TENDER DOCUMENT

NIT No.: BHI/PI(S)/665/1053

FOR

Tender for Detail Engineering, Manufacturing, Testing and Supply of ‘SNUB PULLEY PACKAGE AND ASSOCIATED WORKS’ for the project of “Augmentation of Raw Material Handling Receipt and Handling facilities with new OHP Part- B (Package- 061) of Bhilai Steel Plant, (SAIL)”.

VOLUME - 2

TECHNICAL SPECIFICATION & DRAWINGS

ENGINEERING PROJECTS (INDIA) LIMITED
(A GOVT. OF INDIA ENTERPRISE)
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TECHNICAL SPECIFICATION & DRAWINGS

GENERAL

The following Technical Specification shall be read in conjunction with General Technical Specification (GTS) of Bhilai Steel Plant, SAIL. If there are any provisions in this Technical Specification, which are at variance with the provisions of General Technical Specification (GTS) of Bhilai Steel Plant, SAIL and General Specification, the provisions in this Technical Specification shall take precedence.

SCOPE OF SUPPLY

The scope of the supply includes Detail Engineering, manufacture, shop fabrication, assembly, testing and inspection at manufacturer’s works, packing, dispatch, transportation, delivery to site of PULLEY PACKAGE and ASSOCIATED WORKS as per specifications and scope defined in tender documents complete with all accessories.

CONVEYOR PULLEY

Pulley diameter shall be selected as per the Indian standard and IPSS where applicable. All pulleys shall be of welded steel construction. All welds shall be properly stress relieved and Pulleys are to be statically balanced. All pulley shafts shall be key fitted.

Pulley face width – As per IS: 8531 – 1986 (Re-affirmed 1998).

Pulley grooving width & depth shall be 6 mm at 30 mm interval.

Deflection of drive pulley shaft at bearing shall not exceed 1/2000.

All Pulley shaft – up to 100 mm dia. Class-IV, IS: 1875-1992, more than 100 mm dia shall be heat treated (class-4 normalised) Forged steel, 45C8, IS: 2004-1992.

Bearing: Self-aligning double row spherical roller bearing with adapter sleeve. Life – 40,000 hrs.

P. Block – Material of P.Block shall be of cast Iron (IS:210), cast steel IS: 030, Grade-280-520W (min).

Material characteristics: Material used shall be suitable for efficient operation and reliable service in steel plant condition.

All conveyors with magnetic separator at head end shall have non-magnetic SS pulleys shafts & discharge.

All pulleys shall be of welded steel construction, stress relieved before boring and machining and statically balanced. Solid end discs shall be designed and provided to give maximum strength. Pulleys shall be designed as per relevant Indian Standard and IPSS where applicable. Pulleys shall be connected to the shaft preferably through
keyless friction grip connections for HT motors and key connection for LT motors unless otherwise agreed.

Shell thickness of the pulley shall be suitable for taking bending loads on the pulley. This shall not be less than 16mm for drive pulley and 12 mm for tail and other pulleys.

Drive pulleys shall be covered with minimum 12mm thick diamond rubber lagging. Tail, bend and take-up pulleys shall be covered with minimum 10 mm thick diamond rubber lagging. The depth and width of the grooves in the lagging shall be 6 mm spaced at 30mm interval. The eccentricity of pulley shell shall not be more than $\pm 0.5\%$ of the diameter prior to lagging. Drive pulleys shall be machined at steel faces prior to lagging. Shore hardness of rubber for drive pulleys shall be not less than 55 deg A and for other pulleys shall be not less than 45 deg A. All pulleys shall be statically balanced to minimize the vibration during running.

Rolled steel may be used for pulley shafts of diameter up to 140 mm. Forged steel shall be used for shafts above 140 mm diameter. The deflection slope of pulley shaft at bearings shall be restricted to $1/2000$ under rated load condition. Combined stress value shall be restricted to $500\text{kg/sq.cm}$. Shaft diameter shall be selected based on the maximum value. The shaft diameter shall be as per IPSS.

Pulley shafts shall be supported on self-aligning double row spherical roller bearings with adequate sealing and external lubrication arrangement in plummer blocks. One bearing for each shaft shall be fixed to prevent any movement of the shaft assembly and the other bearing shall be floating to have free axial movement. All lubricating nipples shall be readily accessible without removing the guards. All plummer blocks shall also have four mounting bolts.

Welding on the pulley shell shall be tested radio graphically or by ultrasonic method. Pulley shafts shall be ultrasonically tested. Checking of out of roundness and static balancing tests shall be carried out before dispatch of the pulleys.

Bought out items shall be as per approved makes of Mecon / BSP for package 061.

**DRAWING**

1. BSP-EPI-01-061-01-018-55-DE-00476 : For Non Drive Pulley
NOTES:
1) All dimensions are in mm.
2) Pulleys shall be statically balanced after lagging. Balancing weight shall not be welded on diaphragm plate.
3) Balancing masses have to be distributed equally to each side of pulley. Total balancing masses shall not exceed 1% of pulley total mass (Pulley total mass = shell + diaphragm + key + hub + shaft + bearing + lagging).
4) Pulleys and shafts to be free of sharp edges.
5) Shaft not to be undercut at change of diameters. Chamfering at change in dia. shall not be more than 1 in 5.
6) All mating surfaces of pulleys shall be ground smooth.
7) Pulley rubber lagging:
   b. Checks on rubber lagging to include abrasion loss, shore hardness test, peel-off strength test and physical properties. Peel-off strength shall be 10 Kg/cm². Abrasion loss shall be less than 250 cubic mm when tested as per DIN 53516.
   c. Type of rubber for lagging – Natural rubber blended with styrene butadiene rubber.
   d. Hardness 50 to 65 Shore A (Shore A) – For drive pulley.
   e. Elongation over 300%.
   f. Strength: 100-200 Kg/cm².
8) Hardness 45-55 Shore A (Shore A) – For non-drive pulley.
9) Abrasion loss 250 cubic mm as per DIN 53518.
10) Specific gravity 1.4 to 1.5.
11) Adhesion strength 10 Kg/cm² (minimum).
12) Generally bearings for all pulleys (except deflector roller) are self-aligning double row spherical roller type with adapter sleeve.
13) Hubs of pulleys shall have fit h7/m6 with the shaft.
14) Following care shall be followed by manufacturer at the time of welding between hub, diaphragm & shell.
   a. Preheat to 100°C.
   b. Post heating & slow cooling of hub-diaphragm joint is to be done (Temp: 300°C–400°C) and use of asbestos cloth over the weld.
15) The outer surface of pulley is to be machined only after the shaft/hub ass'y is welded inside.
16) Unless otherwise mentioned, all surfaces shall have 0.3 micron surface finish.
17) The shaft shall be fixed with hub by 1 no. parallel key (standard 5:204-B, 1983).
18) All keys shall be press fit into the keyways. All keyways shall be side milled keyways.
19) All data and dimensions shall be checked by pulley manufacturer before taking up manufacturing.
20) All pulleys are to be marked with the following before despatch:
   a. Work order no.
   b. Conveyor no.
   c. Pulley mark no.
21) In addition to chemical & mechanical properties, pulley shaft forings shall be subjected to ultrasonic testing to ensure internal soundness & MPI RT/UT as per approved CAP.
22) The crowned pulley shall have 12 mm thick diamond groove rubber lagging & non-drive pulley shall have 13 mm thick rubber lagging.
23) Pulley weight marked * thus to be furnished by manufacturers.
24) Four (4) nos. mild steel plugs shall be welded below the pulley shell of all pulleys for speed sensing.
25) Painting, testing & inspection shall be done as per approved CAP & UCS.
26) The thickness specified in the table for 'T' is minimum. In any case, after complete manufacturing, the finished thickness shall not be less than 1 no. negative tolerance on 'T' & 't' will be acceptable.
27) 100% NDT on all welds of all pulleys to be conducted, 100% VT & 100% RT to be conducted on butt welds of all pulleys.
28) Plates for shell (1.5mm thick) shall be ultrasonically tested for lamination. All plates shall be normalized. The procedure shall be as per approved CAP.
29) All weldings on shell, diaphragm & hub shall be done intermittently to avoid distortion/stress concentration.
COMMENTS:

2. WE HAVE CHECKED THE ARRANGEMENT ONLY. ADEQUACY & ACCURACY OF SELECTION & DESIGN OF PULLEY, IT'S INDIVIDUAL COMPONENTS AND THEIR QUALITY/QUANTITY SHALL BE THE RESPONSIBILITY OF EPI.

3. ANY CHANGE IN PULLEY SPECIFICATION DURING APPROVAL OF CONVEYOR DRAWING SHALL BE INCORPORATED IN THIS DRAWING & RESUBMITTED FOR FURTHER APPROVAL BEFORE MANUFACTURING.

4. Additional notes shall be as indicated in Annexure-II attached with this drawing. However, duplicated notes indicated above shall be deleted.

SHEET 1 OF 4

HEAD END SNIP PULLEY, TAIL END SNIP PULLEY, TAIL PULLEY, HT BEND PULLEY, LT BEND PULLEY

PLUMMER BLOCK DETAILS

PLUMBER SCHEDULE FOR 'Z' SERIES

PLUMBER SCHEDULE FOR 'L' SERIES

NOTES:
1. ALL DRAWINGS ARE V.S.M.

2. ALL PULLEYS ARE TO BE PHYSICALLY BALANCED.

3. PULLEYS & SHAFTS ARE TO BE CENTERED TO SHAFT EXCES.

4. DRUM BRIDGING JOURNAL ARE TO BE IDEAL TO MAX. LAGGER.

5. PULLEYS SHALL BE MACHINED CONSTRUCTION & STATUS MACHINING.


7. ALL NON-SPUR PULLEYS WILL BE 18T, HOT PLAIN SURFACE LAGGED AS SHOWN.

8. IF ALL THE BALANCED ARE ID. AS PER ITS DESIGN & WILL BE WEAR & WARP OF BRD & JOINED.

9. ALL BDR. shall BE OF STEEL & MADE ONLY.

10. PULLEY BLOCK SHALL BE CEMENTED AS PER BDR. & ACCESSORIES.

11. TOTAL PULLEY ASSEMBLY IS INCLUDED OF 2 X ID. FL, BLOCK ASSEY FOR PULLEY.

12. FOR TAKE-UP PULLEY ASK FSC & BDR. AS THIS BDR.

13. AMOUNTS WITHOUT TRADES AS ID. AS SHOWN.

14. PULLEY SHELL, TO BE STRESS SPECIFIC.

15. ONLY ONE LAGGING MRED PER PULLEY SHALL BE PROVIDED & MUST BE W.B. SHOWN FOR FABRICATION PULLEY LAGGED AS SHOWN.

16. THE OUT OF ROUNDNESS SHALL NOT EXCEED 1% OF THE DIAMETER PRIOR TO LAGGING.

17. GAS CUT SURFACES SHALL BE SHOWN SMOOTH.

18. ALL PULLEY BLOCKS SHALL BE HEAT TREATED ON TYPE EQUIPPED WITH SELF ALUMINIZING DOUBLE NEW SPHERICAL BEARING AND ADAPTATION with MAXIMUM LIFE 120,000 HR.

19. RAW MATERIAL SPECIFICATIONS TO BE TAKEN AS ID. & TO BE TRAILED TO WHDT OF SUPPLIERS.

20. FABR. PULLEYS AT FABR & SHOULD HAVE LOCATING RINGS.

21. ALL WEIGTHS SHALL BE DISREGARDED.

22. Problems presented in this submission are not due to a third party such as manufacturers, nor are those due to manufacturing processes.

23. The weight of any material presented in this submission is not to be taken into consideration. THE SHIPMENT OF MATERIAL SHOWN IS NOT THE RESPONSIBILITY OF THE SHIPPER.

24. Additional notes shall be as indicated in Annexure-II attached with this drawing. However, duplicated notes indicated above shall be deleted.

25. THE CONTRACTOR HAS BEEN REQUESTED...
G.A. OF NON-DRIVE PULLEY

CENTRE DISC

END DISC

DETAIL: D1

CONNECTION BETWEEN SHELL PLATE & RIB

VIEW: B-B

KEY CONNECTION (TYP)

PARALLEL KEY

DETAIL: D2

CONNECTION BETWEEN HUB & RIB

SHELL WELDING DETAILS

DETAIL: D3

BILL OF MATERIALS FOR ONE SET NON DRIVE PULLEY

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PLEASE FURNISH SHAFT & HUB DIMENSION DETAILS/ DRAWING IN THIS SHEET.

Please review

07.11.2014

For reference with comments

SHEET 2 OF 4
READ THIS DRAWING TOGETHER WITH DRAWING NO. BSP-EPI-01-061-01-018-55-DE-00476, SHEET 4 OF 4.

COMMENTS ARE SAME AS SHEET 2 OF 4.

G.A. OF NON-DRIVE PULLEY
(TAIL, BEND AND SNUB)

PLUMMER BLOCK DETAILS (TYP.)
FLOATING TYPE WITH ONE END OPEN & ONE END CLOSED

VIEW: B-B
KEY CONNECTION (TYP)
PARALLEL KEY

DETAIL: D1
SHELL WELDING DETAILS

DETAIL: D2
CENTER DISC

CONNECTION BETWEEN SHELL PLATE & RIB

CONNECTION BETWEEN HUB & RIB

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</table>

MECON LIMITED

TECPO SYSTEMS LTD.

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