

**GUJARAT INDUSTRIES POWER COMPANY LIMITED**  
**(Surat Lignite Power Plant)**

**AT & POST NANI NAROLI, TALUKA: MANGROL, DIST: SURAT, PIN 394110 (GUJARAT)**  
**Phone Nos.: EPABX (02629) 261063 to 261072, fax Nos.: (02629) 261112, 261080**

DETAILED TECHNICAL SPECIFICATIONS FOR;

***Surat Lignite Power Plant: 4 x 125 MW: Unit 1 to 4:  
Replacement of existing roofing & cladding sheets from  
top of Boiler Unit-1 & 2 and roofing sheets of ESP Unit-1  
& 2 with new Color coated Galvalume sheets.***

***Bid No.: SLPP/Civil/Galvalume sheeting/2017-18/***



**VOLUME-II**

# DETAILED TECHNICAL SPECIFICATIONS

## 1.0 SCOPE

This specification covers the general requirements for supply, delivery and erection of all Galvalume sheeting for roofing, side cladding, ridge, gutter, etc... including all accessories and fixtures necessary to provide weather exposed surfaces of roof & walls, complete as per detailed specifications and scope of work.

## 2.0 APPLICABLE CODES AND SPECIFICATIONS

The following specifications, standards and codes, including all official amendments and revisions and other specifications referred to there in shall be considered as a part of this specification. In all cases the latest issue/edition/revision shall apply. In case of discrepancy between this specification and those referred to herein, this specification shall govern.

- (a) IS:277 & IS:513 - Specification for galvanized steel sheets (plain and corrugated).
- (b) AS-1397 - Galvalume sheet coating.
- (c) IS : 730 - Specification for hook bolts for corrugated sheet roofing.
- (d) IS : 8869 - Specification for washers for corrugated sheet roofing.

## 3.0 MATERIALS

The base metal of the roofing shall be Cold Rolled Steel Sheet conforming to IS: 513. It shall be zinc aluminum coated by Hot-dip process as per AS:1397 / IS:277 / IS:14246, AZ-150 gsm zinc / alum alloy coating total of both sides as per AS 1397), weathering surface finished with coat of nominal 20 micron of specified colour RMP (Regular Modified Polyester) over approved primer, rear side having nominal 5 micron neutral back coating and minimum Yield Strength 550 MPa (Test reports shall be submitted).

Supply & Fixing of Prepainted coloured Trapezoidal or approved profiled Sheeting 1000-1020 mm cover width, 28-30 mm high crests with subtle square fluting in the five pan at nominal 190-255 mm (as approved by EIC) centre-to-centre manufactured out of 0.50 mm TCT hi-tensile prepainted Zinalume /Galvalume steel (AZ-150 gsm. Aluminium –Zinc alloy metallic coating of total both sides 550 MPa yield stress as per AS-1397). Colour/ Exterior coat of RMP 20 micron top coat applied over 5 micron primer and a 5 micron polyester back coat applied over 5 microns primer OR equivalent coating/painting. The sheet shall have wide pans with stiffening ribs for effective water shedding and special male/female ends with full return legs on side laps for purlin support. The male end of the sheet shall have anti-capillary flute at side laps to prevent leakages. The sheet shall be fixed by means of anti corrosive approved make "Rust Shield" (Epoxy Polymer) coated self-drilling self tapping fasteners 12-14 X 55 mm with EPDM seals through crest for roofing and 12-24 X 20 mm through valley (pans) for wall cladding. The sheet shall be supplied in lengths maximum up to 6-12 meter long to suit site dimensions. The scope includes all sealing of joint, curves, edges or other accessories with silicon sealant.

The sheets shall be free from cracks, pitting, blisters, split edges, twists, laminations, scales and other surface defects. Sheets shall be clearly sheared and be free from twist or buckle and shall have uniform profile, true in depth and pitch parallel to the sides of the sheet. The coating shall be clean, bright, smooth and free from ungalvanized spots and other defects. The sheets supplied shall show no signs of rust or white powdery deposits on the surface.

- a) The bidder may consider CLIP LOCK system instead of self-drilling screw system without any change in specification, rates and terms and conditions of the work.
- b) 0.50 mm thick TCT (Total Coated Thickness) / 0.45 BMT (Base Metal Thickness) pre-coated sheet of make "TATA BlueScope", "Lloyd", "Interacrh - Tracdec" or "Kirby" or "Jindal" make confirming with minimum tensile strength 550 MPa confirming AS : 1397. The sheet should pass 1000 hour salt test as per relevant test.

### 3.1 Properties

The pre-coated zinc aluminium steel sheets meet the following performance standards.

Pencil Hardness	Min. HB
T-Bending Test	5 T
Impact Resistance	Min. 10J
Salt Spray Test	1000 Hours (Exposed top side)
QUV – Wealterometer Test	1000 Hours
Humidity Test	1000 Hours
Temperature Resistance	100 deg C for 24 hours
Fire Performance	Class-I

### 3.2 Profile

The profile shall have a depth of not less than 28mm at a pitch of not more than 255 mm (with intermediate ribs). Overall total coated thickness shall be minimum 0.50mm having base metal thickness of 0.45mm. Minimum weight (supply width) shall be 5.00Kg/SqM.

### 3.3 Accessories

All roofing accessories like ridge, corners, flashing, north light curves/ bend, and gutter, gutter spout, etc. shall be fabricated out of the approved pre-coated sheets. Metallic self-drilling self-tapping fasteners for fixing shall be corrosion proof meeting performance standard as per AS: 3566, Class-III having neoprene washer. Sealants shall be neutral cure type and cold setting variety.

All the final inspected materials should be packed properly for transportation, loading/unloading and storage purpose. Packing & forwarding cost shall be included with offer.

### **3.4 SAMPLES FOR APPROVAL**

The contractor shall furnish to the Engineer-In-Charge for approval of samples of all material to be used in the item/work. Such samples shall be submitted before item/work is commenced in advance. Profile of ridges, curved surface, North light Curve, louver, corners, Apron Piece, Gutter, Gutter pipe is to be decided by EIC. It is the responsibility of the contractor to arrange for tests as required by Engineer-In-Charge at his own cost. The material representing approved samples shall only be used for the construction and installation. Contractor shall procure materials as indicated in list of approved makes (if given) / or materials with ISI certification may also be used after approval of EIC.

### **4.0 STORAGE OF MATERIALS**

- 4.1 Sheets shall be stacked to a height of not more than one meter on firm and level ground, with timber or other packing beneath them.
- 4.2 Galvanized steel materials of same variety and size shall be stacked together.
- 4.3 All galvanized materials shall be protected from damage while stored on site preferably in sheltered store. If they are to be placed in an exposed position, they shall be protected from damage by wind and rain by providing a suitable cover.
- 4.4 Contractor shall exercise great care in handling the sheets and accessories. Damaged materials shall not be stacked with sound materials. All damaged or rejected materials shall be removed from site immediately.

### **5.0 LAYING**

- 5.1 The sheets shall be laid on the purlins/ other roof members, wall cladding and side girths as indicated on the drawings or as instructed by Engineer.
- 5.2 Before the actual laying of sheets is started, the purlin spacing and the length of the sheets shall be checked to ensure proper laps and the specified overhang at the eaves. The end lap of the sheets shall always fall over a purlin/ side girt.
- 5.3 The bearing surfaces of all purlins/other roof members and side/girths shall be in one plane so that the sheets being fixed shall not be required to be forced down to rest on the purlins/side girths. The finished roof shall present a uniform slope and the lines of profile shall be straight and true and the completed work shall present a neat and uniform appearance and be leak proof. For side sheeting, profile shall be vertical and in one plane.
- 5.4 The sheets shall be laid with a minimum lap of 150 mm at the ends and special male-female lapping at each side. In the case of roofs with a pitch flatter than 22 degrees or in the case of very exposed situations, minimum end laps shall be 200 mm. The side laps shall be laid on the side facing away from the prevailing monsoon winds. The minimum lap of sheets with ridges, hips and valleys shall be 200 mm measured at right angles to the line of ridge, hip or valley respectively. The free overhang of the sheets at the eaves shall not exceed 300 mm.
- 5.5 The sheets shall be cut to suit the dimensions or shape of the roof, either along their length or their width or in a slant across their lines of profile at crests and valleys. They shall be cut carefully with a straight edge and chiseled to give a smooth and straight finish. The profile sheets shall not generally be built into gables and parapets. They shall be bent up along

their side edges close to the wall and the junction shall be protected by suitable flashing or by a projecting drip course covering the junction by at least 75 mm.

- 5.6 Where slopes of roofs are less than 22 degrees, sheets shall be joined together at the side laps by approved fasteners. The seam bolts shall be placed zig zag over the two overlapping profile at a spacing not exceeding 600 mm along each of the staggered rows.

## **6.0 FIXING**

- 6.1 Sheets shall be secured to the purlins and other roof members by means of approved self driven screws or required size & dia. approved make PVC coated galvanized iron J or L hook bolts and nuts with bitumen and G.I. limpet washer or with a G.I. limpet washer filled with white lead, as directed by Engineer-in-charge. The grip of the hook bolt on the side of the purlin shall not be less than 25 mm. Each hook bolt shall have a neoprene washer and a galvanized iron washer placed over the sheet before the nut is screwed down from above. There shall be a minimum of three hook bolts placed at the crest/valley of profile in each sheet on every purlin and spacing shall not exceed 300 mm. Washer 35 mm in dia. and 1.5 mm thick shall be of approved manufacture. Each nut shall be screwed lightly at first. After 10 or more sheets are laid, the nuts shall be tightened to ensure a leak proof roof. The bolts shall be sufficiently long so that after fixing they project at least 12 mm above the top of their nuts.
- 6.2 Where sheets are laid on tubular purlins, the fixing bolt shall be designed to encompass at least half the tube circumference and precautions should be taken to prevent its rotation.
- 6.3 Holes for hook bolts etc. shall be drilled and not punched in the crest/valley of the profile in the exact positions to suit the purlins while the sheets are on the ground. The diameter of holes shall be 1.5 mm more than the diameter of the fixing bolts, while the holes in the washers shall be of the exact diameter of the hook bolts or the seam bolts. No hole shall be nearer than 40 mm to any edge of a sheet or an accessory. Sheets with holes drilled wrongly shall be rejected.
- 6.4 Direct fixing of sheets to drilled steel frame work or by stud welding or fixing by coach screws shall not be permitted.

## **7.0 GENERAL**

- 7.1 All work shall proceed in a diligent and systematic manner.
- 7.2 Contractor shall not allow access to any person other than workmen employed for laying and fixing sheeting while the above work is in progress. If, however, it is not possible to keep the area clear, suitable safety measures shall be taken by contractor during the progress of the work.
- 7.3 Contractor shall use roof ladders or planks while laying and fixing the sheets, to avoid damage to sheets and to provide security to the workmen.
- 7.4 Contractor shall arrange any staging or other temporary structures required for the purpose of installing the roof and side sheeting at his own cost.
- 7.5 At no time shall the sheets or accessories be laid and left unfixed. Temporary fixing/supporting shall not be acceptable. In case of any loss or damage due to infringement of these conditions by contractor, the same shall be made good by contractor at no extra cost to owner.

## **8.0 RIDGE, GUTTER & CORNER FLASHING**

### **8.1 Ridges and hips:**

- 8.1.1 Ridges and hips of profile roofs shall be covered with ridge and hip sections of plain sheets with a minimum 200 mm lap on either side over the profile sheets. The end laps at the ridges and hips and between ridges and hips shall also be not less than 200 mm. The ridges and hips shall be of 600 mm overall width made from plain Galvalume sheets of same technical specifications, bent to shape and fixed as per site requirement.
- 8.1.2 At least one of the fixing bolts shall pass through the end laps of ridges and hips, on either side. If this is not possible extra hook bolts shall be provided.
- 8.1.3 The end laps of ridges and hips shall be joined together by PVC coated G.I. seam bolts 25 x 6 mm size each with a bitumen and G.I. limpet washer. There shall be at least two such bolts in each end lap.
- 8.1.4 The edges of the ridges and hips shall be straight from end to end and their surfaces shall be plane and parallel to the general plane of the roof. The ridges and hips shall fit in squarely on the sheets and shall be leak proof.

### **8.2 Valleys and Flashings:**

- 8.2.1 Valleys shall be 900 mm wide overall made from plain G.I. sheet 1.6 mm thick bent to shape and fixed as shown on the drawings or as directed by Engineer. Laps with profile sheets shall not be less than 250 mm on either side. The end laps of valleys shall also not be less than 250 mm.
- 8.2.2 Flashing shall be of same plain sheet having 400 mm overall width, bent to shape and fixed as shown on the drawings. They shall lap not less than 150 mm over the roofing sheets. The end laps between flashing pieces shall not be less than 250 mm.
- 8.2.3 Laying and fixing shall be as for Ridges and Hips.

### **8.3 Eaves and Valley Gutters:**

- 8.3.1 Gutters shall be fabricated from plain Galvalume sheets of same specifications as profile sheets.
- 8.3.2 Eaves or valley gutters shall be of the shapes and section as shown on the drawings or as directed by the Engineer. The overall width of the sheets referred to therein shall mean the peripheral width of the gutter including the rounded edges. The longitudinal edges shall be turned back to the extent of 12 mm and beaten to form a rounded edge. The ends of the sheets at junctions of pieces shall be hooked into each other and beaten flush to avoid leakage.
- 8.3.3 Gutters shall be laid with a minimum fall of 1 in 120. Gutters shall be true to line and slope and shall be supported on and fixed to Galvanized flat iron brackets bent to shape. Where the brackets are to be fixed to the purlins, the brackets shall consist of 50 mm x 3 mm flats bent to shape with one end turned at right angle and fixed to face of purlins with 10 mm dia. bolt, nut & washer. The requisite

slope in the gutters shall be given in the line of brackets. The brackets shall be placed at a spacing of not more than 1.2 m. The gutters shall be fixed to the brackets with 2 nos. 6 mm dia. G.I. bolts and nuts, each fitted with a pair of G.I. and bitumen washers. The connecting bolts shall be above the water line of the gutters.

- 8.3.4 For connections to down take pipes, Contractor shall fabricate a proper drop end or funnel-shaped connecting piece, stop ends, etc. and flat iron brackets and bolts and nuts required for fixing the latter to the roof members.

## **9.0 MEASUREMENT & PAYMENT**

- 9.1 The measurement shall be taken for the finished work in superficial area on the flat in the plane of the roof/side measured in sqm (M2) without allowance for laps & profiles and payment shall be effected based on the rates quoted by Contractor after making necessary deductions for openings.
- 9.2 The laps between the sheets both at the ends and at the sides shall not be measured. However, the overlaps of the sheets over valley gutters, ridge, hip and flashing pieces shall be included in the measurement.
- 9.3 No deduction shall be made for opening less than 0.40 sqm in area and nothing extra shall be paid for forming such openings. For openings exceeding 0.40 sqm in area, deductions shall be made in measurement for the full opening and no payment shall be made for labour involved for making these openings.
- 9.4 Roofs with curved sheets shall be measured and paid for separately. Measurement shall be taken on the flat and not girthed. The breadth of the roof shall be measured along the trough of the curved sheets.
- 9.5 The rate shall include the cost of all materials and labour involved in all the operations described in these specifications and as may be necessary for the work. The materials shall interalia include sheets, accessories, PVC coated galvanized iron J or L hook bolts and nuts, G.I. seam bolts and nuts, bituminous/neoprene and G.I. limpet washers, brackets, self driven screws, etc.
- 9.6 The rate quoted shall also include providing any staging or any temporary structure required for the purpose of installing the roof and side sheeting by means of MS "H" frame, MS scaffoldings, etc... only.

## **10.0 TESTS / INSPECTION**

Contractor has to make all the arrangements for tests / inspection either at site or elsewhere at his own cost and expenses. Also necessary laboratory tests may be carried out at his own cost and expenses. However, contractor must use ISI marked materials or materials of listed approved make, wherever required. Contractor shall arrange necessary test as per standard practice and decided by Engineer-In-Charge for the materials used for the work. However, the contractor has also submitted the test certificate of material provided by manufacturer.

- 11.0 The rate also includes testing of samples of various materials (field or laboratory) and transportation, loading-unloading of the materials at site including applicable taxes & duties (excluding GST on item rates), etc.

- 12.0** Any other requirement which is not covered in the scope but necessary to complete the supply and work are to be complied by the bidder with the coated rates.
- 13.0** Bidder may visit the site of works before quoting his rates / prices for correct assessment of work.
- 14.0** Length of the sheets & roofing accessories should be 1.5m, 2.0m, 3.0m, 4.0m, 5.0m, 6.0m or as per direction of GIPCL. However, bidder may assess the app. Qty of all sizes by visiting the site before submitting the offer.
- 15.0** Colour of the sheets shall be finalized by GIPCL. Bidder has to supply the materials exactly as per colour suggested by GIPCL.

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