HYDROCYCLONE CLUSTER WITH VALVES AND HEADERS FOR WET BALL MILLING SYSTEM

PROJECT: TSGENCO YADADRI 52 TPH WET BALL MILL

Application:

Hydro cyclone cluster assembly for classifying slurry of Wet ball mill in Flue Gas Desulphurisation application. FGD absorber lime stone slurry with fineness upto 90% thru 325 mesh.

The limestone slurry (feed) is fed to hydrocyclone by a slurry pump. Overflow from hydrocyclone shall be fed to mill circuit tank or limestone storage tank by gravity. Underflow shall be fed to ball mill for further grinding.

Description of Hydrocyclone system:

1. **Hydrocyclone:**
   a. It shall be of modular construction made of carbon steel with rubber lining (for all wetted surfaces)
   b. Cone angle shall not be larger than 20 degree
   c. Minimum operating pressure maintained at feed section of hydrocyclone is 150 kPa
   d. Feed and overflow shall have flange connections.
   e. Feed connection shall have individual isolating valve
   f. Hydrocyclone system shall have sufficient redundancy. A minimum of 10% spare hydrocyclones shall be provided
   g. Lining shall have a minimum wear life of not less than 8000 hrs without reversal.
   h. Apex nozzle shall be of ceramic make.
2. **Manifold system**
   a. Provision of replacement or removal of individual hydrocyclone when the cluster is in service.
   b. Individual isolation valve shall be provided for each hydrocyclone for that purpose
   c. The manifold system with the feed distributor should be such that it results in in an even slurry flow, pressure, density and particle distribution.

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d. A local pressure gauge and transmitter with diaphragm seal and capillary shall be provided for monitoring and operating of the feed distributor pressure
e. Pressure head loss in distribution of slurry by feed distributor to individual cyclones should be minimum.
f. Feed distributor in hydrocyclone system shall be provided with replaceable rubber lining with thickness greater than 12 mm.

3. Overflow and Underflow launders

a. Over flow and underflow launder shall be provided with replaceable rubber lining with thickness greater than 12 mm
b. Piping downstream to the underflow and overflow launders shall be flange connected.
c. The underflow and overflow launder discharge pipe velocity shall be less than 2.5 m/s

Scope:

a. Hydrocyclones along with piping, control valves on input, underflow and overflow lines along with inlet header, underflow launder (to mill for recirculation) & overflow launder (final output). Fixture or frame for installing entire assembly.
b. All fasteners (anchor bolts, nuts washers etc) will be in vendor scope. Mounting details shall be shared along with offer.
c. Vendor should furnish the list of recommended commissioning / operational spares list along with prices.
d. GA drawings along with offer
e. Supervision for commissioning, shall be of 7 mandays. This amount will be paid on receipt of site certification for completion of activity.

Inputs:

Hydro cyclone should handle wet limestone slurry with density upto 1.83 T/m3.

Recirculation ratio of wet ball milling circuit is 353%.

Below are the hydro cyclone input (feed) parameters for 52 TPH wet ball milling system

S No	Description	Value
1	Mass flow rate	428.24 TPH
2	Flow rate	279.94 m3/hr
3	Specific density	1.53 T/m3
4	% of solids by mass	55%
5	Mass flow rate of solids	428.23 TPH
6	Inlet Pressure	101 kPa

Below are the desired hydro cyclone output parameters (overflow) for 52 TPH wet ball milling system

S No	Description	Value
1	Mass flow rate	173.33 TPH
2	Flow rate	140.59 m3/hr
3	Specific density	1.23 T/m3
4	% of solids by mass	30%
5	Mass flow rate of solids	52 TPH
6	Particle size distribution (overflow)	90% thru 325 mesh (44 micron)

Pump will take input slurry from mill agitator tank and it will pump it to hydro cyclone cluster which will be at an elevation of 26 m.

D1: Nominal diameter of hydro cyclone inlet

D2: Apex diameter size

D3: Vortex or cut size

D4: Diameter of cylindrical portion

H1: Height of cylindrical portion

H2: Height of conical portion

H3: Vertical height between vortex bottom and cyclone inlet

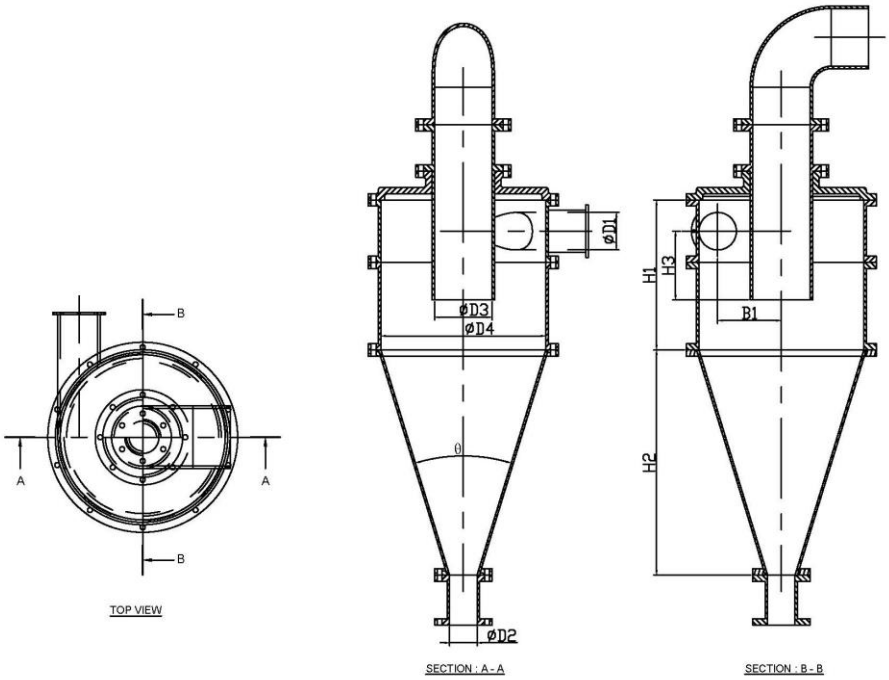
B1: Radius of hydro cyclone inlet

Vendor to specify the following details

1. Vendor to provide provision for fitting pressure gauge / pressure transmitter for hydrocyclone input line.
2. Material of construction for hydro cyclone.
3. Liner material and thickness for hydro cyclone (also specify the running hours) in feed chamber, apex stopper, cone casing, under flow pipe, overflow pipe

4. No of hydro cyclones in cluster.
5. Flow capacity of each hydro cyclone in m3/hr
6. Dimensions as per above schematic
7. No of spare hydro cyclones in each cluster
8. Rated pressure drop at rated capacity in mmWC
9. Design pressure
10. Minimum feed pressure
11. Particle size vs Weight% to underflow curve
12. Cut size or vortex size (D3)

Typical hydro cyclone sections



Inspection and Testing requirements:

Inspection and quality shall be done as per BHEL / customer approved quality plan.

Packing:

a. The hydrocyclone system shall be packed in closed wooden cases to prevent damages during transit and storage.

b. The flange openings shall be protected properly to prevent entry of foreign matter.

c. Rain water should not enter into the materials during storage in the outer yard of the installation site.

Painting:

Painting shall be done as per BHEL / customer approved painting schedule.

Mandatory Spares Annexure:

S No	Description	Quantity
i)	Hydrocyclones	1 Set
ii)	Feed vessel	1Set
iii)	Lining for vessel	1 Set
iv)	Complete vessel assembly	1 No.
v)	Valves	1 Nos. of each type & size
vi)	Pressure gauge	1 Nos.
vii)	Measuring nozzle	1 Set
viii)	Flanges for cycles	1 Set
ix)	Over flow & underflow pipes	1 Set
x)	Filters	1 Set
xi)	Vortex finder and apex inserts	1 Set

MATERIAL CODES

VAR. NO	DESCRIPTION	MATERIAL CODE
00	Hydro Cyclone Assy 52 TPH WBM	BA9789157002
01	Hydro Cyclone 52 TPH WBM Mand Spares	BA9789157010

RECORD OF REVISIONS

REV. NO	DATE	REVISION DETAILS	REVISED	APPROVED

Prepared by	Checked by	Approved by
Manivas	Aman	KHRK