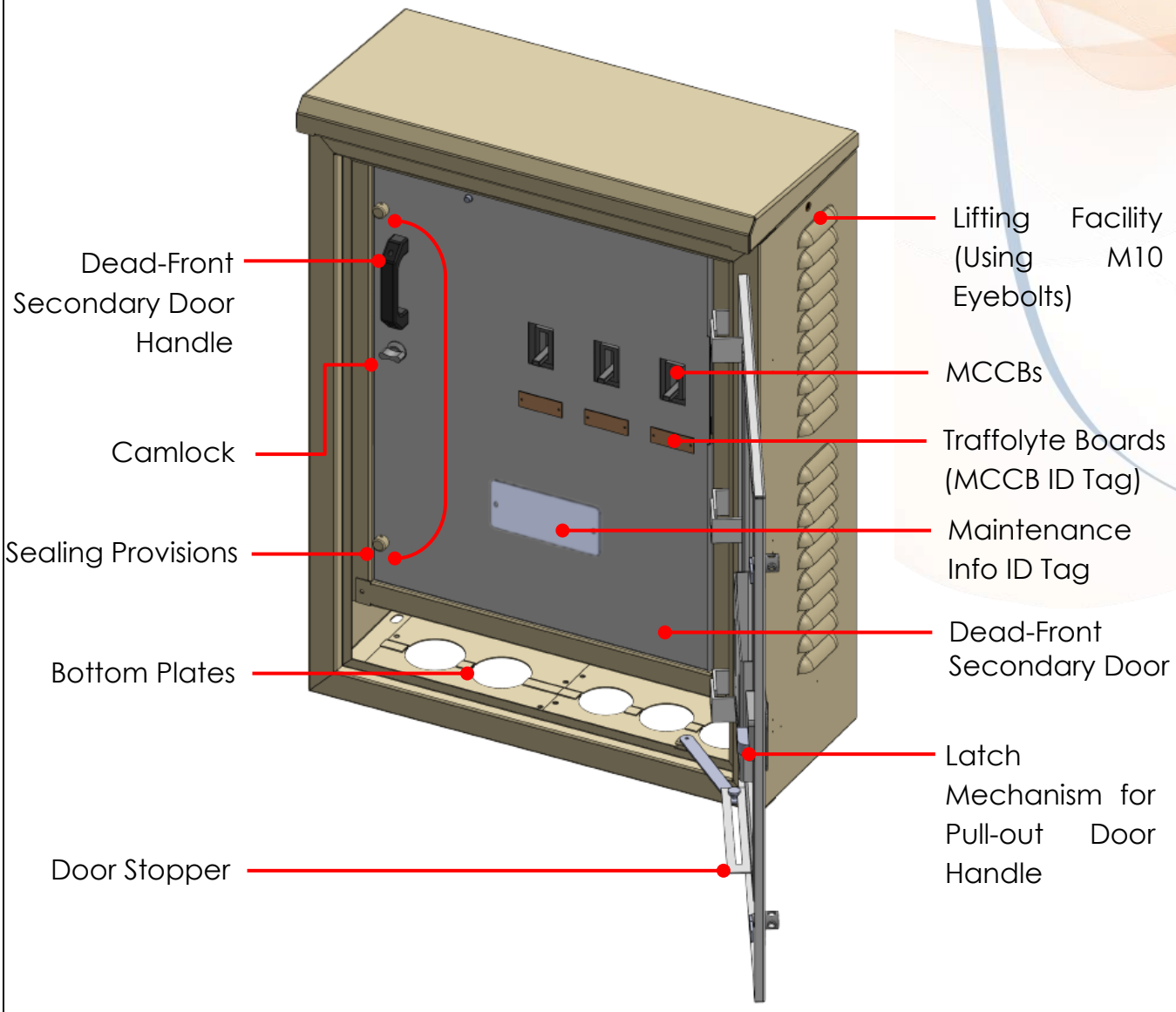
12 DRAWINGS:



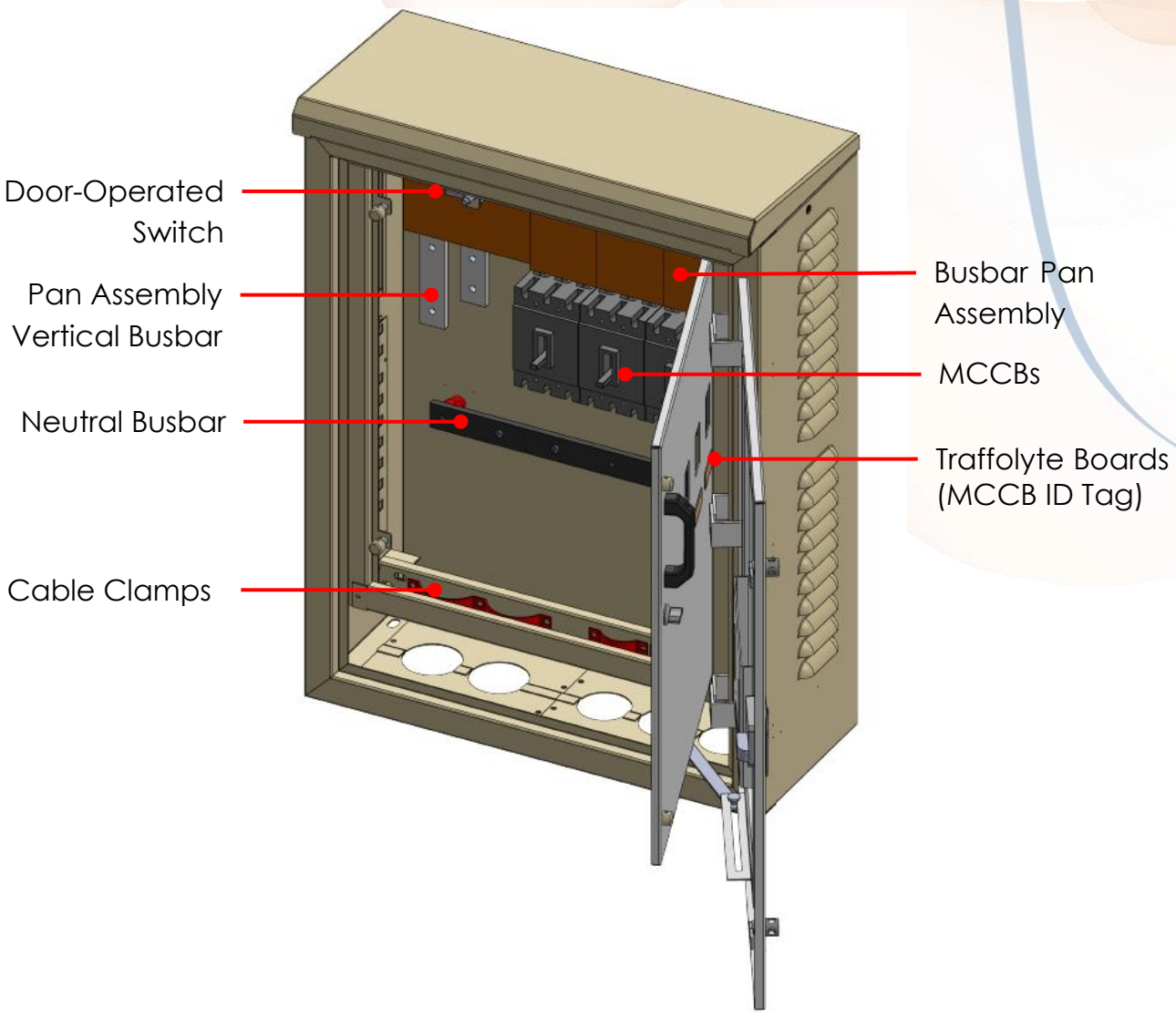
Drawing No. 1.0: Perspective Drawing of a 3-way Mini-Pillar without Generator Quick-Connect Plug-in Compartment Showing Main Design Elements (External Features)



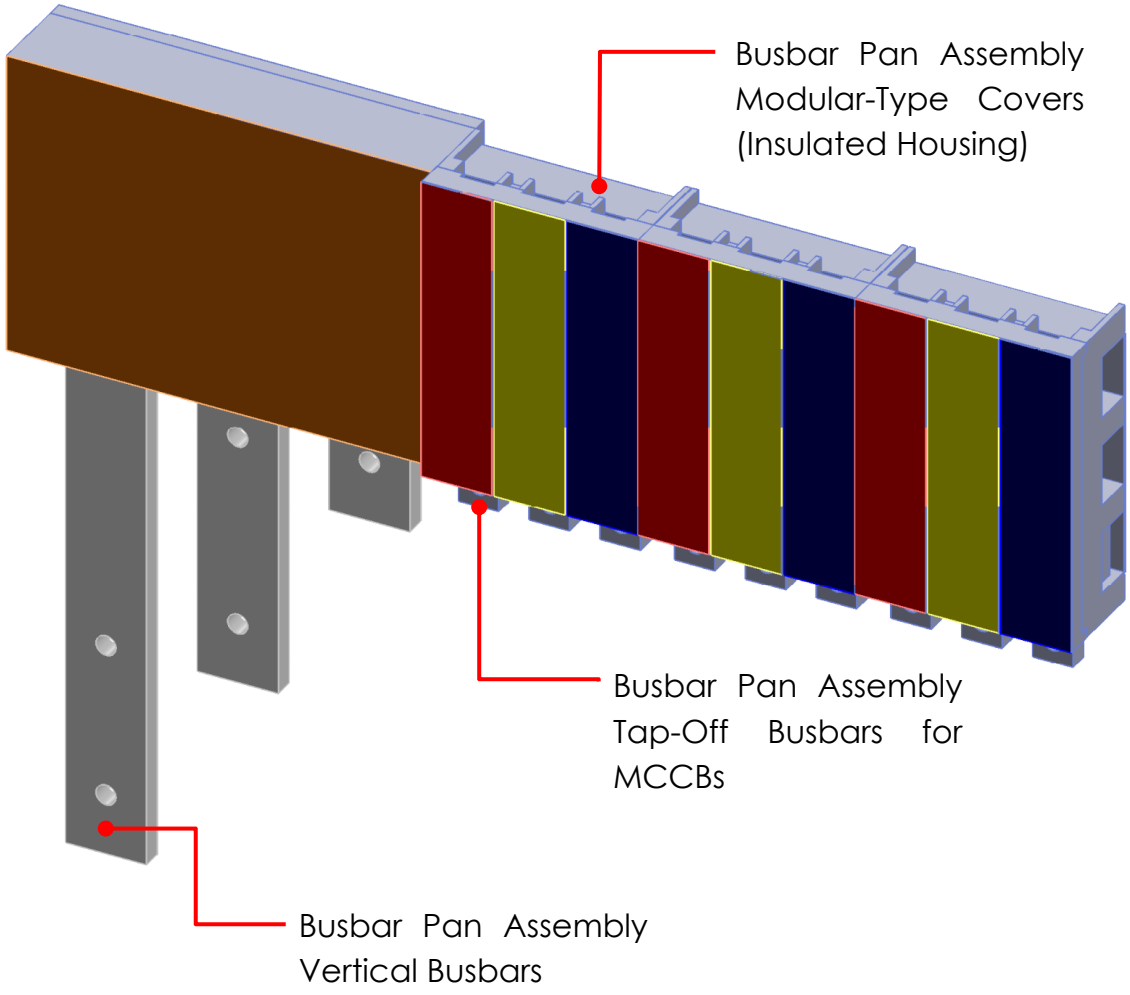
Drawing No. 1.1: Layout Drawing of a 3-way Mini-Pillar without Generator Quick-Connect Plug-in Compartment Showing the Maximum Allowable Dimensions



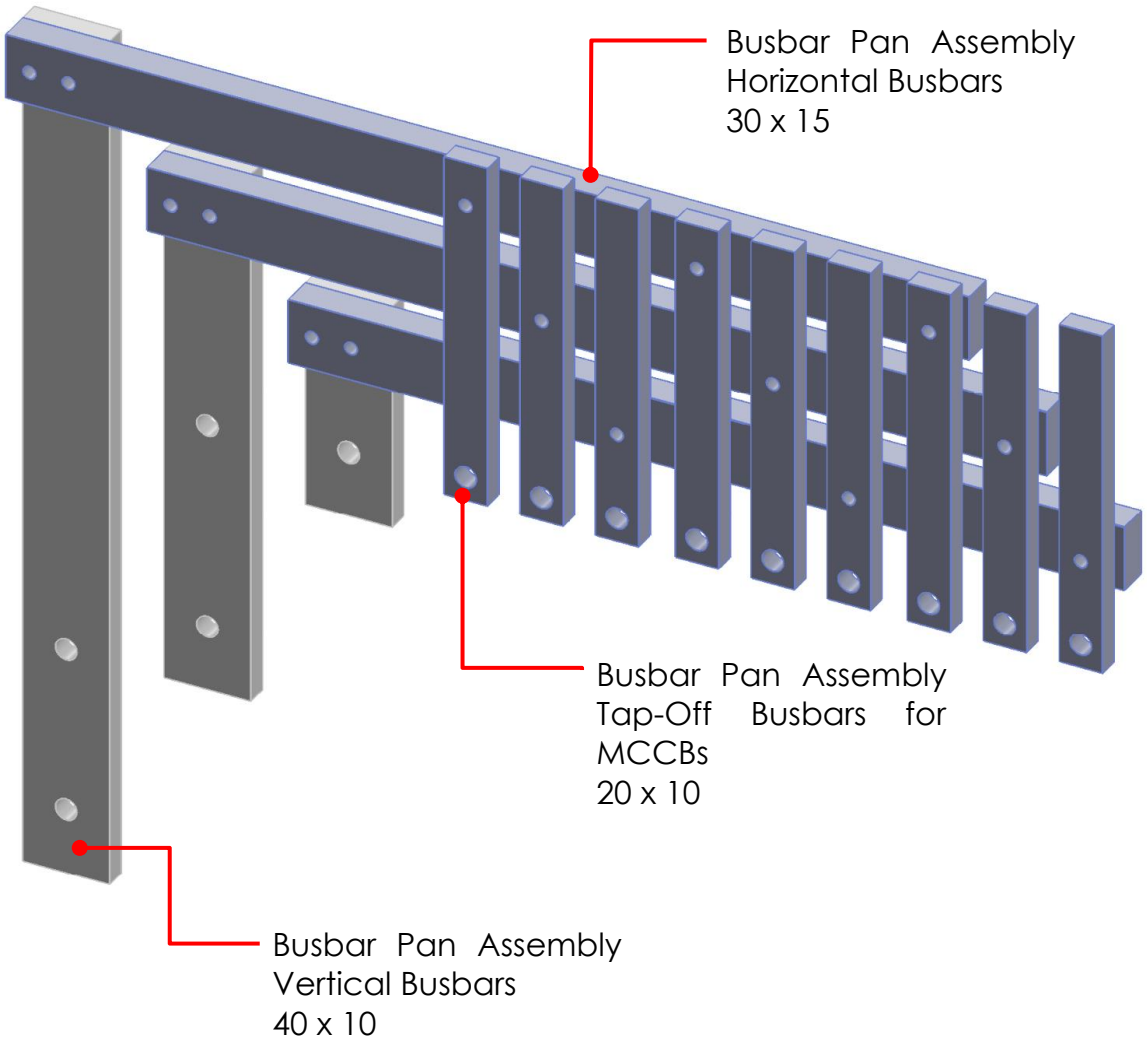
Drawing No. 1.2: Perspective Drawing of a 3-way Mini-Pillar without Generator Quick-Connect Plug-in Compartment with Enclosure Main Door Opened



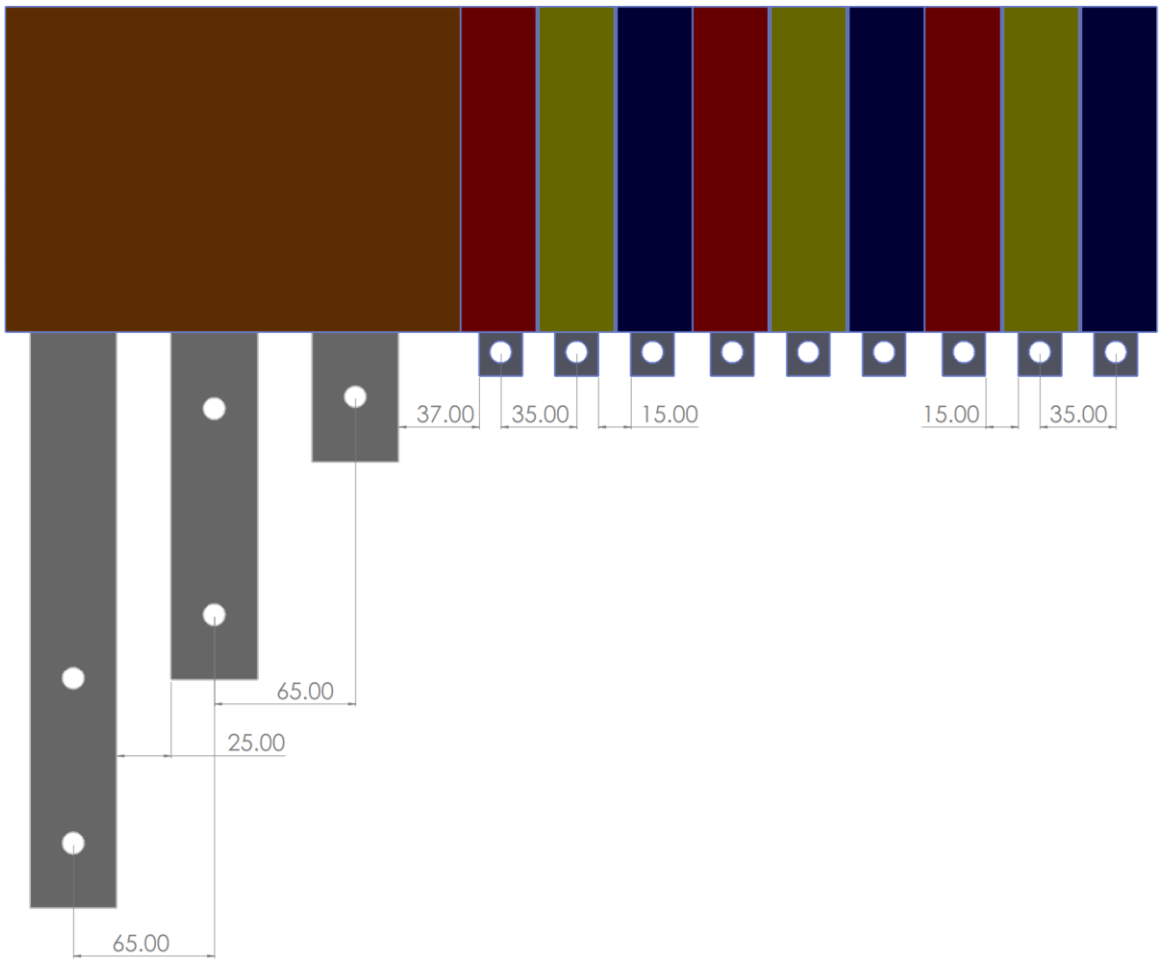
Drawing No. 1.3: Perspective Drawing of a 3-way Mini-Pillar without Generator Quick-Connect Plug-in Compartment with Enclosure Main Door & Dead-Front Secondary Door Opened



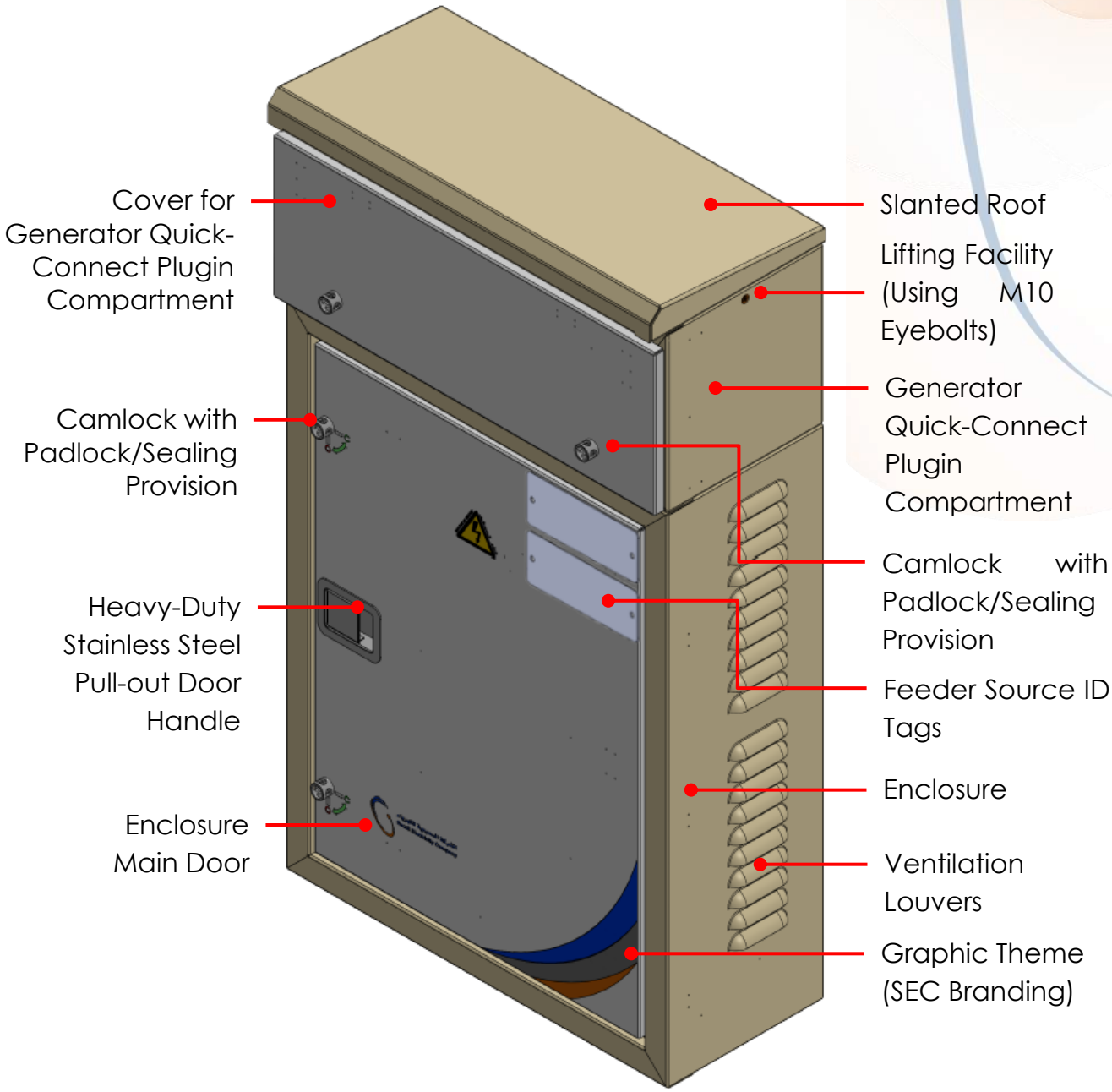
Drawing No. 1.4: Perspective Drawing of a Busbar Pan Assembly (Insulated) for 3-way Mini-Pillar without Generator Quick-Connect Plug-in Compartment



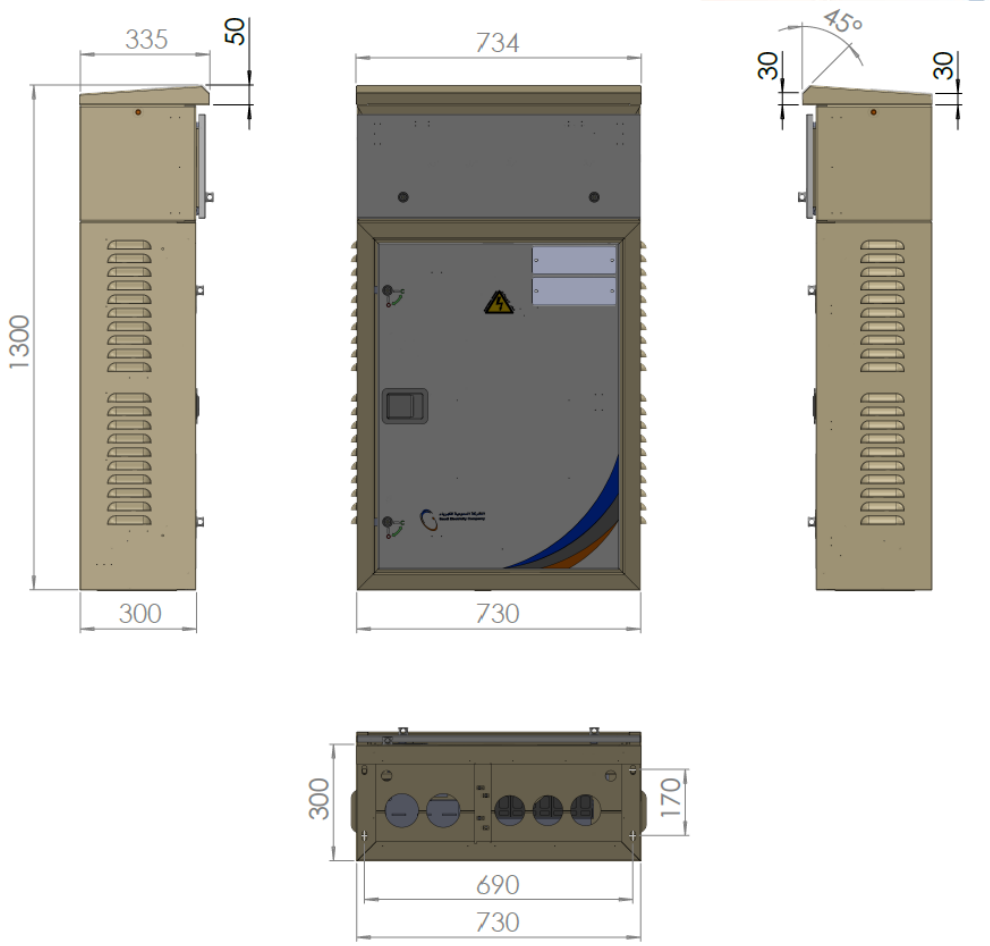
Drawing No. 1.5: Perspective Drawing of a Busbar Pan Assembly (Bare) for 3-way Mini-Pillar without Generator Quick-Connect Plug-in Compartment



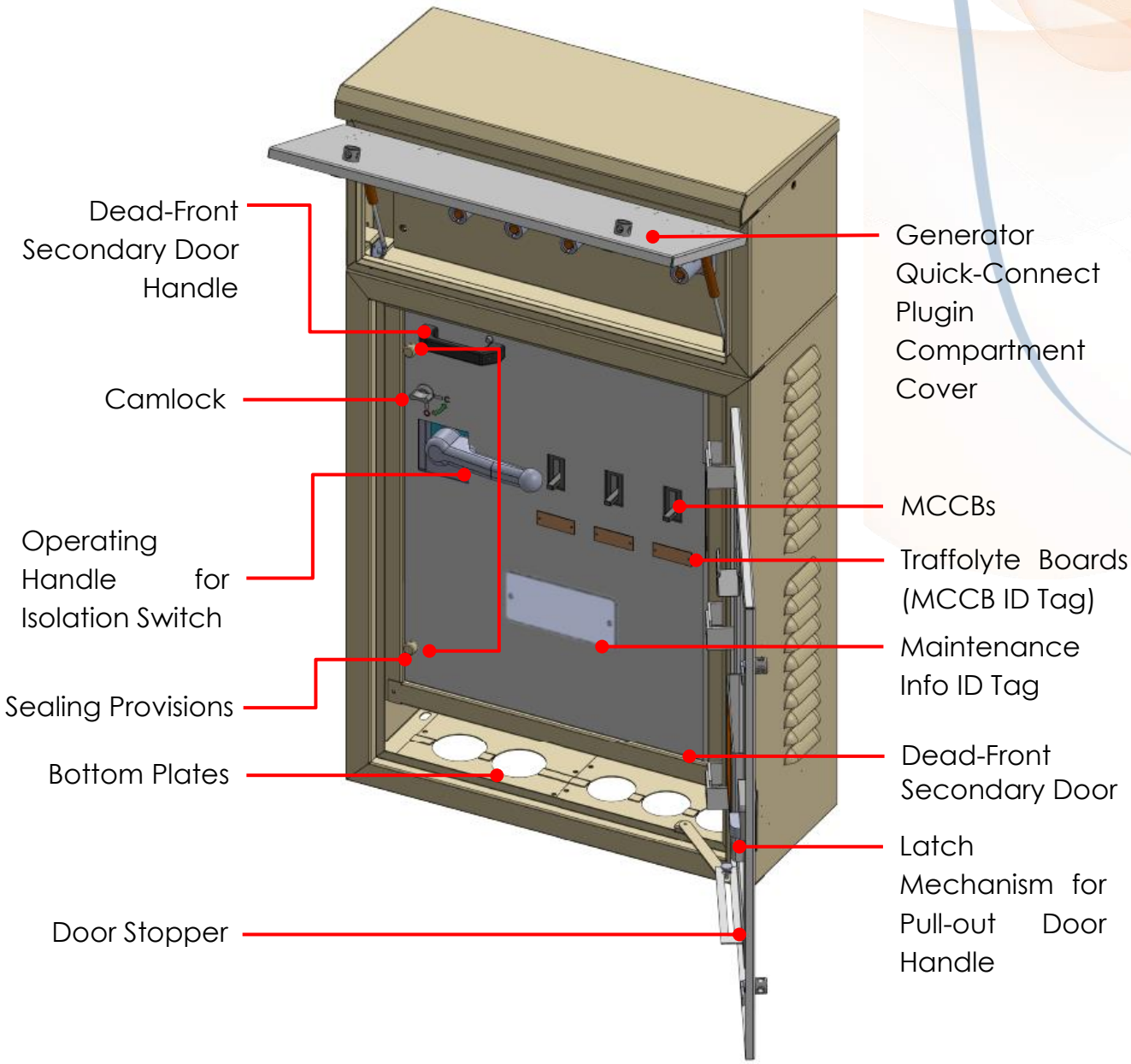
Drawing No. 1.6: Layout Drawing of a Busbar Pan Assembly for 3-way Mini-Pillar without Generator Quick-Connect Plug-in Compartment Showing the Center-to-Center Distance and Spacing of the Busbars



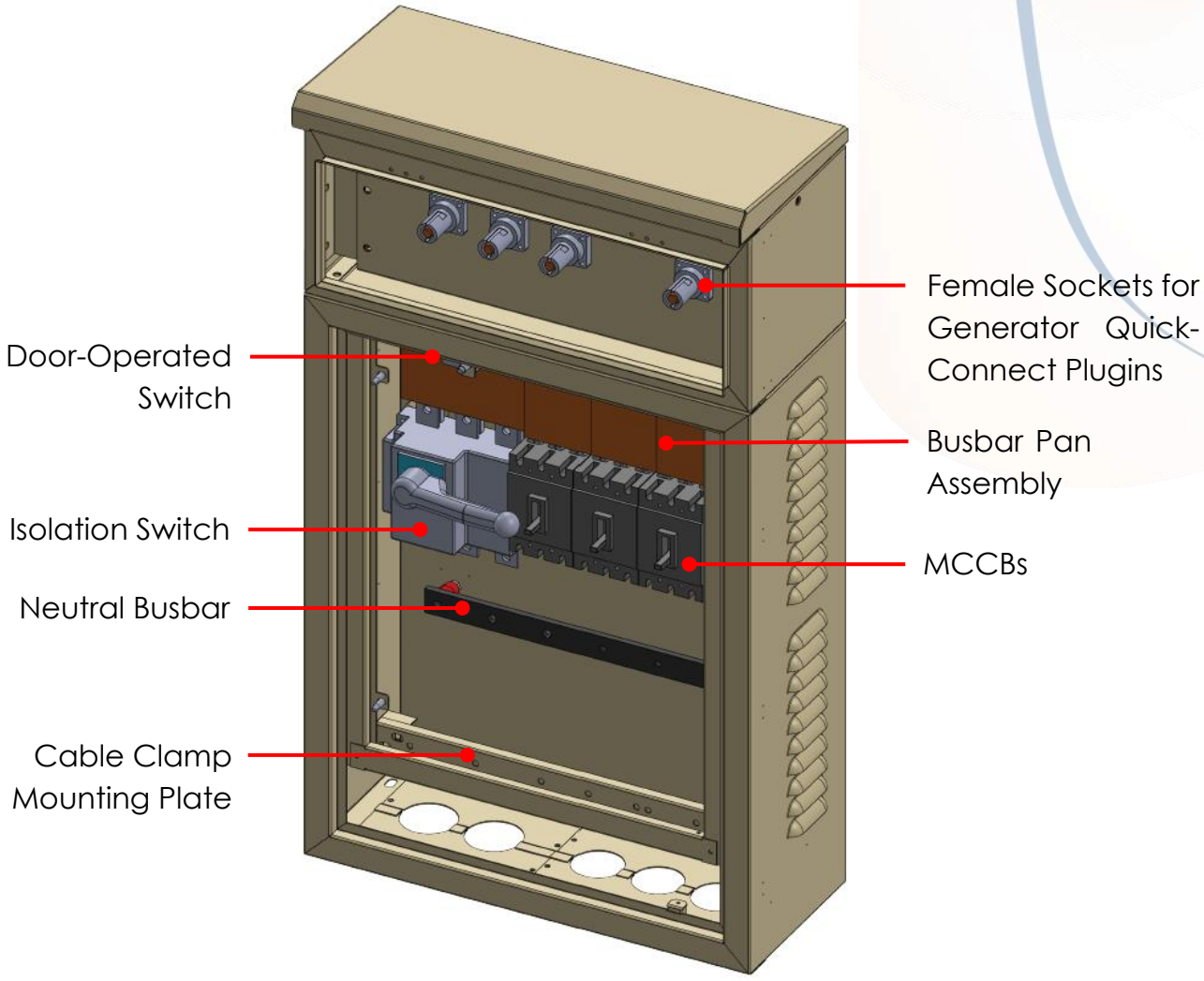
Drawing No. 2.0: Perspective Drawing of a 3-way Mini-Pillar with Generator Quick-Connect Plug-in Compartment Showing Main Design Elements (External Features)



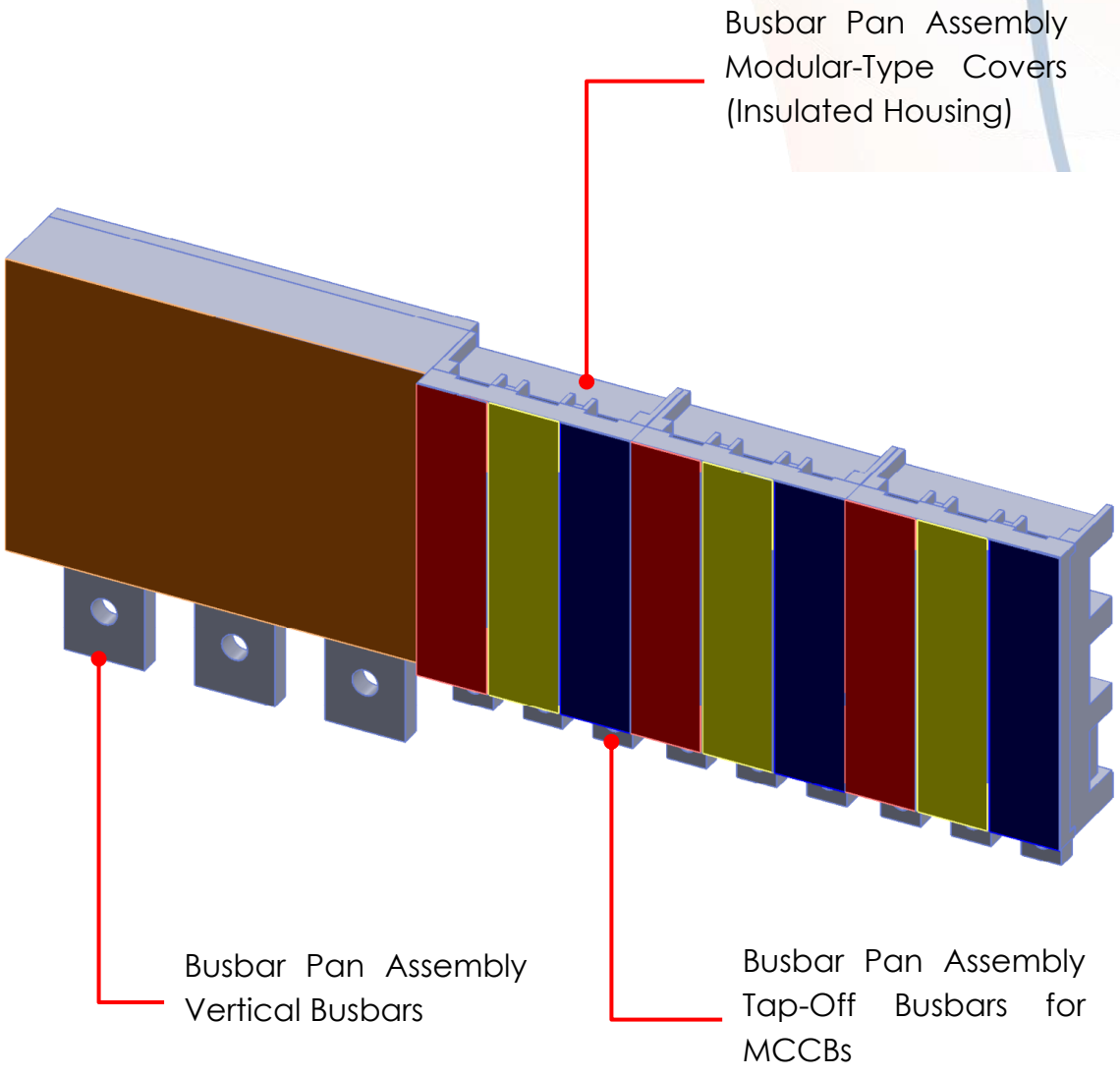
Drawing No. 2.1: Layout Drawing of a 3-way Mini-Pillar with Generator Quick-Connect Plug-in Compartment Showing the Maximum Allowable Dimensions



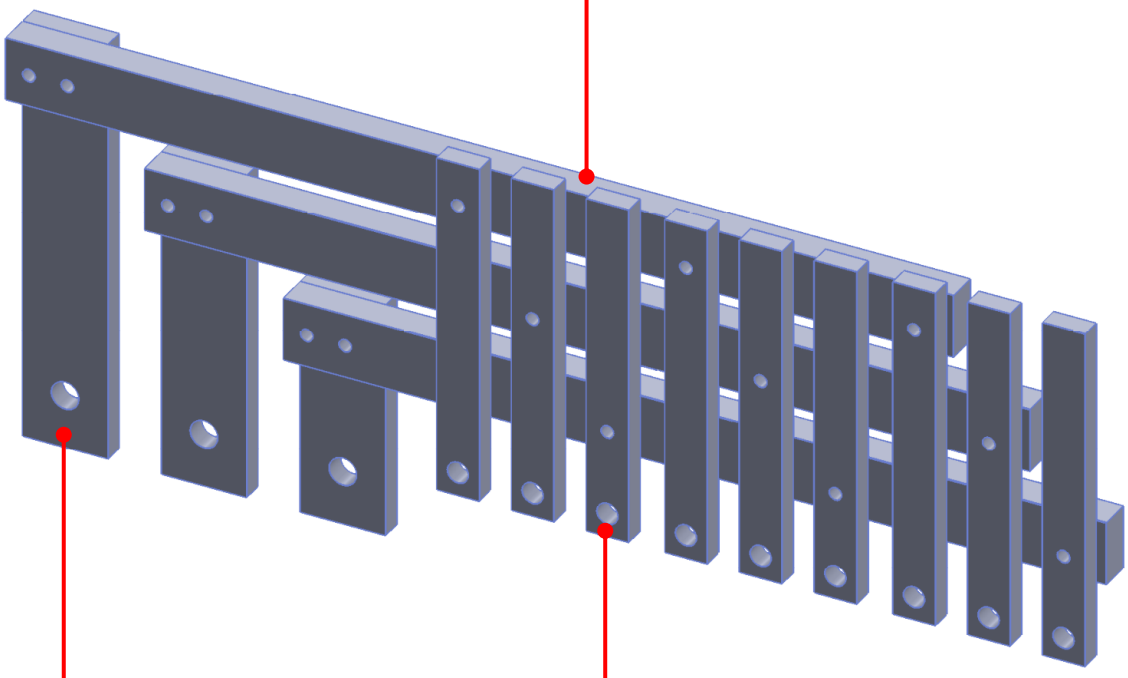
Drawing No. 2.2: Perspective Drawing of a 3-way Mini-Pillar with Generator Quick-Connect Plug-in Compartment with Enclosure Main Door & Generator Quick-Connect Plugin Compartment Opened



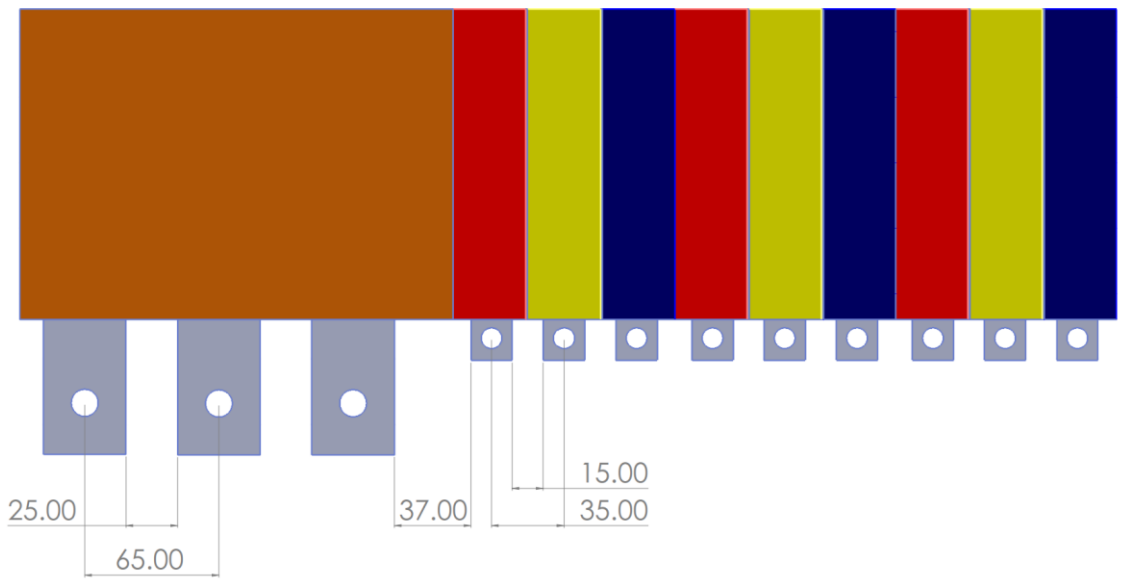
Drawing No. 2.3: Perspective Drawing of a 3-way Mini-Pillar with Generator Quick-Connect Plug-in Compartment with Enclosure Main Door, Dead-Front Secondary Door & Generator Quick-Connect Plugin Compartment Cover Hidden



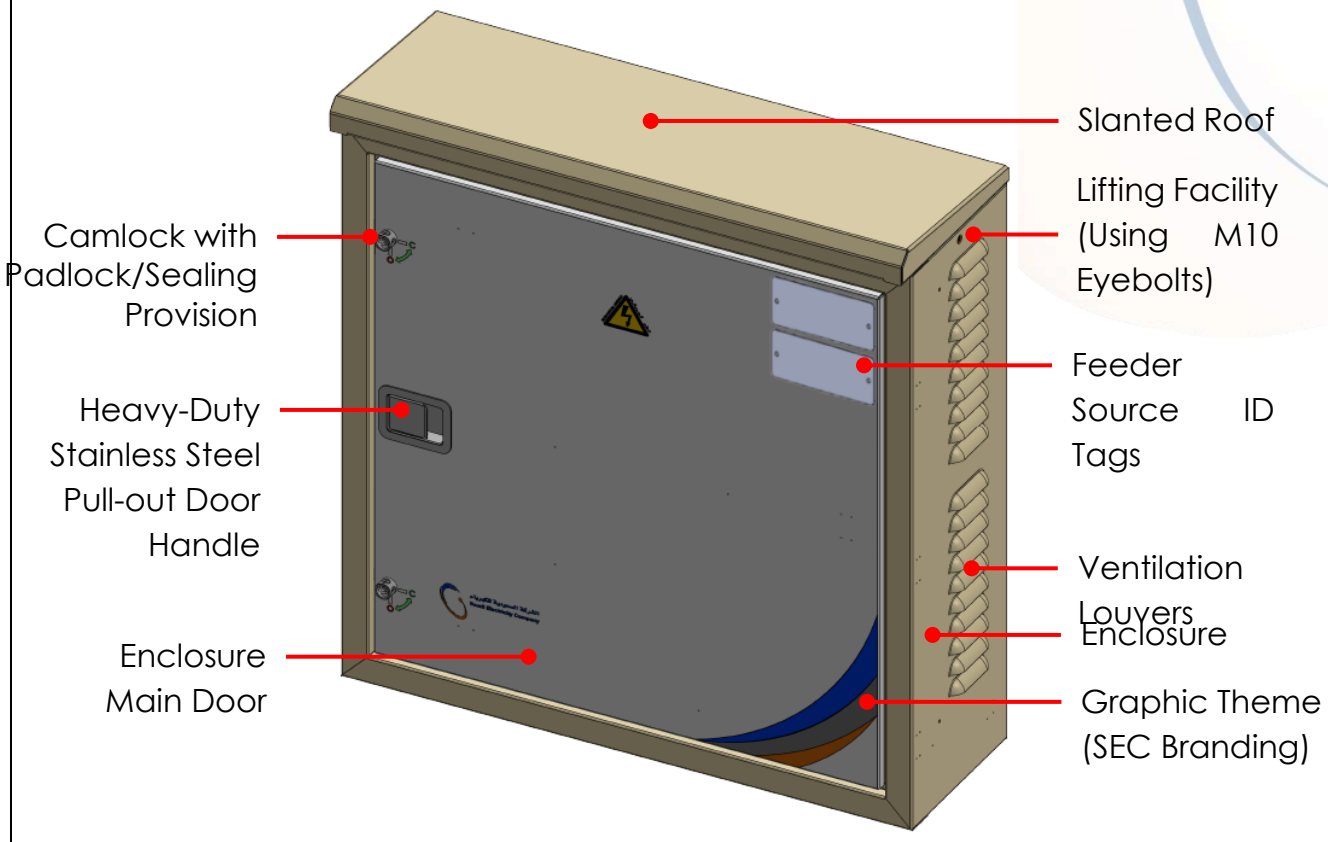
Drawing No. 2.4: Perspective Drawing of a Busbar Pan Assembly (Insulated) for 3-way Mini-Pillar with Generator Quick-Connect Plug-in Compartment



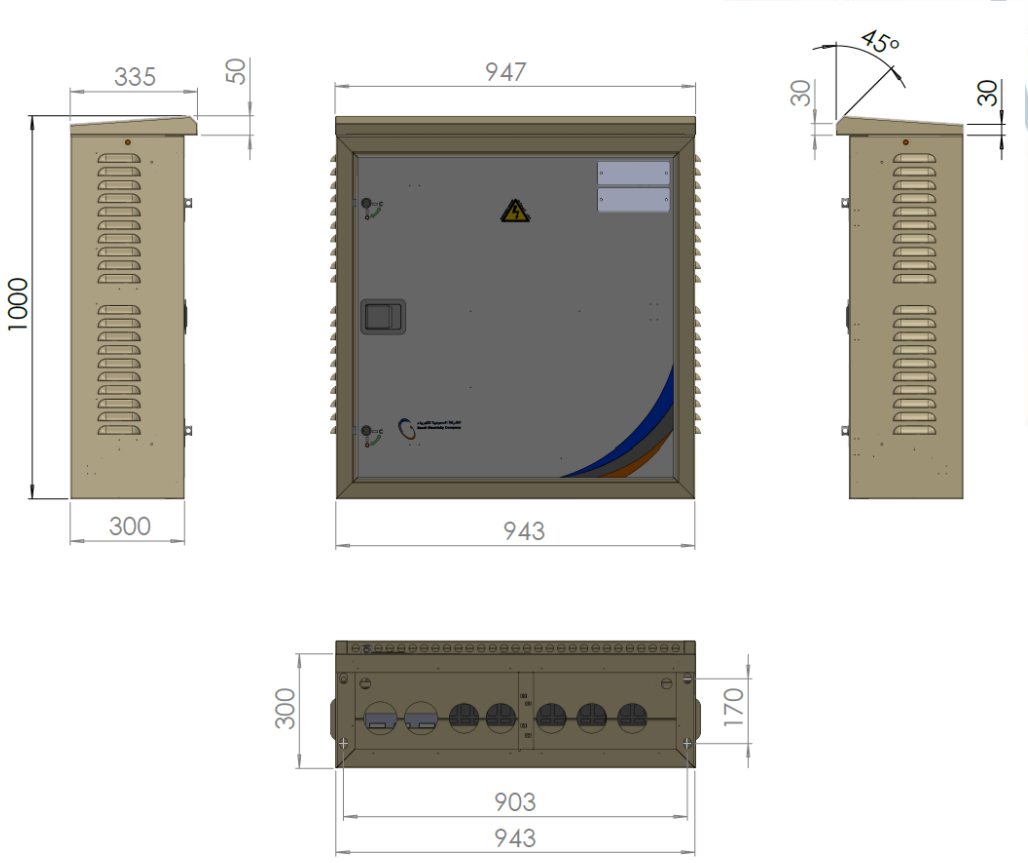
Drawing No. 2.5: Perspective Drawing of a Busbar Pan Assembly (Bare) for 3-way Mini-Pillar with Generator Quick-Connect Plug-in Compartment



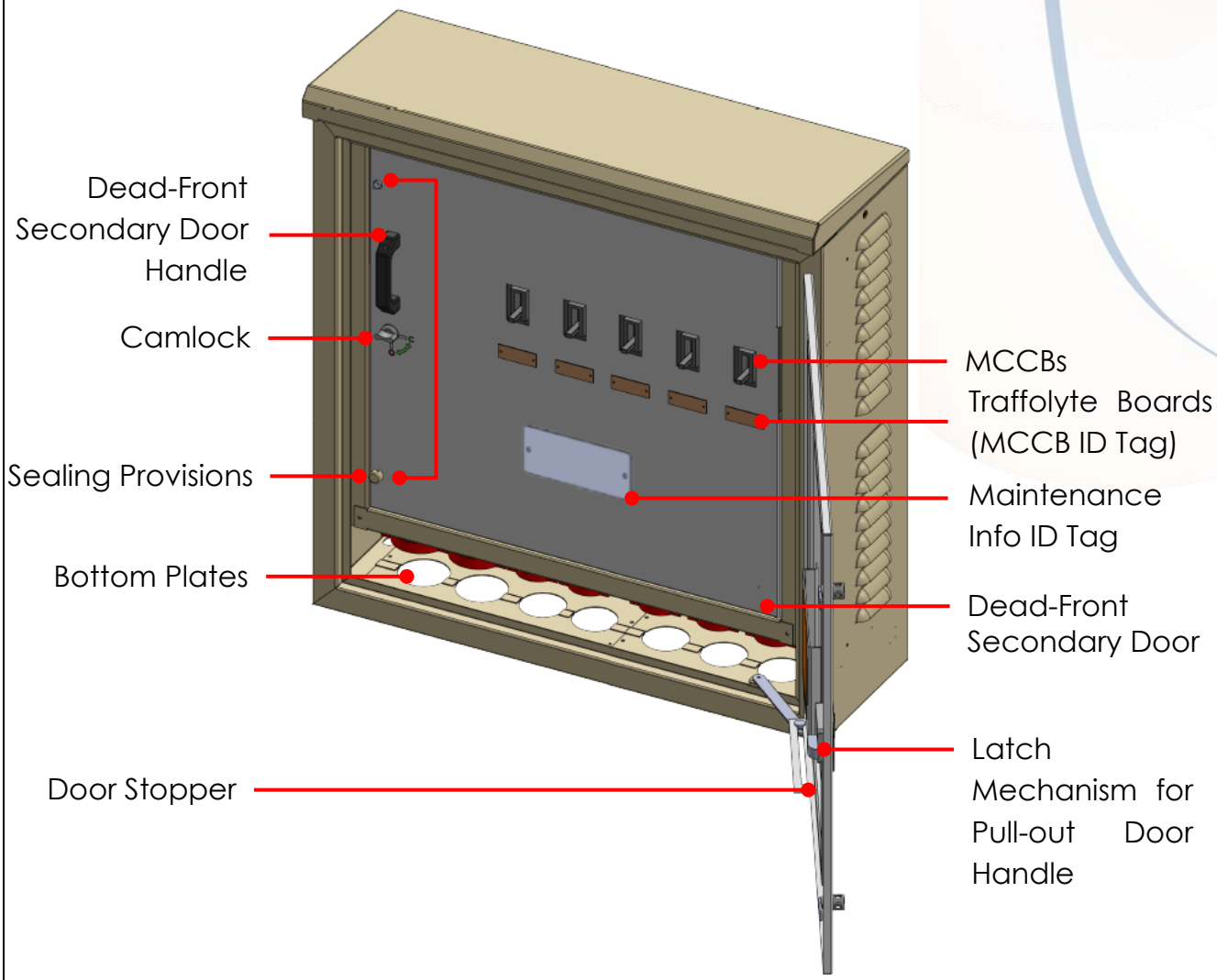
Drawing No. 2.6: Layout Drawing of a Busbar Pan Assembly for 3-way Mini-Pillar with Generator Quick-Connect Plug-in Compartment Showing the Center-to-Center Distance and Spacing of the Busbars



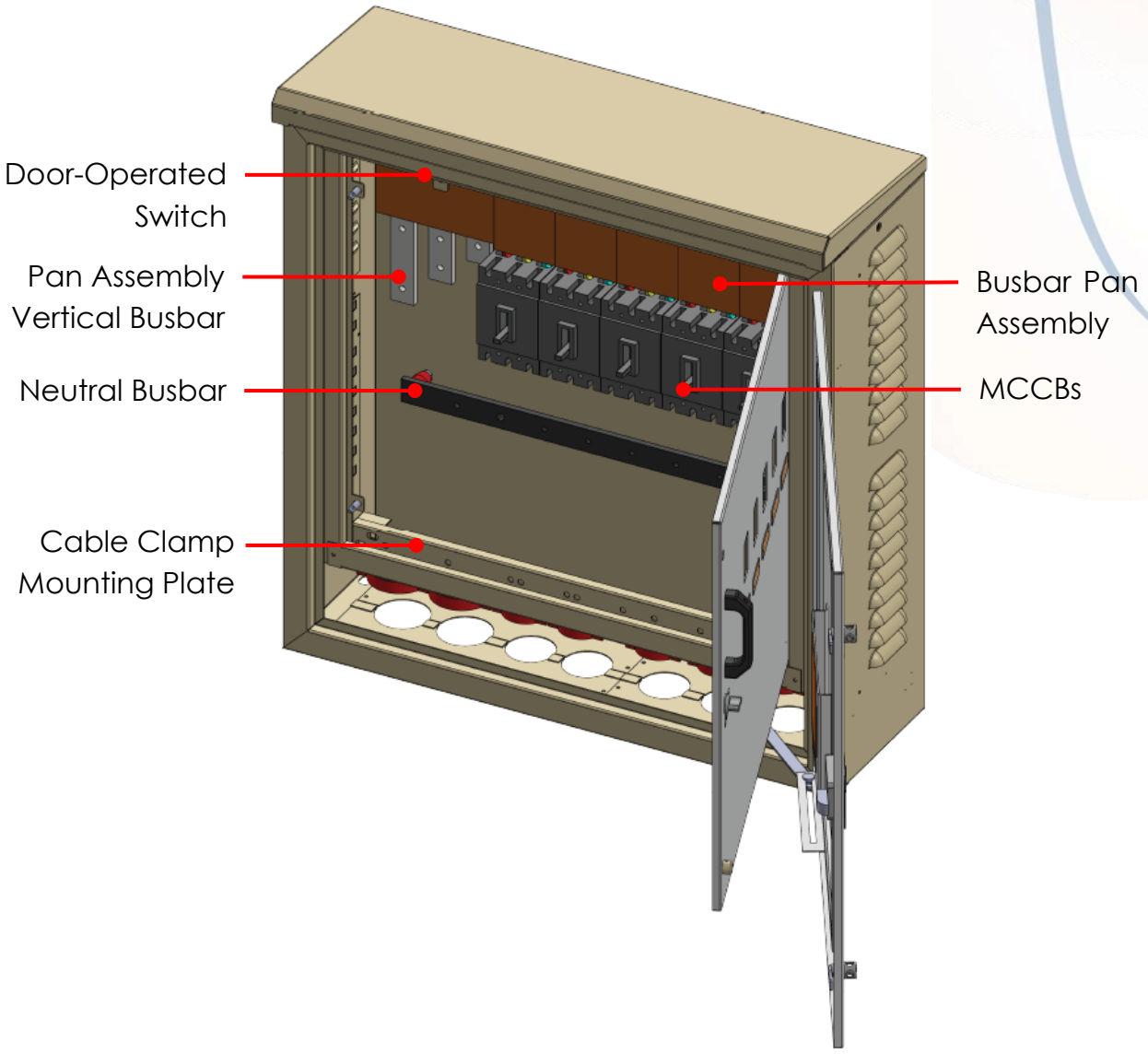
Drawing No. 3.0: Perspective Drawing of a 5-way Mini-Pillar without Generator Quick-Connect Plug-in Compartment Showing Main Design Elements (External Features)



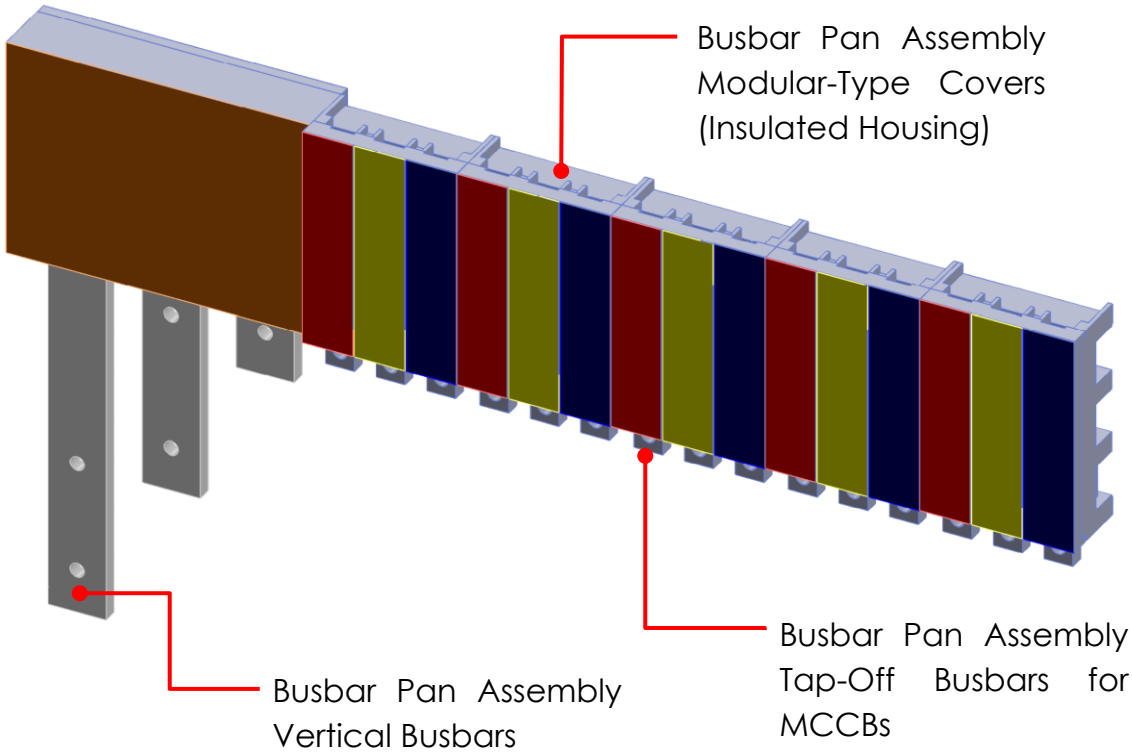
Drawing No. 3.1: Layout Drawing of a 5-way Mini-Pillar without Generator Quick-Connect Plug-in Compartment Showing the Maximum Allowable Dimensions



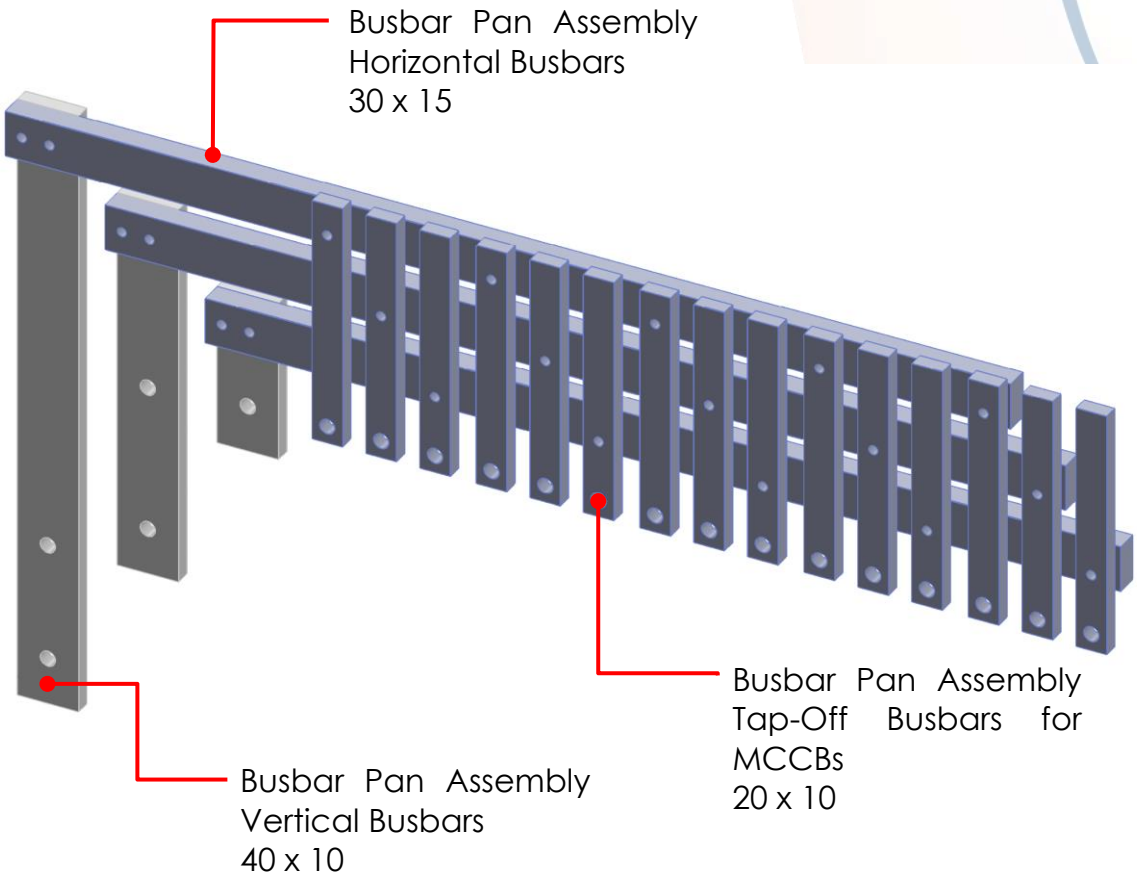
Drawing No. 3.2: Perspective Drawing of a 5-way Mini-Pillar without Generator Quick-Connect Plug-in Compartment with Enclosure Main Door Opened



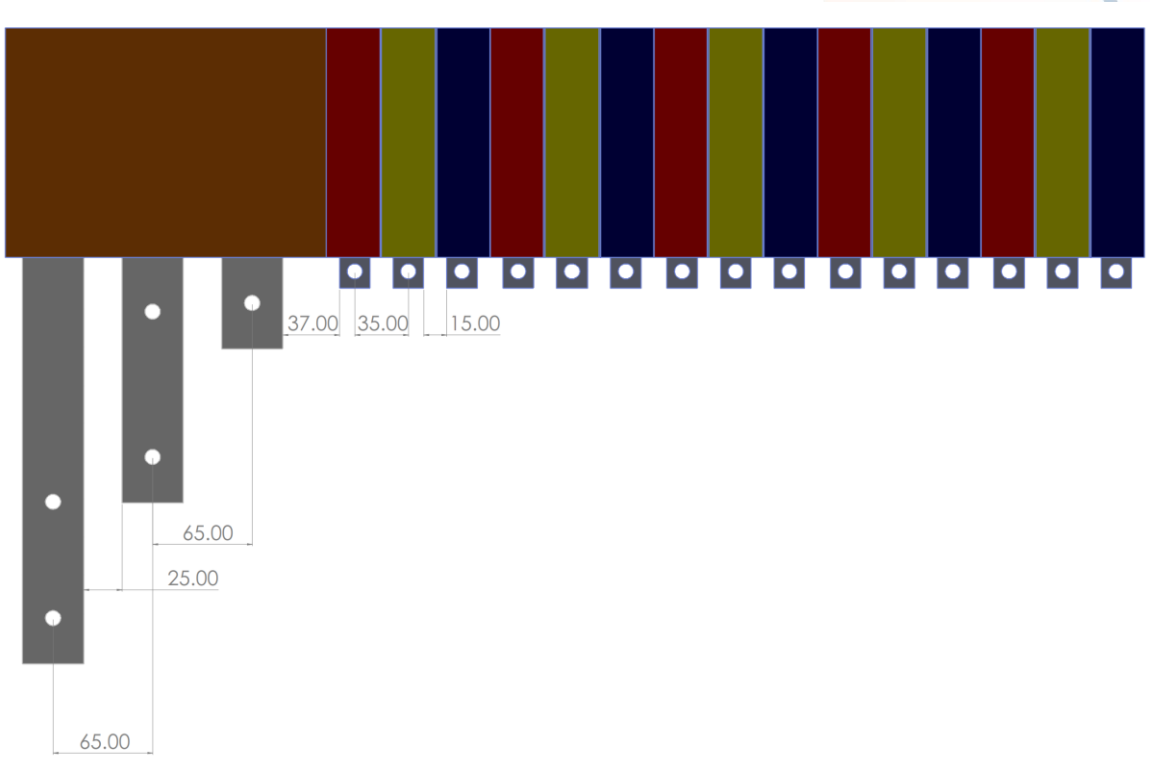
Drawing No. 3.3: Perspective Drawing of a 5-way Mini-Pillar without Generator Quick-Connect Plug-in Compartment with Enclosure Main Door & Dead-Front Secondary Door Opened



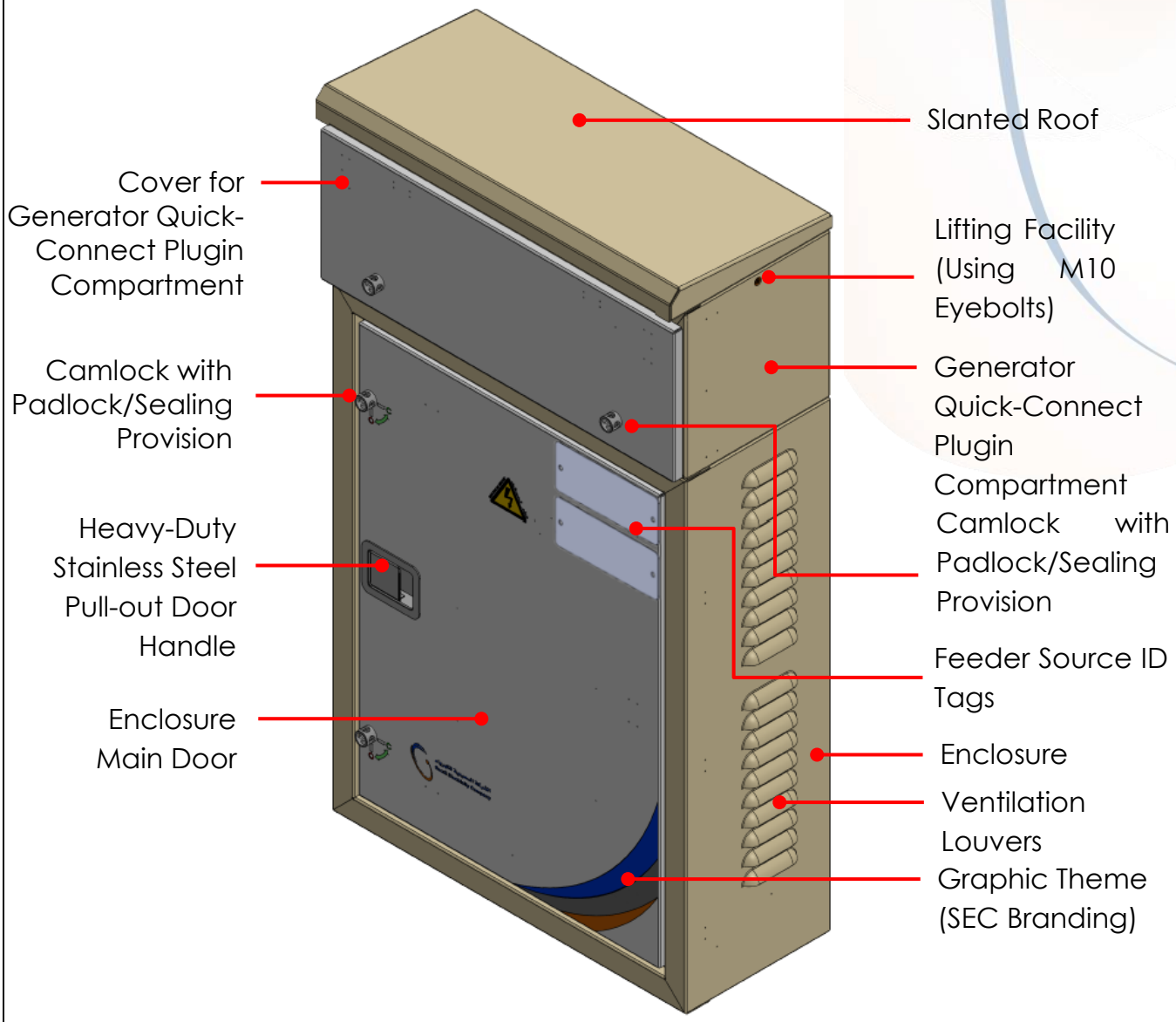
Drawing No. 3.4: Perspective Drawing of a Busbar Pan Assembly (Insulated) for 5-way Mini-Pillar without Generator Quick-Connect Plug-in Compartment



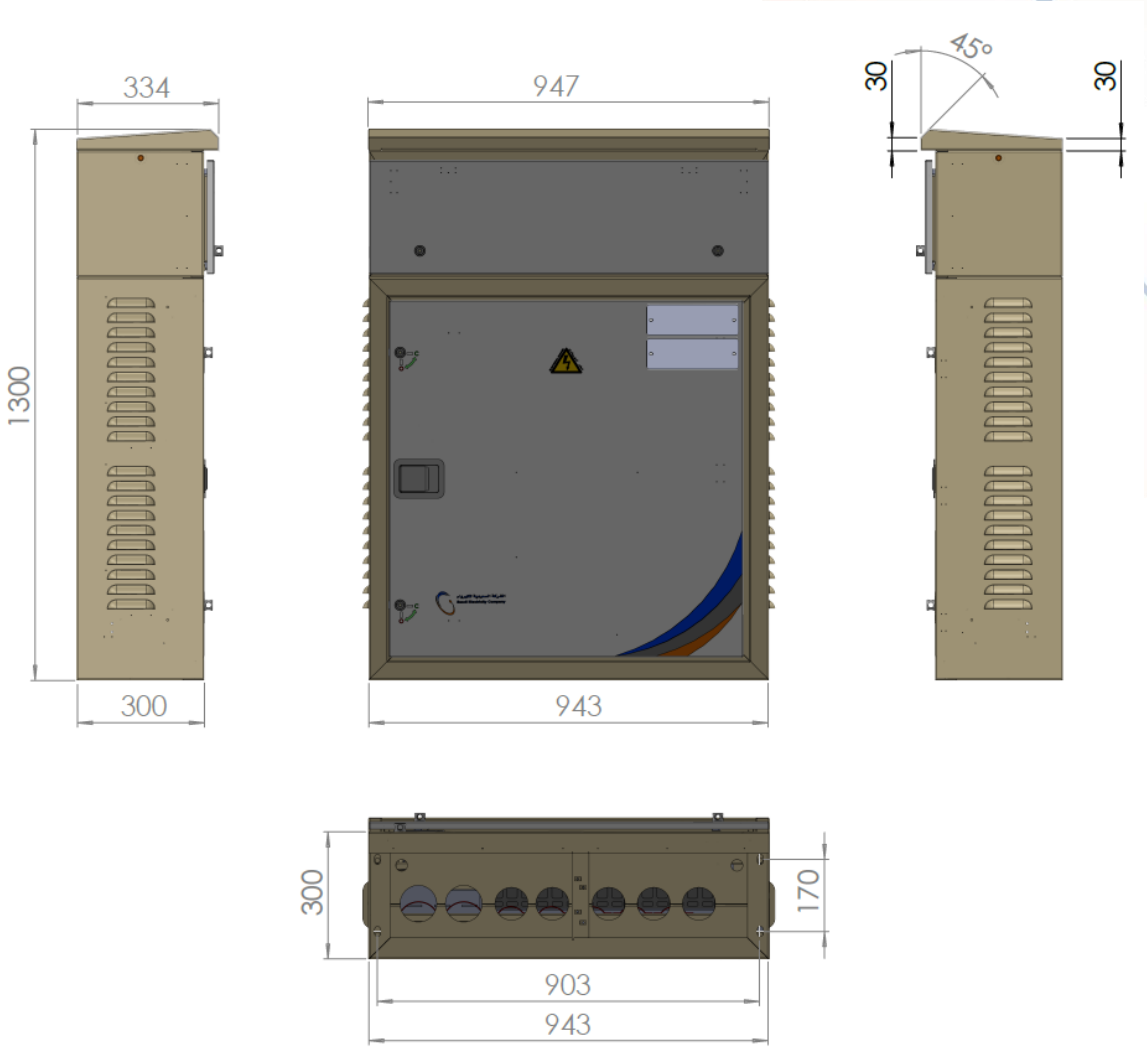
Drawing No. 3.5: Perspective Drawing of a Busbar Pan Assembly (Bare) for 5-way Mini-Pillar without Generator Quick-Connect Plug-in Compartment



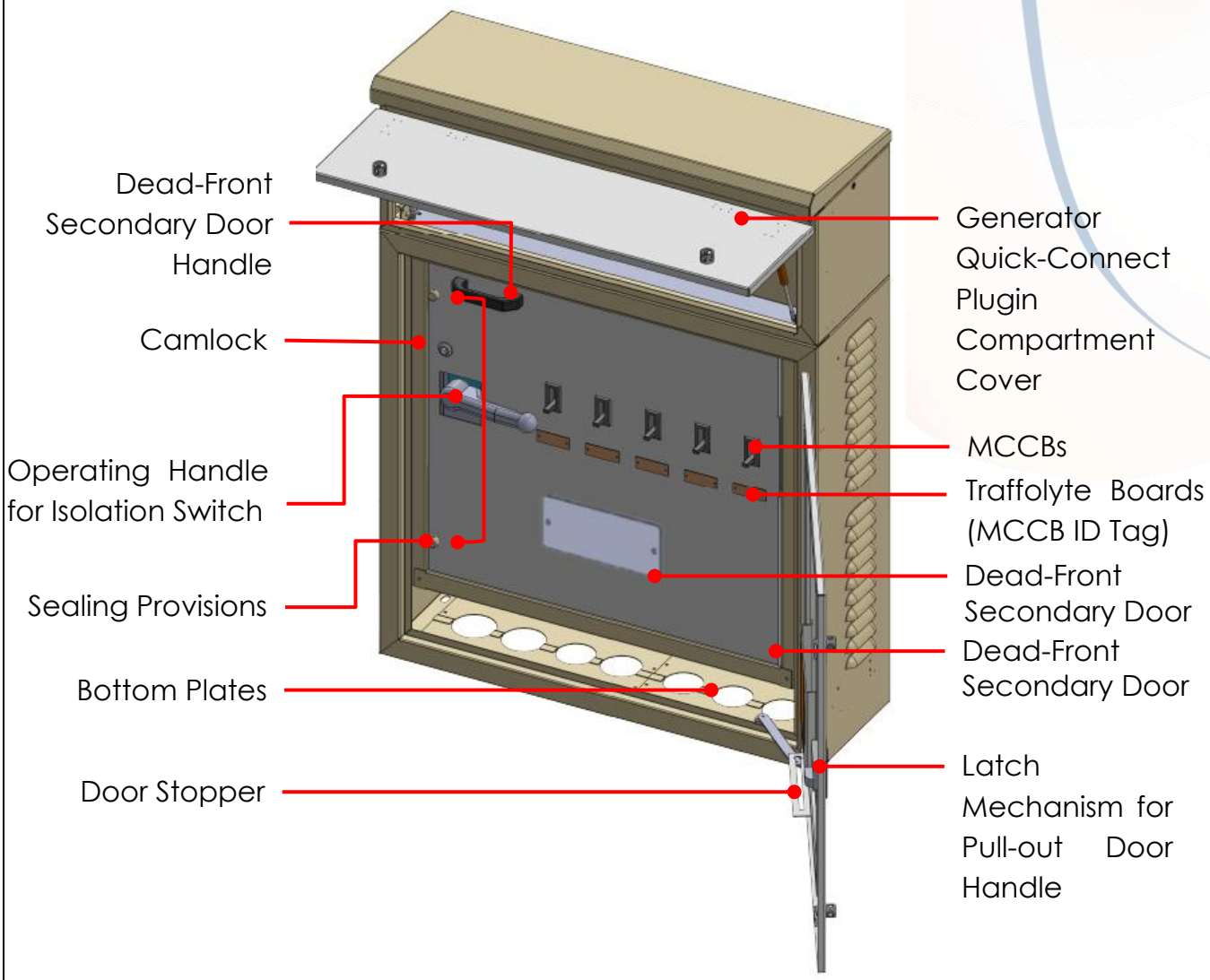
Drawing No. 3.6: Layout Drawing of a Busbar Pan Assembly for 5-way Mini-Pillar without Generator Quick-Connect Plug-in Compartment Showing the Center-to-Center Distance and Spacing of the Busbars



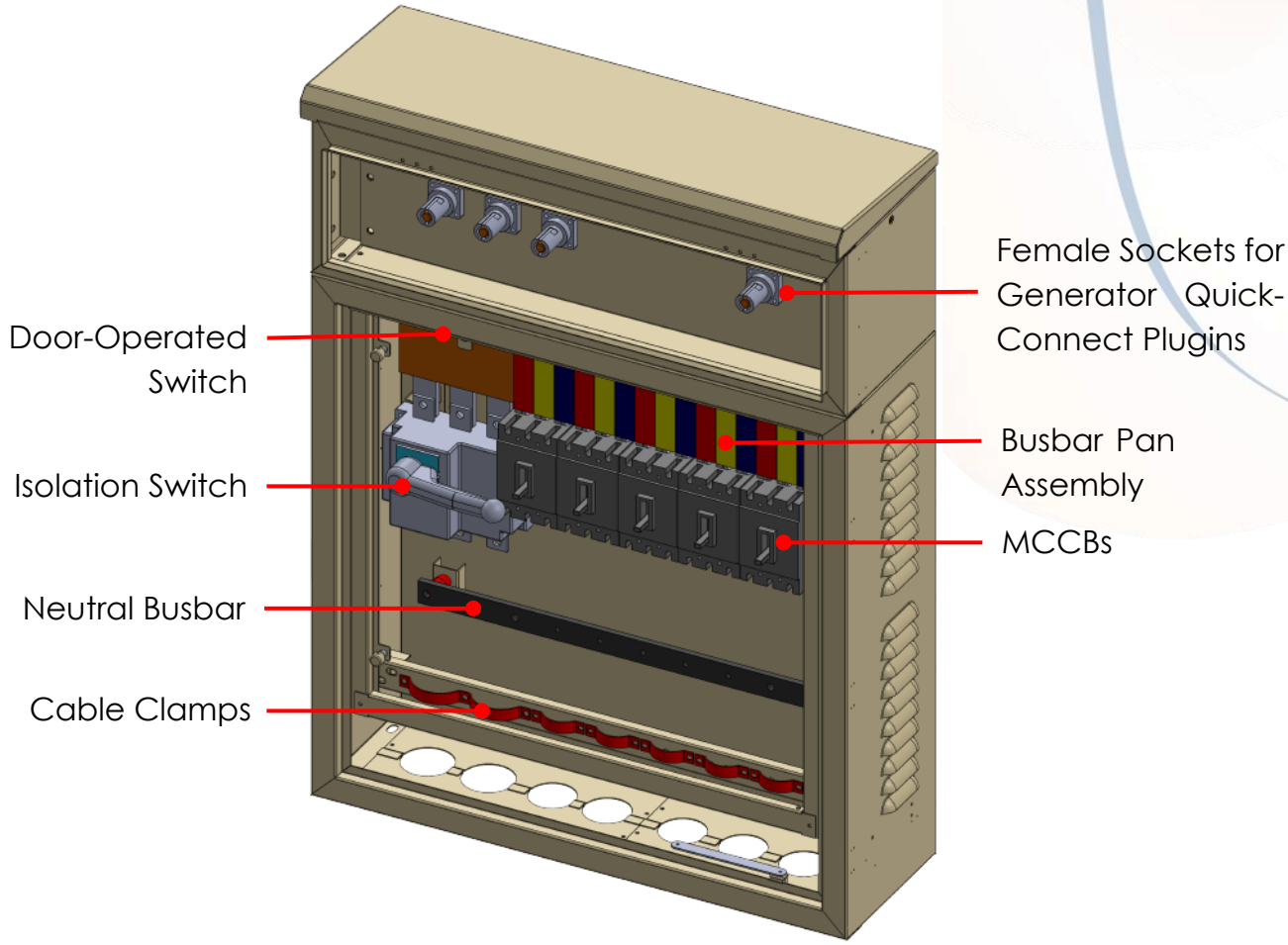
Drawing No. 4.0: Perspective Drawing of a 5-way Mini-Pillar with Generator Quick-Connect Plug-in Compartment Showing Main Design Elements (External Features)



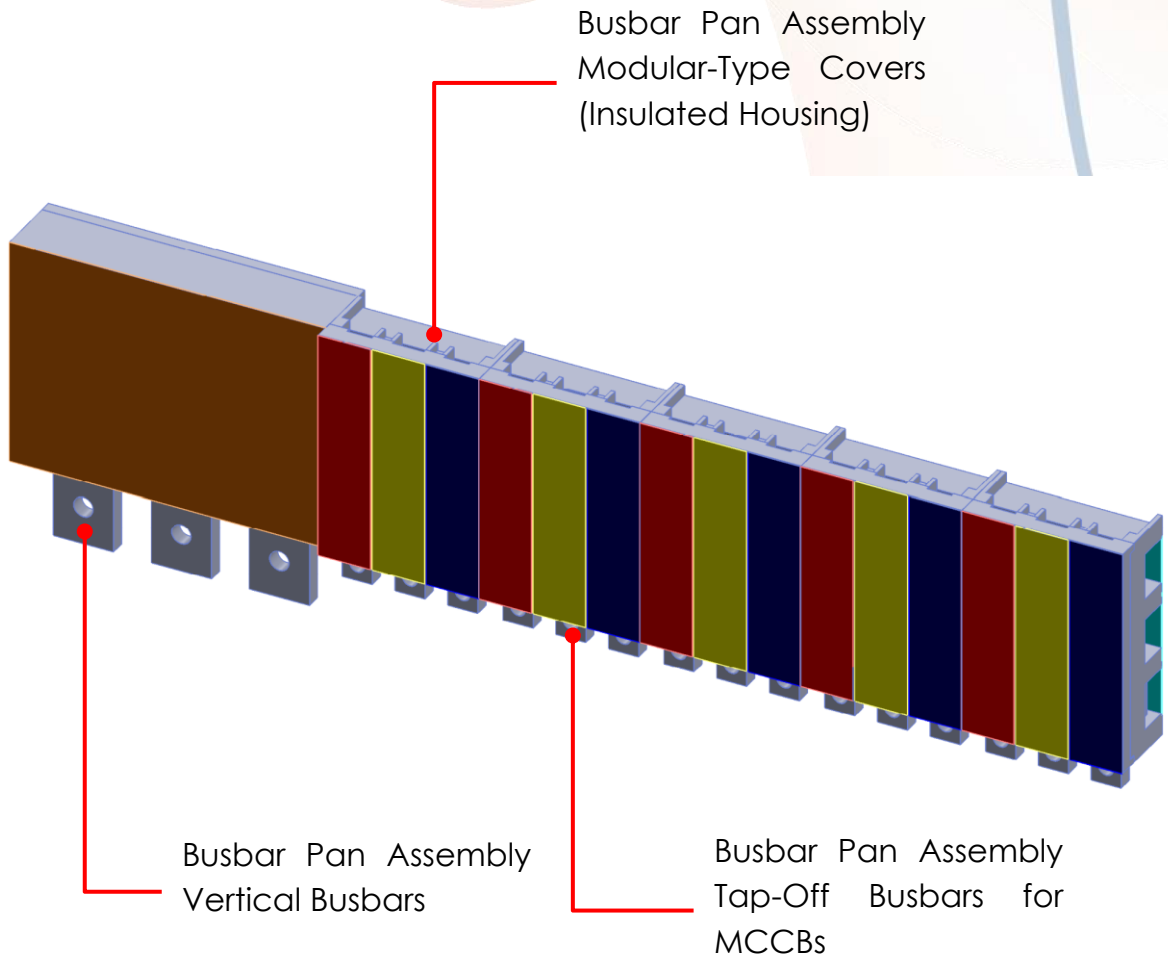
Drawing No. 4.1: Layout Drawing of a 5-way Mini-Pillar with Generator Quick-Connect Plug-in Compartment Showing the Maximum Allowable Dimensions



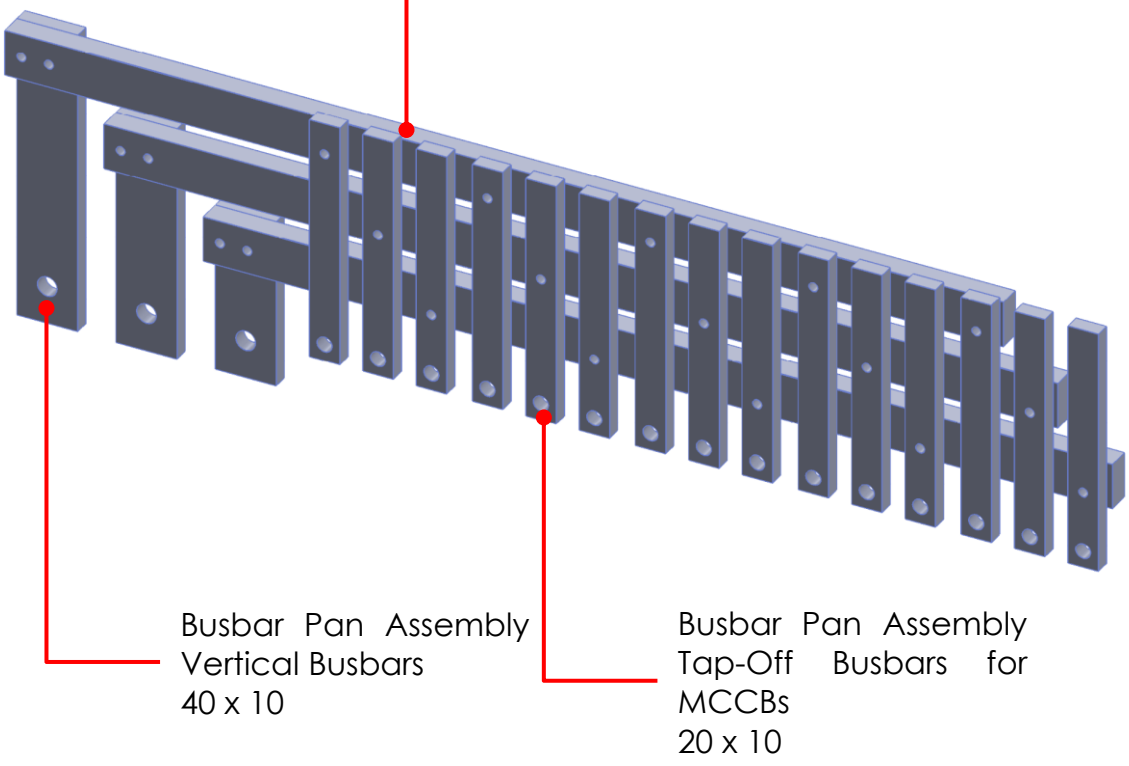
Drawing No. 4.2: Perspective Drawing of a 5-way Mini-Pillar with Generator Quick-Connect Plug-in Compartment with Enclosure Main Door & Generator Quick-Connect Plugin Compartment Opened



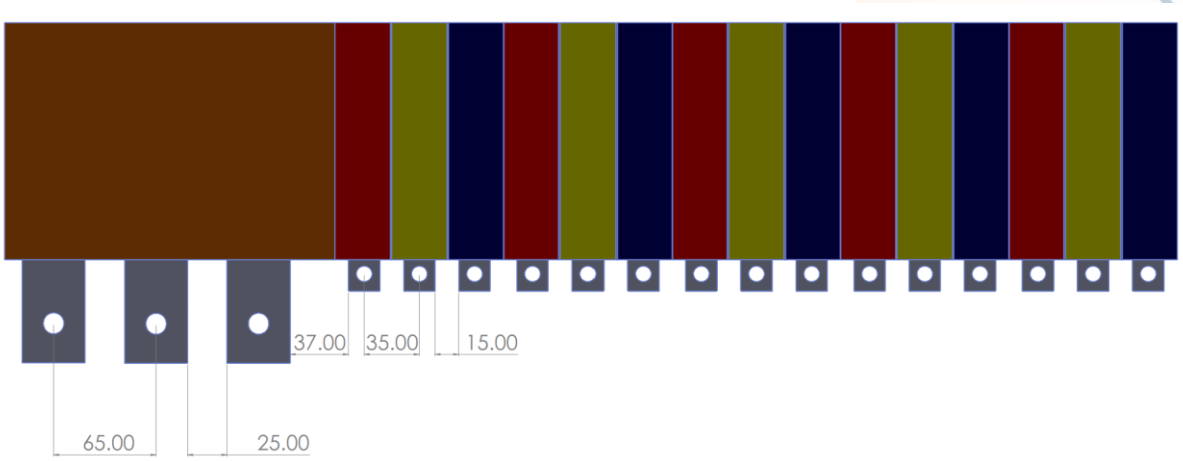
Drawing No. 4.3: Perspective Drawing of a 5-way Mini-Pillar with Generator Quick-Connect Plug-in Compartment with Enclosure Main Door, Dead-Front Secondary Door & Generator Quick-Connect Plugin Compartment Cover Hidden



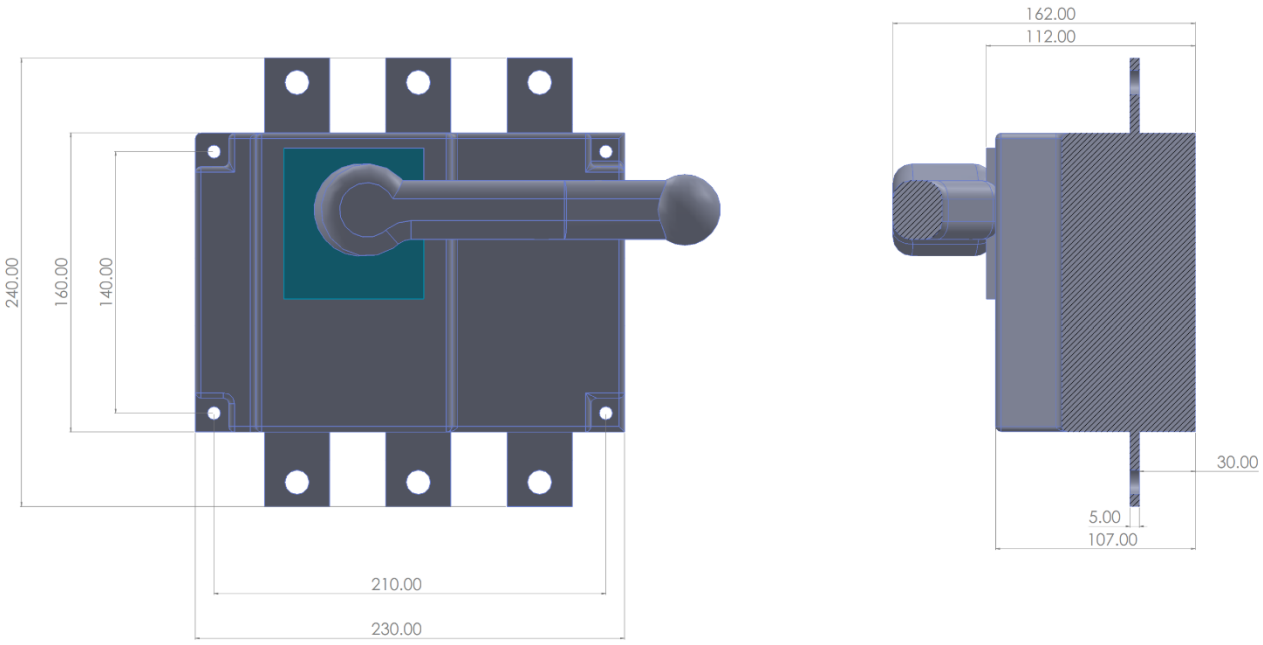
Drawing No. 4.4: Perspective Drawing of a Busbar Pan Assembly (Insulated) for 5-way Mini-Pillar with Generator Quick-Connect Plug-in Compartment



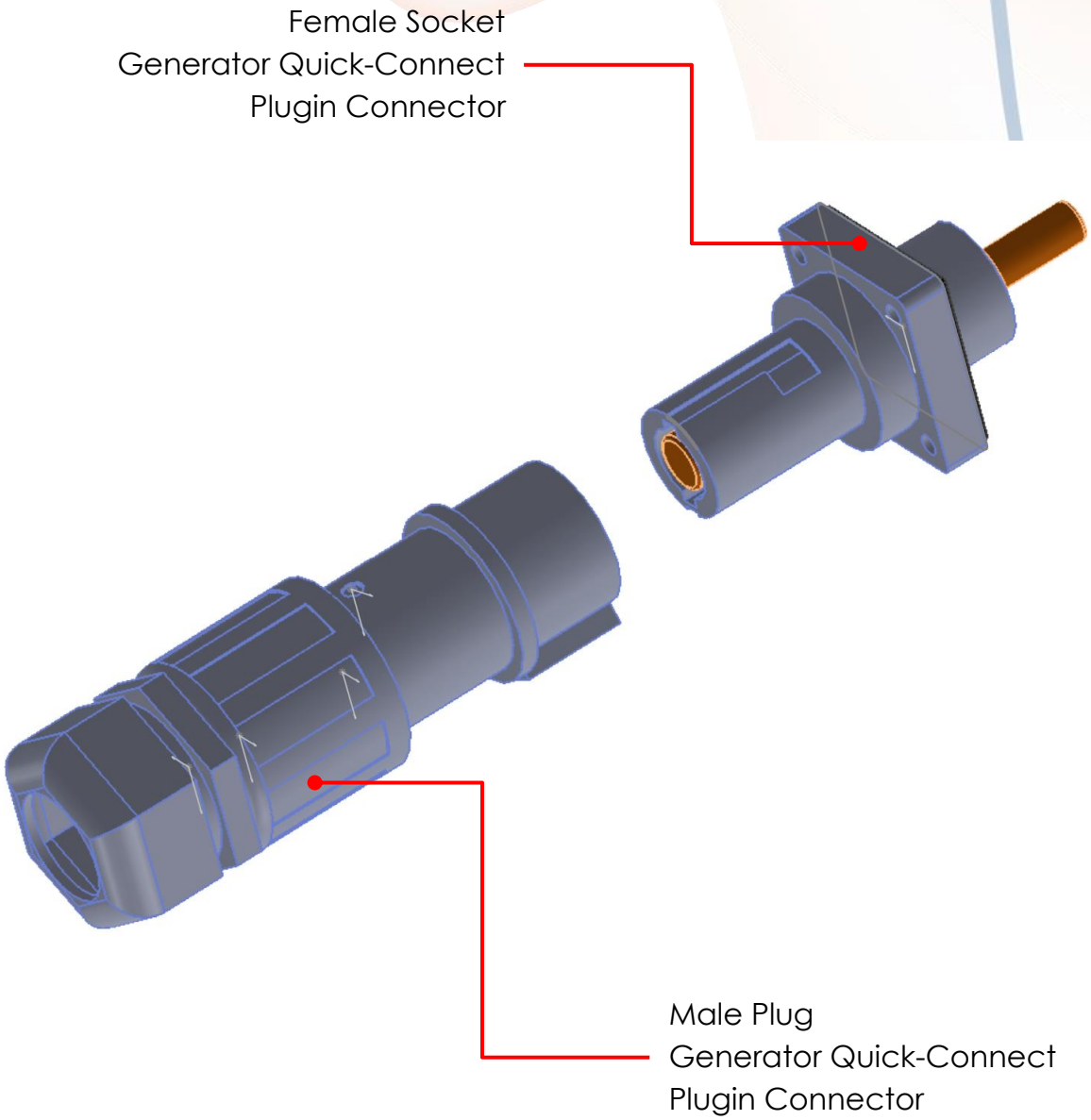
Drawing No. 4.5: Perspective Drawing of a Busbar Pan Assembly (Bare) for 5-way Mini-Pillar without Generator Quick-Connect Plug-in Compartment



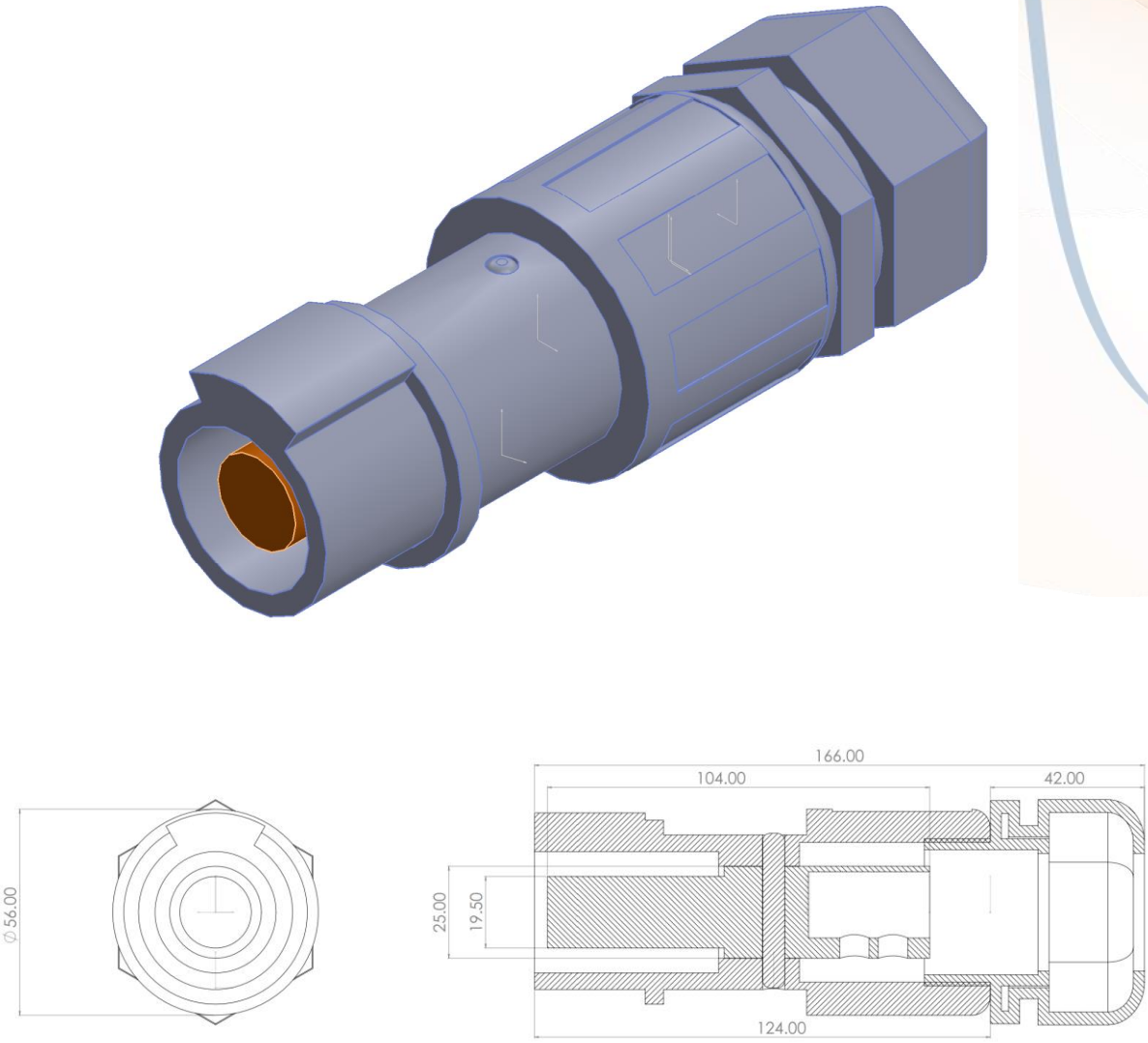
Drawing No. 4.6: Layout Drawing of a Busbar Pan Assembly for 5-way Mini-Pillar with Generator Quick-Connect Plug-in Compartment Showing the Center-to-Center Distance and Spacing of the Busbars



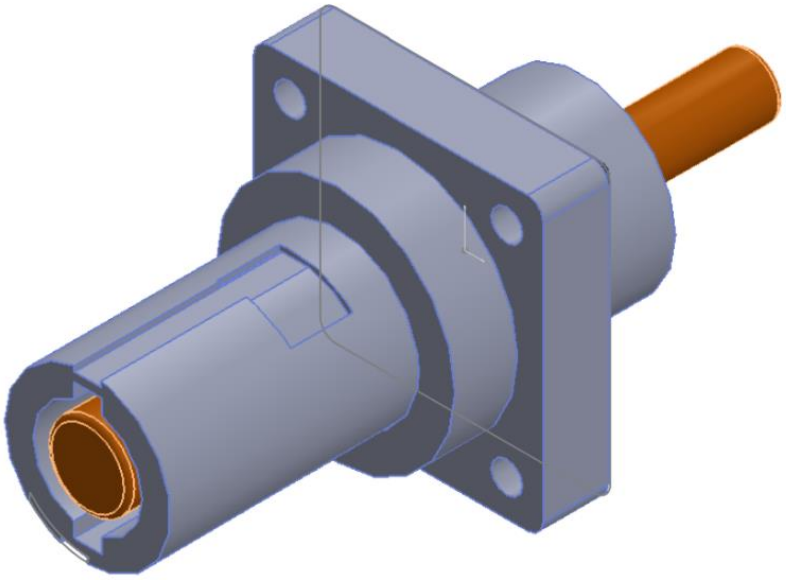
Drawing No. 5.0: Detail Drawings of an Isolation Switch for Mini-Pillars with Generator Quick-Connect Plugin Compartment

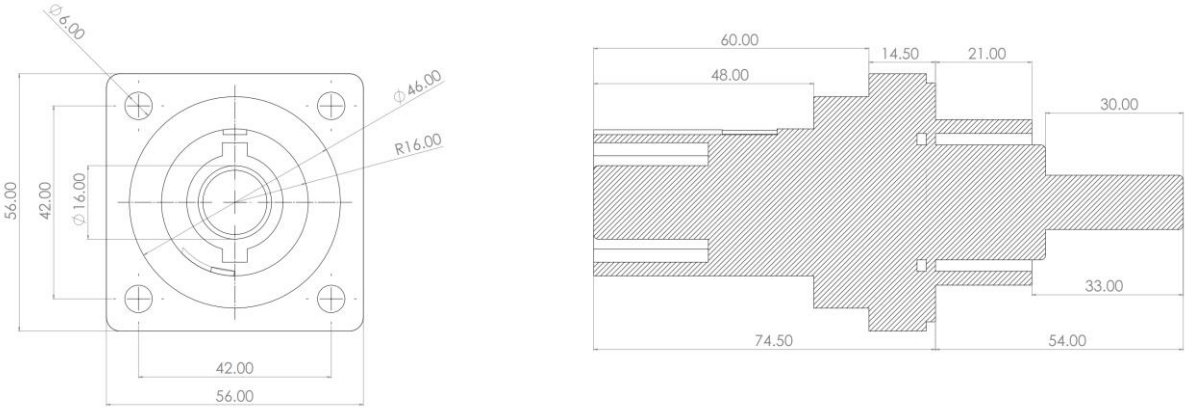


Drawing No. 6.0: Perspective Drawing of a Quick-Connect Plugin Connector Assembly (Plug and Socket) for Mini-Pillars with Generator Quick-Connect Plugin Compartment

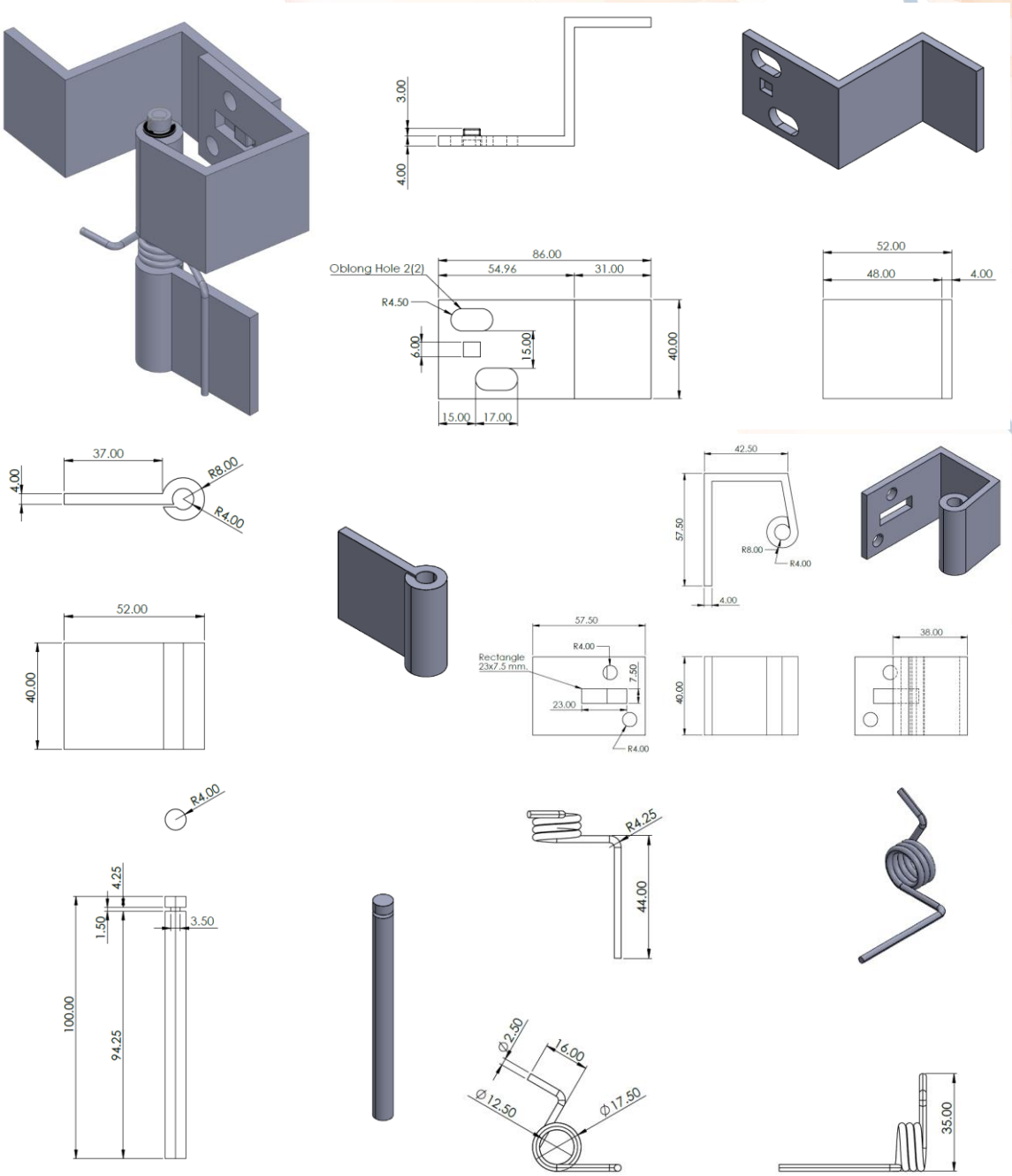


Drawing No. 6.1: Perspective and Detail Drawing of a Quick-Connect Plug (Male Plug) for Mini-Pillars with Generator Quick-Connect Plugin Compartment

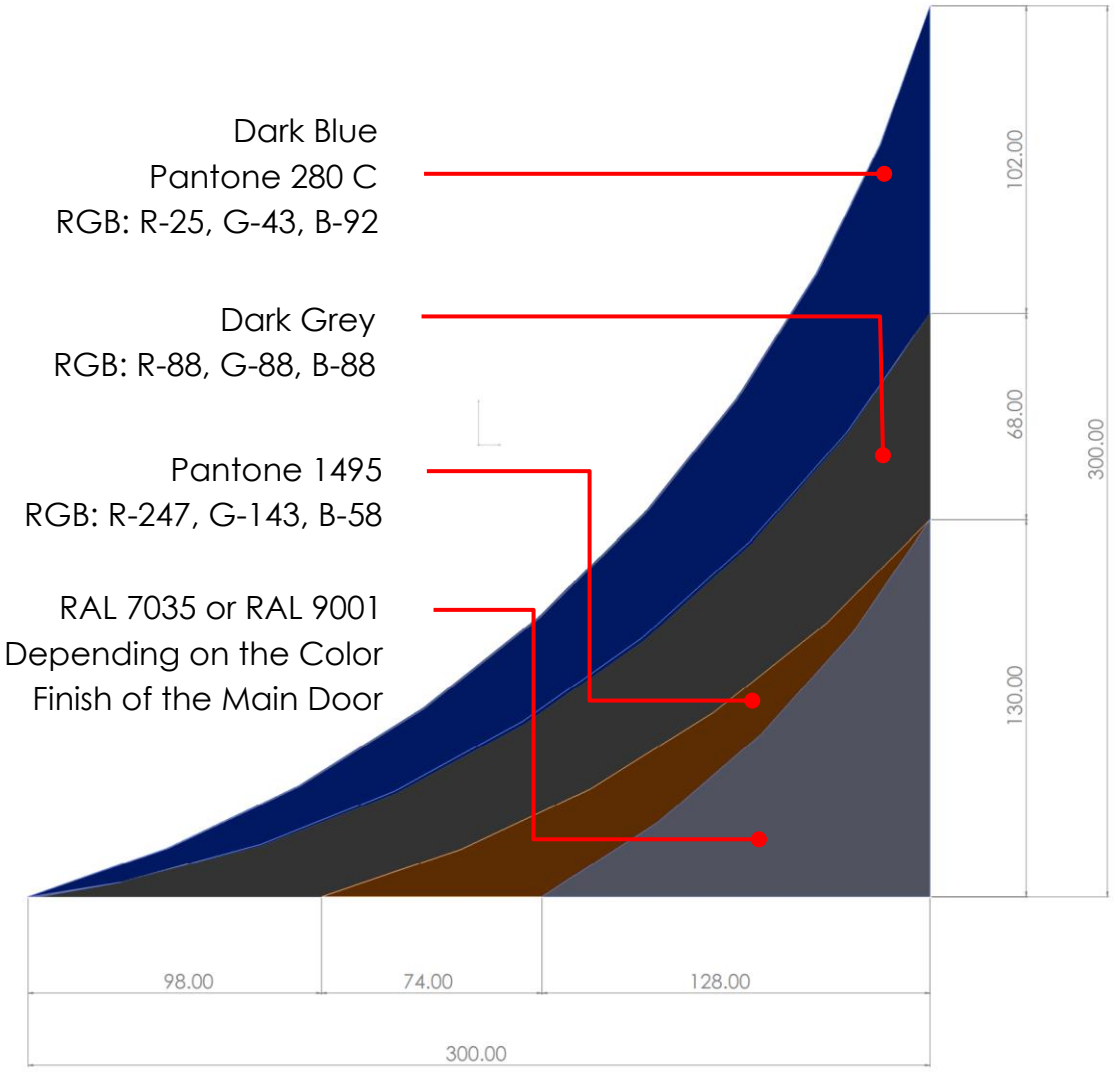




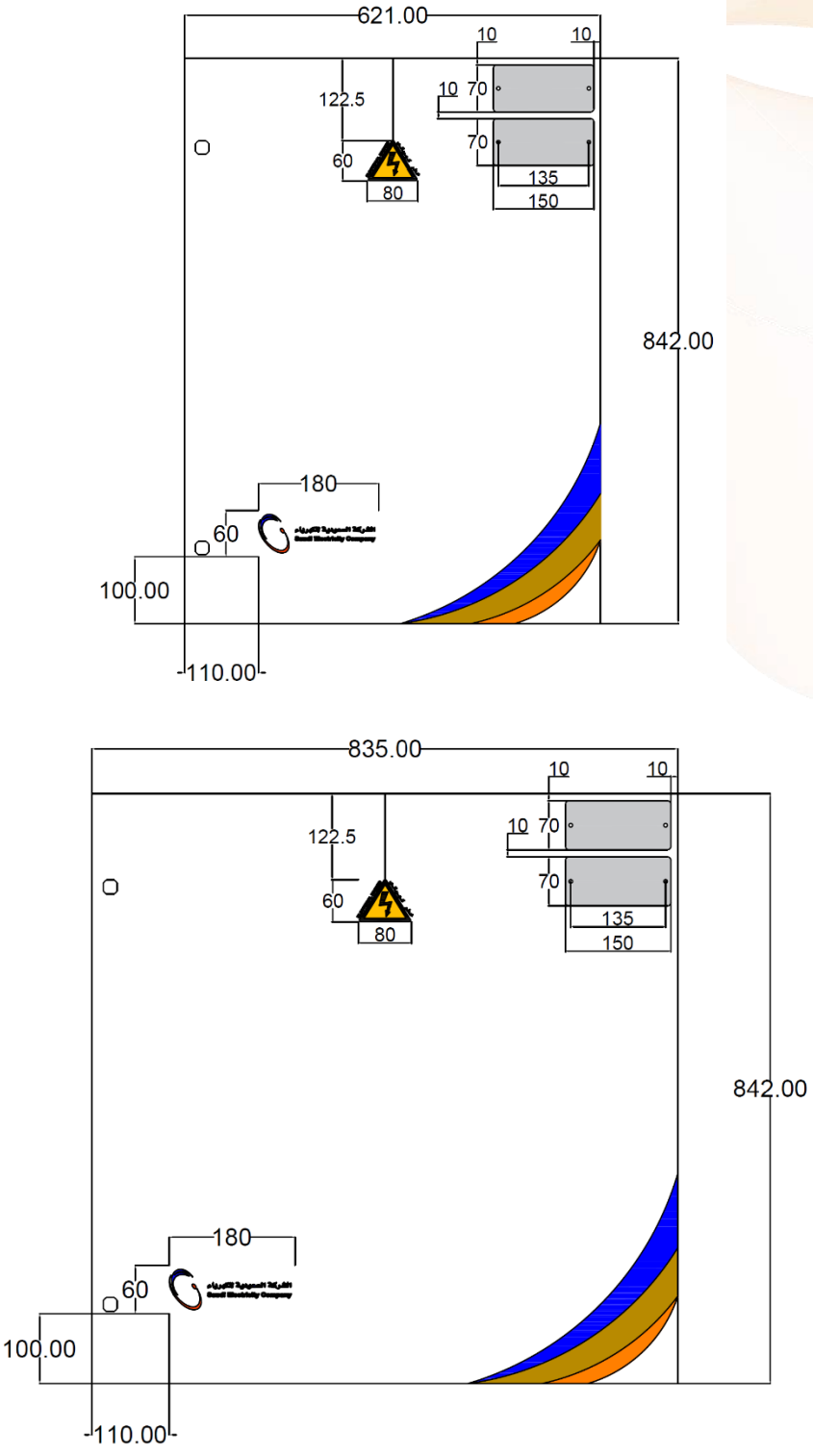
Drawing No. 6.2: Perspective and Detail Drawing of a Quick-Connect Socket (Female Socket) for Mini-Pillars with Generator Quick-Connect Plugin Compartment



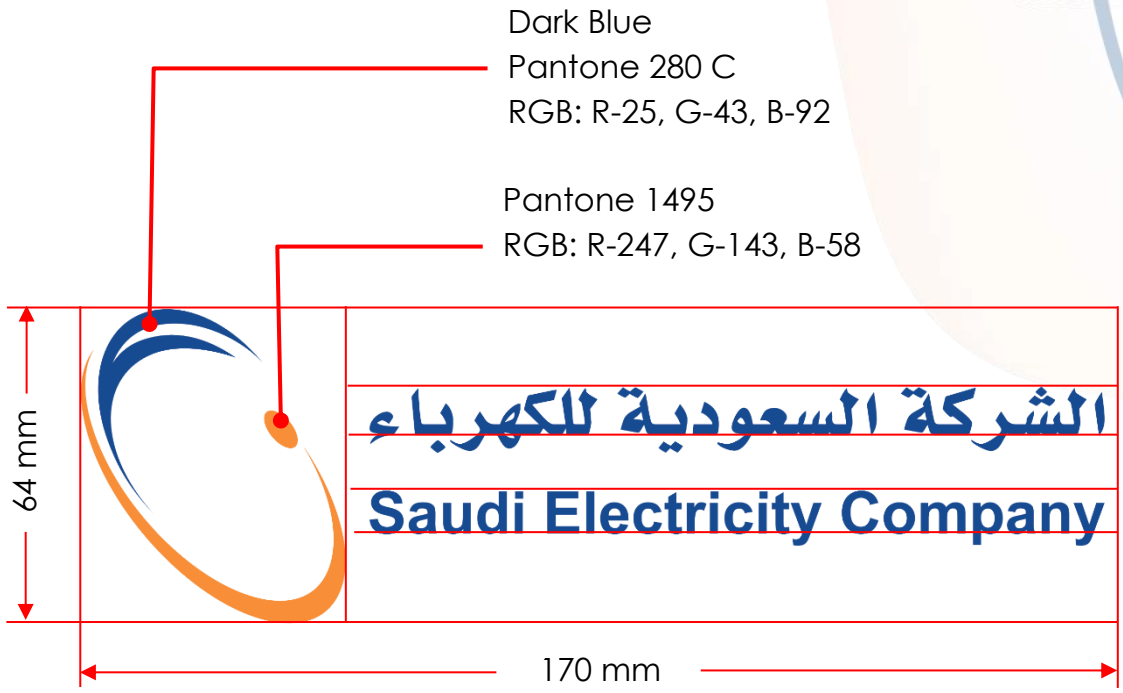
Drawing No. 6.3: Detail Design of Heavy-Duty Stainless Steel Self-Closing (Spring-Return) Concealed Hinges for the Main Door



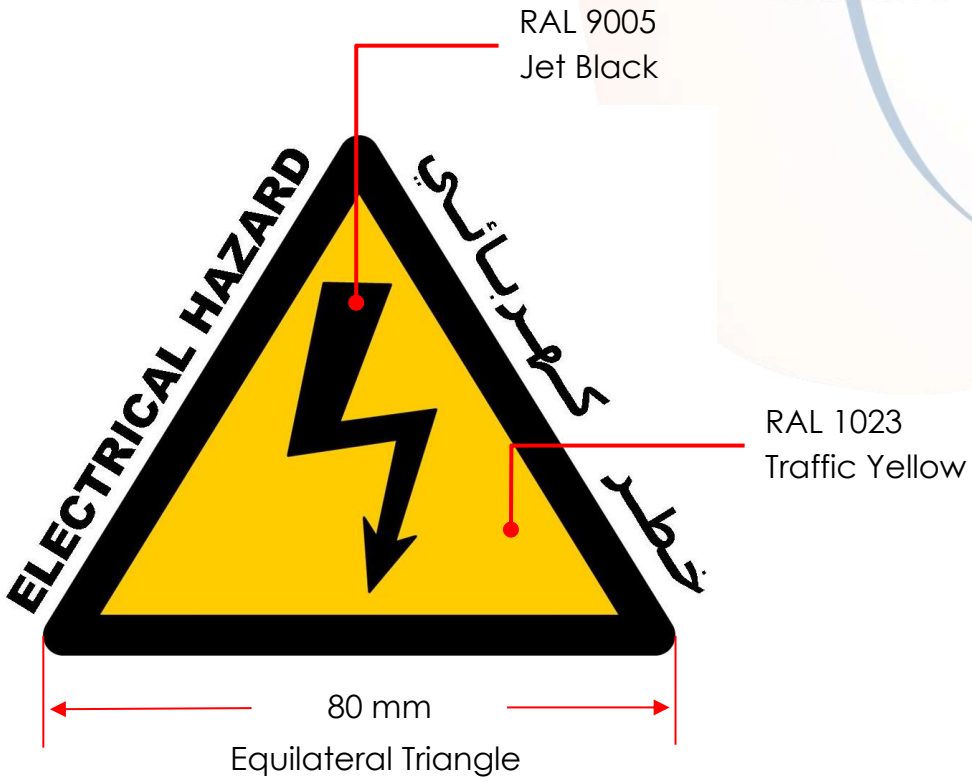
Drawing No. 7.0: Detail Drawing of SEC Standard Graphic Theme (SEC Branding)



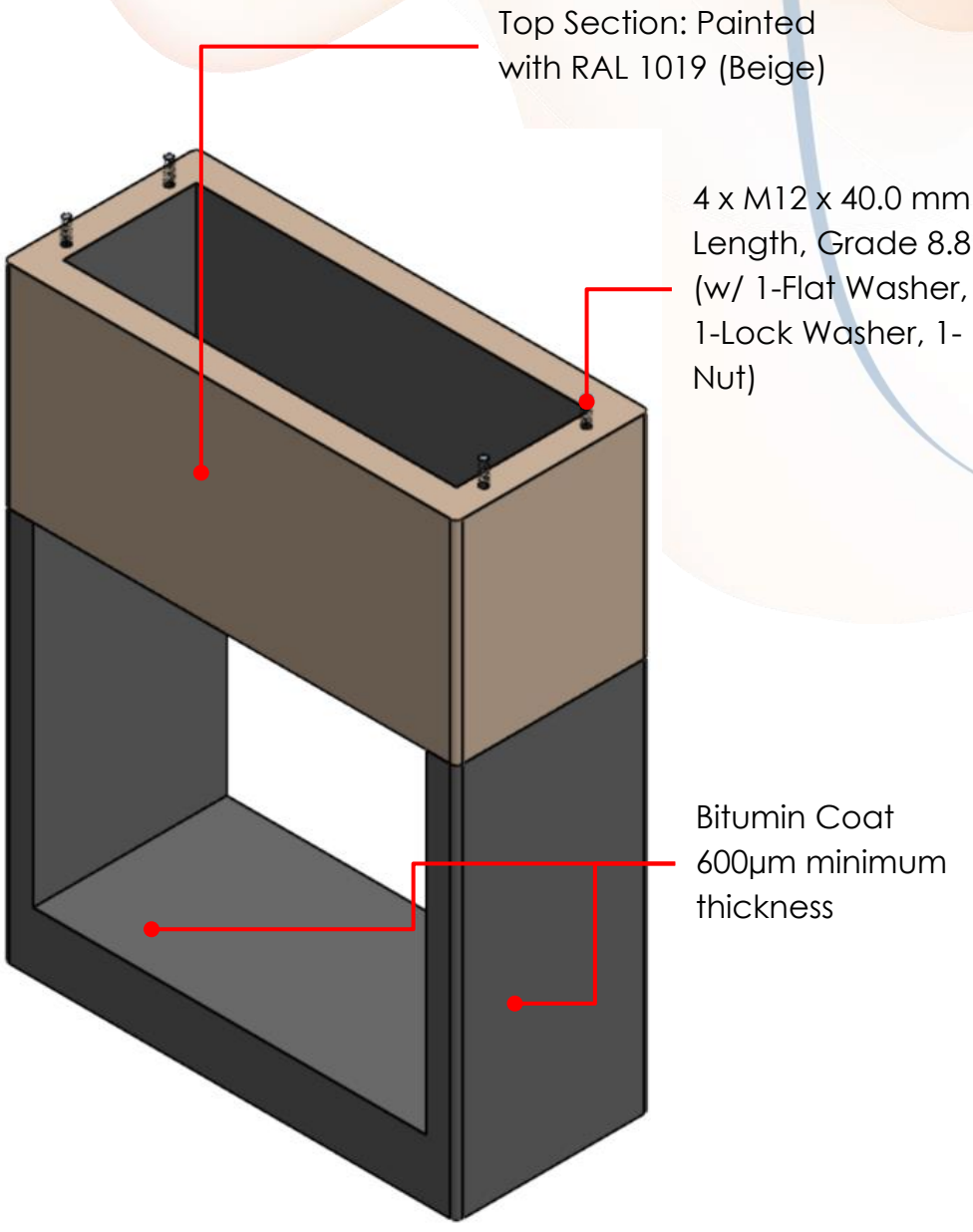
Drawing No. 8.0: Detailed Positioning of the SEC logo and Danger Sign for Mini-Pillar Main Door Both 3-Way and 5-Way



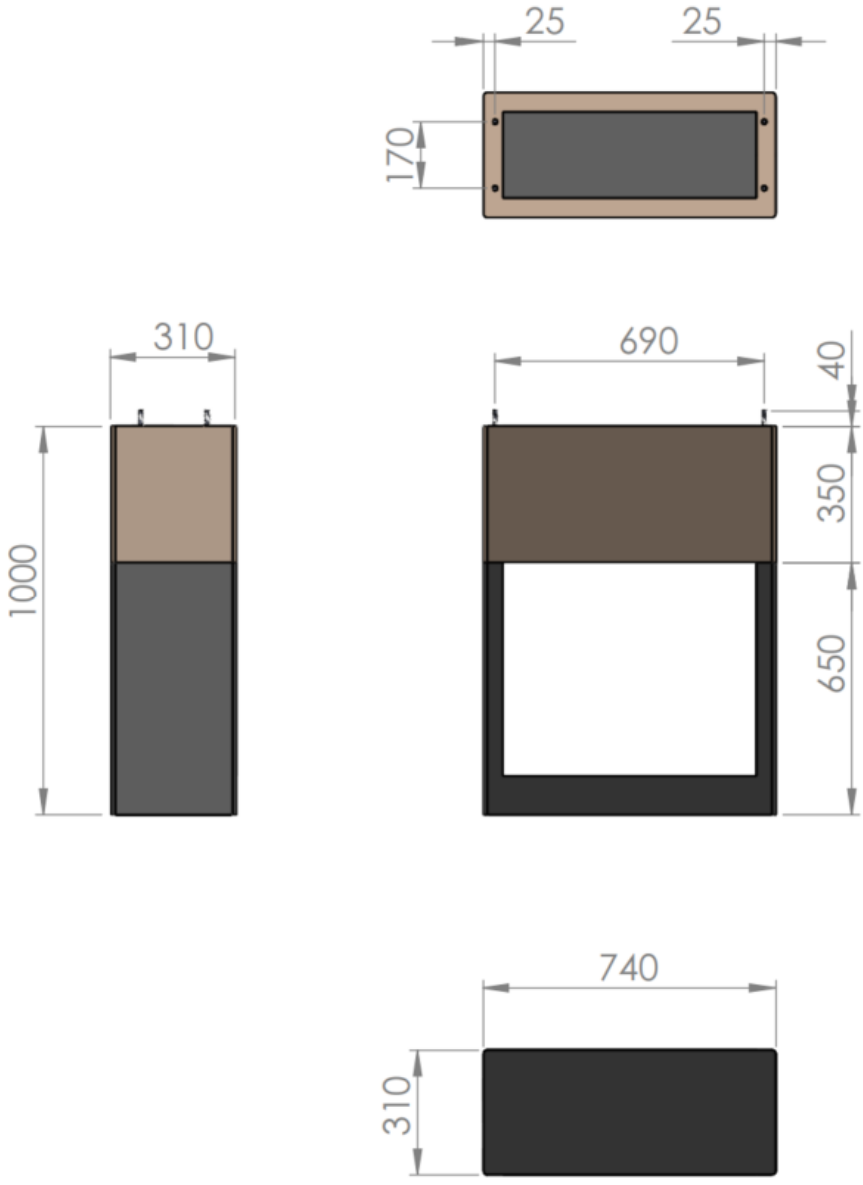
Drawing No. 9.0: Details of SEC logo for Mini-Pillar with Steel Enclosures



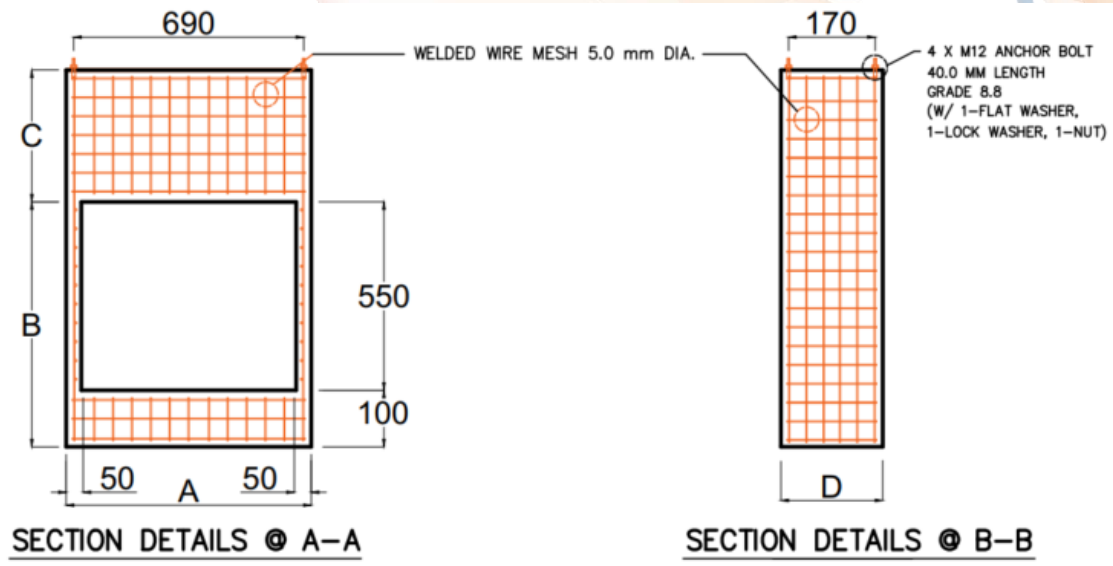
Drawing No. 10.0: Details of Danger Sign for Mini-Pillar with Steel Enclosures

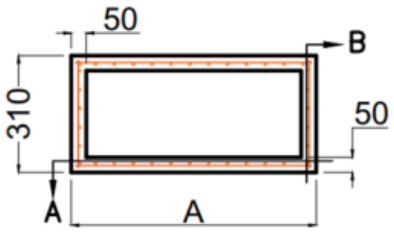


Drawing No. 11.0: Perspective Drawing of Concrete Base for 3-Way Mini-Pillar applicable for both with or without Generator Quick-Connect Plugin Compartment

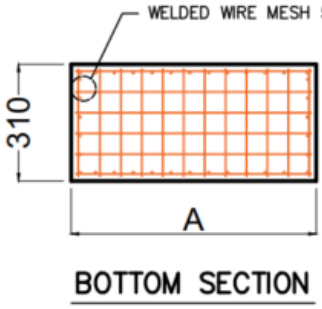


Drawing No. 11.1: Layout Details of Precast Concrete Base for 3-Way Mini-Pillar applicable for both with or without Generator Quick-Connect Plugin Compartment





	A	B	C	D
Dimension (mm)	740	650	350	310



*Actual dimension of the equipment will be illustrated in another specification document.

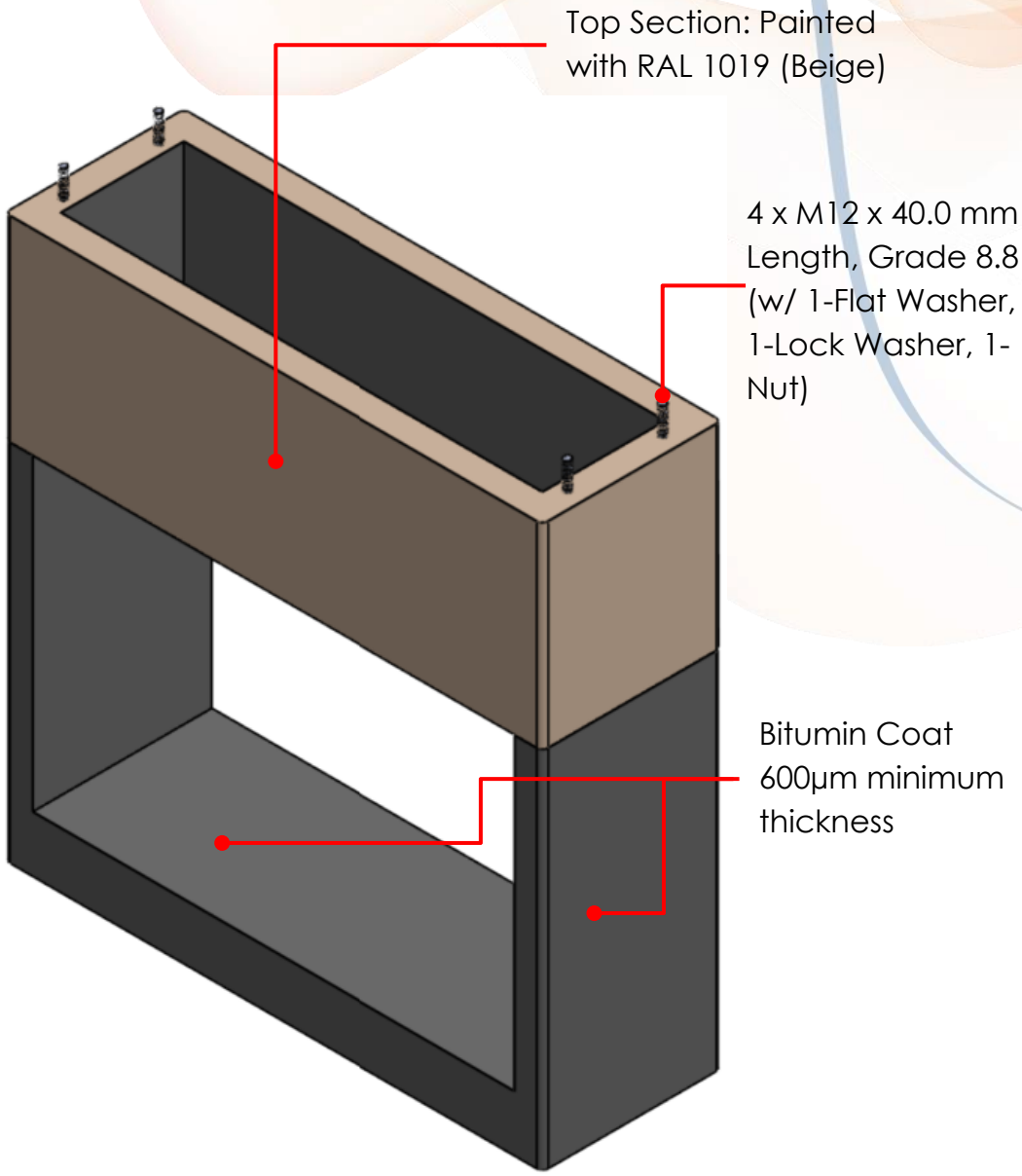
*Concrete is Sulphate Resistant with Compressive Strength Class of C35

*Waterproofing of concrete with Emulsified Bitumen

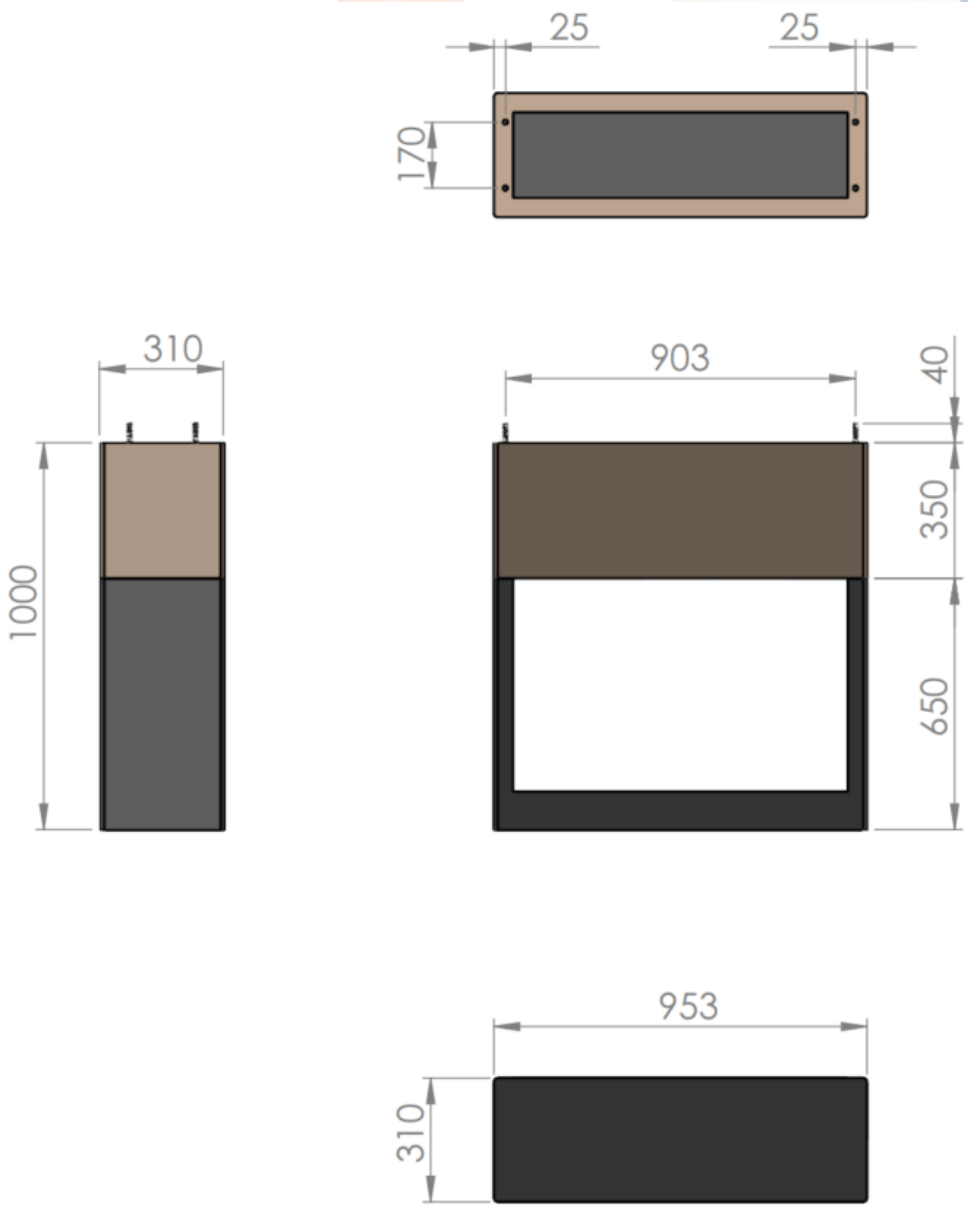
*Top Section: Finishing Color (RAL 1019)

ALL DIMENSIONS ARE IN MILLIMETER

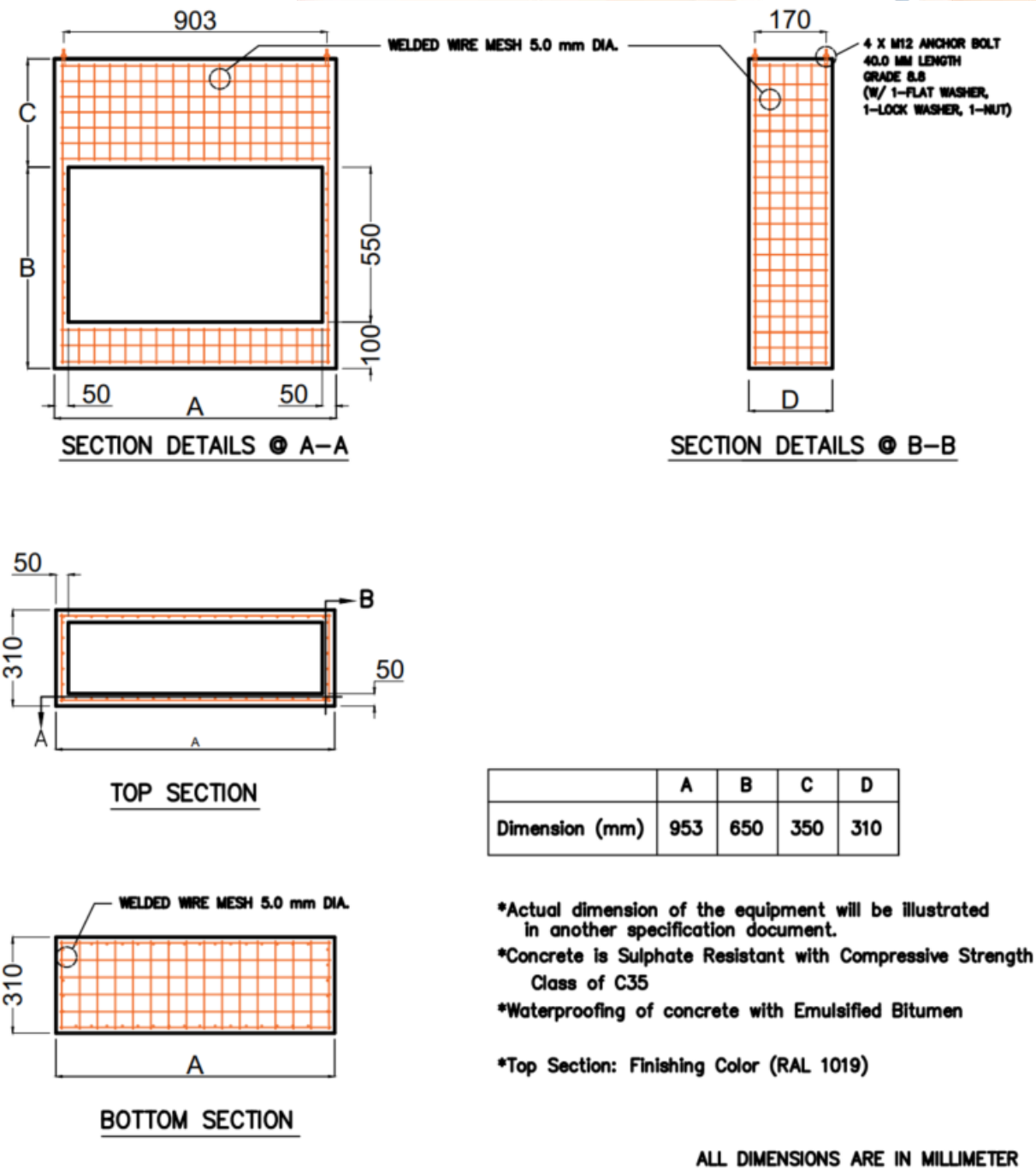
Drawing No. 11.2: Steel Reinforcement Details of Concrete Base for 3-Way Mini-Pillar applicable for both with or without Generator Quick-Connect Plugin Compartment



Drawing No. 12.0: Perspective Drawing of Concrete Base for 5-Way Mini-Pillar applicable for both with or without Generator Quick-Connect Plugin Compartment



Drawing No. 12.1: Layout Details of Precast Concrete Base for 5-Way Mini-Pillar applicable for both with or without Generator Quick-Connect Plugin Compartment



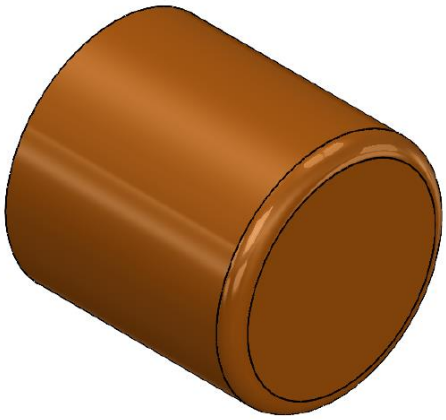
	A	B	C	D
Dimension (mm)	953	650	350	310

*Actual dimension of the equipment will be illustrated in another specification document.
*Concrete is Sulphate Resistant with Compressive Strength Class of C35
*Waterproofing of concrete with Emulsified Bitumen

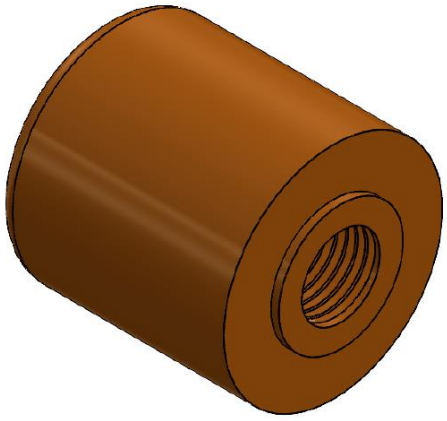
*Top Section: Finishing Color (RAL 1019)

ALL DIMENSIONS ARE IN MILLIMETER

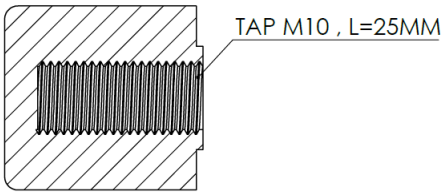
Drawing No. 12.2: Steel Reinforcement Details of Concrete Base for 5-Way Mini-Pillar applicable for both with or without Generator Quick-Connect Plugin Compartment



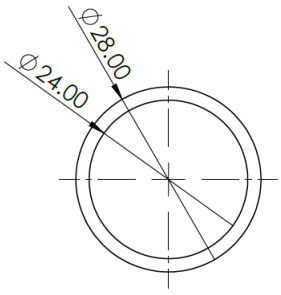
ISOMETRIC VIEW



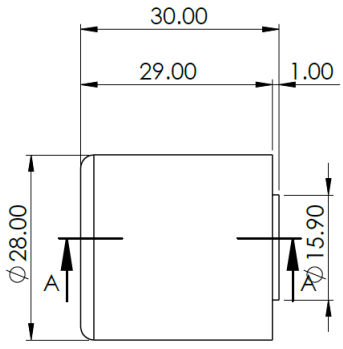
ISOMETRIC VIEW



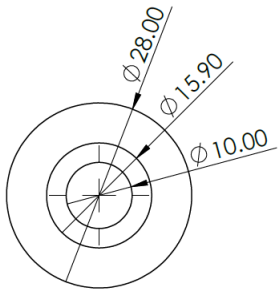
SECTION A-A



LEFT VIEW

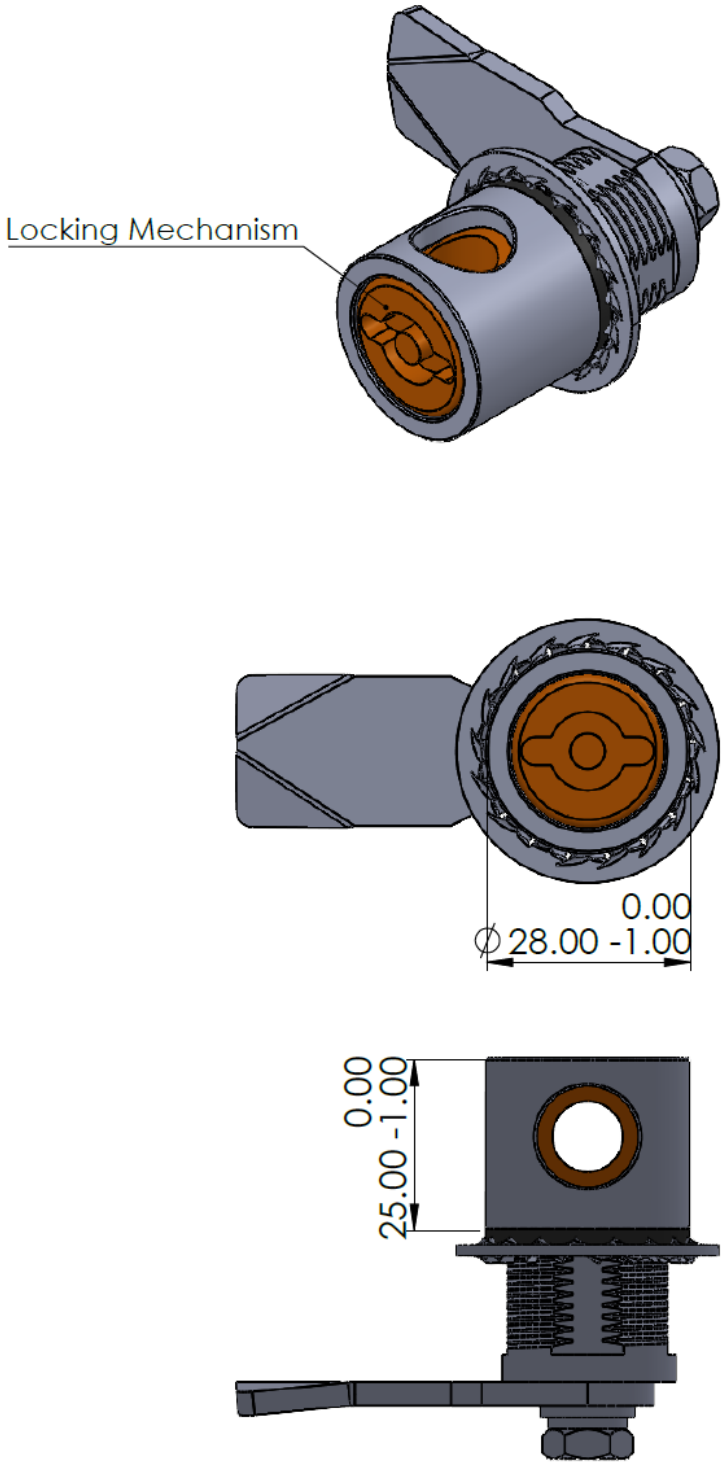


FRONT VIEW

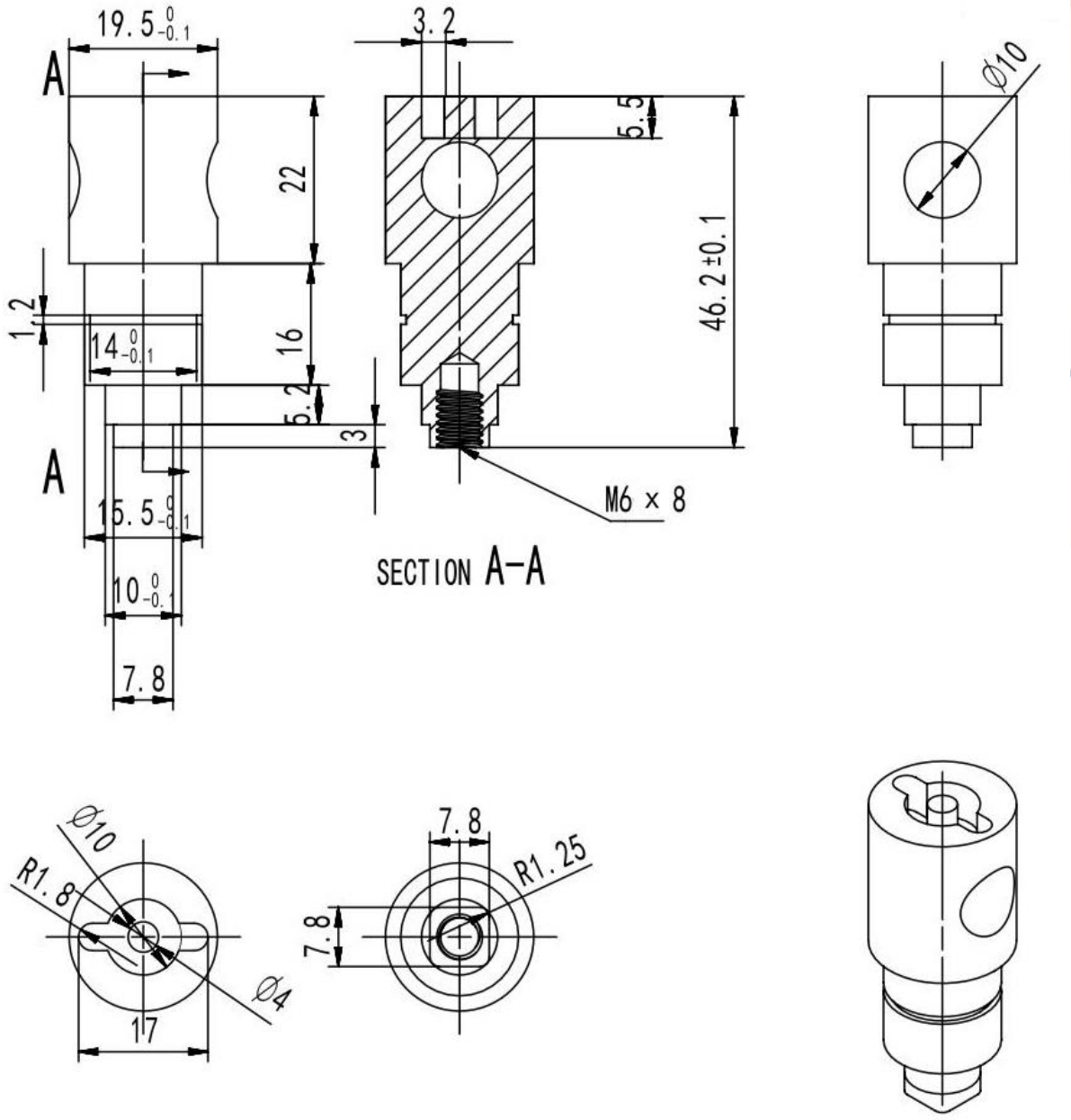


RIGHT VIEW

Drawing No. 13.0: Details of Stainless-Steel Cylindrical Rod Lifting Support



Drawing No. 14.0: Details of Top Inner Door Camlock with Padlocking Provision



Drawing No. 15.0: Details of Locking Mechanism for Top Inner Door Camlock