

SPECIFICATION NO. GRP 9.0
(Revised in March 2010)

SPECIFICATIONS FOR ENCLOSURE TO PACKAGE SUBSTATIONS
CONSISTING OF 250/500/1000/1500 KVA 11/0.433 KV DISTRIBUTION
TRANSFORMERS, RING MAIN UNITS & FEEDER PILLARS.

1.1. Standard Specifications:

All the materials offered shall conform to approved international or national specifications, copies of which shall be enclosed with the offer. The manufacturer's quality assurance document, which shall include the quality control of bought out items and materials, quality control of process, stage inspection, final inspection and testing etc shall be enclosed.

1.2. Site Conditions:

The enclosures shall be installed outdoors in UAE, in salt laden dusty atmosphere where a maximum of 100% humidity and ambient temperature of more than 50 deg. C can be experienced. The proposed enclosure to the sub-station shall withstand wind velocities as high as 130KM/HR.

1.3. Scope and Nature of work.

The specification provides for design of suitable enclosure for the type of substation as described below and as specified in the bill of quantities, manufacture, test at manufacturer's works/independent laboratory, suitable packing, transportation and off-loading at site of works or FEWA stores in satisfactory condition and proper stacking as directed by FEWA.

The substation shall comprise of transformer, ring main unit and feeder pillar connected with each other through XLPE cables. The transformers, ring main unit and feeder pillar shall be mounted on galvanized M.S. channels, which shall be fixed on a concrete ring foundation as shown in the enclosed drawing no. FEWA/E/GEN/274/06. This concrete ring foundation shall be cast at site separately by FEWA and is excluded from the scope of work of this specification. Internal dimensions are shown in drawing, which shall be however, to the approval of FEWA.

1.4 Construction of Enclosures

Construction of Enclosures shall be made of standard panels, frames, roofs and doors which can be easily handled, stored, transported and assembled at the site with labour of minimum skill.

1.4.1 **Walls:**

The panels for assembly of walls are proposed to be of the following standard dimensions:

Height	:	2500mm
Width	:	As shown in the drawing
Thickness	:	6/10 mm

1.4.1 **Roof:**

The roof shall overhang on the walls by atleast 100 mm and should have a suitable slope to prevent accumulation of rain water, The two standard pieces of the roof shall be to the FEWA's approval and shall ensure 100% leak proof joint. There shall be a continuous GRP fabricated frame in each roof piece, which shall rest on the flanges of wall panels. The roof and the GRP fabricated frame shall be moulded together to form one piece. Two pieces of roof shall be assembled together by using nuts and bolts from inside. The joint shall be sealed with water proofing materials or equivalent to ensure the water tightness, Lift off holes suitable for 3/8" eye bolt shall be provided in each roof piece corners in the overhang portion. The roof shall have front fascia of 100 mm all around.

Length	:	As shown in the drawing
Width	:	As shown in the drawing
Thickness	:	6/10 mm

1.4.2 **Ventilation:**

Each panel and shutter of door shall be provided with 2 Nos. of rectangular louvered ventilation cut-out at top and bottom of minimum clear dimensions of 300 x 700 mm to dissipate the heat generated by the substation equipment mounted inside the enclosure. All louvered shall be closed by epoxy coated galvanized mild steel square mesh of maximum 25 mm size in a aluminium/GRP frame together with minimum 12 SWG a finer stainless steel mesh so as to prevent reptiles entering inside the package. The louvers and frames shall be of polyester powder coated aluminium or GRP to the approval of FEWA.

- Two suction fans should be provided with each enclosure fixed on the side panel (one fan for each side of the enclosure) with timer to control the operations of the fans automatically, complete with all necessary fittings / materials required for the operation. The materials / arrangements should be approved by FEWA before mass production.

1.4.3 **Doors:**

Doors shall be provided for access to ring main unit, transformer and feeder pillar. Doors shall be provided as shown in the drawing. The doors shall be fitted in a common frame; the doors shall be sturdy and properly designed with ribs or stiffeners for use in the toughest conditions and shall not deflect or warp. The thickness of door panel shall not be less than 10mm and minimum of 4 nos heavy-duty stainless steel hinges shall be provided. Each shutter of doors shall be provided with wind stays at top and bottom to secure it in fully opened position and two numbers of tower bolts shall be provided on one shutter to secure it in closed position. Each door shall be provided with handle and aldrop, locking arrangements.

1.5 **Material for Standard Panels and accessories:**

The panel frames, door shutters and roof shall be made of fibre glass reinforced plastic (F.G.R.P). The fibre glass content of GRP shall be not less than 450gm/sq,m/mm thickness.

No corrosive material shall be used for construction of panels and accessories. The materials used shall have high mechanical strength and shall not deteriorate in high ambient temperature and humidity and long exposure to sun rays. The material shall have good fire resistance and shall be of self extinguishable type to Din 4102 class B 2 or BS 476 part 7 Class 1. and shall be bought from an approved materials supplier. Premixing of any ingredient for improving fire resistance/self extinguishable properties of the resin and gel coat shall not be allowed in local fabricator's factory. If required, it should be done at materials supplier's plant only.

The laminate shall have the following mechanical properties:

Tensile Strength : 80 MPA as per BS 2782 Method 320 C
Impact Strength : 55 KJ/m2 as per BS 2782 Method 350

The manufacturer shall confirm the capacity of the above GRP products for fire resistance.

All accessories such as screws, hinges, locking arrangements, fixing facilities shall be of non-corrosive materials as indicated below:

Hinges, Handles, Nuts, Bolts etc.	: Stainless Steel
Screws for jointing panels/frames and hinges	: Stainless Steel
Foundations bolts, bolts for supporting structure And bolts for mounting channels	: Stainless Steel
Wind stays of minimum 12 mm dia	: Stainless Steel
Aldrop of minimum 350x250mm	: Stainless Steel
Tower bolt of minimum 400mm in length	: Stainless Steel

1.6 **External finish :**

External finish coat of the panels shall conform protection against climatic conditions prevailing in UAE by using gel coat or by any method to the approval of FEWA. The coating shall provide a high level of resistance to ultra-violet light colour of external coat shall be grey or as per FEWA approval.

1.7 **Name Plates and Danger Plates :**

Name Plates and Danger Plates of Stainless Steel Type 316 L shall be engraved and painted in Arabic and English with the required information to the Approval of FEWA.

1.8 Electrical Fittings:

Two Fluorescent tubes with necessary fittings and their mounting arrangement shall be provided in the enclosure.

1.9 Fixing of earth fault indicators

- Suitable arrangement for fixing earth fault indicator internally on a side panel should be Provided.
- The earth fault indicator should be read clearly from out side through unbreakable glass window which shall not fade / defuse with the time.
- One complete sample of GRP should be inspected and approved by fewa before mass production.

1.10 Minimum Thickness

The minimum thickness shall be 6 mm and it shall be atleast 10 mm at flanges, bracing, frames, corner posts and any other area of high stresses. The specified thickness shall be even and uniform throughout the cross section of the product.

1.11 Installation of Panels at site (by others):

The fixing of panels at site is excluded from the scope of this specification.

The panels shall be fixed by others to the concrete base of floor by using nuts and bolts, it shall be possible to fix and to remove the panels from inside or outside the package substation, which shall be to the approval of FEWA.

The wall panels are to be duly supported by a structure of fabricated GRP section. This frame structure shall be fixed on concrete base and then panel assembly shall be completed. Panels shall be fixed to the floor and framed structure and joined with each other by nuts and bolts of 10mm diameter to the approval of FEWA. Roof shall also be joined by nut and bolt arrangement at the site. The wall panels shall be to the approval of FEWA. The tenderer shall furnish complete details of fixing and jointing along with his offer. The final arrangement shall, however, be to the approval of FEWA. Special tools, if any, shall be supplied for every 20 nos of enclosures.

The details given in the specification and drawings are for general information to the tenderer. The tenderers are required to furnish the details of fixing the panels (roof, frames & panels) with each other and with the supporting structure as well as fixing these to the foundation/floor along with his offer.

1.12 Design Calculations:

The tenderer shall support his offer with the necessary design documentation and test certificates from an independent testing authority to prove that his offer meets all the requirements specified, in general and the following in particular.

- a. Enclosures when assembled shall withstand the specified wind pressure.
- b. Panels, frames, shutters and roof thickness shall be that these are free from deflection or warp.
- c. Test certificates for chemical and mechanical properties of the proposed materials including GEL.

1.13 Templates for fixing panels and frames on concrete base:

One number of galvanized steel templates of 6 mm thickness in two halves for every 25 Nos. of enclosures shall be supplied so that correct grouting positions for bolts are achieved on different sites. These two halves shall be easily transportable to different sites and easily assembled on the sites by nuts and bolt arrangements.

1.14 Galvanized Iron Channel:

It is proposed to use 6 nos. of 150 mm x 75 mm @ 17 kg/m size galvanized M.S channels of grade 43 A on which transformer, RMU and feeder pillar will rest, as per the drawing. Each channel shall have two holes of 12mm dia at ends to fix on concrete base besides the required number of holes to fix transformer, RMU and feeder pillar. The mechanical properties, chemical composition and dimensions tolerance of approved channel shall comply the requirement of BS 4360 or equivalent. Pre-drilled channels shall be sand blasted and galvanized in approved workshop. The procedure of testing and galvanizing shall be in accordance with BS 729 or equivalent. These channels shall be included in the offer and shall be supplied along with the material for enclosure.

1.15 Weights of Transformer, RMU & Feeder Pillar:

The approximate weights of Transformers, RMU and Feeder Pillar shall be taken as follows:

1000KVA transformer	: 4000 kg
RMU	: 600 kg
Feeder Pillar	: 500 kg

While selecting M.S. channels safe load factor of weights to be added with the above figures. M.S. channels shall be selected in such way that a factor safety of 2.5 is achieved when positioned at the site.

1.16 Tests on finished Products:

The following tests shall be carried out on the finished product in accordance with approved test procedures. The tenderers shall submit their detailed proposals for the above. One finished panel/roof out of a batch 50 Nos. enclosures shall be selected by FEWA for these tests to be carried out in an independent laboratory. The Supplier shall make necessary arrangements for such tests in the presence of two FEWA Engineers. The supplier shall make provision in his offer to bear all costs that are incurred in carrying out these tests to the satisfaction of FEWA representatives, However the costs towards travel, accommodation etc of FEWA representatives shall not be included in the quoted price.

1. Mechanical properties to be tested in an independent laboratory.
 - a) Fibre Glass Content
 - b) Impact Strength
 - c) Tensile Strength
2. Fire retardant properties in an independent laboratory.
3. Routine tests on all finished products at manufacturer's works.
4. Demonstration of satisfactory assembly of the first GRP enclosure at manufacturer's works.
5. Water proof test shall be conducted at site on assembled GRP enclosure.

SCHEDULE 'A'

SUB-MANUFACTURERS

The Tenderer shall state below the names of the sub-manufacturers to the main manufacturer and details of the equipment proposed to be manufactured or supplied by them:

Name & Address of the Sub-Manufacturer	Description of Equipment
<ol style="list-style-type: none">1. Resin2. Gel coat3. Fibreglass mat4. Stainless steel Hardwares and fixtures5. Galvanized fixtures6. galvanized M.S. channels7. Protective mesh for louvers <p>Any other items which the tenderer may desire to mention, other than the above items.</p>	

Signature : _____

Designation : _____

Name of Tenderer : _____

Date : _____

SCHEDULE 'B'

PLACE OF MANUFACTURE, TESTING AND INSPECTION

The Tenderer to complete the following schedule for all materials he proposes to supply

Item No.	Description	Manufacturer	Place of manufacture	Place of testing and inspection

Signature : _____

Designation : _____

Name of Tenderer ; _____

Date : _____

SCHEDULE 'C'

DEVIATION FROM TENDER SPECIFICATION

The Tenderer to state in the following schedule the deviations from the tender specifications proposed in his offer. Deviations other than those specifically listed below will not be taken note of:

Item No.	Description	Precise Details of the Deviations

Signature : _____

Designation : _____

Name of Tenderer : _____

Date : _____

SCHEDULE 'D'

TECHNICAL PARTICULARS AND GUARANTEES

Item No.	Description	Unit	Particulars
1.	Name of Manufacturer		
2.	Material of enclosure		
3.	Process of manufacture : Hand-lay-up process		Yes/No.
4.	Applicable standard	BS/IEC/DIN	
5.	Fibre glass content of GRP	gm/sq.m/ Per mm thickness	
6.	Overall dimensions after assembly		
a)	Height	mm	
b)	Length	mm	
c)	Width	mm	
7 a)	Thickness of GRP at the flanges of panels	mm	
b)	Thickness of GRP panels	mm	
c)	Thickness of GRP fabricated frame	mm	
8.	Overall weight of enclosure when assembled	Kg	
9.	Material of accessories:		
a)	Hinges		
b)	Screws for fixing panels and hinges		
c)	Foundation bolts, channels, bolts		
d)	Al drop		
e)	Wind stays		
f)	Mesh for louvers		
g)	Frame for ventilation and louvers		
h)	Handles		
i)	Tower bolts		

Signature :

Stamp :

Item No.	Description	Unit	Particulars
10.	Total area of ventilation		
a)	Inlet	Sq.cm	
b)	Outlet	Sq.cm	
11.	Galvanized M.S. channels for mounting equipments included in the offer	Yes/No.	
a)	Dimensions of galvanized M.S. channel	mm	
12.	Degree of Protection IP 42.		
13.	Mechanical Properties of GRP :		
a)	Impact strength		
b)	Tensile strength		
14.	Fixing up of panels and interconnection of panels	Inside/ outside	

Signature :

Stamp :

SCHEDULE 'E'

DETAILS OF PAST EXPERIENCE OF MANUFACTURER

Name and address	Quantity supplied	Year of supply	remarks

Signature : _____

Designation : _____

Name of Tenderer : _____

Date : _____

