1.0.0 SCOPE

1.1.0 This design memo gives brief design parameters and material specifications of thermal insulation for power cycle piping and associated equipments.

1.2.0 Piping and equipments operating at hot face temperature more than 60 Deg. cent. will be insulated for energy conservation and also for the protection of the operating personnel.

2.0.0 DESIGN PARAMETERS

2.1.0 Thermal insulation thicknesses will be calculated based on the following design parameters.

a) Hot face temperature:	Operating Temperature at MCR Condition
b) Cold face temperature:	60 Deg. Cent.
c) Ambient temperature:	35 Deg. Cent
d) Wind velocity:	Still air condition
e) Emmissivity of Cladding:	0.09
f) Thermal conductivity:	As per IS: 8183 for Bonded mineral (Rock) wool mattresses and IS:8154 for Calcium silicate preformed insulation.

2.1.0 Standard thickness of insulation layers will be 25, 40, 50, 60 and 75 mm. Higher thicknesses will be combination of the above.

3.0.0 INSULATION MATERIALS

3.1.0 Piping will be insulated with preformed Calcium silicate (conforming to IS:8154) / Lightly Resin Bonded Mineral (Rock) Wool mattresses (conforming to IS 8183). Insulation will be provided as below:

3.1.1 FOR TEMPERATURE ABOVE 449 ^{0}C

Preformed Calcium Silicate of density 240 Kg/ M^3 will be applied in one or more layers so that the interface temperature reaches 449 ^{0}C. Subsequent layers will be of Lightly Resin Bonded Mineral (Rock) Wool mattresses of density 150 Kg/ M^3

3.1.2 FOR TEMPERATURE ABOVE 400 ^{0}C AND UPTO 449 ^{0}C

Lightly Resin Bonded Mineral (Rock) Wool mattresses having density of 150 Kg/ M^3 will be used for all the layers of insulation.

3.1.3 FOR TEMPERATURE 400 ^{0}C & BELOW

Lightly Resin Bonded Mineral (Rock) Wool mattresses having density of 100 Kg/ M^3 will be used for all the layers of insulation.

3.2.0 All equipments shall be insulated with Lightly Bonded (Rock) Wool Mattresses of density 100 Kg/M^3.

4.0.0 CLADDING & OTHER ANCILIARY MATERIALS.

4.1.0 Mattresses shall have backup hexagonal wire netting of galvanized steel on outer side of each layer with wire mesh of 13 mm aperture and 0.711 mm dia (22 SWG) stitched with 0.4 mm diameter Galvanised steel wire.

4.2.0 Mattresses shall be wrapped and held in place using binding and lacing wires of galvanised steel conforming to IS:280. Wire diameter shall be 0.91 mm (20 SWG) for binding wire and lacing wire.

4.3.0 Insulation mattresses will be finally covered with Aluminium sheet conforming to IS:737 Gr. 19000 – H2. Thickness of Aluminium sheets will be as below :-

18 SWG (1.22 mm)	For piping having outside diameter over insulation 450mm and above and for all equipments.
20 SWG (0.91 mm)	For piping having outside diameter over insulation above 150mm and upto 450mm.
22 SWG (0.71 mm)	For piping having outside diameter over insulation 150mm and below.

4.4.0 Insulation supporting arrangements for horizontal / vertical piping and equipments will be fabricated from 20 mm x 3 mm mild steel flats.

4.5.0 The straps for securing aluminium cladding sheet will be of aluminium similar to the cladding material.

4.6.0 All Screws will be of Zinc coated.

4.7.0 Other than insulation and cladding sheet, all other ancillary materials i.e. binding / lacing wires, straps, wire netting, joint sealing compound, ceramic mill board, MS flats, lugs, bolts & nuts etc. shall be of commercial quality.

5.0.0 INSPECTION AND TESTING

5.1.0 BHEL's standard quality plan shall be applicable for Lightly Resin Bonded Mineral (Rock) Wool mattresses (Doc. No.: PE-QP-356-169-M031) and Preformed Calcium Silicate (Doc. No. PE-QP-356-169-M033).

5.2.0 Test for thermal conductivity (K value) will be as per IS:3346 for Lightly Resin Bonded Mineral (Rock) Wool mattresses and shall be carried out at govt. approved test houses only and as per IS:9490 for Preformed Calcium Silicate.