SPECIFICATION OF MILL CIRCUIT TANK -WBM 2958

1. INTENT OF SPECIFICATION:

This specification is intended to cover the design, engineering, manufacturing, inspection and testing at manufacturer's works, packing and delivery to site, supervision of erection of Mill Circuit tank with its accessories complete in all respects. Mill Circuit Tank is a fabricated cylindrical tank with flange mounted top entry (vertical) type agitator.

In case of additional requirement of instrumentation and other accessories/auxiliaries for safe, reliable and trouble-free operation of mill circuit tank necessary reasons for recommendation shall be furnished and the same shall be included in scope of supply with the purchaser's approval.

2. APPLICATION:

In Wet Ball Milling System, the dilution of limestone slurry is done with water in the Mill Circuit Tank. Agitator shall be used in mill circuit tank to prevent caking and settlement of limestone particles out of the slurry and maintain uniform slurry concentration.

3. SCOPE OF SUPPLY :

3.1 All the plate materials required for Tank Bottom, Shell, and Roof etc.

3.2 All the required connections, nozzles and accessories required for each tank as per Annexure-II.

3.3 All the required baffle plates inside the tank.

3.4 All the required pad plates on the tanks for supporting outside piping.

3.5 All flanges and counter flanges/blind flanges for all nozzles of tank connections including the fasteners (bolts, studs, nuts) and gaskets for these connections.

3.6 All the required manhole covers/flanges including the fasteners (bolts, studs, nuts) and gaskets. Manholes shall be provided with davit arrangement for ease of maintenance.

3.7 All the structural material required for roofs, ladders, wind girders, rails, platforms, stairs, supports, stiffeners, curb angles etc.

3.8 Suction Strainer at the suction pipe line flange.

3.9 All anchor bolts, nuts, washers including pad plates (as required for anchoring of tank

3.10 Required material for Earthing of the tanks up to the nearest risers of earthing mats including earthing pads, strips etc.

3.11 All the required quantity of paint material indicated.

3.12 O&M Manuals in both soft and hard form.

3.13 Required hard copies of approved drawings/documents indicated elsewhere in this specification.

3.14 Any other material required to complete the Tanks as per the intent and requirements of this specification.

3.15 Rubber lining shall be provided on all internal surfaces of tank including slurry contact area.

4. DISCHARGE SLURRY PROPERTIES :

4.1 Solids (limestone) Concentration (w/w) %: 55

4.2 Flow rate (m^3/Hr) : 92.5

4.3 Specific gravity of slurry : 1.53

5. INLET SLURRY PROPERTIES:

5.1 Solids (limestone) Concentration (w/w) %: 70

5.2 Flow Rate (m^3/Hr) : 62

5.3 Specific gravity of slurry : 1.78

6. FLOW RATE OF DILUTION WATER:

Flow Rate (m^3/Hr): 30.5

7. WEAR PROTECTION:

Interior surface of the tanks shall be lined with replaceable Chlorobutyl / Bromobutyl rubber lining of 6 mm thickness.

8. CONSTRUCTION OF MILL CIRCUIT TANK:

8.1 The design, fabrication and erection of mill circuit tank shall be as per IS 803.

8.2 The lining inside diameter of the tank is 3000 mm and height of the tank (distance between top and bottom plates) is 2500 mm. Refer Annexure-II. The thickness of the plates to be considered shall be as per Annexure-II.

8.3 Mill Circuit tank shall be made from IS:2062 Gr E350-Gr quality mild steel plates of tested quality. The tanks shall be of welded construction.

8.4 The tank shall be provided with nozzles for drain line, over flow line, water line, hydrocyclone return line, inlet and discharge ports, standby holes for future requirements etc. with positions and elevations followed as per Annexure –II.All flanges shall be in accordance with ANSI B16.5 class 150.

8.5 For tank connections refer Annexure-IV.

8.6 Suction screens shall be installed at the suction pipe line to protect the mill circuit pump.

8.7 Level transmitter shall be mounted on the circuit tank as per annexure-II.

8.8 The vendor shall decide the location of breather/vent, ladder and platform to the top of the Tank and supply the same (the location of breather not shown in annexure-II).

8.9 Baffles shall be provided by vendor as per requirement after confirmation from BHEL during detail engineering.

8.10 The slope of bottom plate shall be maintained at 1:100.

8.11 Reinforcement pads in tank connections shall be provided and the reinforced connection shall be completely pre-assembled into the shell plate. The completed assembly including the connection shall be thermally stress-relieved.

8.12 For foundation and mounting details of mill circuit tank refer Annexure-III. For anchor bolt details, refer Annexure-V. Nuts and washers for this anchor bolt shall be provided by vendor.

8.13 For all nozzles (except vent and level transmitter) matching counter flanges/blind flanges shall be the terminal point.

8.14 Maximum Height of unstiffened shell shall be calculated based on the corroded thickness of shell courses. Section modulus of wind girders shall also based on corroded thickness of shell course.

8.15 Staircase / access ladder and hand railing shall be provided as per the relevant codes and standards.

8.16 Code conformance for flanges / counter flanges shall be as per IS2062 Gr B (Dimensional standard- ANSI B16.5 clause 150/IS 1538).

9. GENERAL :

9.1 Design, engineering, preparation of detailed fabrication drawings, bill of material, tag and piece numbers, welding procedures, Erection and commissioning procedures, preventive and overhauling recommendations etc. Stiffeners and other structural framing for supporting the tank shall be designed by the fabricator and properly shown in the fabrication drawings.

9.2 Vendor should furnish technical data and general arrangement drawings with the offer.

9.3 The number & location of nozzles (including flanges, counter flanges and inside piping) indicated in the sketches attached with the data sheets are tentative and bidder guidance purpose only and the same may undergo minor change during detail engineering stage for which no commercial implication shall be entertained by BHEL.

9.4 Bidder shall furnish the Standard calculation along with the roof structure calculation during detail engineering for checking the stability of roof.

9.5 After award of contract, bidder shall submit Quality Plan for approval. The quality plan shall be submitted in BHEL quality plan format, Bidder to note that all the cost involved in any of the inspection & testing requirements as per the approved quality plan shall be deemed to be included in the price quoted by the bidder. Bidder shall not be eligible to raise any extra claim on account of any inspection & testing as per the approved quality plan.

10. TESTING REQUIREMENTS:

10.1 Dimensional checks, during in-process and final inspection, shall be carried out for alignments, circularity, verticality, orientation of connections, slope of bottom plate etc.

10.2 NDT on weld joints shall be done as per relevant / applicable standard. However, minimum requirement of NDT, as given below, shall be complied:

10.2.1 100% DPT on root run (butt welds / back-gouged welds).

10.2.2 100% DPT on all finished welds.

10.2.3 RT on butt welded seams (which shall cover all 'T' / Cross joints)

10.3 The Mill Circuit tank shall be subjected to Hydraulic test.

10.4 Rubber lining in circuit tank and agitator shall be tested for hardness and spark test, as applicable.

11. TEST CERTIFICATES:

The following test certificates should be furnished in triplicate along with the consignment:

11.1 Non-Destructive test over and above the material test along with results of the replaceable Rubber liner- Shore Hardness, Class and Type certificate.

11.2 Test certificates shall be issued for each lot of raw material used in the coating, Corresponding to specific weight and traction resistance.

11.3 Test certificates of Chemical and mechanical properties of raw material of foundation fastners.

12. PACKING:

The Mill Circuit Tank shall be packed in a strong rigid wooden crate to prevent damages during transit and storage. Nozzle areas shall be protected from transit damages suitably Rain water should not enter into the internals during storage in the outer yard of power plant.

13. PAINTING:

13.1 SURFACE PREPARATION: Commercial blast Swedish STD SA2.5

13.2 PRIMER COAT: One coat of two component moisture curing zinc (ethyl) silicate primer coat. Dry film thickness (DFT) 50 microns.

13.3 INTERMEDIATE COAT: One coat of epoxy based (high build) paint. Dry film thickness (DFT) 100 microns.

13.4 FINISHED COAT: Two coats of two pack aliphatic polyurethane paint shade: Grey white RAL 9002.Dry film thickness (DFT) =70 microns (35 microns * 2 coats).

13.5 TOTAL DFT –EXTERNAL SURFACE : 220 microns

13.6 Colour shade for external surface: Grey white RAL 9002.

14. SUPERVISION OF ERECTION & TESTING:

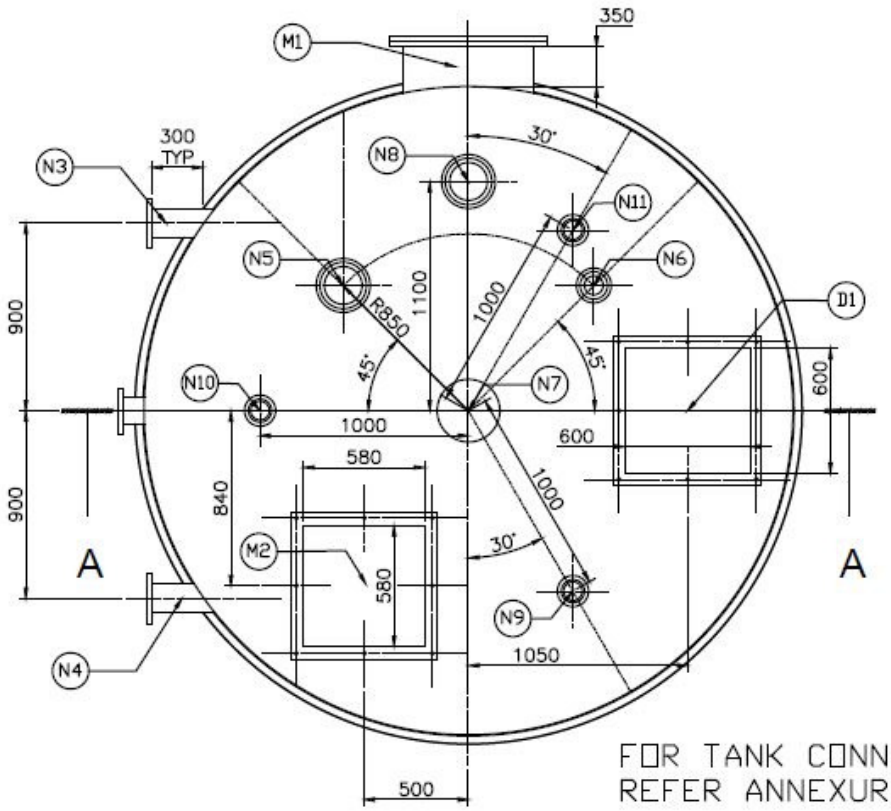
The erection of Mill Circuit Tank & accessories will be done as per Erection Manual and check List. If installation of rubber lining is envisaged at site, supervision of erection and testing is required for 7 days. The bidder will be informed well in advance for the visit.

ANNEXURE-I

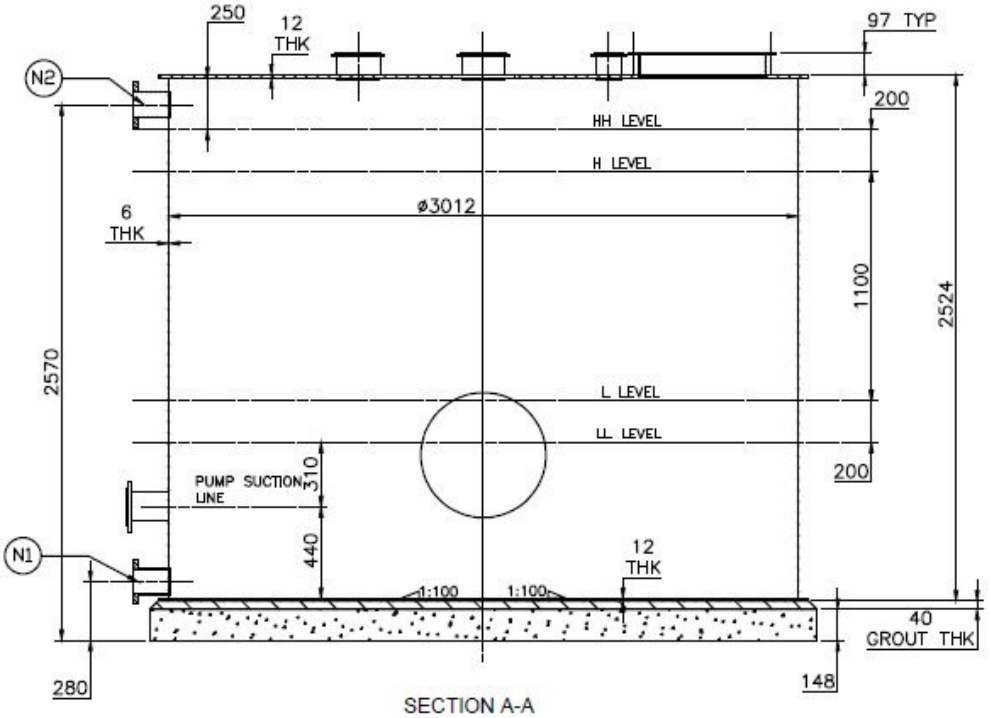
MILL CIRCUIT TANK -WBM 2958: BA9789130007

Sl.No	DESCRIPTION	VENDOR'S COMPLANCE /DATA
1	Make	
2	Application	Top entry agitator to mill circuit tank
3	Tank Capacity (m3/hr)	
4	Baffle plate dimensions	
5	No : of baffle plates	
6	Breather dimensions	
7	Suction Screen make and model	
8	Rubber lining MOC	
9	Total weight of all components	

ANNEXURE-II



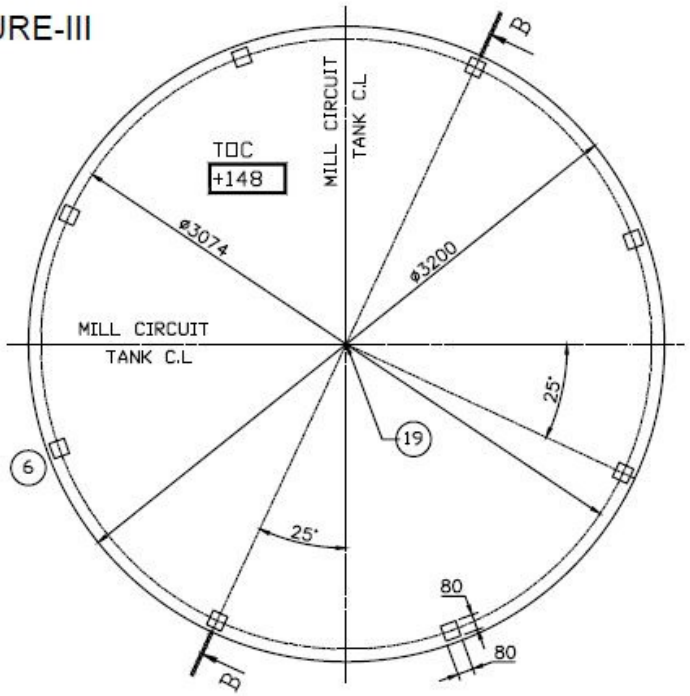
FOR TANK CONNECTIONS
REFER ANNEXURE-IV

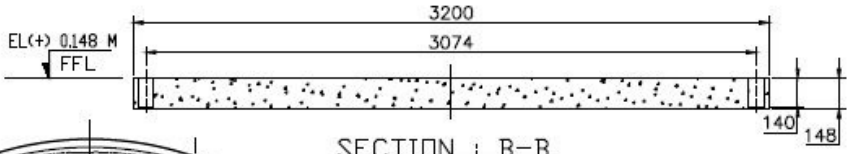


SECTION A-A

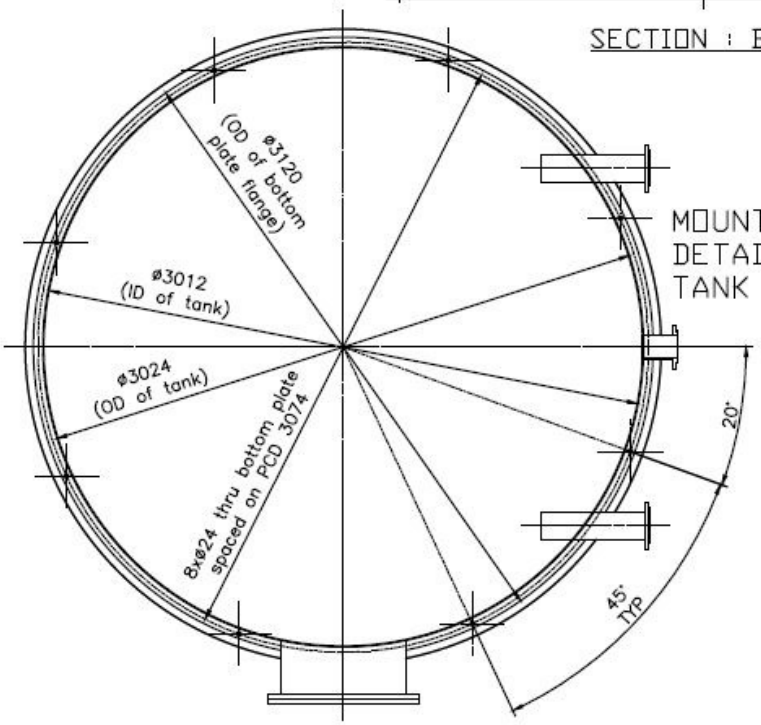
REVISION	PREPARED BY	APPROVED BY	DATE OF 1ST ISSUE
	K PAVAN	AMAN	28.06.2022

ANNEXURE-III





SECTION : B-B



MOUNTING AND FASTENING DETAILS OF MILL CIRCUIT TANK

ANNEXURE-IV

DETAILS OF MILL CIRCUIT TANK CONNECTIONS

Application	Description	Legend	Nozzle Size	Flange
Shell application	Drain	N1	DN100	ANSI B16.5 class 150
	Overflow	N2	DN100	ANSI B16.5 class 150
	Pump Suction-1	N3	DN125	ANSI B16.5 class 150
	Pump Suction-2	N4	DN125	ANSI B16.5 class 150
	Man Hole	M1	Ø 600	
Roof application	Hydrocyclone return	N5	DN200	ANSI B16.5 class 150
	Process water feed	N6	DN100	ANSI B16.5 class 150
	Agitator and accessories	N7	Ø 300	
	Spare Nozzle	N8	DN200	ANSI B16.5 class 150
	Level Transmitter	N9	DN100	ANSI B16.5 class 150
	Level Transmitter	N10	DN100	ANSI B16.5 class 150
	Level Transmitter	N11	DN100	ANSI B16.5 class 150
	Man Hole	M2	580 X 580	
	Mill discharge port	D1	600 X 600	

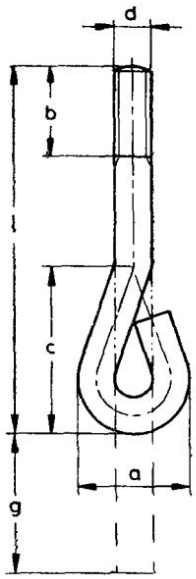
ANNEXURE-V

SPECIFICATION OF FOUNDATION BOLT

1.0 MATERIAL :

The quality of the material and quantity of the fasteners shall be as per the specifications and other details indicated below and in clause no 02:

Sl. No.	Material Description	Qty/tank
1	**FOUNDATION J BOLT M20 X 200-8.8**	8



Thread Size (d)	Bend		Straight length (g)	Threaded length (b)	Nominal length (l)
	a (±3)	c (±5)			
M20	60	105	75	50	200

2.0 COMPLIANCE WITH STANDARDS:

2.1 Dimensions, Tolerances & General Requirements: As per IS: 5624-1993(RA 2008), Type-A.

2.2 Mechanical properties: To conform to **property class 8.8**, as specified in Table-3 of

IS: 1367, Part 3.

2.3 Material and treatment: To conform to **property class 8.8**, as specified in Table-2 of IS: 1367, Part 3

2.4 Threads: Pitch-coarse to IS: 4218, Part 2.
Tolerance quality - Medium.
Tolerance class - 8g.

2.5 Identification Marking: As stated in clause 9 of IS: 1367, Part 3.

3.0 GUARANTEE

3.1 The supplier shall guarantee quality of the product as per specification and in case of any discrepancy at site same shall be replaced free of cost.

3.2 Supplier shall guarantee quantity packed as per specification and in case of any discrepancy at site same shall be made up by immediately supplying the shortages.

RECORD OF REVISIONS

REV .NO	DATE	REVISION DETAILS	REVISED	APPROVED