TECHINCAL PRE-QUALIFICATION REQUIREMENTS

ACCEPTANCE CRITERIA

Weigh feeder & pneumatic diverter along with accessories for Wet ball milling system

SL. NO.	REQUIREMENT	ACCEPTANCE	REMARKS
1.	Capacity/Rating of the system.	Supply of similar or bigger capacity WEIGH FEEDER for wet ball mill system, to at-least one thermal power station, and which are in satisfactory operation for a minimum period of one year as on the date of submission of bid documents.	a) Reference List of supplies made so far. b) Un-priced PO copies of the reference supplies. c) End-user certificates of the reference stations.
2.	Design / Engineering capability for designing of suitable WEIGH FEEDER to meet customer specification requirements	Bidder must have exclusive engineering/design capabilities	Details of Design methods adopted or Collaboration documents to be furnished.
3.	Manufacturing facilities	Bidder must have manufacturing facilities for manufacture of similar rating of WEIGH FEEDER .	a) Detail list of Manufacture facility shall be furnished. b) Details of Manufacturing facilities at tied-up parties, in case of offloading of manufacturing, shall be furnished (if applicable)

4.	Testing facilities	Bidder must have testing facilities for similar rating of WEIGH FEEDER .	Test reports to be furnished.
5.	Inspection agencies for earlier supplies	Lloyds / TUV / NTPC / BHEL / SGS / BHEL TPIA or any other International/ Indian inspection agency.	Copies of earlier inspection certificates to be furnished.
6.	Service after Sales & supply of spare parts	Availability of service center and technical experts to meet the after sales service requirements for the supplied equipment at project sites.	Details of the service centers and technical expertise to be furnished.
7.	Financial capability	Financial turnover shall be atleast 50% of the value of the bid.	Financial turnover of the bidder during last three years (certified by CA) shall be submitted.

NOTE :

The Suppliers not meeting the above criteria (OR) not submitted the required documents will be disqualified.

RECORD OF REVISIONS

REV.NO	DATE	REVISION DETAILS	REVISED	APPROVED

LIME STONE WEIGH FEEDER & PNEUMATIC DIVERTER ALONG WITH ACCESSORIES FOR KOTHAGUDEM WBM.

This specification stipulates the requirements for design, engineering, manufacturing, cleaning coating, painting, inspection, testing, packing, forwarding, delivery at site, site painting (if any), supervision of erection, testing, commissioning, performance guarantee test at shop/site, liquidation of punch points of '**Belt Weigh Feeder &Pneumatic diverter along with accessories** 'with all equipment and auxiliaries

Bidder shall refer Document No.BA89162 for qualification requirement.

1. GENERAL DESRIPTION OF WEIGH FEEDER

The duct from the limestone silo hopper feeds the limestone to the weigh feeder. The weigh feeder feeds limestone to Wet ball mill system.

Sl. No.	Description	Requirement
1.	**Quantity and Design Capacity of Feeder**	
	Quantity and Design Capacity of Feeder	58 TPH –2 sets
2.	**Parameters**	
	Media to be Handled	Limestone
	Limestone Analysis	Refer Annexure -1
	Duty	Continuous

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2.SCOPE OF WORK

Scope for the bidders shall include Design, Engineering, Manufacture, Inspection/testing as per approved quality plans, Packing, Supply, Supervision of Erection & Commissioning, Performance Guarantee Test and handing over of final Customer.

a. Design: Includes basic engineering, detail engineering, preparation and submission of engineering drawings/calculations/datasheets/quality assurance documents/field quality plans, storage instructions, commissioning procedures, Erection & assembly Drawings, operation & maintenance manuals,

performance guarantee test procedures and assisting BHEL in obtaining time bound approval from NTPL.

b. Testing: The scope of the bidder includes all shop tests, type tests, site tests, routine tests etc., fulfilment of complete quality assurance & inspection requirement and related activities for all the equipment & systems covered under the scope of the bidder.

c. Painting: The bidder scope of work includes supply of paints and painting of all equipment's as per approved painting schedule from TSGENCO/BHEL. Approved painting schedule will be provided after award of contract.Tentative painting schedule attached

d. Supervision of Erection & commissioning: Includes supervision of erection & commissioning, supervision of startup and trial operation.

Performance Guarantee Test: The guarantee tests shall be carried out as per approved Performance guarantee test procedure, all the special equipment, tools and tackles, instruments, measuring devices required for successful conductance test shall be provided by bidder free of cost.

3.. Scope of Supply: The scope of supply shall include but not limited to the following.

3.1.Mechanical:

a) One number of Spool Piece (Above Rod Gate)

b) One number of Rod Gate

c) One number of Spool Piece (Below Rod Gate)

d) One number of Spool Piece Between Slide Gate and Feeder Inlet

e) One number of Belt Weigh Feeder (one number below each limestone day silo) each of capacity specified in clause No.1 complete with variable speed drive and its controls to achieve the capacity from 0 to 100% load, load cell, belt, pulleys, idlers, drive motors, brakes, coupling, coupling guard, complete drive unit, supporting frame along with stools, feeding and discharge chute, belt tensioning arrangement, belt cleaners, dust tight enclosure, pull chord switches, belt sway and zero speed switches, inserts, fasteners, weighing and calibration devices, speed sensor, device for loss of flow detection, local control system etc. including all mechanical, electrical, C&I and structural parts and accessories. Limestone weighing shall be automatic and shall include local & remote indication of rate of flow& totalizer counter.

f) Distance Piece: Feeder discharge hood and discharge chute up to Inlet flange of wet ball mill.

g) One number of Motorised gates at feeder inlet

h) One number of Motorised gates at feeder outlet

i) One number of pneumatic diverter gate.

j) One number of mill inlet chute.

k) One number of bypass chute.

l) Equipment fittings, supporting structure, along with insert plates, fixing bolts, MS sleeves, base plates, grouting and proper alignment etc.

3.2 Electrical & Control instruments

a) Cables, Cable glands ,Local elelectrical control panels, JB'S, transmitter, Motors with terminal boxes, VFD with accessories (cable sizing, cable race way and cable procurement between VFD and VFD operated motor) , Cable trays/conduits with supporting system

b) All the necessary Control & field instrumentation i.e. Transmitters, process actuated switches pull cord switches, belt sway switches, zero speed switches, Under Belt Switch, Chute Blockage Switch ,limit switches, switch for loss of flow, sensors, final control elements, solenoid / motor operated valves, etc. as per finally approved P&ID/Flow Scheme, and to facilitate effective control of the system, shall be supplied by Bidder.These shall suit the actual FGD DDCMIS

c) All transmitters, gauges etc. shall be suitably grouped together and mounted inside:

(i) Local Instruments Enclosures (LIEs) in case of open areas

(ii) In Local Instrument Racks (LIRs) in case of covered areas.

Instrument rack / enclosure shall be free standing type with CRCA steel and painting

d) Belt Weigh feeder shall be controlled through either through microprocessor based DDCMIS, supplied by Employer or local control panel based on bidder`s standard practice. However, in case of control through LCP, start / stop command with necessary control and monitoring feedback (Hard wired) shall be provided by bidder from LCP to DDCMIS. Detailed operation and control philosophy shall be furnished by bidder and the same shall be subject to

purchaser / owner's approval during detailed engineering.

e) Two (2) number of pull-cord switches shall be provided at both side along the length of each belt conveyor, which shall enable the respective conveyor to be stopped immediately. Each pull chord switch shall be identified by a specific number on HMI in the main control room. All instruments/JB/racks shall be tagged as per Purchaser's tagging philosophy.

f) Scope of C&I Cable and Cable engineering:

From field instruments/ valves/ devices to JB's – Bidder's scope.

From JB's/field instruments/valves/ devices to Bidder's supplied Local panels- Bidder's scope

g) For DDCMIS preparation of logic/loops in case of operation from DDCMIS, I/O list, Drive list, Instrument List, mimics/ displays etc. shall be provided by Bidder for implementation in DDCMIS for Belt weigh feeder.

h) Temperature transmitter, pressure transmitter and motorized actuators shall be HART PROTOCOL based. All actuators shall be certified for SIL 2 or better.

3.3 Scope of Supply - Civil & Structural:

Structural loading drawings indicating the vertical and lateral loads transmitted to the foundation at each support location. The loads due to dead load, live load, wind load, seismic load and other pertinent conditions shall be listed separately. This shall include, but not be limited to, magnitude, direction of forces; location, service, and / or connection details to Purchaser's furnished supports. All such drawings shall be submitted under separate cover. Overall base plate dimensions and Anchor bolt information shall include the size and location of bolts in relation to equipment center-line, anchor bolt projection above concrete surface, bolt material strength, and required length. Levelling provisions shall be fully described.

BIDDER shall submit design calculations, which include the determination of operating loads, foundation reactions and anchorage design.

.Bidder shall supply any other items required for completeness of the equipment except the items covered in the exclusions.**

4 .Miscellaneous Scope:

I. All equipment, systems and components etc. supplied under this specification

shall be fully designed and engineered by Supplier.

II. Supply of all consumables like chemicals, lubricants required for start-up and commissioning, trial runs, performance guarantee test and up to handing over of the complete plant to the Employer by the Purchaser including first fill of lubricants. The first fill requirement same includes oils and lubricants for one-year toppings.

III. Supply of all Start-up and commissioning spares Bidder shall quote for recommended spares, if any, as an optional item.

IV. Special tools & tackles, which are necessary or convenient for erection, commissioning and overhauling of any equipment.

V. Testing instruments during commissioning and performance guarantee testing at site shall be provided by the Bidder and provision for install of these items to be provided.

VI. All equipment, systems and components mentioned under this specification shall be technically complied with codes/standards, technical requirements and technical datasheet to meet the mentioned guaranteed requirements. Bidder shall fully own the responsibility of functional requirement of equipment covered in this specification.

VII. Inspection and testing for all equipment and components at Bidder's works and his sub-vendor's works shall be as per approved QAP, applicable codes and approved drawing/documents/procedures.

VIII. Supervision of Erection and Supervision of commissioning of all equipment and system under scope of this package. For Erection and commissioning requirements.

IX. Supervision of Performance guarantee testing as specified elsewhere in the specification.

X. Bidder shall be responsible for establishment of overall performance of the System/equipment supplied under this contract. Bidder shall provide qualified technical field personnel & testing equipment/instruments as required for commissioning, testing and as well as for establishment of performance parameters at site. Any additional work (if required) on equipment and accessories/associated systems to establish performance parameters as per

the specification/Purchaser/Employer observation shall be performed by the

Bidder without any commercial and schedule implication to Purchaser.

5 Equipment Functional Guarantee

I. Bidder shall provide minimum availability of Belt Weigh Feeder as minimum 98%.

6 .Other Services

a) Training of Employer's Personnel :

The Bidder's supervisory personnel at site shall train adequate number of Employer's operation and maintenance personnel at site during erection and commissioning of equipment to enable them to take over proper operation and maintenance of the equipment after commissioning.

b) Shop inspection and Test Procedures

The Equipment's covered by this specification shall be subjected to inspection and testing. The Bidder shall provide all services to establish and maintain quality of workmanship in his works and that of his sub-Vendors to ensure the mechanical accuracy of components, compliance with drawings, identification and acceptability of all materials, parts and equipment.

c) Quality plan shall submit after award of contract. Bidder shall follow quality plan approved by BHEL/Customer

d) Packaging for Transportation

All the equipment's shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit till the time of erection. While packing all the materials, the limitation from the point of view of the sizes of railway wagons available in India should be taken.

The Bidder shall be responsible for any loss or damage during transportation due to improper packing.

Preservative coatings used on components shall be suitable for the conditions normally expected during shipping, storage and throughout the erection period.

Each type of preservative used shall be identified as to quality, life expectancy and type. Toxic and hazardous-type preservatives shall not be allowed. Complete information shall be submitted to the Purchaser covering step-by-step procedures, including federal, state and local governing controls for handling and removal of each

type of preservative. This information shall be submitted six months prior to delivery.

The Bidder shall indicate the Weights and dimensions of each component, which shall be shipped along with the offer.

7 .EXCLUSION:

Broad terminal points have been indicated in the tender specification. Within these terminal points, all equipment and electrical distribution, piping network, control and instrumentation etc. as required shall be furnished by the Bidder unless specifically excluded as follows:

7.1 Mechanical

I. Limestone Day Silo and its supporting structure.

II. Wet ball mill

III. All concrete foundations and RCC works (if applicable).

7.2 Electrical

I. Main LT power supply

II. Lightning System.

7.3Control & Instrumentation

I. FGD DDCMIS and its associated RIOP Cabinets, Data highway, Workstation

II. Cabling between local JB/LCP to FGD DDCMIS

III. Fire Detection & Alarm System

7.4 CIVIL:All concrete foundations and RCC works,

8. TERMINAL POINTS

The following are the Bidder's battery limits:

8.1 MECHANICAL

Sl. No.	System / Equipment	Bidder's Battery Limits / Purchaser's Connection
1.	Limestone receipt	Limestone day silo shall be provided by Purchaser. Bidder scope starts from the Discharge flange of Silo. Counter flange, gasket, fasteners and seal shall be supplied by bidder
2.	Limestone Discharge	Bidder's scope terminates at the limestone discharge at wet ball mill material inlet. Counter flange, gasket, fasteners and seal shall be supplied by bidder

8.2 ELECTRICAL

The following are the Bidder's battery limits:

Sr.No.	System/Equipment	Bidder's Battery Limit / Purchaser's Connection
1	VFD	a. Terminals for Main incoming power cable b. Terminals for control cable interface c. Earthling terminal
2	Local Push Button Station (LPBS) if any provided by bidder	a. Control terminals b. Earthling terminals on LPBS enclosure

8.3 Control & Instrumentation

Sr.No.	System/Equipment	Bidder's Battery Limit / Purchaser's Connection
1.	Outgoing cables to FGD DDCMIS	Belt weigh feeder local JB/LCP terminals
2.	Power supply to C&I equipment/items	Purchaser will be provide the 230V AC UPS/Non UPS or 24V DC power to equipment / instruments at one end and further distribution through distribution box (PDB) of power supply to instruments / actuators will be in bidder`s scope of supply.
3,	Earthing	Earthing of bidder supplied panels by bidder to nearest earthing JB including earthing JB.

9. CODES AND STANDARDS

All equipment, systems and services covered under this specification shall comply with all currently applicable statutory regulations and safety codes in the locality where the equipment will be installed. The equipment and systems shall also conform to the latest applicable standards specified. All codes and standards referred to in the specification shall be understood to be the latest version on the date of offer made by the Bidder unless otherwise indicated. Nothing in this specification shall be construed to relieve the Bidder of this responsibility.

Bureau of Indian standards (BIS)

Japanese Industrial Standards (JIS)

American National Standards Institute (ANSI)

American Society of Mechanical Engineers (ASME)

American Society for Testing and Materials (ASTM)

American Petroleum Institute (API)

American water works association. (AWWA)

Standards of the Hydraulic Institute, USA

International Organisation for Standardisation (ISO)

Tubular Exchanger Manufacturer's Association (TEMA)

American Welding Society (AWS)

National Electrical Manufacturers Association (NEMA)

National Fire Protection Association (NFPA)

International Electro-Technical Commission (IEC)

Expansion Joint Manufacturers Association (EJMA)

Heat Exchange Institute (HEI)

IEEE Standard

JEC Standard

Occupational Safety & Health Administration (OSHA)

American Standard Association (ASA)

Uniform Building Code (UBC)

American Institute of Steel Construction (AISC)

Steel Structures painting Council (SSPC)

State Elevator and Escalator Act

State Elevator and Escalator Rules

Indian Electricity Act.

Indian Electricity Rules.

10 DESIGN AND CONSTRUCTION REQUIREMENTS

10.1 Mechanical

Belt Weigh feeder shall be designed as per the requirement specified in Tender document.

All parts in contact with limestone except belt shall be of stainless steel construction.

Belt feeders shall be positively self-cleaning and have dust tight construction. It shall be provided with flanged belt, rubber lagged head pulleys and inspection doors. No chain/belt drives shall be accepted.

The limestone feeder belt shall be of seamless rubber construction. It should be possible to adjust the belt tension from outside without opening the feeder body.

The feeder shall have adequate instrumentation to detect `loss of flow'.

The feeder shall have a motor/pneumatic operated gate at the outlet.

There shall be no reduction of section in the bunker outlet chute from bunker to feeder. The inlet chute shall be provided with suitable poke doors/holes in order to remove jamming/blockage.

10.2Electrical

All the electrical work and supply shall be as per tender requirements. This specification is intended to broadly define design base of electrical system equipment required for control, operation, protection and monitoring of this package.

10.3 C&I

- Primary instruments like microprocessor based transmitters employing HART

protocol, thermocouples & RTD's along with temperature transmitters, pressure/diff pressure/temperature/flow*ultrasonic/electromagnetic) transmitter & gauges.

- Integral to equipment which are not indicated in the tender drawings, but are required for control, monitoring and operation of the equipment for which no P&ID is attached shall be provided to meet the actual system requirements and meeting redundancy and other technical specifications.
- For binary and analog inputs required in major equipment's of FGD system, protection triple-sensing devices shall be provided. Binary and analog inputs, which are required for protection of more than one equipment as well as protection signals for HT drives etc., triple sensing devices shall be provided.
- For other critical binary and analog inputs required for protection and interlock purpose of other equipment (Eg. Those interlocks which may lead to loss if production, non-availability of major equipment etc.,) triple sensors shall be provided
- Temperature elements, electronic transmitters etc., are to be provided for all the cases. Use of process actuated switches is acceptable only in case indicated in tender drawings.
- Redundancy in instrumentation shall be designed by the Bidder, to ensure that malfunction of any single instrument shall not lead to loss of any Major Auxiliary (all HT Drives and Critical LT drives) or loss of Generation or loss of control function or loss of protection function. Bidder shall also ensure that Loss/ Malfunction of any single sensor shall not jeopardize the safety of the equipment.
- All instruments supplied by the Bidder shall be of proven type. In the event of any instrument/ system not working satisfactorily as per the intent of the specification within performance guarantee period in spite of best attention by the Bidder, the Bidder shall replace them with a good one to the satisfaction of Purchaser. The items/ systems so replaced by the Bidder shall have the same guarantee for satisfactory performance starting from the date of replacement without any commercial & schedule implication.

PAINTING REQUIREMENTS

Painting shall be followed as per approved painting scheme. However, for

components where no specific requirement is stipulated, the painting conforming to the requirements stipulated below shall be as per OEM practice.

11. Documents Submission:

11.1 Documents along with offer

Bidder shall submit the following drawings/data and technical information along with their Techno-commercial offer

Item	Description
1.	General arrangement drawing of belt weight feeder
2.	Quality assurance plan(QAP)
3.	Published equipment brochures and documents
4.	Experience/installation list of similar projects
5.	Other vendor supplied supporting documents
6.	Warranty & performance guarantee schedule
7.	Sub vendor list
8.	Guaranteed auxiliary power consumption
9.	Complete electrical load list .

11.2 Documents along with offer

Bidder shall submit the following drawings/data and technical information along with after award of contract. For approval or Information:

Item	Description
1.	Data Sheet & General arrangement drawing of belt weight feeder
2.	Quality assurance plan(QAP)
3.	Utility Consumption & Lubricating Oil List
4.	Equipment sizing & Motor sizing calculations
5.	Sub vendor items documents & quality plans
6.	Sub vendor list
7.	GA Drawings with dimensional details of all offered panels
8.	Complete electrical load list .
9.	loading details(static and dynamic loads) Drawing, Anchor Bolts, mounting plates static & dynamic details
10.	Cross sectional drawings
11.	VFD and Motor Data Sheet and type test report(as applicable)
12.	Erection and commissioning manual
13.	Performance test procedures
14.	Shop inspection and test procedures
15.	Operation and maintenance manual in a comprehensive manner prepared for use by operating and maintenance personnel.(3 sets)

- MDL shall be finalized with the successful Bidder after award of contract.
- Other drawings as may be required will be determined at a later date.

- Descriptions in the drawings, in the documents, and in the displays shall be in English.
- Bidder shall submit instruction manual for all the equipment's covered under the scope of bidder as per agreed engineering schedule. The instruction manuals shall contain full details required for erection, commissioning, operation and maintenance of each equipment. The manual shall be specifically complied for this project. The erection portion of manual shall contain erection strategy, sequence of erection, erection instructions, critical checks (along with permissible deviations/tolerance), Bill Of Materials, procedure for erection, general safety procedures to be followed. Procedure for initial checking after erection, procedure for testing (along with acceptance norms) check list for commissioning/pre-commissioning activities, List of tools and tackles.

- All the manuals shall be two rim PVC bound stiff sided binder able to withstand constant usage. The cover shall be printed with project name.

13. SUPERVISION OF ERECTION, TESTING AND COMMISSIONING

- The erection of Belt Weigh Feeder &Pneumatic diverter along with accessories will be done by owner (BHEL) as per Erection Manual and check List provided by bidder. The bidder has to supervise for erection, pre-commissioning & post-commissioning check-up, start-up, trial runs of all the items covered under the scope of supply.
- There will be two visits per each weigh feeder assembly totally there will be 4 visits. The bidder will be informed well in advance for the visit. Bidder shall consider 15 working days per weigh feeder assembly.
- In case erection and commissioning activities get delayed due to any account, resulting into overstay of vendor supervisory engineer beyond schedule time, then BHEL shall pay for additional man-day stay of vendor supervisory engineers. Vendor to quote Per day cost for deputation along with this offer.
- TA/DA, boarding and lodging shall be borne by the bidder and shall be inclusive in supervision charges portion.
- Charges for supervision of Erection & commissioning shall be quoted by the bidder.
- Price comparison for evaluating the lowest bid will be considered all main supply, supervision of E&C charges and mandatory spares price all together.

****Confirmation shall be taken from BHEL during detail engineering for Mating flange and interface details accordingly vendor drawing shall be updated.**

14.Guarantee/ Warranty Requirement:

- 18 months from the date of commissioning or 24 months from the date of supply whichever is early

ANNEXURES LIST:

Annexure Sl. No.	Description
1.	Lime stone properties
2.	Deviation list.
3.	Vendor scope of items drawing
4.	Wet ball mill and Day silo GA drawing
5.	Painting Schedule
6.	Equipment sizing report and details
7.	VFD specification attached

VARIANTS – TABLE

VARIANT NO.	DESCRIPTION	MATEIRAL CODE
00	LIME STONE WEIGH FEEDER & PNEMUNATIC DIV	BA9789161000

RECORD OF REVISIONS

REV. NO	DATE	REVISION DETAILS	REVISED	APPROVED

1.0 BALL MILL & FEEDER SELECTION DATA

S.NO	DESCRIPTION	DATA
1.0	WET BALL MILL (WBM)	
1.1	Number of wet ball mills	03 Nos (2W + 1S)
1.2	Rated capacity of wet ball mill, kg/h	52,000.
2.0	FEEDER	
2.1	Type of feeder	Gravimetric
2.2	Number of feeders	3 Nos (2W + 1S)
2.3	Capacity of feeder, kg/h	57,200

2.0 LIMESTONE ANALYSIS/CHARACTERISTICS

The following limestone property to be used designing Limestone grinding system

Sl.No	Absorbent Composition		Unit	Limestone	Note
1.	Dolomite		wt%-d	Not Detectable	
2.	CaO		wt%-d	47-50	
	In CaCO3		wt%-d	83.88 to 89.00	
3.	MgO		wt%-d	0.9-3.8	
4.	Inert	Cl_2	wt%-d	<0.015	
		Al_2O_3	wt%-d	1.19-2.1	
		Si_2O_3	wt%-d	2.1-4.5	
		$Fe2O_3$	wt%-d	0.45-1.0	
		TiO_2	wt%-d	<0.02	
		Na_2O	wt%-d	<0.16	
		K_2O	wt%-d	<0.01	
		P_2O_5	wt%-d	Traces	
		LOI	wt%-d	38.0-41.3	
		Total Sulphur	wt%-d	<0.1	
		Mn_2O_3	wt%-d	<0.12	
5.	Density		kg/m^3	1400	For Volumetric Calculation
			kg/m^3	1700	For Torque & Drive Calculation
			kg/m^3	2200	For structural load calculation
6.	Granule Size		mm	≤ 25 (100 %)	At limestone silo near to wet ball mill
7.	Bond Index		Kwh/Mt	14.33	

Project Name : ……ENQ/ NIT No: _____(Vendor to fill & submit along with offer)

LIST OF DEVIATIONS/ EXCEPTIONS (IF ANY, vendor to fill and submit along with offer)

Sl No	Clause No	Page No	Description of Deviation

Note: Enlarge the table to incorporate items

SIGNATURE OF BIDDER ----------

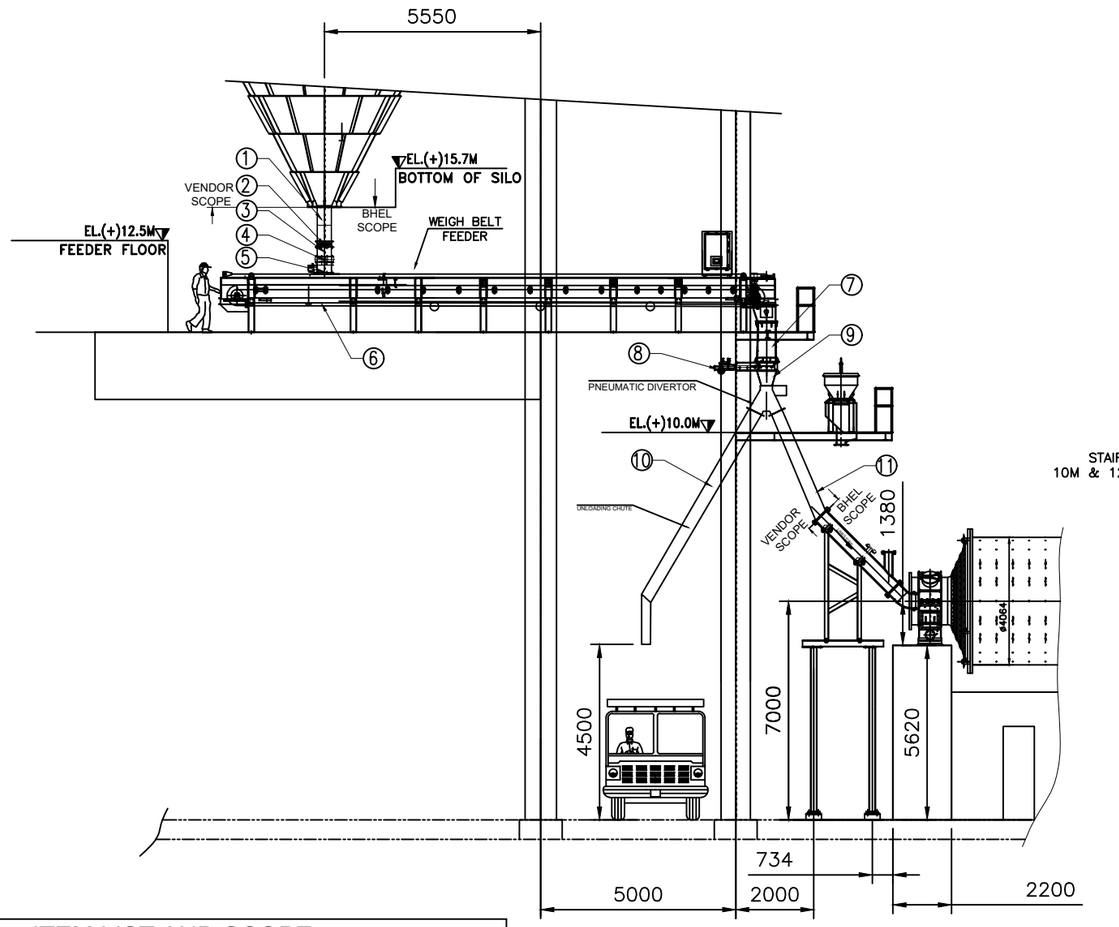
NAME ----------

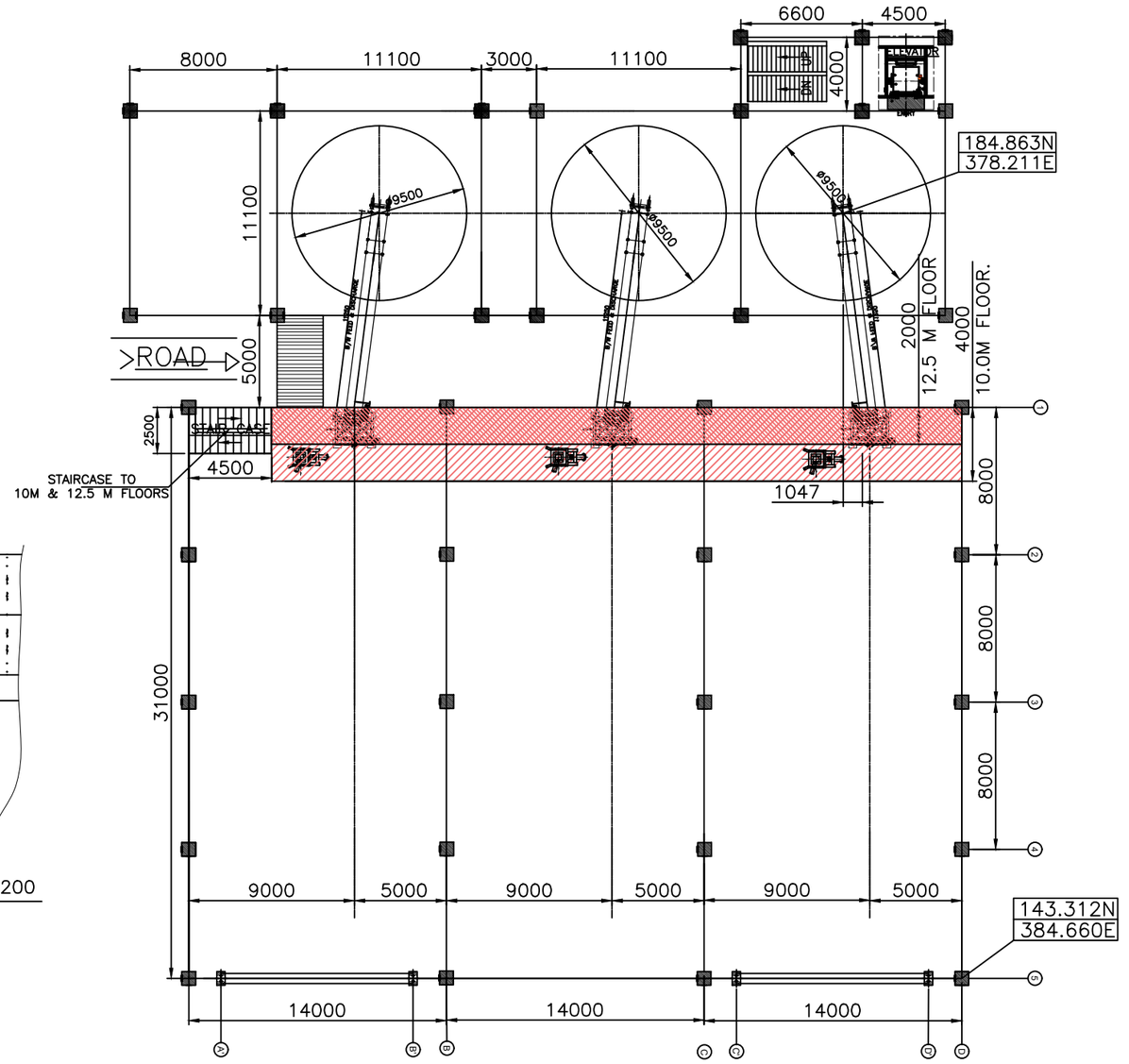
DESIGNATION ----------

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG.NO. 3-62-221-00045





ITEM LIST AND SCOPE		
SL. NO	DESCRIPTION	SCOPE
1	SPOOL PIECE (ABOVE ROD GATE)	VENDOR
2	ROD GATE	VENDOR
3	SPOOL PIECE (BELOW ROD GATE)	VENDOR
4	MOTORIZED SLIDE GATE ABOVE FEEDER	VENDOR
5	SPOOL PIECE BETWEEN SLIDE GATE AND FEEDER INLET	VENDOR
6	WEIGH FEEDER	VENDOR
7	DISTANCE PIECE	VENDOR
8	MOTORIZED SLIDE GATE BELOW FEEDER	VENDOR
9	PNEUMATIC DIVERTER GATE	VENDOR
10	BYPASS CHUTE	VENDOR
11	BALL MILL INLET CHUTE	VENDOR

REV.	DATE	ALTERED		REV.	DATE	ALTERED	
		CHD.	APPD.			CHD.	APPD.
ZONE				ZONE			

FILE NAME

REF.DRG.NO.

INVENTORY NO.

THE FOLLOWING CONDITIONS APPLY EXCEPT OTHERWISE STATED...

1. REF.TO HY0230261 FOR UNSPECIFIED TOLERANCES.
2. CHAMFER M/CD SHARP EDGES 1.2 TO 1.0 AT 45°.
3. INTERNAL M/CD CORNER RADII 1 TO 0.7.
4. THE SURFACE ROUGHNESS WHEREVER NOT SHOWN SHALL BE TAKEN FROM THE SURFACE ROUGHNESS SHOWN OUT SIDE BACK SLASHES GIVEN AT THE TOP MOST RIGHT CORNER OF THE DRG.

TYPE OF PRODUCT
OR
NAME OF CUSTOMER/PROJECT

TELANGANA STATE POWER GENERATION CORPORATION LTD
TELANGANA INDIA
YADADRI TPS (5X800 MW)

BHARAT HEAVY ELECTRICALS LTD.
HYDERABAD

	NAME	SIGN.	DATE	NO.OF VAR.
DRN.	BGK		14.07.22	
CHD.	PVSB		14.07.22	
APPD.	AMAN SURIN		14.07.22	

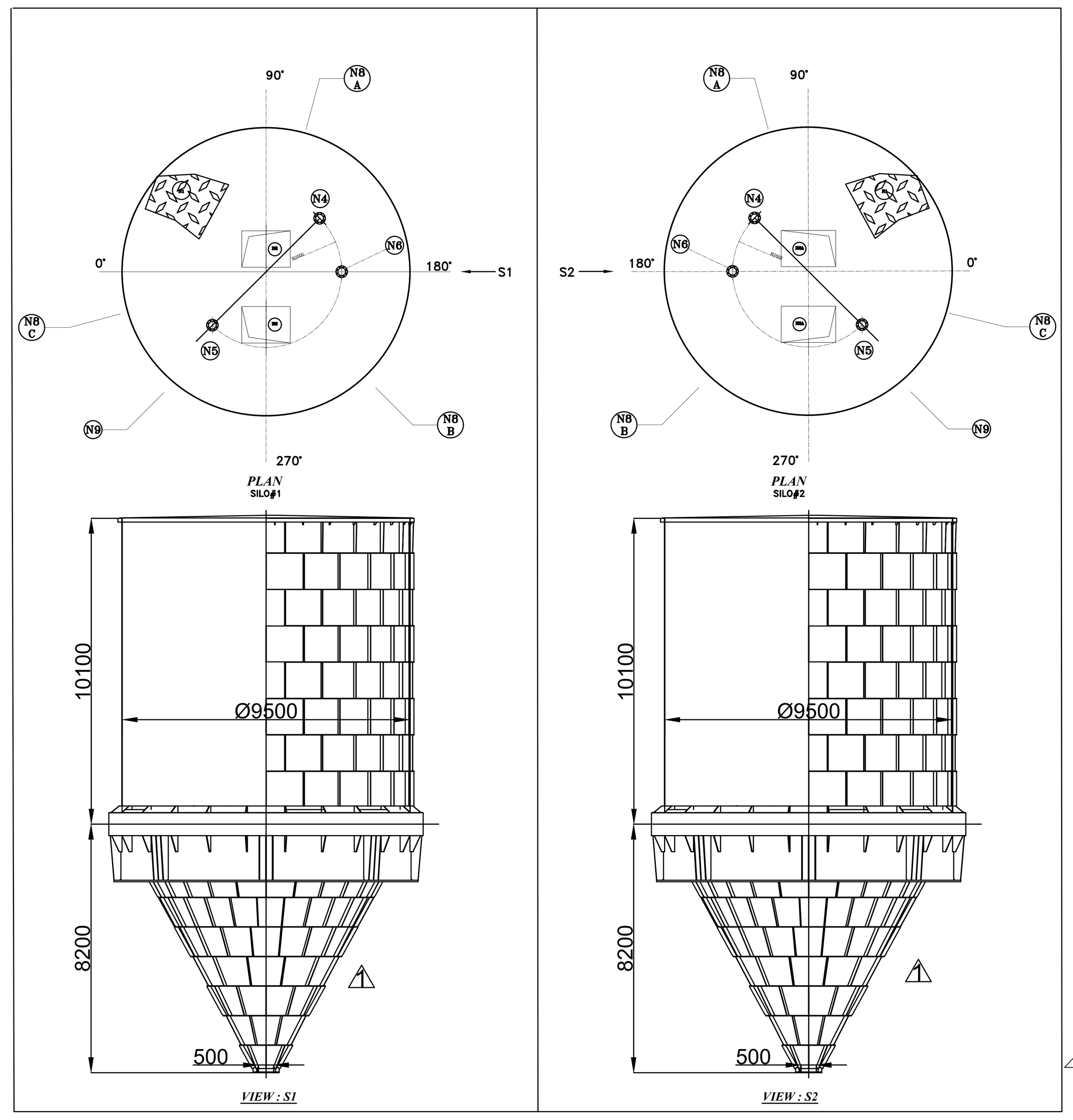
DEPT. PULV ENGG.	SCALE	WEIGHT (KG)	REF. TO ASSY DRG.	ITEM NO.	NO.OF ITEMS
CODE 446	NTS	--		01	01

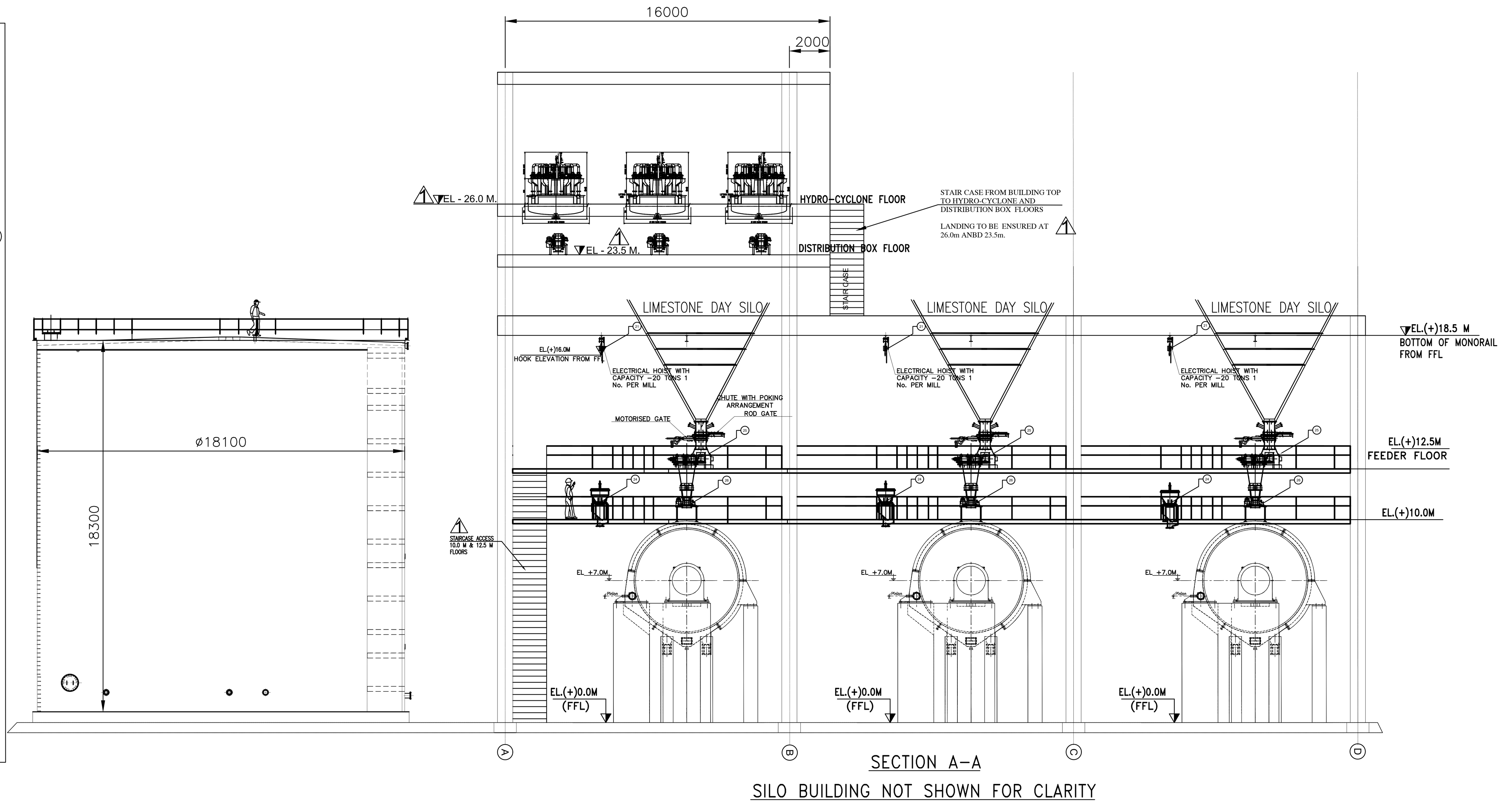
TITLE: WEIGH FEEDER ALONG WITH ACCESSORIES

DRAWING NO. 3-62-221-00045 REV. 00

SHEET NO. 01 NO OF SHEETS 01

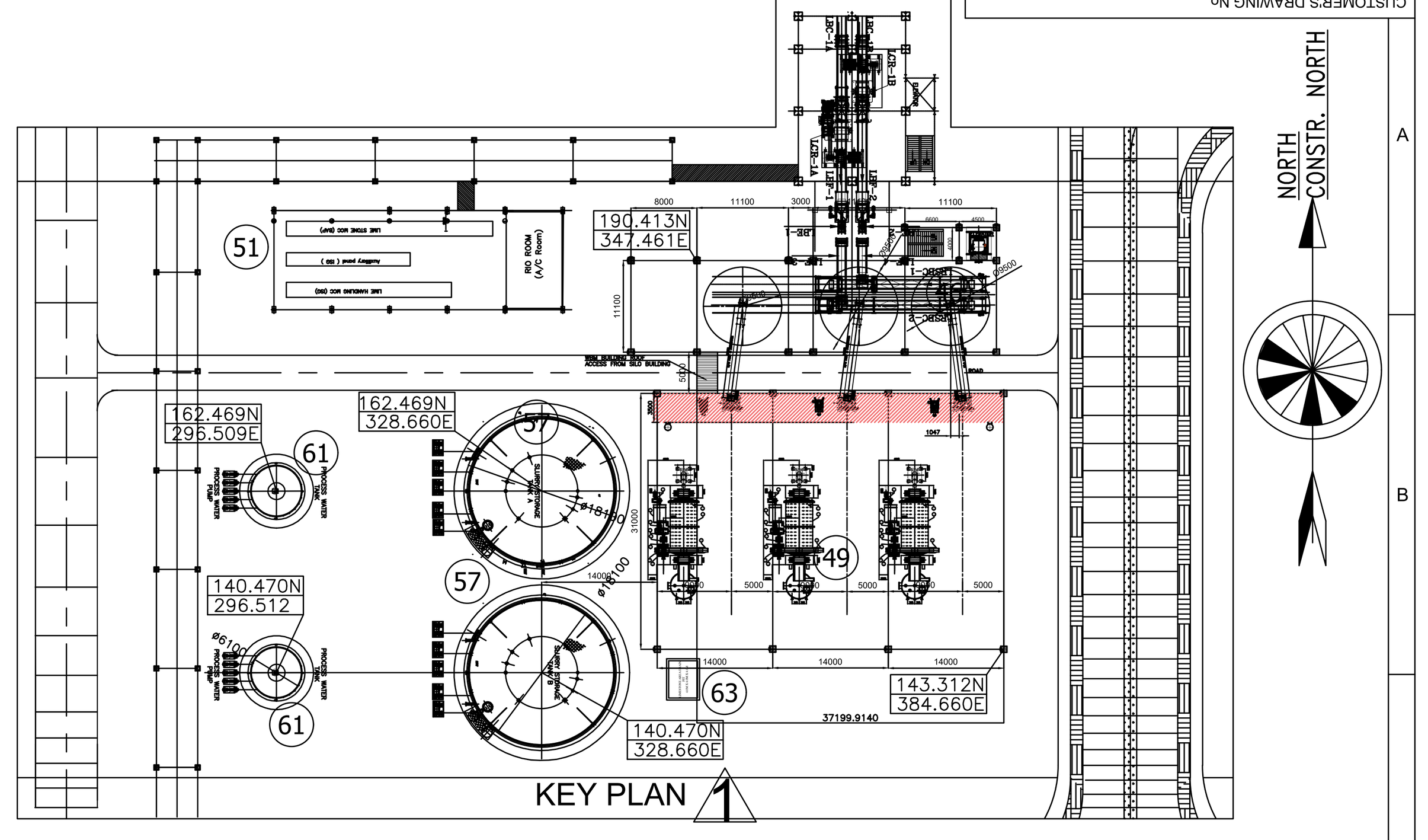
TD-151/REV. 03 SIZE A3





BILL OF MATERIAL- WET BALL MILLING SYSTEM (01)

ITEM No:	DESCRIPTION	QUANTITY/MILL
01	BALL MILL SHELL ASSLY	01
02	CHEEK WITH TRUNNION_NDE	01
03	CHEEK WITH TRUNNION_DE	01
04	SUPPORT BEARING ASSLY	02
05	INLET HOOD ASSLY	01
06	GIRTH GEAR & GIRTH GEAR HSG ASSY	01
07	DRIVE SHAFT ASSEMBLY WITH PINION	01
08	PINION BEARING BODY WITH COVER-FLOATING	01
09	PINION BEARING BODY WITH COVER-THRUST	01
10	COUPLING BETWEEN MAIN REDUCER & Dr.ASY	01
11	MAIN REDUCER (GEAR BOX)	01
12	MAIN MOTOR	01
13	INCHING REDUCER ASSEMMBLY	01
14	DISCHARGE HOOD ASSLY	01
15	REJECT CHUTE	01
16	SLURRY TANK WITH AGITATOR	01
17	COUPLING BETWEEN MAIN MOTOR & MAIN REDUCER	01
18	BALL MILL LINERS	01 SET
19	TROMMEL SCREEN	01
20	SLURRY PUMP	02
21	MILL HYDRO-CYCLONE WITH DIST. BOX	01
22	ELECTRIC HOIST	01
23	SLURRY PIPING	01
24	BALL CHARGE HOPPER	01
25	LIMESTONE FEEDER	01
26	PNEUMATIC DIVERTOR	01



« NOZZLE SCHEDULE » FOR EACH SILO

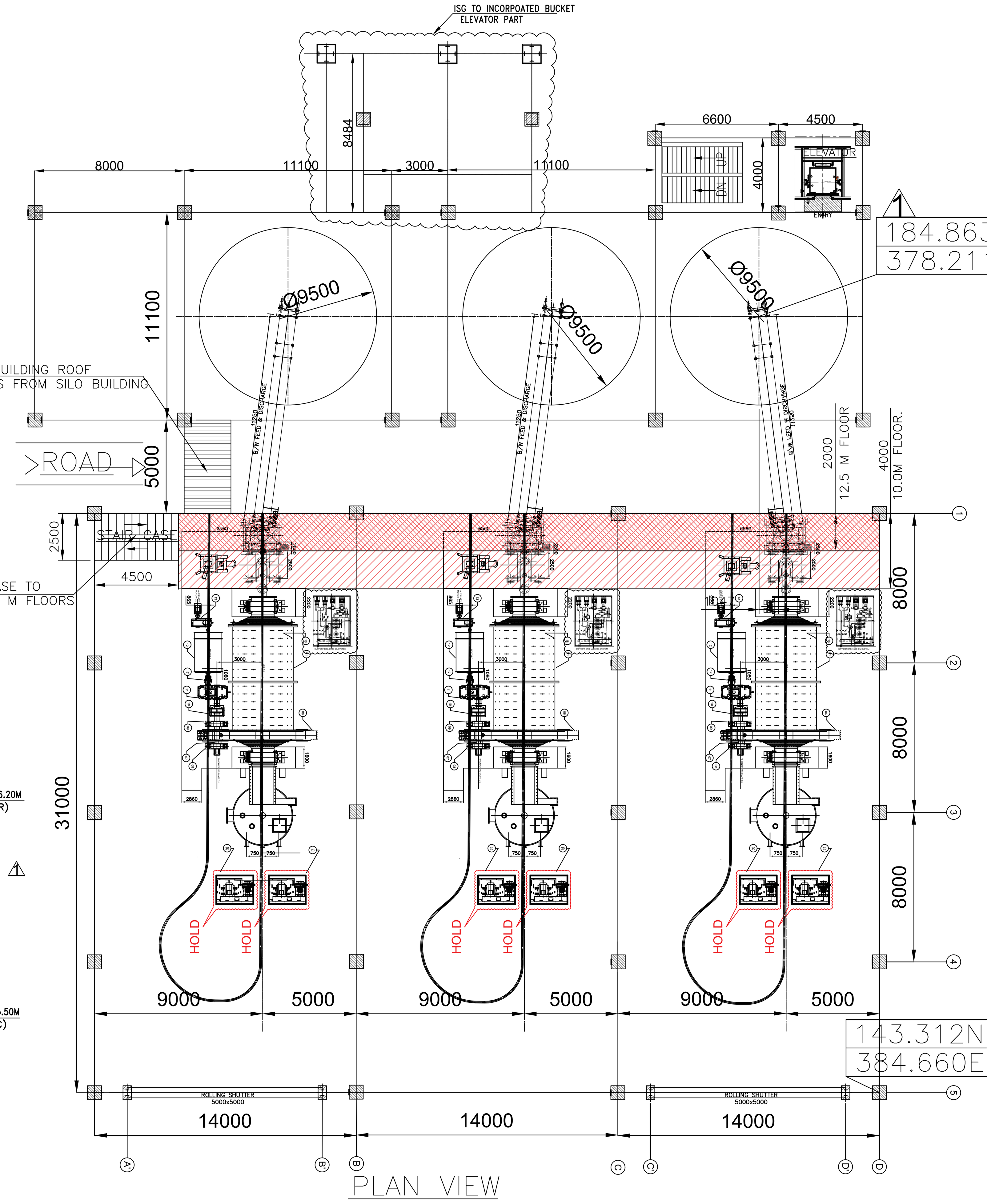
Nozzle. No.	Opening Size ON SILO TOP	Opening Size EL (+)35.5 M FLOOR	Nos	Flange	Service	Projection	Remark
N1	850x850		01	850x850	ACCESS HATCH FRAME	–	
N2	–	1800X1150	02	1130X1030	LIMESTONE FEED	–	
N2A	–	2000X1150	02	1130X1030	LIMESTONE FEED	–	
N3	500NB	–	01	ANSI B16.5#150 WELDNECK FLANGE	DISCHARGE	–	
N4	150NB	200NB	01	ANSI B16.5#150	LEVEL TRANSMITTER	150	
N5	150NB	200NB	01	ANSI B16.5#150	LEVEL TRANSMITTER	150	
N6	150NB	200NB	01	ANSI B16.5#150	SPARE NOZZLE	150	
N8A,B,C	150NB	150NB	03	ANSI B16.5#150	AIR CANON	150	SHALL BE AS PER VENDOR DRG
N9	150NB	150NB	01	ANSI B16.5#150	POKING NOZZLE	150	

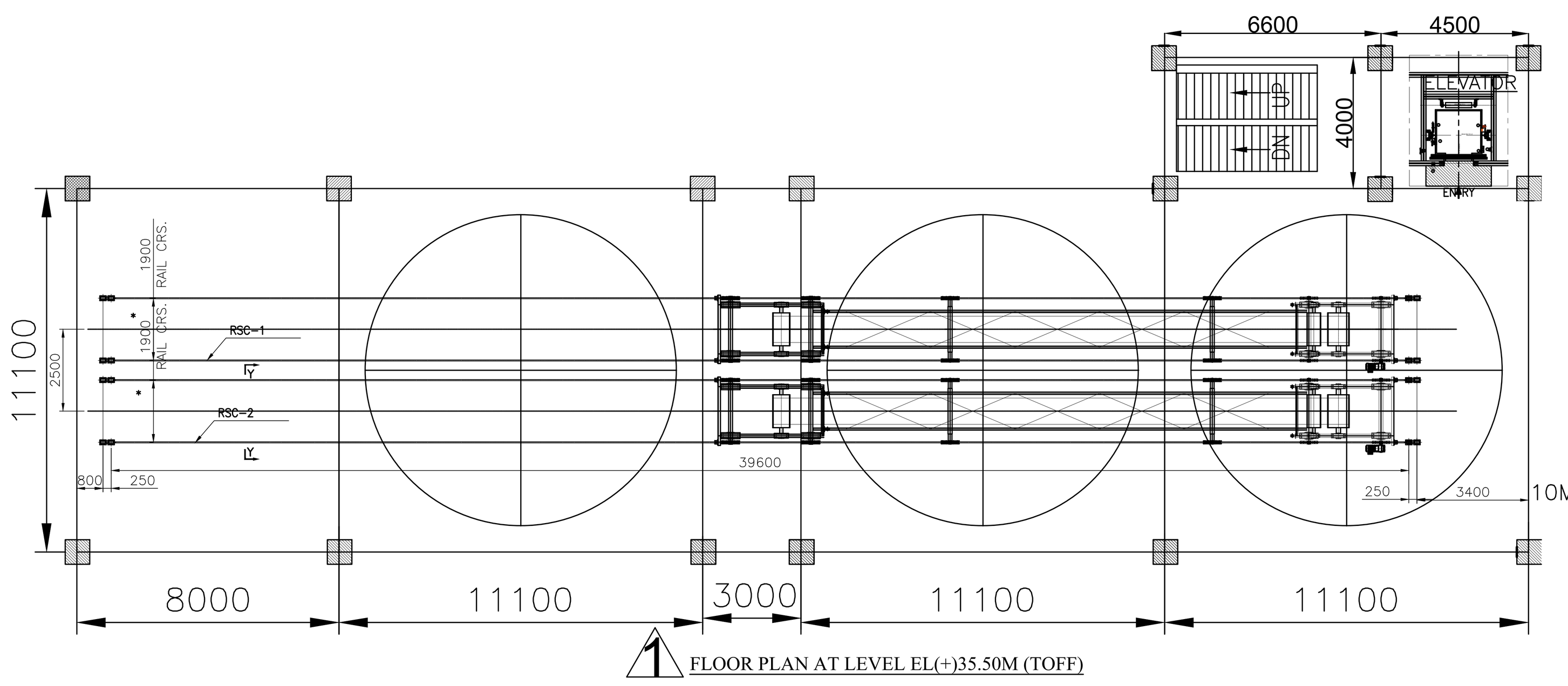
MATERIAL SPECIFICATION FOR SILO

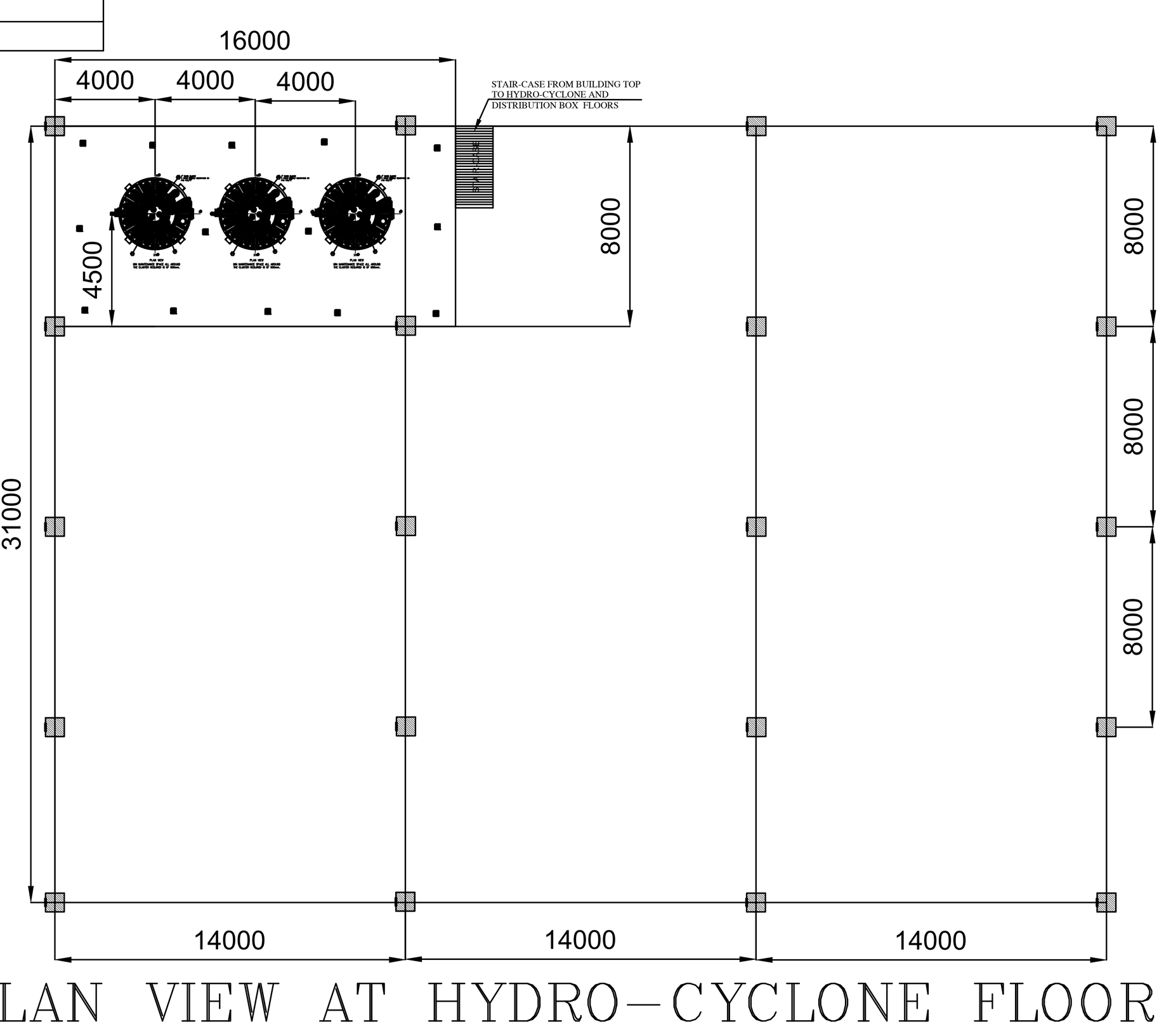
ITEM	MATERIAL
SHELL, ROOF, BASE AND BAFFLE PLATE	IS:2062 E250 GRADE BR
STRUCTURES	IS:2062 E250 GRADE A/BR
STAIRWAYS & PLATFORMS	IS:2062 E250 GRADE A/BR
MANHOLE	IS:2062 E250 GRADE BR
NOZZLE	A106 Gr B
NOZZLE FLANGES	IS:2062 E250 GRADE BR
NOZZLE REINFORCEMNT	IS:2062 E250 GRADE BR
HAND RAILING	IS:1161
BOLT	IS: 1367 CLASS 4.4
FITTINGS	A-105
ANCHOR BOLT	IS2062 E250 GRADE BR

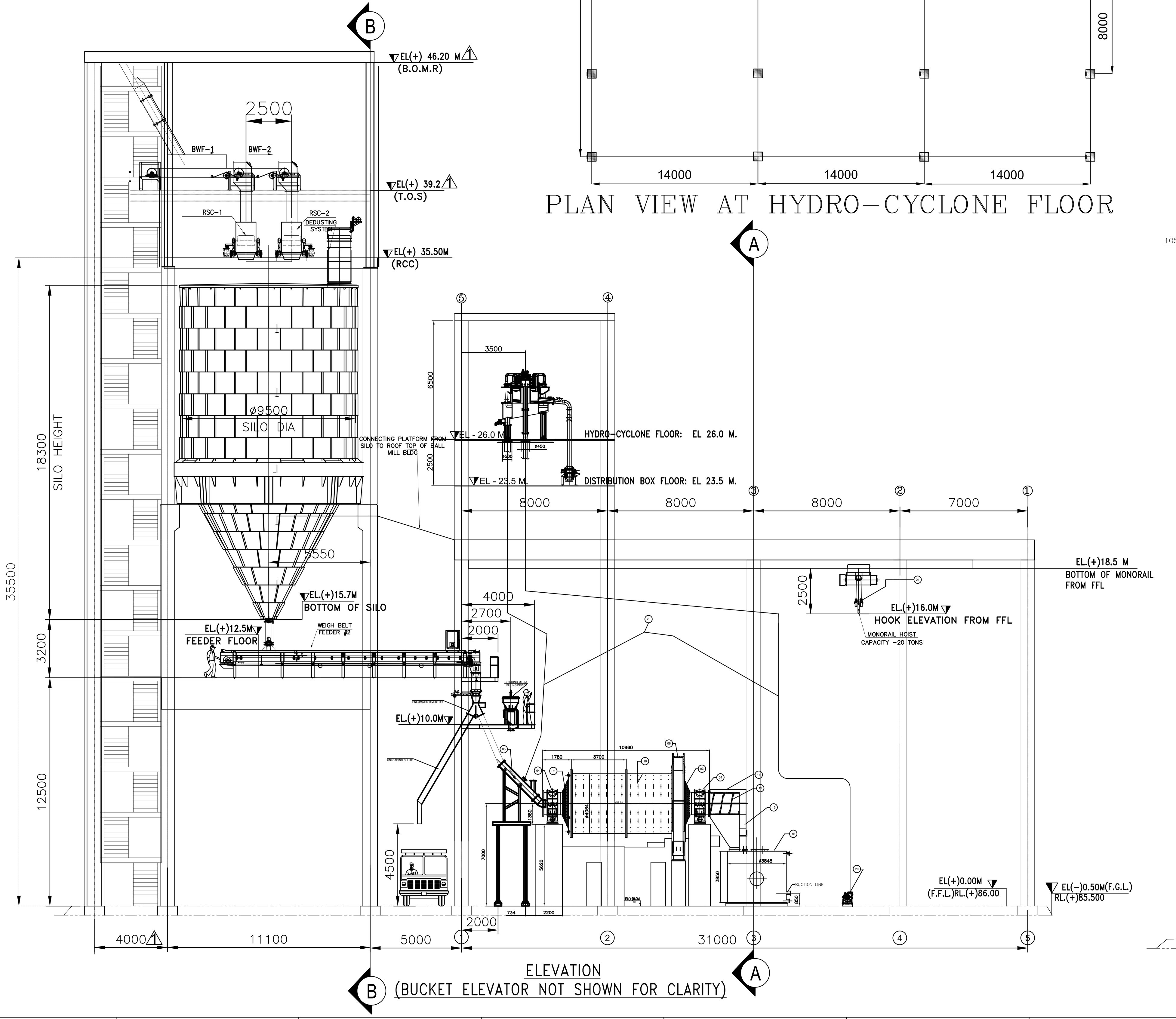
DESIGN DATA

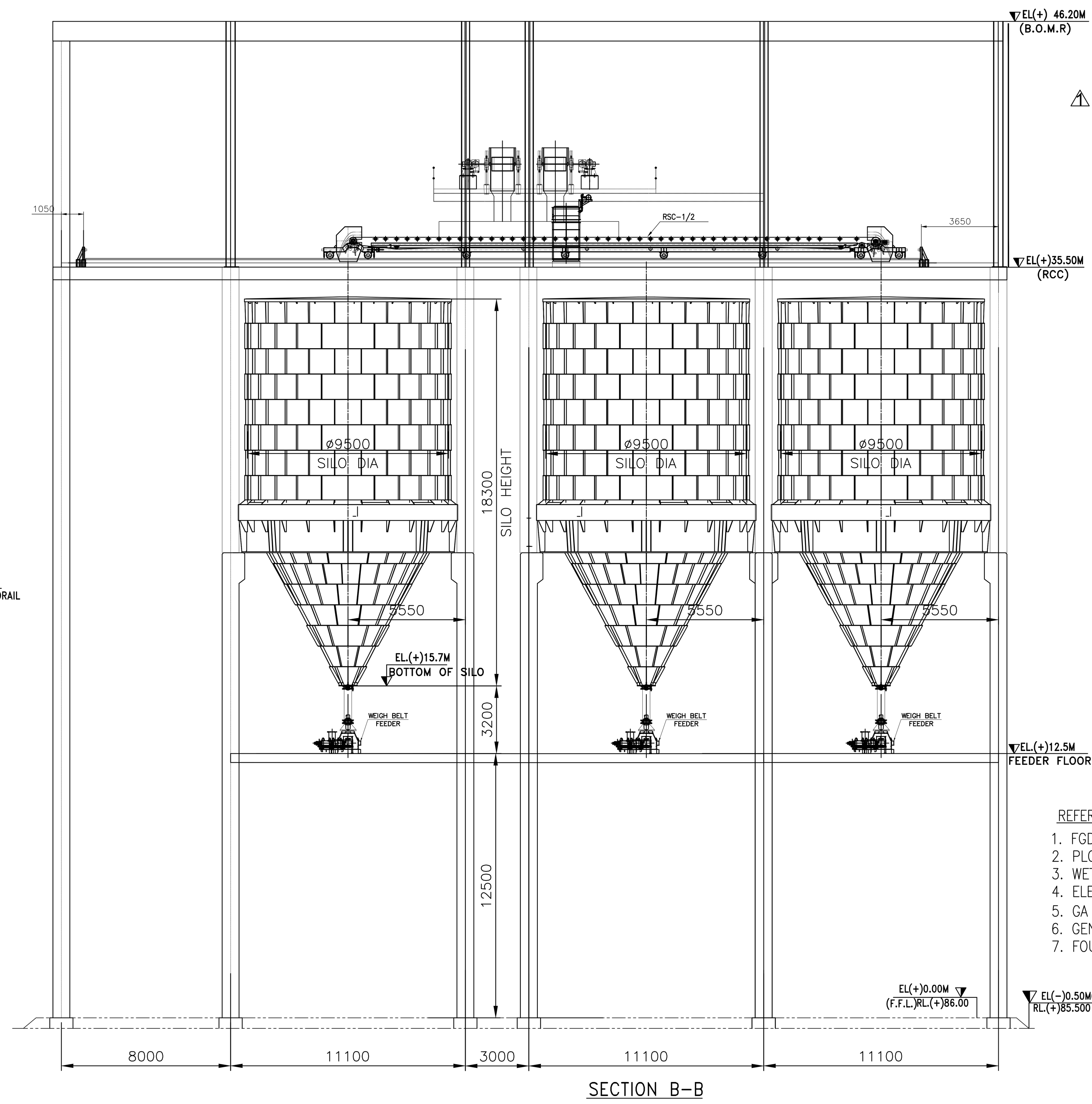
DESIGN CODE	-	IS:9178 (PART 1 TO PART 3)
STORAGE PRODUCT	-	CRUSHED LIMESTONE (1 INCH SIZE)
SILO CAPACITY	M3	610
ROOF SLOPE	-	1 IN 50
BULK DENSITY (VOLUME CALCULATION)	KG/CUM	1400
BULK DENSITY (WEIGHT CALCULATION)	KG/CUM	2200
WIND CODE	-	AS PER CONTRACT SPECIFICATION
SEISMIC CODE	-	AS PER CONTRACT SPECIFICATION
NO. OF SILOS	NO.	02
DIAMETER (I.D)	MM	9500
CYLINDRICAL HEIGHT	MM	10100
CONICAL HOPPER HEIGHT	MM	8200
ROOF PLATE THICKNESS	MM	8
SHELL PLATE THICKNESS	MM	12
CONICAL HOPPER THICKNESS	MM	12
INSULATION	-	NOT APPLICABLE
INSIDE LINING	-	SS304-LINING- 4MM THICK IN CONICAL PORTION ONLY











NOTES: (1)

1. ALL LEVELS AND GRIDS ARE INDICATED IN METRES. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFICALLY MENTIONED.
2. FFL CORRESPONDS TO EL(±)0.00 WHICH IS 500MM ABOVE FGL. FGL IN THIS AREA CORRESPONDS TO RL.(+)85.5M.
3. THE EQUIPMENT/MACHINERY SIZES SHOWN IN THE DRAWING ARE INDICATIVE ONLY AND WILL BE CONFIRM AFTER VENDOR DATA. THE MAXIMUM ANTICIPATED SIZE AND LOADING IS PROVIDED IN THE DRAWING
4. FLOOR OPENINGS, PIPE CROSSINGS SHALL BE CONFIRMED DURING DETAIL ENGINEERING.
5. INSPECTION DOOR SHALL BE LEAK PROOF.
6. GRAVIMETRIC FEEDER DETAILS SHOWN IS TENTATIVE ONLY AND SHALL BE FINALIZED AFTER GETTING SUPPLIER DATA
7. BUILDING HAS BEEN DESIGNED CONSIDERING ALL EQUIPMENTS, GRAVIMETRIC FEEDERS, BELT FEEDERS, CONVEYORS WORKING SIMULTANEOUSLY UNDER FULL LOAD.
8. DRAWING TO BE READ IN CONJUNCTION WITH BHEL-ISG MECHANICAL GA AND LOAD DETAILS OF BE-1/2, RBF-1/2 AND DE FOR LIMESTONE DAY SILO FLOOR. REFER DRAWING NO. IS-1-GA-719-101-M010A

REFERENCE DWG. :- (1)

1. FGD PLOT PLAN -- PY-LQ-0-M081-8507-01
2. PLOT PLAN -- PE-DG-417-100-M001
3. WET BALL MILL BUILDING- ARCH DRAWING -- PY-DA-1-M112-1252-01
4. ELEVATOR FOR SILO -- HY-EL-YAD-DS-00
5. GA OF LIMESTONE BUCKET ELEVATOR BE-1 /2 -- IS-3-GA-720-101-M009
6. GENERAL ARRANGEMENT OF WET BALL MILL -- 0-00-620-87125
7. FOUNDATION PLAN OF WET BALL MILL -- 0-00-620-87124

REV.	DATE	ALTD:	CKD.	APPD.
01	02.05.2022	ABUL KALAM	AMAN SURIN	KHRK

DRG IS REVISED AS PER TSGENCO YADADRI COMMENTS

CUSTOMER: TELANGANA STATE POWER GENERATION CORPORATION LTD
TELANGANA INDIA
YADADRI TPS (5X800 MW)

OWNER'S CONSULTANT: TATA CONSULTING ENGINEERS LIMITED
BANGALORE, INDIA

BHARAT HEAVY ELECTRICALS LTD
HYDERABAD

DEPT CODE: M

	NAME	SIGN	DATE
DRN	UDAY/ABUL	-Sd-	12.11.2021
DESN	UDAY/ABUL	-Sd-	12.11.2021
CHD	PV SRIHARI BABU	-Sd-	12.11.2021
APPD	AMAN SURIN	-Sd-	12.11.2021

TITLE
LIMESTONE DAY SILO AND WET BALL MILL AND SILO BUILDING

DEPT. SIGN SCALE NTS DRAWING NO. 0-00-620-87116
SHEET 1 OF 1 REV. 01
SIZE-A0

PROJECT:

5 X 800 MW YADADRI THERMAL POWER STATION

OWNER:

TELANGANA STATE POWER GENERATION CORPORATION LTD

Owners Consultant:

TATA CONSULTING ENGINEERS LIMITED

EPC CONTRACTOR:

BHARAT HEAVY ELECTRICALS LTD

FGD DOCUMENT TITLE:

Painting Schedule of Wet Ball Milling system and Silo.

ISSUED FOR:	BHEL Doc No : **BA-WBM-PS-YADADRI-00**	REV. : **00**
☐ INFORMATION ☐ ENQUIRY ☐ CONSTRUCTION ✓ APPROVAL ☐ AS BUILT	TSGENCO Doc No:	REV. : **00**

Rev No	Date	Reason of Revision	Prepared by	Reviewed by	Approved by
			BHEL	BHEL	TSGENCO
00	05.08.2021	First Submission	UDAY REDDY	PVS/AMAN	

Painting scheme of Wet Ball Milling system: Shop manufactured Items

FGD TSGENCO YADADRI								
Painting Scheme : Wet Ball Milling system Outsourced (BOHT) Items								
Revision : 0 - Date : 05.08.2021								
Outsourced (BOHT) Items								
Shop manufactured jobs								
Sl. No.	Description	Surface Preparation	Primer Coat	Intermediate Coat	Finished Coat	Total DFT External surface	Colour shade for external surface	Remarks
1	Mill Shell - Internal surface	Commercial blast Swedish Std SA 2.5	One coat of Inorganic Zinc Silicate paint. Dry film thickness (DFT) 50 microns.	Not applicable (NA) since rubber lining being installed across surface of internal surface		NA	NA	
2	Mill shell - External surface	Commercial blast Swedish Std SA 2.5	One coat of Inorganic Zinc Silicate paint. Dry film thickness (DFT) 50 microns	One Coat of Micaceous iron oxide (MIO) epoxy based paint Dry film thickness (DFT): 100 microns	Two coats of Polyamide cured color pigment epoxy based paint Dry film thickness (DFT) 70 microns (35 micron X 2 Coats)	220	Grey White RAL 9002	
3	Support bearing housing-Internal surface	Commercial blast Swedish Std SA 2.5	One coat of Inorganic Zinc Silicate paint. Dry film thickness (DFT) 50 microns.	Not applicable (NA) as surface shall be in permanent contact with oil		NA	NA	
4	Support bearing housing-External surface	Commercial blast Swedish Std SA 2.5	One coat of Inorganic Zinc Silicate paint. Dry film thickness (DFT) 50 microns	One Coat of Micaceous iron oxide (MIO) epoxy based paint Dry film thickness (DFT): 100 microns	Two coats of Polyamide cured color pigment epoxy based paint Dry film thickness (DFT) 70 microns (35 micron X 2 Coats)	220	Grey White RAL 9002	
5	Ball charging hopper and ball charge chute	Commercial blast Swedish Std SA 2.5	One coat of Inorganic Zinc Silicate paint. Dry film thickness (DFT) 50 microns	One Coat of Micaceous iron oxide (MIO) epoxy based paint Dry film thickness (DFT): 100 microns	Two coats of Polyamide cured color pigment epoxy based paint Dry film thickness (DFT) 70 microns (35 micron X 2 Coats)	220	Grey White RAL 9002	
6	Material inlet & outlet - Internal surface - Rubber lining	Commercial blast Swedish Std SA 2.5	One coat of Inorganic Zinc Silicate paint. Dry film thickness (DFT) 50 microns	Not applicable since rubber lining being installed across surface of internal surface			NA	Not applicable since rubber lining being installed across surface of internal surface.

FGD TSGENCO YADADRI								
Painting Scheme : Wet Ball Milling system Outsourced (BOHT) Items								
Revision : 0 - Date : 05.08.2021								
Outsourced (BOHT) Items								
Shop manufactured jobs								
Sl. No.	Description	Surface Preparation	Primer Coat	Intermediate Coat	Finished Coat	Total DFT External surface	Colour shade for external surface	Remarks
7	Material inlet & outlet - External surface	Commercial blast Swedish Std SA 2.5	One coat of Inorganic Zinc Silicate paint. Dry film thickness (DFT) 50 microns	One Coat of Micaceous iron oxide (MIO) epoxy based paint Dry film thickness (DFT): 100 microns	Two coats of Polyamide cured color pigment epoxy based paint Dry film thickness (DFT) 70 microns (35 micron X 2 Coats)	220	Grey White RAL 9002	
8	Base frame of Pinion shaft assembly: Un-machined surface	Commercial blast Swedish Std SA 2.5	One coat of Inorganic Zinc Silicate paint. Dry film thickness (DFT) 50 microns	One Coat of Micaceous iron oxide (MIO) epoxy based paint Dry film thickness (DFT): 100 microns	Two coats of Polyamide cured color pigment epoxy based paint Dry film thickness (DFT) 70 microns (35 micron X 2 Coats)	220	Grey White RAL 9002	All unmachined surfaces
9	All Machined surface - Ball Mill		Tectyl 506 / standard rust preventive /equivalent			NA	NA	Temporary protection for machined surface. Includes all components i.e. Pinion; Shaft; bearing shoe; drive bearing; mill web portion; girth gear and base frame etc.
10	Girth gear - Un-machined surface	Commercial blast Swedish Std SA 2.5	One coat of Inorganic Zinc Silicate paint. Dry film thickness (DFT) 50 microns	One Coat of Micaceous iron oxide (MIO) epoxy based paint Dry film thickness (DFT): 100 microns	Two coats of Polyamide cured color pigment epoxy based paint Dry film thickness (DFT) 70 microns (35 micron X 2 Coats)	220	Grey White RAL 9002	
11	Anti-Friction Bearing Housing (for Pinion Shaft Assembly)	Commercial blast Swedish Std SA 2.5	One coat of Inorganic Zinc Silicate paint. Dry film thickness (DFT) 50 microns	One Coat of Micaceous iron oxide (MIO) epoxy based paint Dry film thickness (DFT): 100 microns	Two coats of Polyamide cured color pigment epoxy based paint Dry film thickness (DFT) 70 microns (35 micron X 2 Coats)	220	Grey White RAL 9002	
12	Girth Gear guard - Internal surface	Commercial blast Swedish Std SA 2.5	One coat of Inorganic Zinc Silicate paint. Dry film thickness (DFT) 50 microns	One Coat of Micaceous iron oxide (MIO) epoxy based paint Dry film thickness (DFT): 100 microns	Two coats of Polyamide cured color pigment epoxy based paint Dry film thickness (DFT) 70 microns (35 micron X 2 Coats)	220	Grey White RAL 9002	

FGD TSGENCO YADADRI								
Painting Scheme : Wet Ball Milling system Outsourced (BOHT) Items								
Revision : 0 - Date : 05.08.2021								
Outsourced (BOHT) Items								
Shop manufactured jobs								
Sl. No.	Description	Surface Preparation	Primer Coat	Intermediate Coat	Finished Coat	Total DFT External surface	Colour shade for external surface	Remarks
13	Girth Gear guard - External surface	Commercial blast Swedish Std SA 2.5	One coat of Inorganic Zinc Silicate paint. Dry film thickness (DFT) 50 microns	One Coat of Micaceous iron oxide (MIO) epoxy based paint Dry film thickness (DFT): 100 microns	Two coats of Polyamide cured color pigment epoxy based paint Dry film thickness (DFT) 70 microns (35 micron X 2 Coats)	220	Grey White RAL 9002	
14	Fastners & hardware/ foundation bolts	NA	NA	NA	NA	NA	Shall be applied with temporary oil.	

Painting scheme of Wet Ball Milling system: out-sourced (BOHT) Items

FGD TSGENCO YADADRI								
Painting Scheme : Wet Ball Milling system Outsourced (BOHT) Items								
Revision : 0 - Date : 05.08.2021								
Outsourced (BOHT) Items								
Sl. No.	Description	Surface Preparation	Primer Coat	Intermediate Coat	Finished Coat	Total DFT - External surface	Colour shade for external	Remarks
1	GearBox							
i.	Main Gear Box (GB)	Commercial blast Swedish Std SA 2.5	One coat of Inorganic Zinc Silicate. Dry film thickness (DFT) 50 microns	One Coat of Micaceous iron oxide (MIO) epoxy based paint Dry film thickness (DFT): 100 microns	Two coats of Polyamide cured color pigment epoxy based paint Dry film thickness (DFT) 70 microns (35 micron X 2 Coats)	220	Shade: Grey White RAL 9002	The mention DFT shall be maintain on blasted surface only
ii.	Base Frame (GB + Motor)	Commercial blast Swedish Std. SA2.5	One coat of Inorganic Zinc Silicate. Dry film thickness (DFT) 50 microns)	One Coat of Micaceous iron oxide (MIO) epoxy based paint Dry film thickness (DFT): 100 microns	Two coats of Polyamide cured color pigment epoxy based paint Dry film thickness (DFT) 70 microns (35 micron X 2 Coats)	220	Shade: Grey White RAL 9002	The mention DFT shall be maintain on blasted surface only
iii.	Inching Reducer	Commercial blast Swedish Std. SA2.5	One coat of Inorganic Zinc Silicate. Dry film thickness (DFT) 50 microns)	One Coat of Micaceous iron oxide (MIO) epoxy based paint Dry film thickness (DFT): 100 microns	Two coats of Polyamide cured color pigment epoxy based paint Dry film thickness (DFT) 70 microns (35 micron X 2 Coats)	220	Shade: Grey White RAL 9002	The mention DFT shall be maintain on blasted surface only

FGD TSGENCO YADADRI								
Painting Scheme : Wet Ball Milling system Outsourced (BOHT) Items								
Revision : 0 - Date : 05.08.2021								
Outsourced (BOHT) Items								
Sl. No.	Description	Surface Preparation	Primer Coat	Intermediate Coat	Finished Coat	Total DFT - External surface	Colour shade for external	Remarks
iv.	Base Frame (GB + Motor + Brake)	Commercial blast Swedish Std. SA2.5	One coat of Inorganic Zinc Silicate. Dry film thickness (DFT) 50 microns	One Coat of Micaceous iron oxide (MIO) epoxy based paint Dry film thickness (DFT): 100 microns	Two coats of Polyamide cured color pigment epoxy based paint Dry film thickness (DFT) 70 microns (35 micron X 2 Coats)	220	Shade: Grey White RAL 9002	The mention DFT shall be maintain on blasted surface only
2	Lubrication System - Support Bearing							
i.	Tank	Commercial blast Swedish Std. SA2.5	One coat of Inorganic Zinc Silicate. Dry film thickness (DFT) 50 microns	One Coat of Micaceous iron oxide (MIO) epoxy based paint Dry film thickness (DFT): 100 microns	Two coats of Polyamide cured color pigment epoxy based paint Shade: Grey White RAL 9002. Dry film thickness (DFT) 70 microns (35 micron X 2 Coats)	220	Shade: Grey White RAL 9002	The mention DFT shall be maintain on blasted surface only

FGD TSGENCO YADADRI								
Painting Scheme : Wet Ball Milling system Outsourced (BOHT) Items								
Revision : 0 - Date : 05.08.2021								
Outsourced (BOHT) Items								
Sl. No.	Description	Surface Preparation	Primer Coat	Intermediate Coat	Finished Coat	Total DFT - External surface	Colour shade for external	Remarks
ii.	Base Frame	Commercial blast Swedish Std. SA2.5	One coat of Inorganic Zinc Silicate. Dry film thickness (DFT) 50 microns.	One Coat of Micaceous iron oxide (MIO) epoxy based paint Dry film thickness (DFT): 100 microns.	Two coats of Polyamide cured color pigment epoxy based paint Dry film thickness (DFT) 70 microns (35 micron X 2 Coats).	220	Shade: Grey White RAL 9002	The mention DFT shall be maintain on blasted surface only
3	Lubrication System - Girth Gear							
i.	Drum Cover, AMU Plate, Spary Panel Plate	All CS surfaces - Commercial blast Swedish Std. SA2.5	One coat of Inorganic Zinc Silicate. Dry film thickness (DFT) 50 microns.	One Coat of Micaceous iron oxide (MIO) epoxy based paint Dry film thickness (DFT): 100 microns.	Two coats of Polyamide cured color pigment epoxy based paint. Dry film thickness (DFT) 70 microns (35 micron X 2 Coats)	220	Shade: Grey White RAL 9002	The mention DFT shall be maintain on blasted surface only

FGD TSGENCO YADADRI								
Painting Scheme : Wet Ball Milling system Outsourced (BOHT) Items								
Revision : 0 - Date : 05.08.2021								
Outsourced (BOHT) Items								
Sl. No.	Description	Surface Preparation	Primer Coat	Intermediate Coat	Finished Coat	Total DFT - External surface	Colour shade for external	Remarks
4	Hydro-Cyclone & Slurry Pumps							
i.	Slurry Pumps	Power tool cleaning to St3(SSPC-SP3	One coat of Inorganic Zinc Silicate. Dry film thickness (DFT) 50 microns.	One Coat of Micaceous iron oxide (MIO) epoxy based paint Dry film thickness (DFT): 100 microns	Two coats of Polyamide cured color pigment epoxy based paint Dry film thickness (DFT) 70 microns (35 micron X 2 Coats)	220	Shade: Grey White RAL 9002	The mention DFT shall be maintain on blasted surface only
ii.	Hydro-cyclone	Commercial blast Swedish Std. SA2.5	One coat of Inorganic Zinc Silicate. Dry film thickness (DFT) 50 microns.	One Coat of Micaceous iron oxide (MIO) epoxy based paint Dry film thickness (DFT): 100 microns	Two coats of Polyamide cured color pigment epoxy based paint Dry film thickness (DFT) 70 microns (35 micron X 2 Coats)	220	Shade: Grey White RAL 9002	The mention DFT shall be maintain on blasted surface only

FGD TSGENCO YADADRI								
Painting Scheme : Wet Ball Milling system Outsourced (BOHT) Items								
Revision : 0 - Date : 05.08.2021								
Outsourced (BOHT) Items								
Sl. No.	Description	Surface Preparation	Primer Coat	Intermediate Coat	Finished Coat	Total DFT - External surface	Colour shade for external	Remarks
5	Weigh Feeder							
i.	Weigh Feeder Assembly	Commercial blast Swedish Std. SA2.5	One coat of Inorganic Zinc Silicate. Dry film thickness (DFT) 50 microns.	One Coat of Micaceous iron oxide (MIO) epoxy based paint Dry film thickness (DFT): 100 microns	Two coats of Polyamide cured color pigment epoxy based paint Dry film thickness (DFT) 70 microns (35 micron X 2 Coats)	220	Shade: Grey White RAL 9002	The mention DFT shall be maintain on blasted surface only
ii.	Rod Gate	Commercial blast Swedish Std. SA2.5	One coat of Inorganic Zinc Silicate. Dry film thickness (DFT) 50 microns.	One Coat of Micaceous iron oxide (MIO) epoxy based paint Dry film thickness (DFT): 100 microns	Two coats of Polyamide cured color pigment epoxy based paint Dry film thickness (DFT) 70 microns (35 micron X 2 Coats)	220	Shade: Grey White RAL 9002	The mention DFT shall be maintain on blasted surface only

FGD TSGENCO YADADRI								
Painting Scheme : Wet Ball Milling system Outsourced (BOHT) Items								
Revision : 0 - Date : 05.08.2021								
Outsourced (BOHT) Items								
Sl. No.	Description	Surface Preparation	Primer Coat	Intermediate Coat	Finished Coat	Total DFT - External surface	Colour shade for external	Remarks
iii.	Connecting Chute	Commercial blast Swedish Std. SA2.5	One coat of Inorganic Zinc Silicate. Dry film thickness (DFT) 50 microns.	One Coat of Micaceous iron oxide (MIO) epoxy based paint Dry film thickness (DFT): 100 microns	Two coats of Polyamide cured color pigment epoxy based paint Dry film thickness (DFT) 70 microns (35 micron X 2 Coats)	220	Shade: Grey White RAL 9002	The mention DFT shall be maintain on blasted surface only
iv.	Vent Hood	SS Parts are not painted						
v.	Damper Gate	SS Parts are not painted						
vi.	Transition Chute	Commercial blast Swedish Std. SA2.5	One coat of Inorganic Zinc Silicate. Dry film thickness (DFT) 50 microns.	One Coat of Micaceous iron oxide (MIO) epoxy based paint Dry film thickness (DFT): 100 microns	Two coats of Polyamide cured color pigment epoxy based paint Dry film thickness (DFT) 70 microns (35 micron X 2 Coats)	220	Shade: Grey White RAL 9002	The mention DFT shall be maintain on blasted surface only

FGD TSGENCO YADADRI								
Painting Scheme : Wet Ball Milling system Outsourced (BOHT) Items								
Revision : 0 - Date : 05.08.2021								
Outsourced (BOHT) Items								
Sl. No.	Description	Surface Preparation	Primer Coat	Intermediate Coat	Finished Coat	Total DFT - External surface	Colour shade for external	Remarks
vii.	Stool	Commercial blast Swedish Std. SA2.5	One coat of Inorganic Zinc Silicate. Dry film thickness (DFT) 50 microns.	One Coat of Micaceous iron oxide (MIO) epoxy based paint Dry film thickness (DFT): 100 microns	Two coats of Polyamide cured color pigment epoxy based paint Dry film thickness (DFT) 70 microns (35 micron X 2 Coats)	220	Shade: Grey White RAL 9002	The mention DFT shall be maintain on blasted surface only
6	Pneumatic Diverter Gate							
i.	Valve	Standard Bought out (BOHT) item. Color shade & DFT shall be maintained as per manufacturer standard						
ii.	Actuator	Standard Bought out (BOHT) item. Color shade & DFT shall be maintained as per manufacturer standard						
7	Motorized Slide Gate							
i.	Motorized Slide Gate	Standard Bought out (BOHT) item. Color shade & DFT shall be maintained as per manufacturer standard						
8	Agitator							
	Agitator	Standard Bought out (BOHT) item. Color shade & DFT shall be maintained as per manufacturer standard						
9	Mill Circuit Tank (including Agitator Support)							
	Mill Circuit Tank (including Agitator Support)	Standard Bought out (BOHT) item. Color shade & DFT shall be maintained as per manufacturer standard						

FGD TSGENCO YADADRI								
Painting Scheme : Wet Ball Milling system Outsourced (BOHT) Items								
Revision : 0 - Date : 05.08.2021								
Outsourced (BOHT) Items								
Sl. No.	Description	Surface Preparation	Primer Coat	Intermediate Coat	Finished Coat	Total DFT - External surface	Colour shade for external	Remarks
10	Slurry Pipe & Fittings (Temp < 90°C)							
	Slurry Pipe & Fittings (Temp < 90°C)	Commercial blast Swedish Std. SA2.5	One coat of Inorganic Zinc Silicate. Dry film thickness (DFT) 50 microns.	One Coat of Micaceous iron oxide (MIO) epoxy based paint Dry film thickness (DFT): 100 microns.	Two coats of Polyamide cured color pigment epoxy based paint Dry film thickness (DFT) 70 microns (35 micron X 2 Coats)	220	Shade: Grey White RAL 9002	The mention DFT shall be maintain on blasted surface only
	Slurry Pipe & Fittings (Temp < 90°C)	For FRP Pipes & Fittings- painting is not applicable						
11	Process Water & Cooling Water - Pipe & Fittings (Temp < 90°C)							
	Process Water & Cooling water Pipe & fittings (Temp < 90°C) (For External surface only)	Commercial blast Swedish Std. SA2.5	One coat of Inorganic Zinc Silicate. Dry film thickness (DFT) 50 microns.	One Coat of Micaceous iron oxide (MIO) epoxy based paint Dry film thickness (DFT): 100 microns.	Two coats of Polyamide cured color pigment epoxy based paint Dry film thickness (DFT) 70 microns (35 micron X 2 Coats)	220	Shade: Grey White RAL 9002	The mention DFT shall be maintain on blasted surface only

FGD TSGENCO YADADRI								
Painting Scheme : Wet Ball Milling system Outsourced (BOHT) Items								
Revision : 0 - Date : 05.08.2021								
Outsourced (BOHT) Items								
Sl. No.	Description	Surface Preparation	Primer Coat	Intermediate Coat	Finished Coat	Total DFT - External surface	Colour shade for external	Remarks
12	InstrumentAirPipe&Fittings(Temp<90°C)							
	Instrument Air Pipe & Fittings (Temp < 90°C)	GI Pipes & Fittings will be used for Slurry application. Hence, painting is not applicable						
13	AllValves(Temp<95°C)							
	All Valves (Temp < 95°C) (For External surface only)	Commercial blast Swedish Std. SA2.5	One coat of Inorganic Zinc Silicate. Dry film thickness (DFT) 50 microns.	One Coat of Micaceous iron oxide (MIO) epoxy based paint Dry film thickness (DFT): 100 microns	Two coats of Polyamide cured color pigment epoxy based paint. Dry film thickness (DFT) 70 microns (35 micron X 2 Coats).	220	Shade: Grey White RAL 9002	The mention DFT shall be maintain on blasted surface only
14	All Electrical & Instrumentation Items (applicable for Wet Ball Mill FGD Package)							
	All Electrical & Instrumentation Items (applicable for Wet Ball Mill FGD Package)	Standard Bought out (BOHT) item. Color shade & DFT shall be maintained as per manufacturer standard						

FGD TSGENCO YADADRI								
Painting Scheme : Wet Ball Milling system Outsourced (BOHT) Items								
Revision : 0 - Date : 05.08.2021								
Outsourced (BOHT) Items								
Sl. No.	Description	Surface Preparation	Primer Coat	Intermediate Coat	Finished Coat	Total DFT - External surface	Colour shade for external	Remarks
15	Rubber liners, grinding media, stainless steels, rubber parts, ERW Pipes, forging /casting							
	Rubber liners, grinding media, stainless steels, rubber parts, ERW Pipes, forging /casting	Painting not applicable.						

NOTE:

1. The above equipment wise painting scheme given for major system covering broader level items. As regard other small components and misc items not covered above, then painting scheme/colour shade shall be as per OEM manufacturing standard.
2. No painting for FRP Pipes, FRP pipe fittings, SS, Aluminium, non-ferrous, stainless steel and galvanized items.

Painting scheme of Silo, Passenger cum bucket elevator for silo, Air canons and Dust extraction System items.

FGD TSGENCO YADADRI								
Painting Scheme : Silo, Passenger cum goods elevator for silo structure, air cannons and Bag filter								
Revision : 0 - Date : 05.08.2021								
Silo Items								
Sl. No.	Description	Surface Preparation	Primer Coat	Intermediate Coat	Finished Coat	Total DFT External surface	Colour shade for external surface	Remarks
1	Limestone Silo - Internal surface	Commercial blast Swedish Std SA 2.5	One coat of Inorganic Zinc Silicate primer coat. Dry film thickness (DFT) 50 microns.	NA	NA	NA	NA	
2	Limestone Silo - External surface	Commercial blast Swedish Std SA 2.5	One coat of Inorganic Zinc Silicate primer coat. Dry film thickness (DFT) 50 microns	One Coat of Micaceous iron oxide (MIO) epoxy based paint. Dry film thickness (DFT): 100 microns	Two coats of Polyamide cured color pigment epoxy based paint. Dry film thickness (DFT) 70 microns (35 micron X 2 Coats)	220	Grey White RAL 9002	
3	Passenger cum goods elevator and accessories	Commercial blast Swedish Std SA 2.5	One coat of Inorganic Zinc Silicate primer coat. Dry film thickness (DFT) 50 microns	One Coat of Micaceous iron oxide (MIO) epoxy based paint. Dry film thickness (DFT): 100 microns	Two coats of Polyamide cured color pigment epoxy based paint. Dry film thickness (DFT) 70 microns (35 micron X 2 Coats)	220	Grey White RAL 9002	
4	Bag filter	Commercial blast Swedish Std SA 2.5	One coat of Inorganic Zinc Silicate primer coat. Dry film thickness (DFT) 50 microns	One Coat of Micaceous iron oxide (MIO) epoxy based paint. Dry film thickness (DFT): 100 microns	Two coats of Polyamide cured color pigment epoxy based paint. Dry film thickness (DFT) 70 microns (35 micron X 2 Coats)	220	Grey White RAL 9002	
5	Air Canons	Commercial blast Swedish Std SA 2.5	One coat of Inorganic Zinc Silicate primer coat. Dry film thickness (DFT) 50 microns	One Coat of Micaceous iron oxide (MIO) epoxy based paint. Dry film thickness (DFT): 100 microns	Two coats of Polyamide cured color pigment epoxy based paint. Dry film thickness (DFT) 70 microns (35 micron X 2 Coats)	220	Grey White RAL 9002	

1. INTRODUCTION

The Limestone grinding and slurry preparation system, which consists of wet ball mill circuit for limestone slurry preparation purpose, is a part of FGD (Flue Gas Desulphurisation) plant. The power plant uses coal as the fuel to generate power. The combustion reaction (burning of the coal) process produces flue gas, which typically releases Sulphur dioxide in the atmosphere. FGD system is designed to reduce the amount of Sulphur dioxide in the flue gas prior to discharge it to atmosphere and limestone slurry is used as the reagent for the same.

2. PROJECT INFORMATION

Owner	:	TELANGANA STATE POWER GENERATION CORPORATION LTD
Contractor	:	BHEL
Project/Product	:	YADADRI TPS (5X800 MW) FGD
Ambient temperature (Min.)	:	27°C
Ambient temperature (Design)	:	45°C
Ambient Relative Humidity	:	60%

3. EQUIPMENT INFORMATION

Below indicated are the main components of the limestone grinding / slurry preparation System.

1) Wet Ball Mill.
2) Weigh Feeder.
3) Gates (Rod, Knife, Flap).
4) Mill Slurry Tank with Agitator.
5) Slurry Pumps.
6) Hydro-Cyclone.
7) Piping and Valves.
8) Chutes

4. EQUIPMENT SIZING AND SELECTION DATA

4.1 Wet Ball Mill (2 nos.)

There shall be two numbers of wet Ball mills for grinding of limestone; each mill shall be sized to meet the following conditions.

WBM Design Capacity	52 Tons Per Hour (TPH)
Input Limestone Size	Max. 25 mm, 100% < 25mm & 90% < 20mm.
Minimum Slurry Conc. Leaving System (at hydro cyclone overflow)	30% Solids (w/w)
Output Fineness (at hydro cyclone overflow)	90% passing through 325 mesh (44 µm).
Limestone bond index	14.3 kWh/ton (design)
pH of Limestone slurry	7 to 9
Chloride content in Limestone slurry	50 to 70 ppm as CaCO3 / 35.4 to 49.6 mg/l

An emergency auxiliary drive is provided to prevent settling /solidification of limestone when the mill is out of operation and also for maintenance purpose.

All parts of the mill including mill body, trunnion, hydro-cyclones, integral pipes, mill circuit pumps and other parts in contact with limestone slurry is provided with replaceable rubber wear liners.

Facility shall be provided for on-load loading of steel balls to the mill.

The material of the balls shall be chosen to ensure that the balls do not lose their original shape and to ensure minimum ball consumption.

4.2 Weigh Belt Feeder (2 nos.)

Weigh belt feeders / Gravimetric feeders (closed type) are sized to meet 110% of the maximum mill design capacity.

Therefore, belt weigh feeder capacity = 52TPH x 1.1 ~ 58 TPH.

57.2 TPH is the maximum capacity with highest speed of weigh feeder. This capacity can be reduced as per requirement. The speed variation is in the range of 1:10 for drive motor.

All parts of weigh feeder (battery limit i.e. from inlet hopper to discharge hood) which are in contact with limestone except belt will be of stainless steel.

The interconnecting chutes, which do not come under battery limit of weigh feeder equipment i.e. from Silo outlet to the transition chute below discharge hood, construction will be MS (6thk.) mother plate + SS304 (3thk.) Liner.

The feeder shall have adequate instrumentation to detect "loss of flow"and also to have weighing instruments to accurately control the feed rate.

The chutes will be designed to ensure proper flow of the limestone. However, in case of jamming / blockage, suitable poke doors/holes shall be provided in the inlet chute of weigh feeder.

One no. chute blockage switch is provided to trip the feeding conveyor in case of Chute blockage and protect the feeding conveyor equipment.

4.3 Rod Gate and Motorised Gate (at feeder inlet and feeder outlet)

The Rod gates are installed at bottom of limestone storage silo and Motorised Gate at Feed & Discharge of weigh feeder.

Motorized slide gate with actuator is designed to ensure 100% opening & closing of the gate even with storage silo full of material.

In addition, a hand wheel with proper access shall also be provided for manual operation of the knife gate at the discharge of weigh feeder. The force at the rim of the hand wheel shall not exceed 35 Kg with bunker full of limestone.

All the actuator gates shell be provided with local as well as remote operation.

All parts in contact with limestone shall be of stainless steel construction

Material flow: Max. 57.2 TPH.

4.4 Change Over Flap / Diverter Gate (2 Nos.)

The change-over flap / diverter gate is installed at discharge of weigh feeder after knife gate to divert the material flow either to ball mill or to chute, which is extended up to floor level in mill building.

The arrangement can be used for empting the silo & for weigh feeder calibration as needed.

Material flow: 57.2 TPH (Design)

4.5 Mill Circuit – Limestone Slurry Tank with Agitator (2 nos.)

The Mill Circuit tank is provided to hold and dilute the circulating slurry of the mill circuit for desired operation of the Ball mill for limestone grinding. It is also required

ANNEXURE -7

SPECIFICATION OF VARIABLE FREQUENCY DRIVE (VFD)

1. **General Requirement :**

The VFD shall be selected for motor. which drives the weigh feeder with variable speed.

2. **Application :**

The variable speed drive is used to drive the motor of a weigh feeder in wet ball milling system in an electrical energy-generating power station. A power plant distributed control system provides a signal to the VFD to regulate motor speed. The signal will be 4 to 20 mA DC. The motor and drive will be installed in a power plant application requiring reliable and continuous operation 24 hours per day and 365 days per year with minimal downtime maintenance.

3. **Environmental Conditions :**

The drive is to operate within an environment with temperatures ranging from 0°C to 50°C. The motor is to operate within an environment with temperatures ranging from 0°C to 50°C. The equipment, motor will be located in an area in which is in dusty environment which will result in the material settling on the equipment. The motor will be installed less than 500 meters from the VFD.

4. **Scope of Supply :**

The Supplier will provide the following items:

4.1 Variable frequency drive to meet specified electrical, control and construction requirements.

4.2 Variable frequency drive with enclosure cabinet with wired local control panel and necessary switchgears. Cabinet shall be of Rittal/ ABB or Siemens make. The cabinet shall have thermostatically controlled air conditioner. The dimension of cabinet shall minimum size. All the operation & display shall be possible from front door of the panel without opening the door. It should be min. IP54.

4.3 VFD shall be provided with air cooled arrangement.

4.4 Certified drawings.

4.5 The Supplier shall indicate if output line reactors are required to prevent impedance mismatches and potential damage to the motor from voltage spikes. If output line reactors are required, the Supplier must quote them as an option

4.6 It is the supplier's responsibility to ensure the supplied VFD is satisfying all functional requirements as per clause 9.Vendor to include any or all accessories/equipment for the same even if not mentioned in this specification.

5. **Power and speed requirements :**

Vendor shall select the speed range of motor with VFD as per weigh feeder functional requirement.

6. **Noise Requirements :**

The Supplier shall furnish the drive motor to a maximum predicted sound pressure level of 85 dBA, measured 3 ft (1 m) horizontally from the surface of the motor. Allowable sound pressure level applies to one motor with negligible sound contributed by other equipment.

7. **Low Voltage Starting:**

The motor and drive must be capable of starting without damage to the motor with a supply voltage range of 90 – 110 % of motor nameplate voltage. The motor must also be capable of starting with 80% motor nameplate voltage.

8. Surface Preparation and Paint :

Equipment shall be prepared and painted per manufacturer's standard for a minimum of 10 year power station operating life in a tropical environment. Equipment must arrive at the site with a finished coat.

9. Variable Frequency Drive Requirements :

9.1 The system offered shall be energy efficient, provide very high reliability, high power factor, low harmonic distortion, low vibration and noise. It shall be easy to install with minimum time and expense and no special tools shall be required for routine maintenance.

9.2 The system shall be suitable for the load characteristics and the operational duty of driven equipment. It shall be capable of withstanding the thermal and dynamic stresses and the transient mechanical torques, resulting from short-circuit. Any damage resulting from such a short-circuit or internal fault shall be limited to the component concerned.

9.3 The system shall be speed, torque or power controlled as dictated by the driven equipment.

9.4 The system shall be suitable for continuous speed control of the motors in single drive system as per data sheet and soft start feature shall be provided to reduce the disturbances in the electrical system.

9.5 The drive will vary the frequency of the supplied AC power to control motor speed according to a signal from the plant distributed control system (DCS). A 4 to 20 mA DC/0-10V DC signal from the DCS will represent 0 to 100% motor speed .VFD to have facility for user to configure range of speed for 4-20mA /0-10 V input signal.

9.6 The drive motor shall be speed regulated to a speed corresponding to purchaser's 4-20mA or 0-10 V reference signal. Upon complete loss of the DCS speed reference signal, the drive shall automatically run at constant speed as determined by the last speed reference available prior to the loss of signal.

9.7 All components of the drive system shall be mounted in an IP-54 enclosure fully accessible from the front.

9.8 In case of failure of VFD, for any reason, VFD shall have an in-built facility to immediately isolate VFD output and switch-On motor in DOL condition, via a bypass breaker.

9.9 Power semi-conductors shall be IGBT (Isolated Gate Bipolar Transistor) type. Fast switching SCRs are not acceptable.

9.10 The drive shall also include the

- **9.9.1** Electric Thermal overload protection.
- **9.9.2** Potential free contacts for local indication in control room for following functions : Supply Healthy, Run, Trip, Stop
- **9.9.3** 4-20 mA signal follower.
- **9.9.4** Local Control panel, mounted on VFD panel, for user operation, with functions as per clause 12.
- **9.9.5** Connection for control keypad to be through the cabinet door.
- **9.9.6** Current limit adjustment 50% to 150% of drive rating
- **9.9.7** Independent acceleration and deceleration ramps adjustable from 0.1 of a second to 1800 seconds.
- **9.9.8** Slip compensation to improve speed regulation.

9.11 Vendor to select operation / type / quadrant of operation of VFD to be suitable for load / application characteristics.

9.12 The modulating control scheme shall closely approximate actual sine wave current throughout the speed range of the drive.

9.13 The regulator shall be fully digital with microprocessor control of frequency, voltage and current.

9.14 Speed resolution shall be within +/- 1 RPM.

9.15 All drive adjustments and custom programming, configuration etc. shall be capable of being stored in a non-volatile memory.

9.16 The drive shall be designed to protect itself against instantaneous current levels above 200% of its rating. The drive shall continue to operate through instantaneous current spikes below 200%.

9.17 Isolation transformers shall not be used to eliminate possible line converter notching of the input filter. The drive shall not be sensitive to line notching from other drives.

9.18 The drive shall be capable of automatic restart upon power failure or momentary source voltage dips, and restarting into a rotating motor at any speed without tripping.

9.19 The drive shall actively monitor its output current and frequency and shut down the drive if the motor is in a stall condition. A stall condition is defined as operating in current limit at or below 10 Hz for 10 seconds. This definition of stall shall be field adjustable to match the application.

9.20 Power capacitor voltage levels shall be discharged below 50 volts within one minute of de-energization or less per NEMA and NFPA standards.

9.21 The input displacement power factor of the drive shall be a minimum of 0.95 at all speeds and loads above 10% load.

9.22 Drive efficiency shall be evaluated and the Supplier shall provide drive efficiency curves for 0% to 100% speed at 25, 50, 75, and 100% rated load. Minimum acceptable efficiency shall be 97% at full load.

9.23 The drive shall be capable of operating with the output open circuited.

9.24 The Total Harmonic Distortion for Voltage and Current Harmonics shall be in line with latest revision of IEEE 519 standard at the supply side of the drive system based on the short circuit capacity of the bus.

10. Drive Protection :

Drive protection functions shall operate independent of the microprocessor control logic and shall include as a minimum:

10.1 Over current protection
10.2 Short circuit protection.
10.3 DC bus under voltage protection.
10.4 DC bus over voltage protection.
10.5 Over temperature protection.
10.6 Ground fault protection.
10.7 Electronic thermal overload monitor.
10.8 Settings for trip / alarm settings shall be user configurable either through software interface / local control panel.

11. Drive Diagnostics :

The drive shall include first fault indication in the protection functions and ability to store 20 successive fault indications in order of occurrence. As a minimum, the following fault indications shall be displayed on the local operator control panel:

11.1 Over current
11.2 Short circuit
11.3 Under voltage or phase loss
11.4 Over voltage

11.5 Over temperature
11.6 Motor Thermal overload

12. Drive Controls :

12.1 The drive shall be supplied with a local control panel which shall include the following operating functions
12.1.1 Drive Start and Stop
12.1.2 Fault reset
12.1.3 Provision to increase or decrease the local speed reference with accuracy to 1 RPM.
12.1.4 Local/remote selection.

12.2 The local control panel shall include a digital display to monitor the following functions:
12.2.1 Local frequency reference
12.2.2 Motor load calibrated in amps
12.2.3 Output frequency
12.2.4 Output voltage
12.2.5 Remote frequency references
12.2.6 Fault diagnostic messages
12.2.7 Trouble shooting test points
12.2.8 Motor speed

12.3 The local control panel shall be the operator interface for making all drive adjustments. Internal adjustments are not permitted.

12.4 The drive shall also include provisions for the following hard wired inputs and outputs for remote operator controls:
12.4.1 Digital inputs, 24 VDC contacts from plant controls including: 1 Drive start 1 Drive stop 1 Remote control selector 1 Run at present speed.
12.4.2 Digital output relay contacts 5 Amps 125 VDC / 250 VAC rating, 1 Drive off, 1 Drive running, 1 Drive fault.

12.4.3 Analog input for reference signal, 4 to 20 mA.
12.4.4 Analog output signal, 4 to 20 mA and/or 0 to 10 VDC to transmit output frequency and speed.

12.5 The drive is to be factory programmed and wired for:
12.5.1 having the speed ramped as a function of a 4 to 20 mA signal input
12.5.2 any trouble with the drive is to give a dry fault contact
12.5.3 the drive is to get its start and stop signal as an input contact from the DCS.
12.5.4 the drive is to output a signal indicating the motor speed.
12.5.5 the drive is to be programmed for an acceleration ramp of 60 Hz/180 seconds.
12.5.6 the drive is to be programmed for a deceleration ramp of 60 Hz/180 seconds.
12.5.7 the drive is to be programmed so that during a start cycle it will catch and stop a reversed spinning load before it starts it in the correct direction.
12.5.8 the drive is to be programmed so that if there is a loss of load it will trip and send out a fault signal.
12.5.9 the drive is to be programmed so that if the power (current) exceeds the motor name plate rating for more than 3 seconds, it will trip and send out a fault signal. This shall be configured from LCP.

13. Quality Assurance :

13.1 All work is to be done in accordance to the Manufacturing Quality Plan and so documented.

13.2 All material, components and subassemblies shall be inspected and/or tested for conformance to these specifications and Supplier's engineering and quality assurance specifications.

13.3 The Supplier shall on request make available for review copies of Supplier Quality Assurance Policy, documentation, and records pertinent to equipment purchased.

13.4 The drive is to conform to NEMA, IEEE, UL and IEC standards.

14. Testing :

14.1. Type Test & Routine Tests like, No load tests, Insulation test, Functional test, Rated current test & Visual inspection, etc.

14.2. No load tests includes: Motor shaft voltage & Vibration severity measured at bearing housing, etc.

14.3. Insulation test (vendor to specify with relevant standards).

14.4. During Inspection, any physical damage or non-working of the unit shall be replaced with new units**.**

15. Document submission :

1. Recommended Spare Parts List (motor and drive)
2. Drive Electrical Schematic Drawing
3. Drive Dimensional Drawing
4. Drive Parameter List -Settings
5. Drive Installation, Operation and Maintenance Manual (Electronic pdf format)
6. General Arrangement drawing, Test certificates, conformance certificates.

16. Preservation and Packaging :

16.1 The material is to be preserved for long term storage (two years minimum) without additional onsite preservation activities.

16.2 The motor and drive to be boxed in shrink-wrap covering.