

**GLOBAL TENDER FOR FUEL OIL HANDLING AND STORAGE SYSTEM OF 2 X 250 MW  
NEW NEYVELI TPP (SG)**

Ref No. : PE/PG/NTI/E-4588/2014

Date: 10.11.2014

**CORRIGENDUM/ ADDENDUM-2**

**Our Ref : TENDER ENQUIRY NO: PE/PG/NTI/E-4588/2014 Dt. 10-10-2014**  
**Package : FUEL OIL HANDLING AND STORAGE SYSTEM**  
**Project : 2 X 250 MW NEW NEYVELI TPP (SG)**

This is in reference to the above Tender Enquiry No: PE/PG/NTI/E-4588/2014, DTD-10.10.2014 please note that following clarification against above tender enquiry.

S.No.	Section/Clause/Page No.	Statement of referred clause	Vendor's Clarifications required	BHEL REPLY
1	Vol. II B, Sec C, Clause 1.1.0. i) & j) / Page 10 of 303	i) One (1) no. vertical Non clog centrifugal pump motor set of capacity 10m <sup>3</sup> /hr with all accessories in OWS to transfer separated oil water mixture to ETP. j) Two (2) number vertical centrifugal sump pump motor sets with all accessories of capacity 10m <sup>3</sup> /hr in Fuel oil U/L Pump House to transfer bilge water from pump house to OWS.	Both referred clauses are contradicting about type of sump pumps. Hence please clarify the same.	Sump pump shall be vertical single screw type
	Vol. II B, Sec C, Annexure II/ Clause 1.5/ Page 31 of 303	UNLOADING PUMPS, DRAIN OIL PUMPS & SUMP PUMPS 1. Type of Pumps: Sump Pump in Oil Water Separator pit - Vertical single screw type		

12.10

Please reply to:  
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HRD & ESI Complex Plot No. 25, Sector -16 A,  
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2	Vol. II B, Sec C, Annexure II/ Clause 1.14/ Page 38 of 303	VELOCITIES FOR SELECTING PIPING	Please provide the velocity criteria for HFO & LDO suction and discharge sides.	HFO , suction side - 1m/s max, discharge side - 1.5 m/s. LDO, suction side - 1.5m/s, discharge - 2.0 m/s
3	Vol. II B, Sec C,/ Page 2 of 303	Thermal Insulation	Specifications & thicknesses for thermal Insulation and caldding material for pipelines and equipment (ie., tanks) is not given in the tender. Please provide the same.	Thermal insulation specification is attached under Annexure-I.
4	17.0.0 OTHER REQUIREMENTS xi) Page 21 of 303	In case of any contradiction of above specification with that of specification given under section- VIII, the spec. given under section-VIII shall prevail.	Kindly specified the NDT requirement for site activities.	For FOPH Shell butt joints- • 100% LPI after back grinding. • 100% RT for all "T"Joints • 10% RT for remaining butt joints For FOPH Shell fillet joints • 10%LPI for all fillet joints. • Fill test for full tank • Vacuum test for the bottom plate For the floor coil • 100% RT for all butt joints (TIG & Arc) Remaining butt joints of steam and oil lines (TIG & Arc)

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				<ul style="list-style-type: none"><li>• 10% RT for butt joints</li><li>• 10%LPI for fillet joints</li><li>• 100% Hydro test</li></ul>
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Thanking You,

With Regards,  
For & on behalf of BHEL

  
10/11/2014

Kamal Kishore  
Sr. Engineer/PG-II-2

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ANNEXURE-I

SPECIFICATION FOR THERMAL INSULATION





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### 5.1 General

All equipment / pipes / ducts whose surface temperature is higher than 60°C will be provided thermal insulation along with aluminum cladding for personnel protection and heat conservation. The insulation material will be chemically inert, non-combustible and will be harmless. Outer surface of the insulation will be covered with aluminium cladding.

### 5.2 Design Criteria

Thermal insulation to be provided for:

- i) Piping & equipment having rated operating temperature exceeding 60°C (except mills).
- ii) For insulation thickness calculation ambient temperature will be 45°C or as per ASTM C 680 or equivalent.
- iii) Wind velocity = 0.25 m/sec for outside the plant building and 0.5 m/sec for inside the plant building.
- iv) Thermal conductivity = Not less than values given in IS-8183
- v) Emissivity = 0.2

### 5.3 General Requirements

#### 5.3.1 Insulation Materials

a) Material and application of insulation material, protective cladding, wire mesh etc. will be conforming to latest edition of following Codes:

- i) IS:8183 - Bonded mineral wool
- ii) IS:3677 - Unbonded Rockwool/Mineral Wool
- iii) IS:3144 - Methods of test for mineral wool thermal insulation materials
- iv) IS: 14164 - Thermal insulation of cold services
- v) IS:280 - Mild Steel Wire for General Engineering Purposes
- vi) ASTM-B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
- vii) IS 4412 - Copper wires for general engineering purposes
- viii) IS 7413 - Code of practice for thermal industrial application and finishing of thermal insulating materials
- ix) IS 9843 - Code Of Practice For Use Of Adhesives For Packaging
- x) IS 737 - Wrought aluminium and aluminium alloy sheet and strip for general engineering purposes

Other equipment or better international codes/ standard will also be acceptable.

b) Insulation material for all equipments, piping, ducting, etc. will conform to following requirements:

- i) Material Lightly resin bonded mineral wool of best grade conforming to IS: 8183. (Hand made mattresses are not acceptable). Material will be rock wool only. Slag wool or slag wool inclusion will not be accepted.







- Lightly resin bonded glass wool mattress, having density 64 kg/m<sup>3</sup> (min.), self stitched in shop can also be accepted for temperature less than 400°C.
- ii) Bulk density of lightly resin bonded mineral wool mattresses will be 100 kg/m<sup>3</sup> for use up to 400°C and 150 kg/m<sup>3</sup> for use above 400°C.
  - c) The Insulation mattress will be rated incombustible when tested by the method prescribed in clause 15 of IS:3144 and will meet the requirement of the Mercantile Marine department, Lloyd's Register of shipping, underwriter, fire hazards codes and other International standards.
  - d) Insulation material (and protective covering) will:
    - i) Be fresh, incombustible, rust proof, non hygroscopic,
    - ii) Be capable of withstanding continuously and without deterioration the maximum temperature to which they will be subjected.
    - iii) Not react chemically, either to itself or with other components.
    - iv) Not sustain any fungi or vermin and must not pose health hazards.
  - e) The use of insulation of finishing materials containing asbestos in any form is not permitted.
  - f) Insulation mattress/section will be supplied in thickness of 25, 40, 50 and 75 mm. Insulation of higher thickness will be made up in multiple layers using mattress/slabs of thickness specified above. However, if the required thickness is such that by using above mattress/slabs the calculated thickness is not achieved, the mattress/slabs in increment of 5 mm will be acceptable for outer layers. The min. thickness however, will not be less than 25 mm and number of layers will be minimum and innermost layer will be thickest.

### 5.3.2 Sheathing Material

Sheathing material for all insulated surfaces, equipments, piping etc. confirming to ASTM B-209-1060 temper H-14 or IS: 737 Gr. 19000/H2 will be provided as per following:

- a) For dia of insulated surfaces of 450 mm & above and flat surfaces 18 SWG
- b) For dia of insulated surfaces less than 450 mm - 20 SWG
- c) For steam generator outer casing ribbed Aluminium - 18 SWG

### 5.3.3 Binding and Lacing Wires

Binding and lacing wires will be provided as follows:

- a) Up to 400°C - Binding wire of 18 SWG and Lacing wire of 22 SWG and material for both is Galvanised steel.
- b) Above 400°C - Binding and Lacing wire is 19 SWG and material for both is Stainless steel.

### 5.3.4 Straps and Bands

Straps and bands will conform to materials as under:

- a) Up to 400°C - Galvanised Steel







b) Above 400°C - Stainless Steel

Bands will be 20 mm wide and 0.6 mm thick

For securing Aluminium sheathing material, stainless steel or anodised aluminium bands will be used.

Screws will be of galvanised steel, check headed, self tapping type. Above 400°C temperature, screws will be stainless steel.

Non metallic components like 3 mm thick mill board, aluminium pigment sealant, white glass cloth, insulating cement, neoprene washer will be provided.

**5.3.5 Application of Insulation**

- a) All surfaces to be insulated will be cleaned of all foreign materials such as dirt, grease, rust etc. and will be dry before the application of insulation.
- b) Before applying the insulation the Contractor will check that all instrument tapping, clamps, lugs and other connections on the surface to be insulated have been properly installed as per the relevant erection drawing.
- c) All flanged joints will be insulated only after the final tightening and testing.
- d) The insulation will be applied to all surfaces when they are at ambient temp. Ample provision will be made for the maximum possible thermal movement and the insulation will be applied so as to avoid breaking/telescoping due to alternate periods of expansion and contraction.
- e) All cracks voids and depressions will be filled with finishing cement, suitable for the equipment operating temperature so as to form a smooth base for the application of cladding.
- f) All vertical pipes will be provided with the suitable insulation supports to prevent collapsing/crushing of insulation due to its self weight. Support rings will be provided on all vertical piping with a difference in elevation of 4 m or above and there will not be more than 3 m straight length between support rings.
- g) Longitudinal joints of insulation mattress sections of horizontal piping will be on the bottom or at the sides of the pipe.
- h) When more than one layer of insulation mattress/section is required on piping the circumferential joints on adjacent layers will be staggered by at least 150 mm and longitudinal joints will be staggered by at least 50 mm.
- i) The mattress type insulation will be formed to fit the pipe and applied with the mattress edges drawn together at the longitudinal joints and secured by lacing wire. Pipe section insulation will be fitted on pipe using binding wires.
- j) Where insulation is applied in two or more layers each layer of mattress will be backed with hexagonal wire mesh. For the first layer of insulation and in case of single layer insulation, hexagonal wire mesh will be provided on both the surface of the mattress. For pipe sections, the sections will be held in place by binding wires without any wire mesh.





- k) The ends of all wire loops will be firmly twisted together with pliers, bent over and carefully pressed into the surface of the insulation. Any gap in the insulation will be filled with loose mineral wool or finishing cement.
- l) Insulation mattress/section ends will be terminated at a sufficient distance from the flanges to facilitate removal of bolts.
- m) The insulation will be held in place by fastening over with binding wire for insulation surface with diameter up to and including 550 mm and with metal bends for insulation surfaces with diameter over 550 mm. The fastening will be done at intervals of 250 mm except where specified otherwise. The ends of the binding wires will be hooked and embedded in the insulation. The straps will be mechanically stretched and fastened with metallic clamping seals of the same materials as the strap.
- n) Insulation for application on bends and elbows will be cut into mitred segments, sufficiently short to form a reasonably smooth internal surface. After the application of insulation material place, insulating cement will be applied as required to obtain a smooth surface.
- o) Weather hoods will be provided for insulated piping passing through floors/walls.
- p) All pipe attachments coming on horizontal pipes, inclined pipes and bends will be insulated along with pipe such that there will be no insulation applied to hanger rod and the component connecting hanger rod to pipe attachment. All pipe attachments exposed to weather will be provided with weather proof covering.
- q) Upstream of all drain lines and the lines connected to steam traps, will be insulated up to and including first isolating valve for heat conservation. Rest of such lines such as downstream of the drain valves, traps etc. and other lines such as safety valve discharges, vents, etc. will be insulated for personnel protection.
- r) All valves fittings and specialties will be insulated with the same type and thickness of insulation as specified for the connected piping with the special provisions and or exceptions as given below.
- s) All valves fittings and specialties will be insulated with the same type and thickness of insulation as specified for the connected piping with the special provisions and or exceptions as given below.
- t) All valves and flanges will be provided with removable box type of insulation covered with box fabricated from aluminium sheets of thickness same as the connected pipe cladding. Adjoining pipe insulation will be bevelled back to permit removal bolts and nuts or bands. The portion of the valve which can not be covered by box type insulation will be filled by loose insulating material of packing density at least equal to that of the insulating material of adjoining pipe. The insulation for valves/flanges will be applied after the finishing has been applied over the connected piping. The cladding will be applied in such a manner that the bonnet flange can be exposed easily without disturbing the complete insulation and cladding.
- u) Union will not be insulated. Expansion joints, metallic or rubber, will not be insulated unless otherwise specifically indicated.





- v) Safety valves will be insulated.
- w) Sampling of steam, feed water lines at high temperatures will be insulated.

#### 5.4 Testing of Insulation

- a) All tests, as per the applicable material standards and as specified will be carried out in accordance with the methods prescribed. Owner/Consultant will have the right to witness any or all of the tests conducted by the Contractor at the shop or laboratory.
- b) The Contractor will guarantee that if on actual measurement the specified maximum insulation surface temperatures are exceeded, if the Contractor will either replace the insulation with a superior material or provide additional insulation thickness at no extra cost.

#### 5.5 Refractories

The refractory material will comply with relevant Indian Standards. The refractory selected will ensure perfect sealing, and will have good thermal cycling properties allowing quick startup/shut down of Steam Generators.

#### 5.6 Materials

The refractory material will

- a) Have high bulk density and minimum moisture content,
- b) Be capable of withstanding service temperature not less than 1400 degree Celsius.
- c) Be resistant to slagging products due to lignite, and to impurities of oil like V2O5, Fe2O3, K2O2, Na2O etc. and to erosion due to fly ash.
- d) Be chemically inactive towards alkalis, iron, silica etc. will pose no health hazard to working personnel, and will not have any explosive properties.
- e) Have sufficient strength to withstand forces generated in boiler, without any rupture or damage.

#### 5.7 Application

Application of refractory will be such that:

- a) To ensure perfect sealing, easy maintenance, minimum time for application.
- b) To ensure minimum number of joints, all the joints to be filled and tightly packed with loose powder of same material.
- c) Selection of Refractory will consider the applied stress, stress distribution and expansion allowance.
- d) Refractory will have good thermal cycling properties to ensure quick start up and shut down of Steam Generators.

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