

TD-106-1 Rev No. 5 Form No.		PRODUCT STANDARD PULVERISERS HYDERABAD		Product STD NO.	BA89003
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TECHNICAL SPECIFICATION OF MAIN REDUCER FOR <u>WET BALL MILL BHEL 4074</u> <u>Material Code: BA9789003005</u> 1. <u>PURPOSE:</u> The main reducer function as a speed reducer between main motor and the girth gear pinion. 2. <u>REQUIREMENT:</u> 1. The main reducer i.e gear box the input and output shaft dimensions As shown in drg: 1-62-225-00001. 2. Lubrication system for the above main reducer with stand by filter, oil cooler, pump motor complete with piping and base plate, foundation fasteners & keys shall be supplied. Two hoses with flange connections 2,500 MM long for inlet & outlet oil flow connection as per P&ID drg: 1-62-225-00002. 3. <u>DESIGN INPUT:</u> The main reducer is used in tube mill to reduce the speed from 1000 RPM to 125 RPM. Output. On one side main motor is coupled, while on the other side pinion is meshed with girth gear to reduce the tube mill speed to 15.62 RPM. Also, on high speed side inching reducer is coupled for rotating the mill at slow speed through main reducer. i). Main Motor Power : 1710 KW ii) Motor RPM : 1000 RPM. iii) Power Transmission : 1710 KW iv) Speed : 1000 / 125					
Revisions: Refer to record of revisions:		Prepared: K.C.Mohan	Approved: S.Ghatge	Date:	

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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company.		v). Ratio : 1: 8 vi) Precision class of teeth : 5 according to ISO 1328. vii) The reducer must be able to transmit an exceptional torque equal to 4 times the nominal resisting torque without suffering damage. The number of start utmost 2 to 3 in an hour. viii) The gears and bearings are to be designed for a life time of 1,00,000 hours. ix) The bearings used for main reducer shall be of SKF or fag or torrington or Timken make only. x) The lubrication system shall be suitable to maintain maximum main reducer bearing temperature to 65°C at an ambient temperature of 50°C. Vendor items used by suppliers shall be approved by BHEL before use.		

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4. **GENERAL REQUIREMENTS:**

- i) The main reducer bearings should have provision for fixing duplex RTDs. The operating temperature should not exceed 65°C though out the year.
- ii) The lubrication oil system shall be provided with thermostat, manometer (0-8 Bar), Filter clogging indicator, oil cooler, flow indicator etc., both for normal working and stand by units.
- iii) The lube oil system shall be placed, on a rigid channel frame for easy handling and installation. Also it shall be provided with lifting arrangement and enclosure to avoid dust entry.
- iv) Based on the quality plan, BHEL Engineers will indicate the hold points for inspection testing of the gear box and lubrication system.
- v) The primary responsibility of design, manufacture and performance lies with the supplier. Supplier has to provide the foundation fastners for the gear box.

5.0 **GUARANTEE PERIOD:**

The main reducer is to be guaranteed for minimum operation of 18 months from the date of its commissioning at site or two years from the date of supply whichever is later.

6.0 **DATA TO BE SUPPLIED ALONG WITH THE OFFER:**

- I. Dimensional drawing of gear box base plate, foundation bolts, keys and lubrication system with piping routing with terminal points.
- II. Efficiency of gear box at 100%, 75%, 50%, and 25% load.
- III. Material used for different parts of the gear box (gear wheels, pinion, casing, shafts etc.)
- IV. Size of gear wheel, pinion, shafts, housing, keys etc.
- V. Design calculation of gear sizing, pitch circle diameter, service factor, specific tooth load, bearing life etc.

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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company.			VI. Gear geometry of pinion and wheel like number of teeth, module, velocity, tooth width, pressure angle. Shall be furnished before manufacture. VII. The design calculations for lubrication system, with details of pump selection, motor selection, heat transfer, cooler design etc. VIII. Inspection procedures quality plan and test procedures. Painting and packing details. IX. Details about the type, make, flow rate, delivery, pressure, rpm etc. of pump. X. Cooler details with heat load, flow rate, inlet water temperature, inlet oil temperature, outlet oil temperature shall be furnished. XI. Approximate oil capacity. XII. Reference list of the similar gear boxes and lubrication system supplied earlier, with performance details.		
			7. <u>INSPECTION REPORT AND TEST CERTIFICATES:</u>		
			I Chemical and mechanical properties, mill test certificates for gears and shafts, UT report, heat treatment charts and heat treatment details of case carburising etc. MPI / LPI on gear teeth & shafts. - Details about case hardening depth and gears dimensional report. - Kerosene leak test report of gear box casing. - Lub oil pump characteristic test. - Details about gear assy. backlash, contact pattern, center distance etc. - Balancing report of gears & shafts. II Testing on no load should be carried out with force lubrication system for four hours on full speed for following parameters. a. Speed ratio Temperature rise of oil - < 8°C Noise level - < 85 db Oil leakage - Nil.		

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Visual inspection after no load test of gear teeth bearings and filters.

NOTE:

Since testing at supplier's works is only on no-load, supplier shall demonstrate full load test at site free of cost.

III **GUARANTEE CERTIFICATE:**

8.0 FOLLOWING DOCUMENTS SHALL BE SUPPLIED WITHIN 3 MONTHS FROM THE PLACEMENT OF ORDER.

- i) O&M manual – twenty copies.
- ii) General arrangement drawing of main reducer, lube oil system and piping with bill of material – ten copies.
- iii) List of spare parts and details offer to be given.

9.0 **MAIN REDUCER DRAWING IS GIVEN FOR REFERENCE:**

10.0 **PAINTING:**

The main reducer and lub oil system shall be painted with two coats of epoxy based Grey paint (as per is: 5 colour code 631.)

11.0 The main reducer and lub oil system shall be packed in wooden boxes separately to avoid damage in transit and in store.