42-SDMS-02A

REV. 0

SPECIFICATION

FOR

LOW-VOLTAGE SERVICE CABINET WITH STEEL ENCLOSURE (800A BULK CUSTOMERS)

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Revision History

#	Date	Revision No.	Major Revision Description
1	23-09-2024	0	1st Published Edition (Prepared By: Edilfredo R. Tarenio)

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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 service cabinet with steel enclosures (800A bulk customers) 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*, *37-SDMS-01*, and *50-SDMS-01* titled *"General Requirements for all Equipment/Materials," "Specification for Lugs and Connectors for Low-Voltage and Medium-Voltage Distribution System ", "Specification for Molded Case Circuit Breaker for Service Connections",* and "*Specifications for Current Transformers Rated up to 36kV",* 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 versions 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 subject to review and acceptance by SEC. 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 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	Standard Guide for Preparation of New, Continuous Zinc-Coated (Galvanized) Steel Surfaces for Painting
ASTM E353	Standard Test Method for Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys
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
ASTM E1086	Standard Test Method for Optical Emission Vacuum Spectrometric Analysis of Stainless Steel by the Point-to-Plane Excitation Technique

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	The International Organization for Standardization
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 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 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 service cabinet with steel enclosure shall be suitable for outdoor operation under the service conditions specified in the latest version of SEC specification *01-SDMS-01*. The service cabinet 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 service cabinet 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 version 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 cable terminations as per cable schedule below:

Cable Description	No. & Size of Cables	Type of Termination	Termination Point
Incoming (SEC) Cables	2 x 4C x 300 mm^2 AL	Back-to-Back w/ Cable Lugs	MCCB Incoming: Terminal Spreaders (Bottom)
Outgoing (Consumer) Cables	2 x 4C x 300 mm^2 AL or 2 x 4C x 185 mm^2 CU	Back-to-Back w/ Cable Lugs	Busbars (Right-End)
Outgoing (SEC Remote Metering) Cable	1 x 12C x 2.5 mm^2 CU (Single-Strand)	Direct Termination	Test Terminal Block (Load Side)
Ground/Earthing	1 x 35 mm^2 CU (Bare)	w/ Cable Lug	Enclosure Earthing Stud

Table 4: Cable termination schedule for 800A service cabinet.

5.1.4 The cable lugs used to terminate the cables shall be in conformance with the latest version of SEC specification *12-SDMS-02*.

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

5.1.6 All tin-coated current-carrying parts of the electrical components shall be of bright tin-electroplated with an overall average coating thickness of 20µm and has very smooth surface finish.

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

5.1.8 The design of the service cabinet 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.

5.1.9 Any clarifications shall be addressed to SEC authorized technical representatives. Suppliers/manufacturers may be allowed to propose alternatives but are not authorized to make their own interpretations of any requirements stipulated in this specification.

5.2 Enclosure

5.2.1 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. It is mandatory that it should be sourced locally.

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

5.2.3 It must allow adequate ventilation by natural air circulation through louvers on the sides and on the canopy of the watershed top.

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 service cabinet.

5.2.4 Lifting facilities shall be provided with the service cabinet.

The lifting facilities shall be fit for M10 eyebolts *(as removable lifting lugs)* 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 *Drawing No. 12.0.*

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

5.2.5 The enclosure main door shall be hinged (welded) with 3 heavy-duty stainless-steel spring-return concealed-type hinges, as illustrated in *Drawing No. 2.0.*

5.2.6 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.

5.2.7 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 *Drawing No. 13.0* and *Drawing No. 14.0,* respectively.

5.2.8 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.

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

5.2.10 The enclosure main door shall be equipped with full-frame stiffeners to add rigidity.

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

5.2.12 The following ID tags shall be supplied as loose accessories.

a. 2-piece feeder source ID tags with 4-pieces 3.0 mm∅ x 12.0 $mm_{(length)}$ stainless-steel blind rivets shall be provided.

b. 1-piece maintenance ID tag with 2-pieces 3.0 mm∅ x 12.0 $mm_{(length)}$ stainless-steel blind rivets shall be provided.

5.2.13 The sizes of the ID tags are as follows:

a. Feeder source ID tag 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∅ mounting holes.

b. Maintenance info ID tag size: 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∅ mounting holes

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

Position of the maintenance info ID tag and feeder source ID tags and its dedicated mounting holes are shown in the drawings.

5.2.14 ID tags shall be a 2-ply acrylic based material and have laser engravable cap with reflective or authentic brushed metallic finish *(both samples shall be submitted to SEC for selection and approval)*, UV-resistant, and suitable for outdoor use. Engraving depth shall be 0.08 mm.

For reflective finish: Cap is White or Yellow, Base is Black.

For metallic 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.

5.2.15 The back side of the main door shall be provided with a pocket to store documents like drawings and test reports of the service cabinet. The manufacturer's nameplate shall be provided on the document pocket.

5.2.16 An arc-flash and shock hazard warning plate as specified in the latest version of SEC specification *SEC-04-01* shall be provided on center-bottom at the back of the main door as shown in the drawings.

5.2.17 The enclosure shall have a dead-front hinged inner 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*.

At the front of the inner door, it shall be directly printed with anti-tampering warning sign and note as shown in the drawings.

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

5.2.19 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.

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

5.2.21 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.

5.3 Busbar Assembly

5.3.1 The busbars shall be hard drawn high-conductivity tin-coated copper of uniform cross-section of 50.0 mm x 10.0 mm.

5.3.2 The busbars shall have a continuous current-rating of up to 1250 amperes. It shall be supported by stand-off busbar insulators made of epoxy resins in a robust and secure manner.

5.3.3 There shall be 3 busbars for the phases, and 1 short-link bar of the same cross-section for the neutral.

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

5.3.5 The general design of the busbar assembly shall be made with a minimum number of joints.

5.3.6 The phase busbars shall be color-coded in sequence from top to bottom (RED-YELLOW-BLUE). The neutral bar shall be color-coded (BLACK).

5.4 MCCB

5.4.1 The Molded-Case Circuit-Breaker (MCCB) shall be rated 800 or 1000 amperes in conformance with the latest requirements of SEC specification 37-SDMS-01.

5.4.2 MCCB incoming (bottom side) terminals with terminal spreaders shall be able to hold bolted directly back-to-back incoming (SEC) cables as shown in *Table-4.*

5.4.3 MCCB outgoing (top side) terminals shall be bolted directly to the phase busbars in sequence as mentioned in *Clause 5.3.6.*

5.5 Test Terminal Blocks

5.5.1 The service cabinet shall be equipped with test terminal blocks for current and voltage circuits.

5.5.2 It shall be pre-wired in the factory with proper wire markings and color-coded wires.

5.5.3 It shall consist of 12 terminal safety test devices for use with metering current transformers and voltage circuits.

There shall be 12 poles (3-voltages, 3-neutral, and 6-current) with test jack, current element shorting provision, voltage measuring and voltage disconnecting facilities without disturbing *(in and out of wires)* from this device.

Terminal arrangement shall be as shown in the respective drawings.

5.5.4 The wiring shall be of 2.5 mm^2 single-strand copper and shall be identified by colors and numbers in conformance with the applicable requirements mentioned in the latest version of SEC specification *42-SDMS-01A*.

5.5.5 The test terminal blocks shall be indelibly numbered from left to right as per the following:

Phases : 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10

Neutral : N

Earth : E

5.5.6 Color coding and numbering schemes (from left to right) of wires for service cabinet shall be as shown in the tables below:

VOLTAGE CONNECTIONS

Phase	Color	Corresponding Number in the Testing Terminals
Phase A (1)	Red	2
Phase B (2)	Yellow	5
Phase C (3)	Blue	8
Neutral (N)	Black	10

Table 5: Service cabinet voltage connections color and numbering schemes.

CURRENT CONNECTIONS

Phase	Color	Corresponding Number in the Testing Terminals
Phase A (1)	Red	1 & 3
Phase B (2)	Yellow	4 & 6
Phase C (3)	Blue	7 & 9

Table 6: Service cabinet current connections color and numbering schemes.

5.5.7 The test terminal blocks shall have a continuous current rating of 5 amperes, nominal voltage of 1000V, degree of protection of IP20 (Touch-proof), and DIN rail mounted.

5.5.8 The plastic housing of the test terminal blocks shall be made of PA66 with UL94-VO classification.

5.6 Current Transformers

5.6.1 The service cabinet shall be provided with window-type current transformers conforming to the latest version of SEC specification *50-SDMS-01*.

5.6.2 The CTs shall be mounted properly and arranged in way that the whole CT assembly consumes less space, as shown in the drawings.

5.6.3 The connecting leads of the CTs shall be provided with wire-end sleeves/ferrules *(if not readily available)* to prevent the strands from spreading.

5.6.4 The CT connecting leads are terminated in the test terminal blocks in sequence mentioned in *Table-6*.

5.6.5 Proper cable management shall be exercised to ensure that the CT metering cables (internal wiring) are organized and neat.

5.7 Internal Wiring (CT Metering Conductors)

5.7.1 The internal wirings of service cabinet with steel enclosure shall be fire-resistant cables.

The cables shall withstand carrying rated electric current with nominal voltage of 1000 volts at 750°C flame for 90 minutes.

It shall be manufactured and tested in full conformance with IEC 60228 and other relative standards.

5.7.2 The sizes of the main current-carrying conductors and internal wirings of the service cabinet shall be as follows:

Enclosure Type	Main Current-Carrying Conductor	Internal Wiring (CT Metering Conductors)
Service Cabinet	(3∅ + N) x 50.0 mm x 10.0 mm (Tin-coated Copper Busbars)	2.5 mm^2 soft-drawn copper (Single-Strand)

Table 7: Sizes of main current-carrying conductors and internal wiring of service cabinet.

5.7.3 Internal wirings shall be color coded and numbered in conformance with the schemes mentioned in *Table-5* and *Table-6.*

5.8 Precast Concrete Base

5.8.1 It shall be designed and constructed to support the overall weight of the service cabinet (complete assembly).

5.8.2 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 a flat-washer, lock-washer, and a nut. Further details are provided in the drawings, as applicable.

5.8.3 It shall be fully coated with concrete waterproofing emulsified bitumen. The minimum number of coats shall be two (2). Minimum overall

thickness when fully cured shall be 600µm. The top section as specified in the drawings shall be painted with RAL 1019.

5.9 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.

5.10 Earthing

5.10.1 Internal Earthing

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

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.

5.11 Dimensions

The maximum allowable dimensions of the service cabinet with steel enclosure and its precast concrete base shall be as shown in the drawings.

5.12 Finishing Color

5.12.1 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.

5.12.2 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.

5.12.3 All surfaces of the enclosure shall be painted with RAL 1019 color (textured grain finish) except the main door.

5.12.4 The enclosure main door and dead-front (inner door) shall be painted with RAL 9001 with smooth finish.

5.12.5 The color combination of the service cabinet shall be as per *Table-8*.

Enclosure Surface	Color Combination
Body (Inside & Out)	RAL 1019
Main Door and Dead-Front (Inner Door)	RAL 9001

Table 8: Finishing color combination of service cabinet.

5.12.6 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.

5.12.7 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.

5.12.8 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 service cabinet 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 service cabinet with steel enclosures shall be tested in conformance with the applicable standards.

7.1 Type Tests

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

7.1.2 Test terminal blocks 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.

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 service cabinet 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

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 requirements 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 service cabinet 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 in a 5-ply double-walled cardboard box, and then re-wrapped in a plastic film.

8.3 Packing shall protect the service cabinet against damage during shipment, site handling, and outdoor storage.

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 service cabinet including all its internal parts and components against all defects arising out of faulty design, manufacturer misinterpretation of the requirements or manufacturing defects and/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 service cabinet 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 service cabinet must be technically evaluated and have written approval from SEC authorized technical representative.

SEC reserves the right to reject the service cabinets or return all of the delivered items at the expense of the supplier/manufacturer should it discovered that the parts supplied in the service cabinet did not pass SEC pre-approval.

9.4 The supplier/manufacturer shall guarantee that the service cabinet 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 service cabinet 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 service cabinet 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 service cabinet 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-copies 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 SERVICE CABINET 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	Service Cabinet w/ Steel Enclosure	
2.2	Generator Plug-in Compartment	Yes / No	
2.3	Number of Incoming Cables	2	
2.4	Number of Outgoing Cables	2	
2.5	Steel Enclosure Material (Sheet Metal)	GI: G90	
2.6	Enclosure Thickness, mm	2.0	
2.7	Rated Frequency, Hz	60	
2.8	Nominal Voltage, volts	400 volts	
2.9	No. of Phases	3-Phase + N	
2.10	Short-Circuit Withstand for 1 second, kA	25	
2.11	Degree of Protection (IP Code), Enclosure	IP54	
3	**Busbar**		
3.1	Busbar Size (Cross-Section),	50.0 mm x 10.0 mm	
3.2	Busbar Material	Copper (Tin-Coated)	
3.3	Busbar Current Rating	1250 Amperes	
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	**Supplementary Fittings**		

TECHNICAL DATA SCHEDULE

LOW-VOLTAGE SERVICE CABINET WITH STEEL ENCLOSURE

SEC Inquiry No. _____ *Item No.* _____

No	Description	SEC Specified Values (*)	Vendor Proposed Values (**)
4.1	Is the service cabinet with steel enclosure fitted with all the components and accessories mentioned in this specification?	Yes	
5	**Testing**		
5.1	Product is Type Tested	Yes	
5.2	SEC Approved Laboratory	**	
5.3	Date Tested	**	
5.4	Manufacturer	**	
5.5	Model/Type	**	
5.6	Country of Origin	**	
5.7	Submittals Required with Tender/Inquiry Included or Not?	**	

TECHNICAL DATA SCHEDULE

LOW-VOLTAGE SERVICE CABINET WITH STEEL ENCLOSURE

SEC Inquiry No. _____ *Item No.* _____

Additional Technical Information or Features Specified by SEC

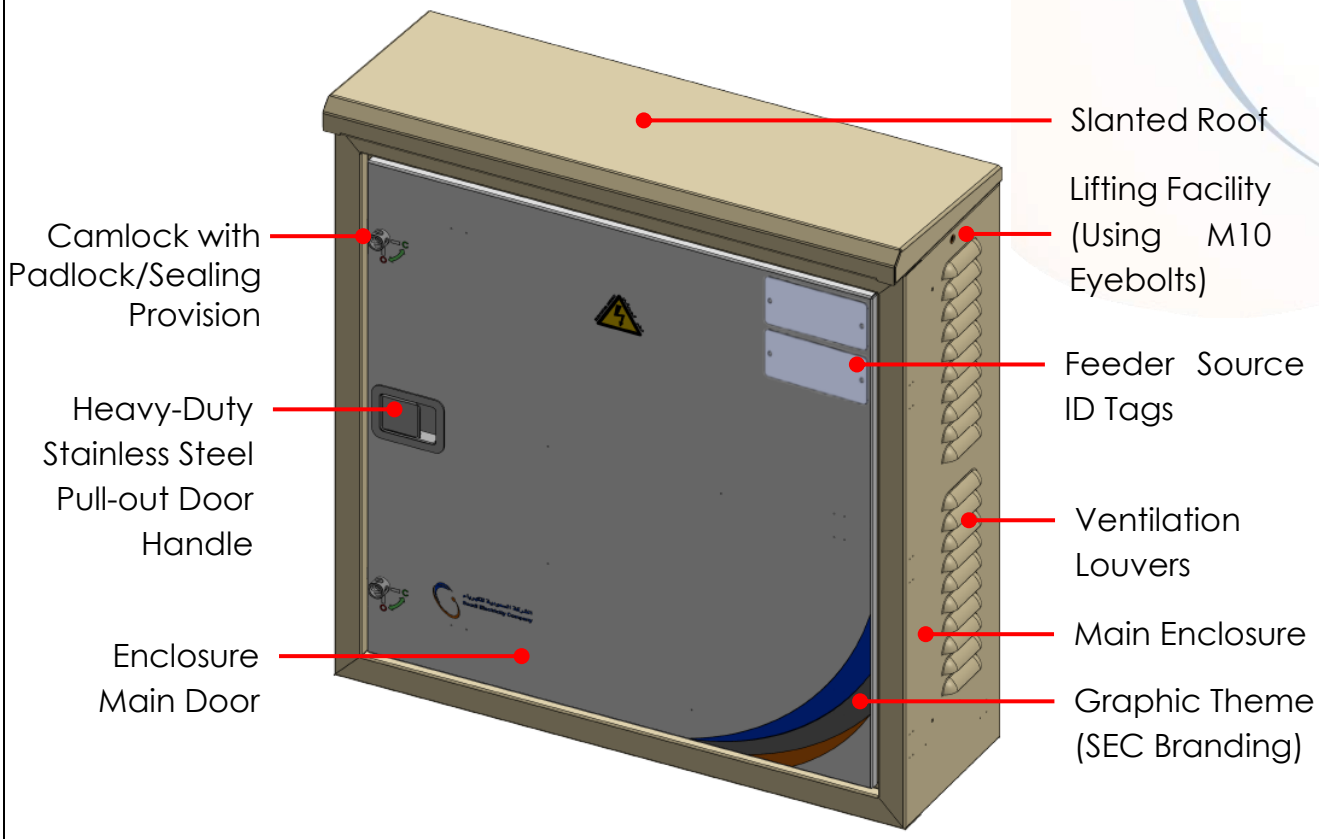
Additional Supplementary Data or Features Proposed by Bidder/Vendor/Supplier.

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

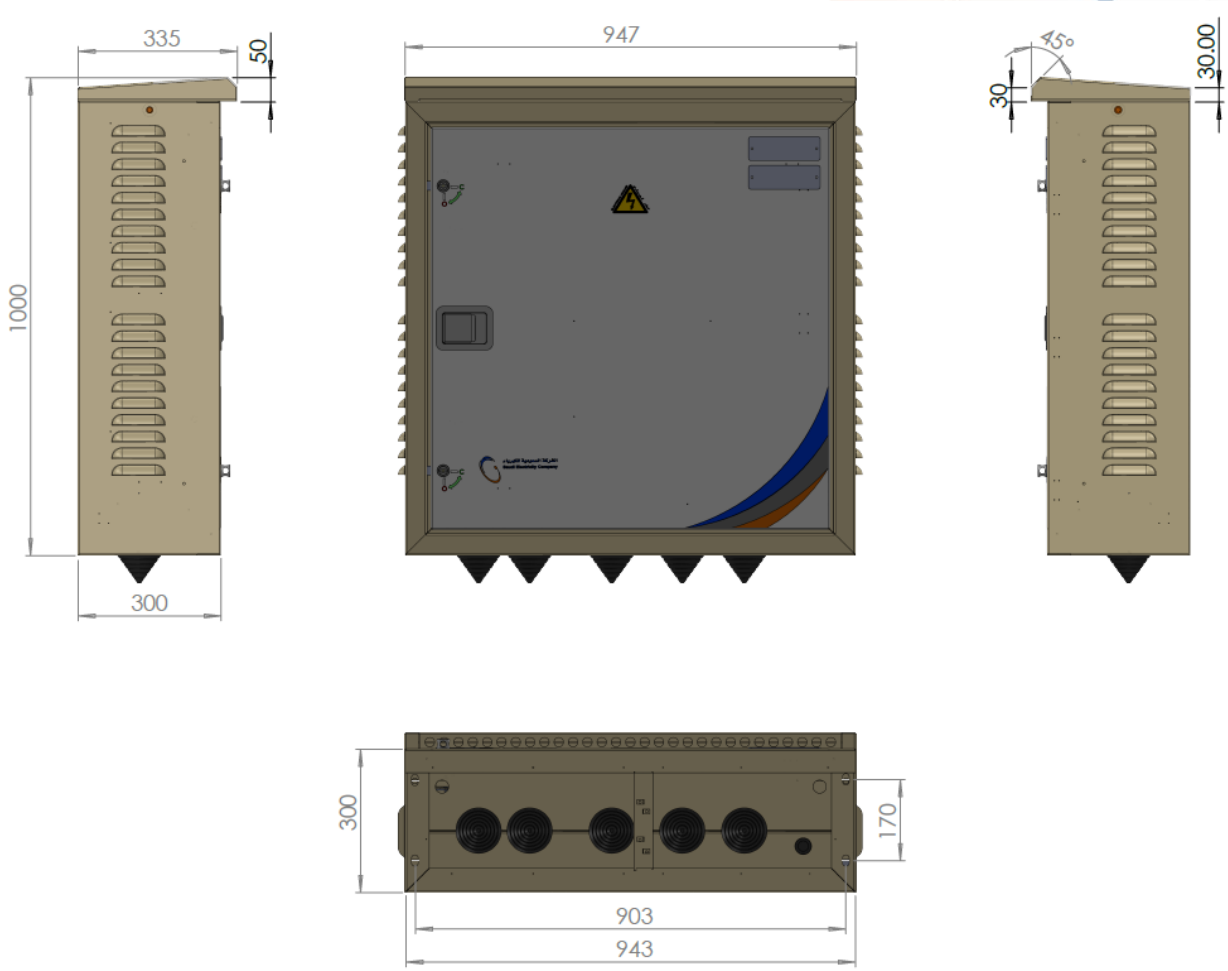
List of Deviations and Clauses to which exception is taken by the Bidder/Vendor/Supplier. (Use separate sheet, if necessary).

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		

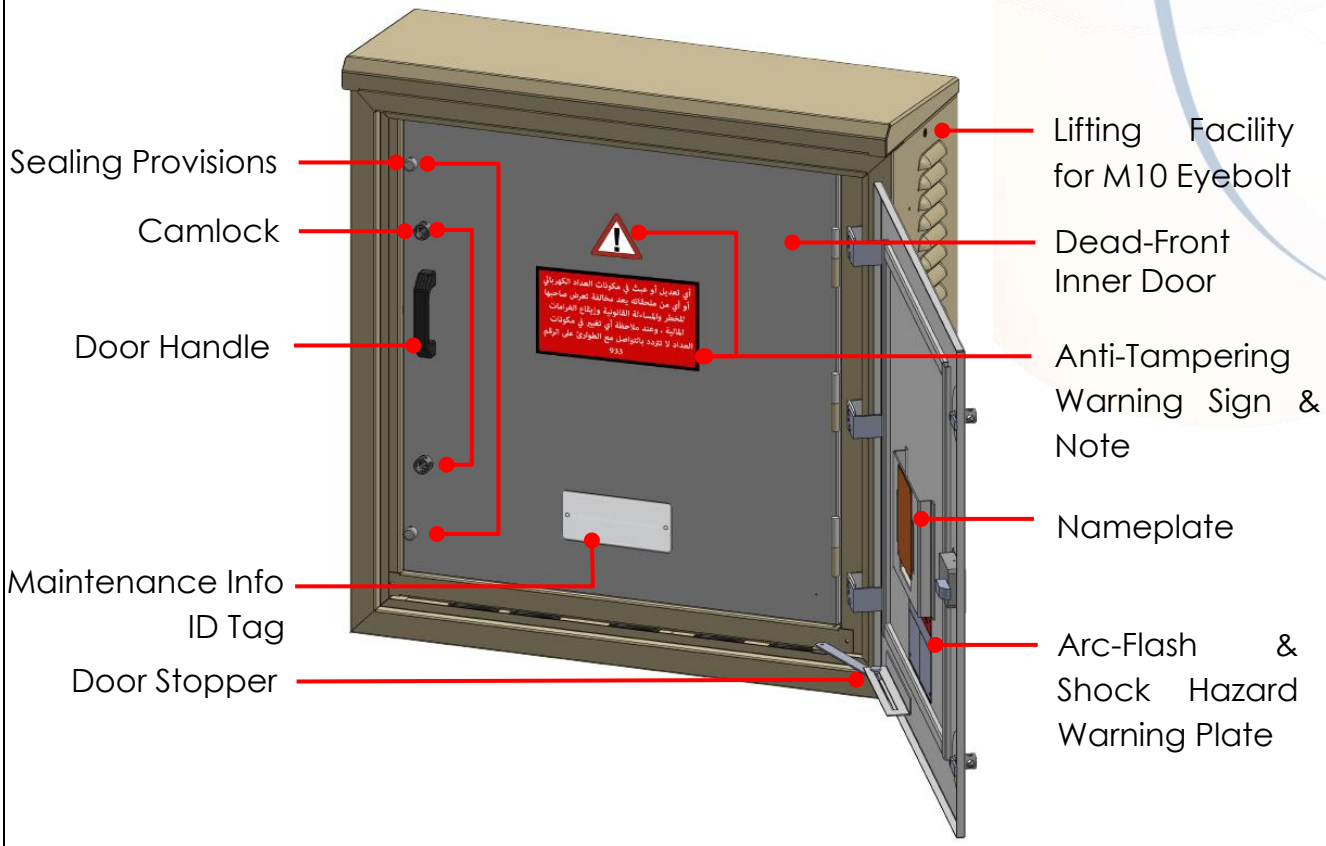
12 DRAWINGS:



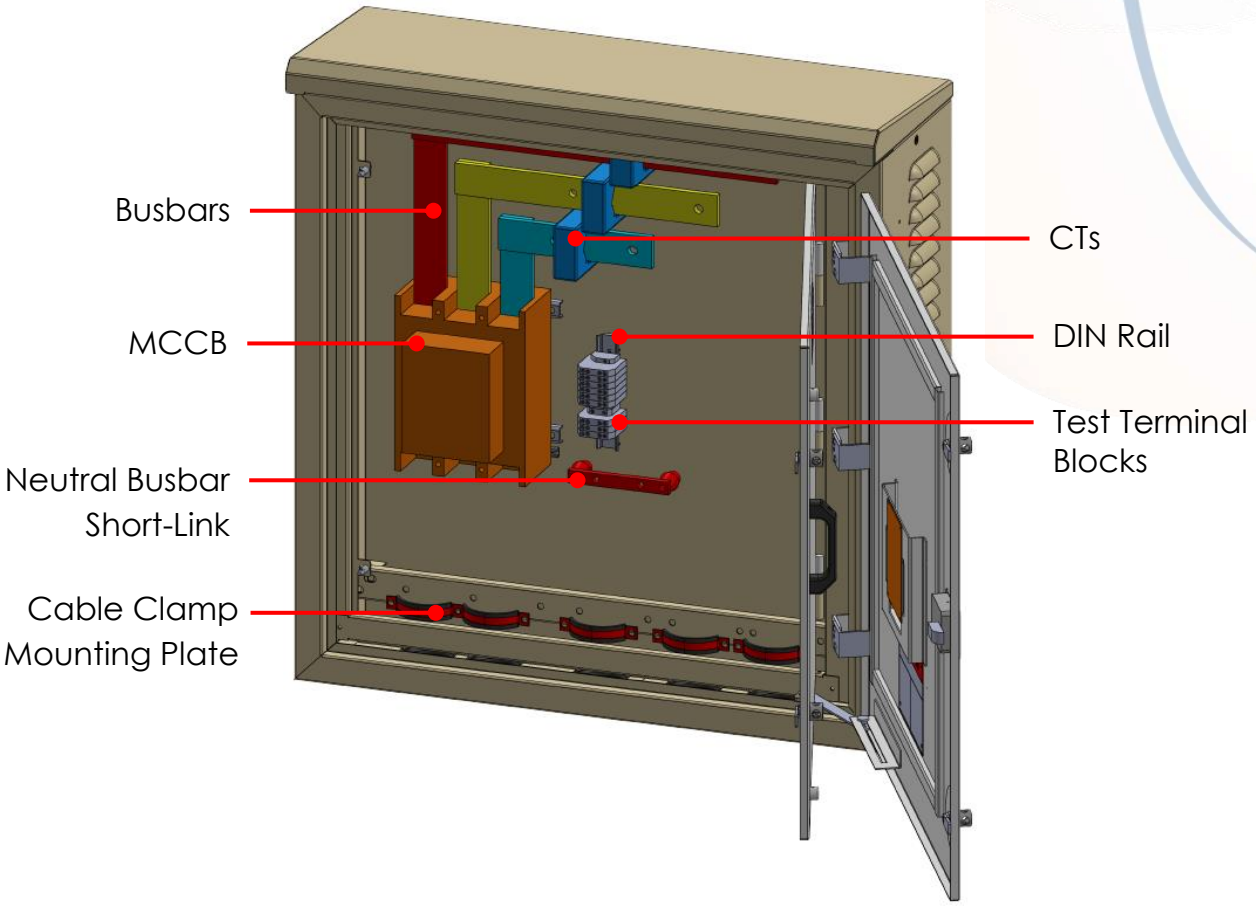
Drawing No. 1.0: Perspective Drawing of the Service Cabinet Showing the Main Design Elements (External Features)



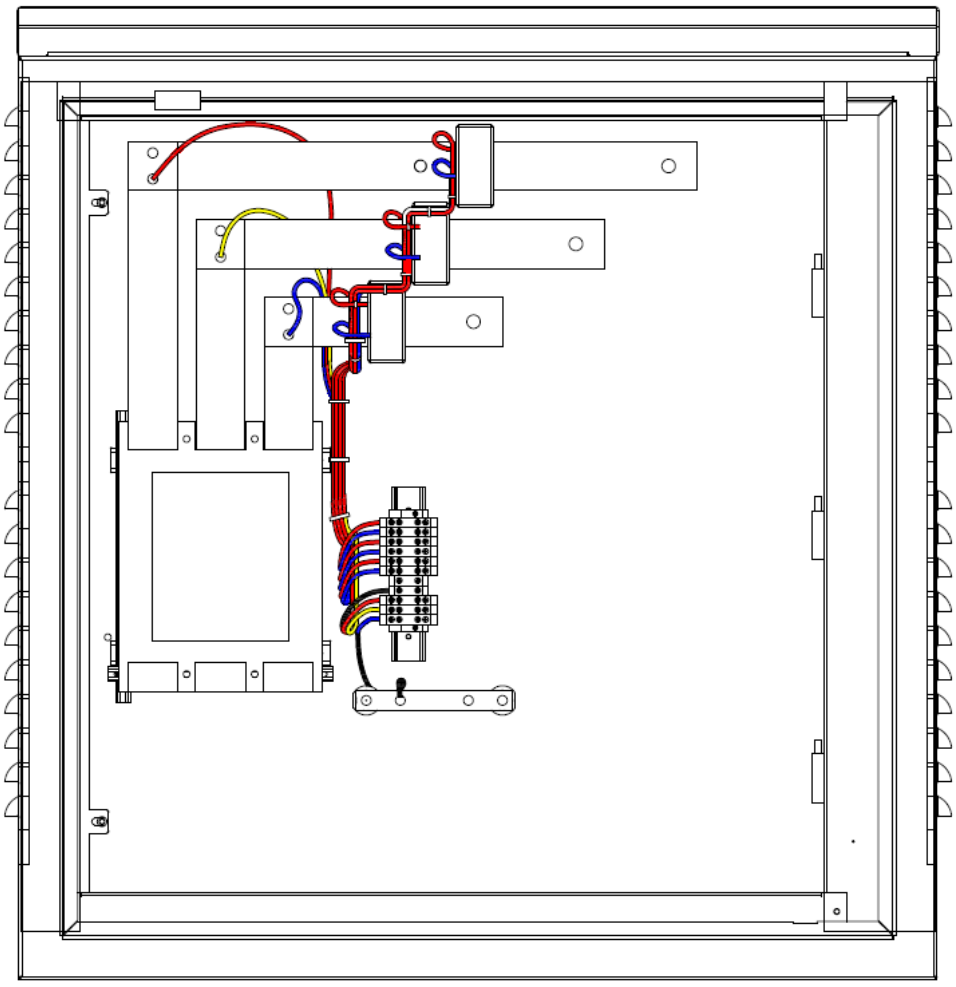
Drawing No. 1.1: Layout Drawing of the Service Cabinet Showing the Maximum Allowable Dimensions



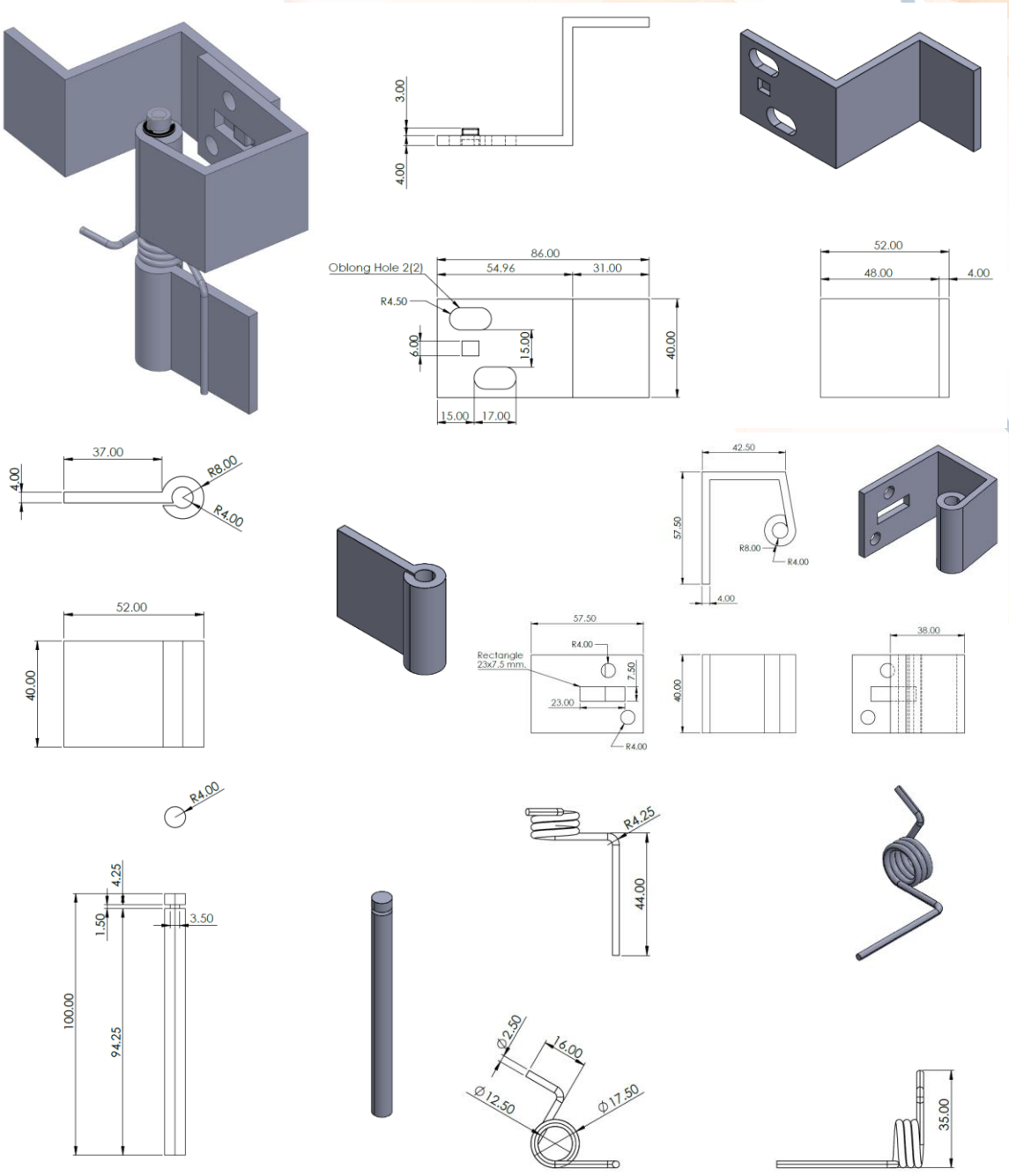
Drawing No. 1.2: Perspective Drawing of the Service Cabinet with Enclosure Main Door Opened



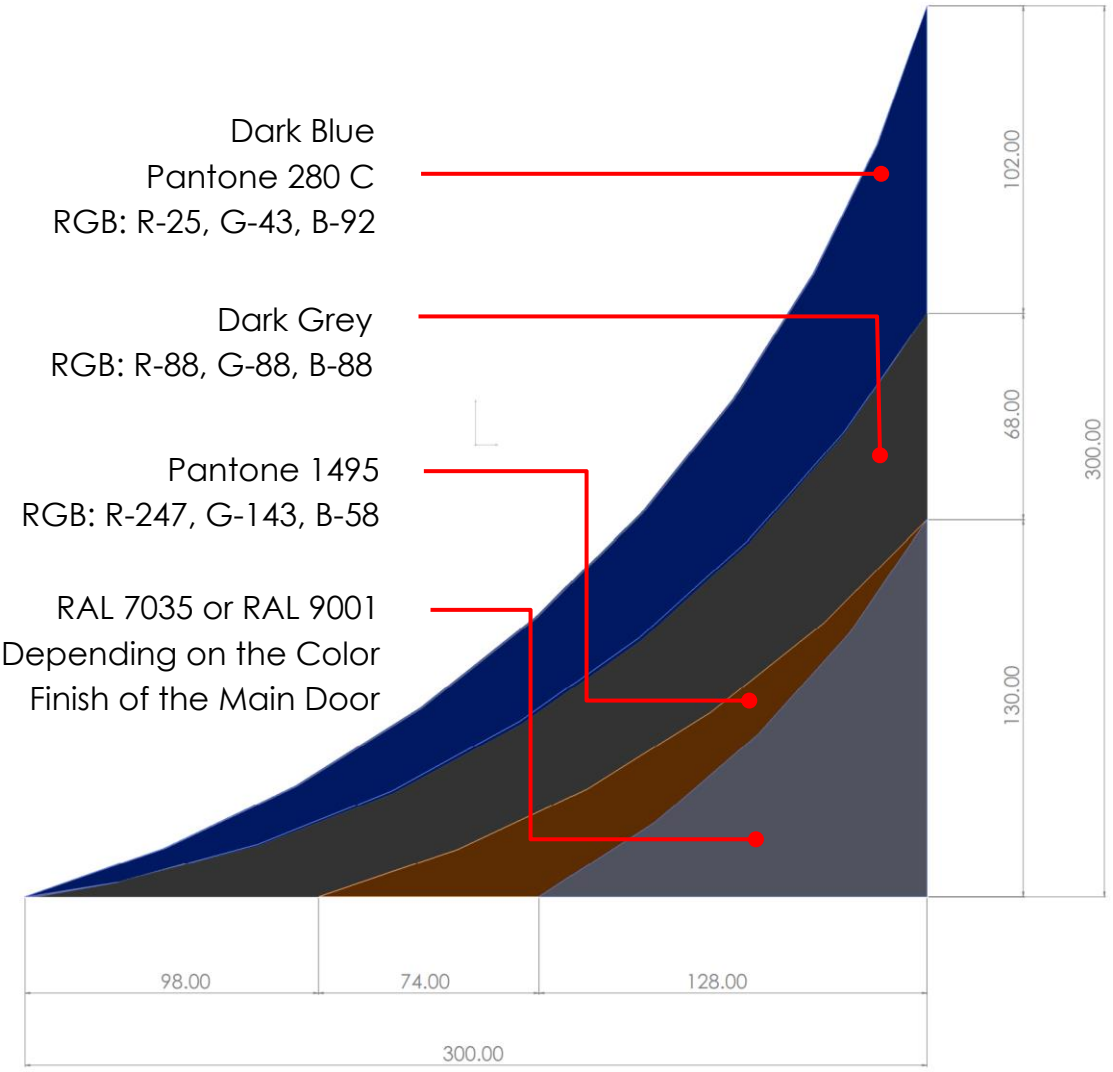
Drawing No. 1.3: Perspective Drawing of the Service Cabinet with Enclosure Main Door & Dead-Front Inner Door Opened



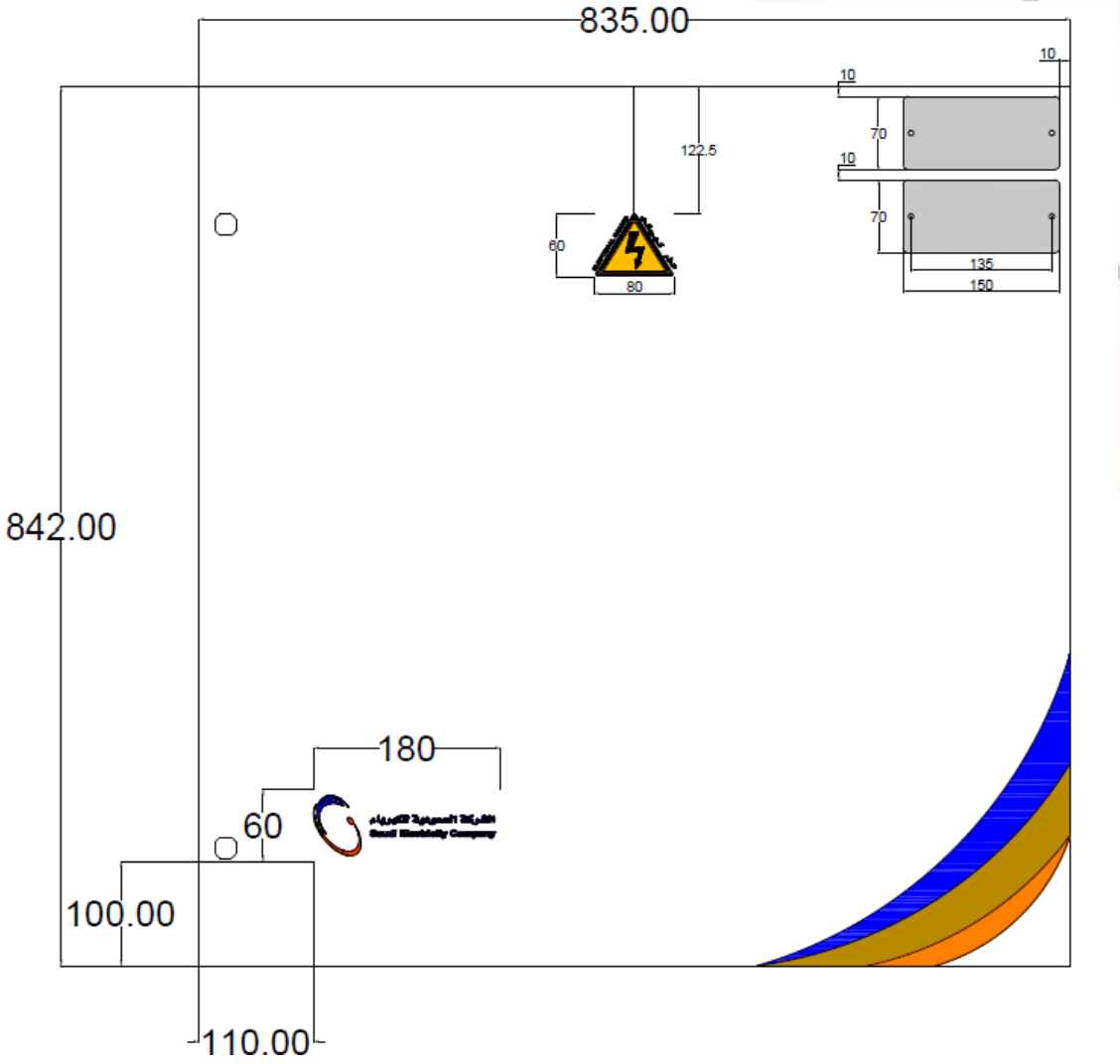
Drawing No. 1.4: Internal Wirings of the Service Cabinet



Drawing No. 2.0: Detail Design of Heavy-Duty Stainless Steel Self-Closing (Spring-Return) Concealed Hinges for the Main Door



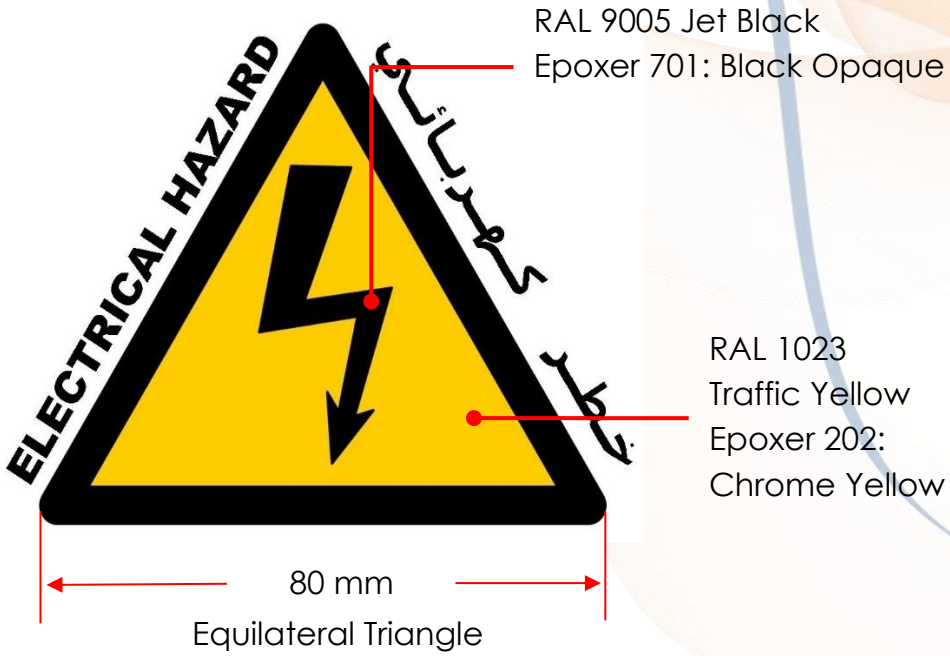
Drawing No. 3.0: Detail Drawing of SEC Standard Graphic Theme (SEC Branding)



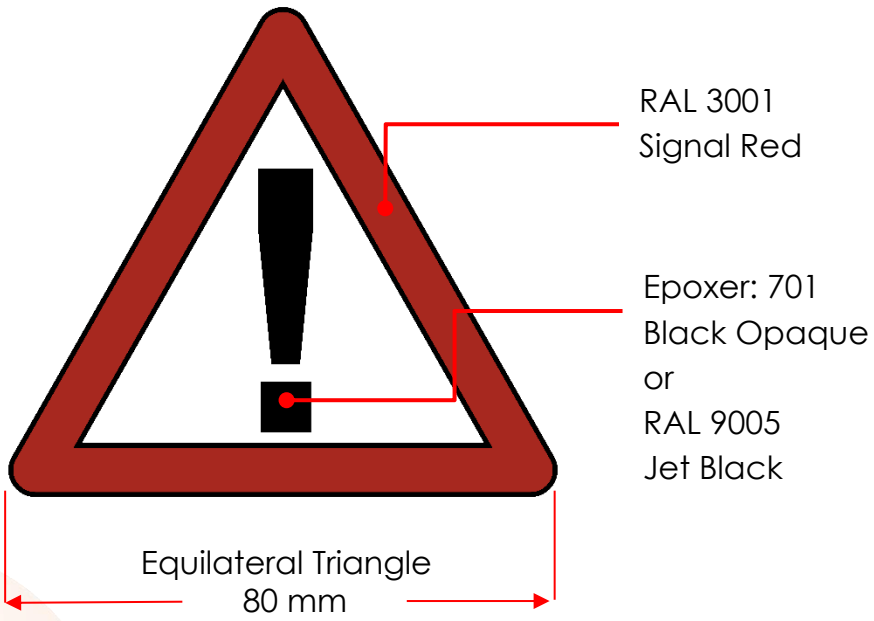
Drawing No. 4.0: Detailed Positioning of the SEC logo, Danger Sign, and Feeder Source ID Tags for the Service Cabinet

Drawing No. 5.0: Details of SEC logo for Service Cabinet with Steel Enclosures

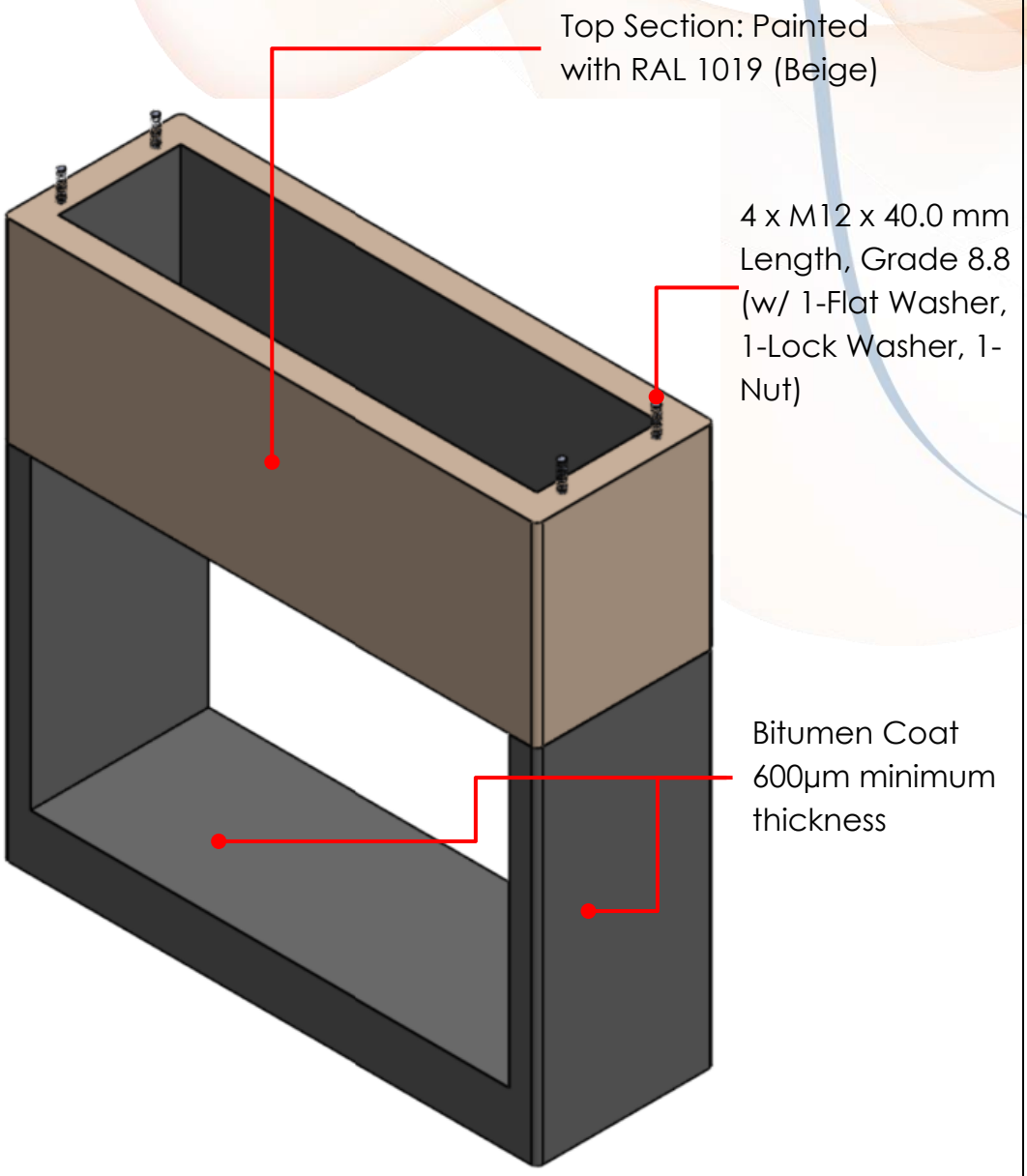
Drawing No. 6.0: Details of Anti-Tampering Warning Note for Service Cabinet with Steel Enclosure



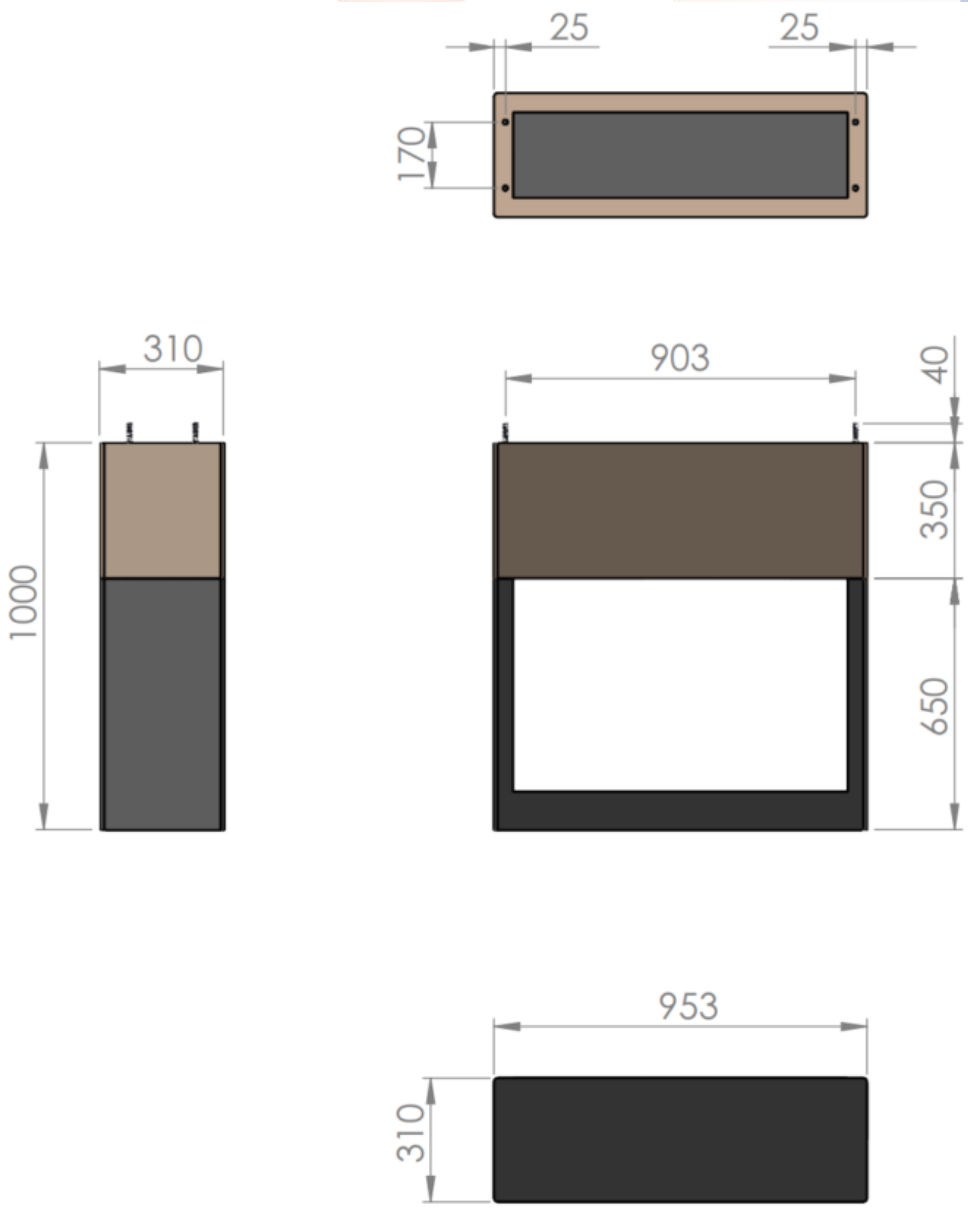
Drawing No. 7.0: Details of Danger Sign for the Service Cabinet with Steel Enclosure



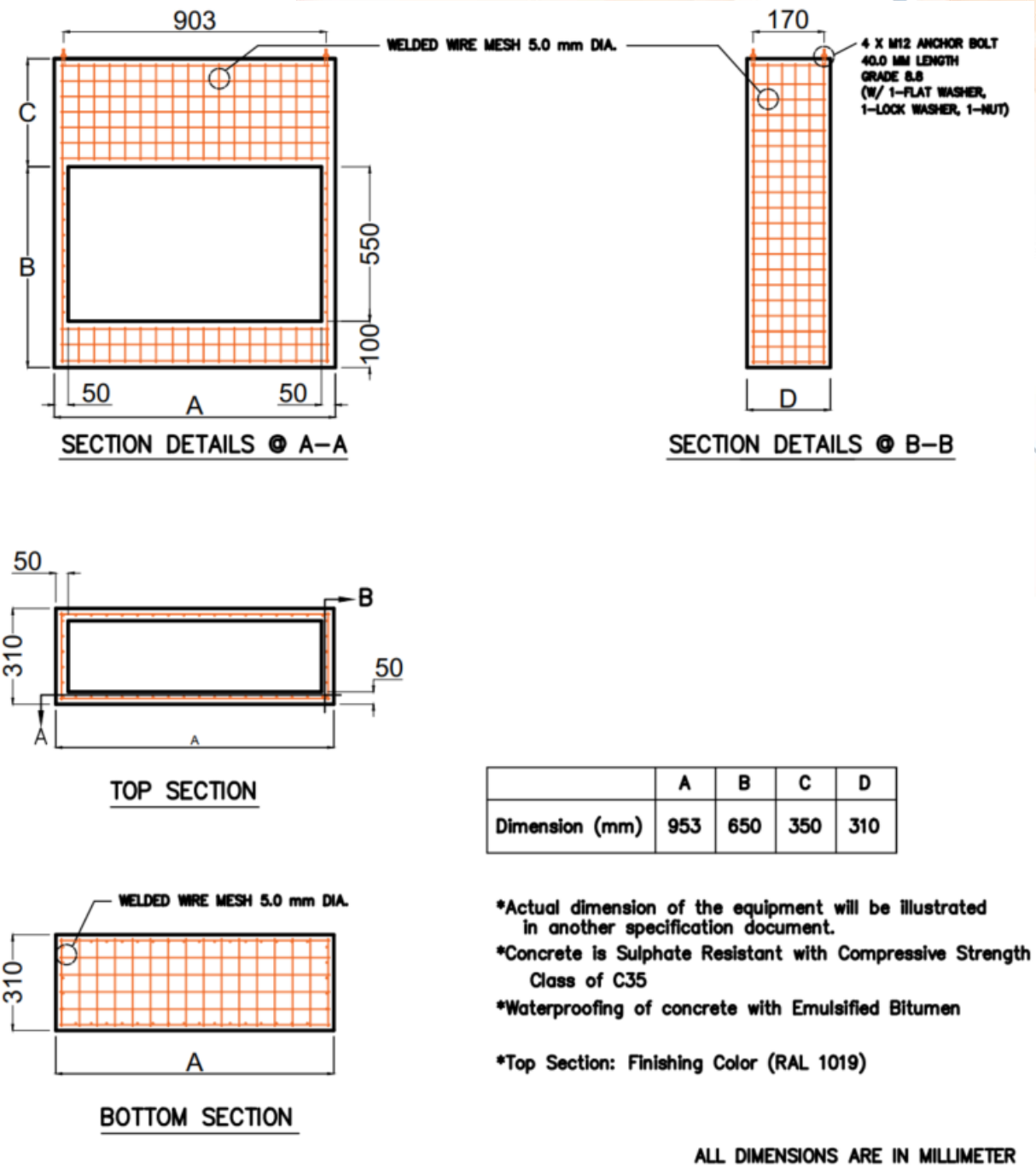
Drawing No. 8.0: Details of Anti-Tampering Warning Sign for Service Cabinet with Steel Enclosure



Drawing No. 9.0: Perspective Drawing of Concrete Base for the Service Cabinet



Drawing No. 10.0: Layout Details of Precast Concrete Base for the Service Cabinet



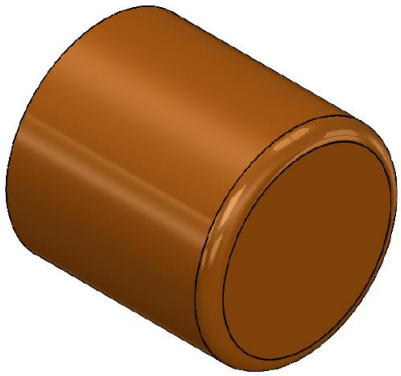
	A	B	C	D
Dimension (mm)	953	650	350	310

*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

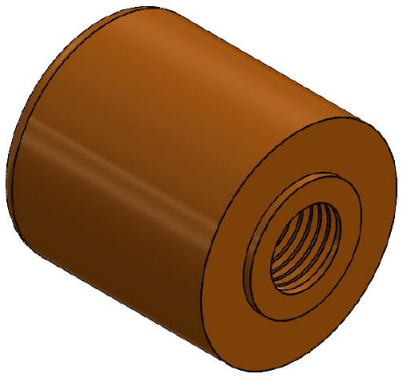
*Top Section: Finishing Color (RAL 1019)

ALL DIMENSIONS ARE IN MILLIMETER

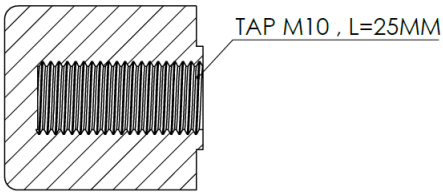
Drawing No. 11.0: Steel Reinforcement Details of Concrete Base for the Service Cabinet



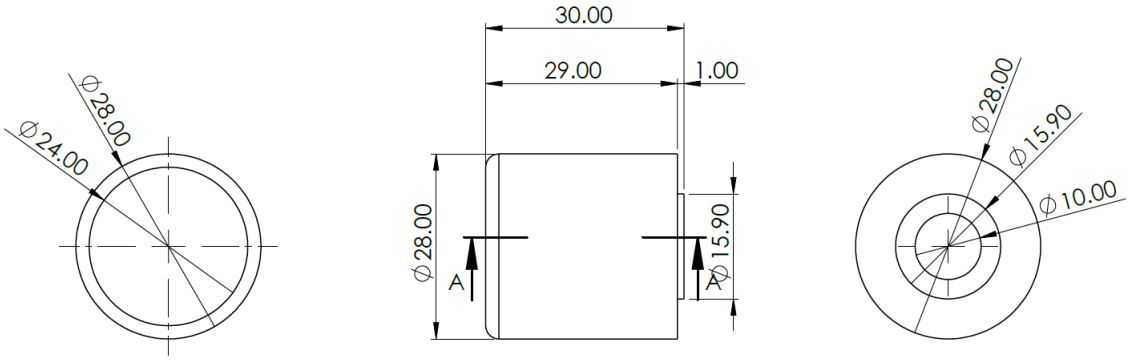
ISOMETRIC VIEW



ISOMETRIC VIEW

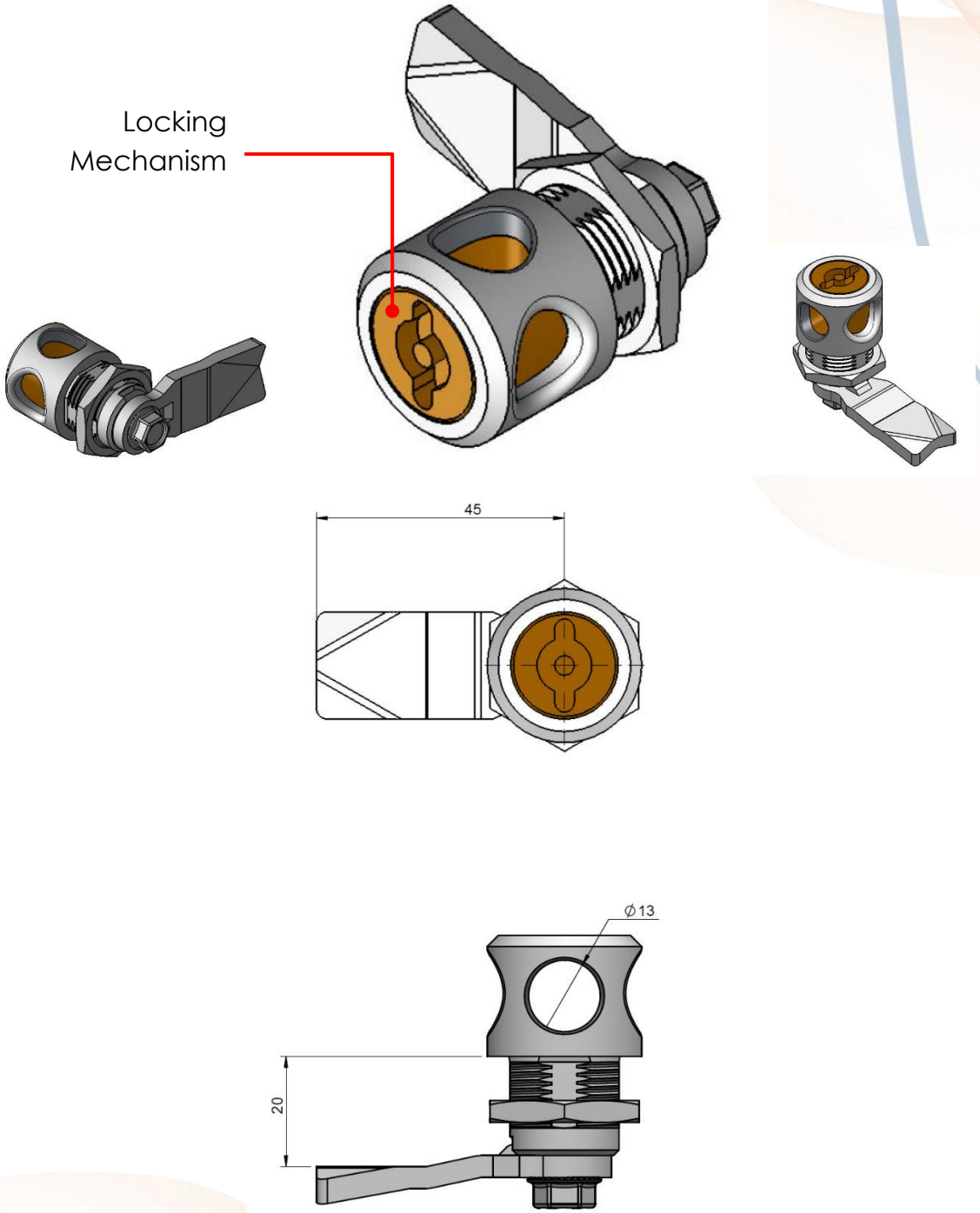


SECTION A-A

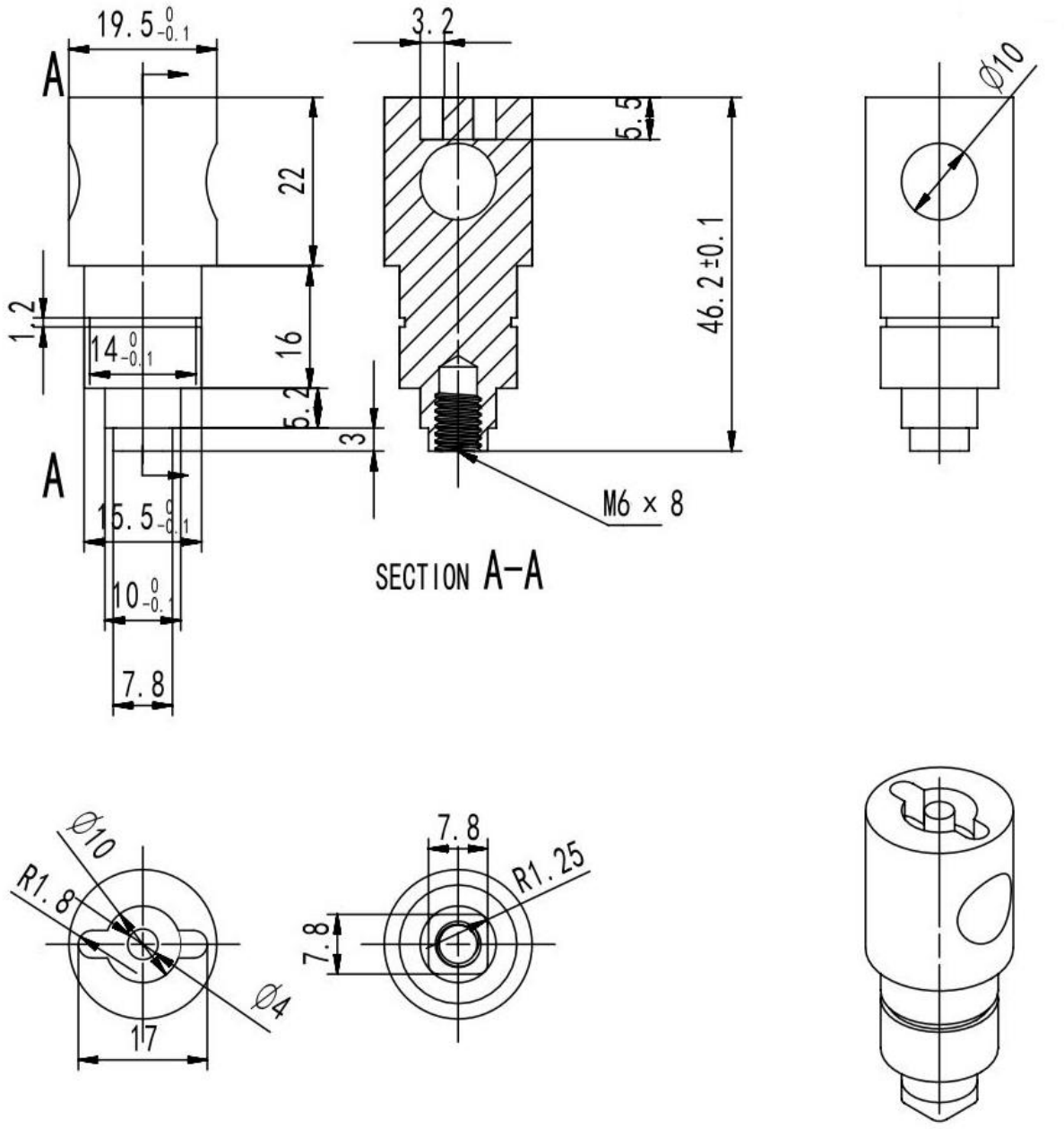


LEFT VIEW FRONT VIEW RIGHT VIEW

Drawing No. 12.0: Details of Stainless-Steel Cylindrical Rod Lifting Support



Drawing No. 13.0: Details of Camlock with Padlocking Provision



Drawing No. 14.0: Details of Locking Mechanism for the Camlocks