Project: Seed processing Unit at Sherghati, Gaya/ Kudra, Kaimur

Specifications for PEB Structure

PRE ENGINEERED STEEL BUILDING STRUCTURE (PEB STRUCTURE)

Structural Members

Curved Rafter: Primary (Build-up) sections for CURVED RAFTER shall be fabricated from hot rolled steel plates conforming to ASTM A 572M Grade 50 **or equivalent with minimum yield strength of 345 MPa**. FlanENG I/Cs shall be welded to the web by a continuous double side fillet weld (min. 8mm) deposited by an automatic submerENG I/Cd arc welding process. The Built up frame shall be shot blast & primed with one coat of zinc rich/Epoxy primer paint applied and two coats of paint as specified.

Purlins, Runner & Bracings : Secondary members viz. Purlins and Runners shall be · Square Hollow Sections: as per IS : 4923 and Rectangular Hollow Sections as per IS : 4923, manufactured by the HFIW (High Frequency Induction Welding) process, from **high quality Hot Rolled coils of YST 310 grade sections**. The bracings will of grade of steel as specified in the drawings.

Galvalume Roofing Sheet- Coloured

Galvalume sheet shall be 0.60mm thick (total coated thickness), 550 MPa minimum, yield strength. It shall be coated with hot deep alloy of 55% Aluminum 43.5%.Zinc 1.5% Silicon and finished with resin coat on both surfaces @ 150gm/sqm of coating(total both surfaces) having overall width and laid width and as specified and shall be fixed using hot dip galvanized, self drilling and self tapping screws neoprene and EPDM washers. Penetration and laps in sheet shall be sealed by using proper bead mastic. HDPE fillers shall be provided wherever required to close voids between sheets, sheet & fasteners etc.

Fixing system shall be as per manufacturers instructions and shall be safe against effects of Wind velocity. End Lapping will be minimum 200mm.

Wall Panels – Coloured

Panels shall be roll formed from nominal 0.60mm base metal thickness of minimum yield strength of 550 MPa, coated with an aluminum / zinc alloy (i.e. Zincalume Steel), (min 150 gm/m² total on both sides), conforming to Australian standard AS1397, pre-painted with Colorbond steel quality paint. The paint finish thickness shall have a total coating thickness of nominal 35µm, comprising of nominal 20µ m on exterior face and nominal 5µ m reverse coat on interior face over nominal 5µ m epoxy primer coat on both surfaces of approve color shade by ENG I/C. The steel manufacturers face certificate for the chemical and mechanical properties of steel shall be submitted for approved by the ENG I/C prior to installation. The sheet shall have brand marking of the manufacturer giving products details on the back of the sheet.

Profile dimensions

Roof and Wall Trapezoidal type profile sheet shall have 1000- 1015mm effective cover with, nominal 28mm deep ribs with subtle square fluting in the five spans at nominal 203mm centre to centre. The wide valley shall have a sloping profile for faster rainwater run off and as per detailed Drawing. The end rib shall be designed anti-capillary action, to avoid any seepage of water through the lateral overlap. The profile and colour of the Sheet shall be sample approved by the ENG I/C.

Trims & Gutters

Wall flashing and trims (gable, corner, framed opening, accessories, etc.) shall be manufactured from s ame color, finish and thickness as wall panels. Roof flashing and trims (parapet flashing, transition

trims, expansion join trims and ridge caps) shall be manufactured from same color, finish and thickness as roof panels. Eave gutters and downspouts shall be cold formed from same material wall panels and as per approved Brand List.

Protection Accessories
Protection net shall be provided as per manufacturer's recommendation.

Accessories
Anchor bolts shall be manufactured from rods conforming to ASTM A 36M Grade 36 or equivalent with minimum yield strength of 240 MPa and an ultimate strength of 400 MPa.

Bracing rods, used in sidewalls of buildings supporting cranes shall be solid plain round steel bars conforming ASTM A 36M or equivalent with minimum yield strength of 240MPa.

FlanENG I/C braces used to stabilize the inner flanges of main frame columns and rafters shall be 50mm x 50mm x4mm steel angles conforming to ASTM A 36M (or equivalent) with minimum yield strength of 240 MPa.

Panel Endlap: The panel lap shall be minimum 200 mm and sealed with bead mastic or Rope seal tape.

Sealant: Special grade of silicon non-hardening, neutral cure type of approved make and grade shall be applied at all side laps and endlaps (with flowable mastick) as per manufacturer's recommendation and approval by ENG I/C.

Bead mastic shall be an extruded elastomeric butyl rubber based sealant supplied in rolls on silicon release paper conforming to Federal Specification TT-C-1796 A Type II Class B (or equivalent).

Flowable mastic (caulking sealant) shall be a neutral cure silicon rubber sealant that is chemically insert and non corrosive, UV resistant and suitable for exterior applications against weathering and rainwater. When cured it is non-toxic and shall be able to accommodate high thermal and shrinkage changes in structural movement joints.

Foam closures shall match the panel profile. They shall be made of expanded polyurethane or similar material.

Fasteners/Screws: The fasteners for sheets will be SDTC (Self Driving Trapping Screws) with EPDM

Erection and Fixing:
The erection and fixing has to be done through approved steel Builder of Manufacturer of PEB structure as per Approved List (Append A)

The contractor shall be required to submit design calculation in support of proposed profile of the sheet and standard loading etc. to the satisfaction of Accepting officer. The contractor shall also submit methodology for fixing and also a maintenance manual for routine maintenance.

Special flashing, ridge capping and trims shall be fixed as per manufacturer's recommendation. The shape and girths shall be as per design requirement and shall be as approved by the ENG I/C.
Panel clips shall be positioned by matching the hole in the clip with the factory-punched holes in the secondary structural members.

Panel endlap, when required, shall be at least 200 mm sealed with neutral-cure sealant and fastened together clamping plates. Sealant shall contain hard nylon beads which prevent it from flowing

out due to clamping actions. The panel shall be joined by means of two-piece clamped connection consisting of a bottom reinforcing plate and at top panel strap. The panel endlap shall be located directly over, but not fastened to, a supporting secondary roof structural member and uniformly placed
The contractor shall ensure that panel erector is familiarized with the erection procedure and all the supporting members are straight, level and true (according to AISC) before starting panel erection. Panels shall be erected according to approved shop drawings.

QUALITY ASSURANCE PLAN AND QUALITY CONTROL MEASURES FOR PEB STRCTURES ARE GIVEN SEPERATELY IN APPENDIX –B.

Embossed Polycarbonate Translucent sheeting for Skylight

The panel shall be nominal 2.00 mm thick, embossed polycarbonate sheets of GE Lexan Make or equivalent. The profile should match that of the roofing sheets for fixing the translucent sheeting. The profile and properties shall be approved by ENG I/C before installation.

PEB REDESIGN ASPECTS & PARAMETERS

The contractor shall follow the design of the Pre Engineered Building (PEB) enclosed as approved as part of this tender. The Design and drawings are firm and will not be changed during construction / erection without prior approval of the ENG I/C.

Deviation in PEB Design by Contractor

In case of any deviation sought by the contractor in the PEB Structure , the Contractor shall take prior approval of the ENG I/C

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APPENDIX – B

QUALITY ASSURANCE & QUALITY CONTROL
PEB Structure

Introduction

This specification shall be read in conjunction with other documents forming the contract viz. NIT, Instructions to Bidders, general conditions of contract, special conditions of contract, specifications of related works and other documents furnished by CLIENT.

The contractor shall visit the site and ascertain the local conditions, entry and traffic restriction, all obstructions in the area and also ascertain all site conditions. The contractor shall allow for extras likely to be incurred due to such conditions and no claim shall be entertained on this account under any circumstances from the contractor.

The contractor shall set out and level the works and will be responsible for the accuracy of the same. The contractor is to provide all instruments and proper qualified staff with labour for getting his work checked by ENG I/C.

The contractor shall take adequate precautions to ensure complete safety and prevention of accidents at site. The safety precautions shall conform to the relevant IS codes, laws and local regulations.

The contractor shall protect surveyor's bench marks and reference lines, ground water gauges and control points from damage or movement during work. In case of any damage, the contractor shall have to restore to original condition at his own cost.

Standards & Site Condition

The design and installation shall fully comply with the requirements of the Bureau of Indian Standards and other statutory regulations that are in force in the place of installation. The work shall be carried out in accordance with the latest editions of relevant BIS Standards particularly the following and wherever Indian Standards are not available, international standards shall be followed:

a. IS 875: 1987 Code of practice for design loads (other than earthquake) for buildings and structure.
   i. (Part I) Dead Loads – Unit weights of building materials and stored materials
   ii. (Part II) Imposed Loads
   iii. (Part III) Wind loads
b. IS 800: 2007 Code of Practice for general construction in steel
c. IS 1893: Part I: 2002 Criteria for earthquake resistant design of structures – general provisions and buildings
d. IS 1893: Part 4: 2005 Criteria for earthquake resistant design of structures – Industrial Structures including stack-like structures
e. IS: 513: 1994 Cold-rolled low carbon steel sheets and strips
f. ARE 814: 1991 Covered electrodes for manual metal arc welding of carbon and carbon manganese steel
g. IS 733:1983 Specification for Wrought aluminum and aluminum alloy Bars, Rods and Sections (for General Engineering Purposes)
h. IS 1081:1960 Code for Practice for Fixing and Glazing of Metal (Steel and Aluminum) doors, windows and ventilators.
j. IS 1868:1996 Anodic coatings on Aluminum and its Alloys-specifications
k. IS 1948 :1961 Specification for Aluminum Doors Windows and Ventilators
l. IS 5523 :1983 Methods of Testing Anodic Coatings on Aluminum and its alloys

Site Conditions

Mean annual rainfall 171.8 cm
Basic wind speed 180 km per hour (as per IS 875- Part 3)
Seismic Zone – Zone V as per IS: 1893
Maximum ambient temperature 35 deg C
Minimum ambient temperature 5 deg C

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QUALITY ASSURANCE

In addition to the special provisions made hereafter as to the sampling and testing of materials by particular methods, samples of materials and workmanship proposed to be employed in the execution of the work may be called for at any time by ENG I/C and when so called for by the Client, the same shall be furnished by the contractor free of cost without delay. The samples when approved shall be kept by

CLIENT who shall reject all materials or workmanship not in conformity with the quality and character of the approved samples. Suitable labelled boxes for the storage of the said samples shall be provided by the contractor free of cost.

The contractor shall furnish to the ENG I/C the following certificates/documents before commencement of fabrication work at any time thereafter as described by the ENG I/C:

A certificate stating the process of manufacture, physical properties and chemical composition of the steel supplied.

Test certificates by the manufacturer giving the results of each of the specified mechanical tests applied to the structural steel, bolts, nuts and rivets and the chemical composition of the same.

QUALITY ASSURANCE PROGRAM (QAP)

All the structural materials shall be inspected by the CLIENT / ENG I/C or its appointed 3rd party inspector before dispatch to site for installation. Should any structure be found not to comply with any of the provisions of this specification, it shall be liable for rejection. No structure or part of the structure, once rejected shall be re-submitted for inspection / test, except in cases where the ENG I/C considers the defect as rectifiable.

DRAWINGS

Unless otherwise stated, the contractor shall be responsible for the preparation of the shop detail (working) drawings, erection and marking plans and all necessary lists such as indents, and bolt lists, material lists and lists for all bought out items on the basis of design drawings.

All drawings prepared by the contractor shall be made to Indian standard size A1 according to IS: 696 – code of practice for general engineering drawings – unless otherwise approved by the ENG I/C. The drawings shall be fully referenced to relevant design drawings, marking/erection drawings and all interconnected drawings. All dimensions and other units shall be given in SI system.

FABRICATION STANDARD

All fabrication of structural steel work shall be in accordance with IS: 800 and as per the approved drawings unless otherwise specified. The fabrication shall be carried out in a state of the art manufacturing facility for pre fabricated structures with minimum following machines:

a. Automatic beam welding line
b. Plate shearing line
c. Radial drilling machines
d. Cold forming line
e. Hydraulic press
f. Shot blasting machines

The tolerances of fabrication of steel structures shall be in accordance with IS: 7215 unless otherwise specified.