



TECHNICAL ENQUIRY SPECIFICATION
OF
CONVEYOR BELTS
FOR
1x250MW NSPCL ROURKELA

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In case any clarification is required relating to this specification, the same may be sent to us by e-mail at jv@bhel.in or rsp@bhel.in



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I. PROJECT INFORMATION:

The proposed unit of 1x250 MW will be installed on the western side of existing 2x60 MW units within the boundary of Rourkela Steel Plant in Sundergarh district of Orissa, Rourkela with all the facilities as specified in the NIT of NSPCL. Mecon-Ranchi is the consultant for NSPCL.

BASIC SITE INFORMATION:

1. Average elevation above mean sea level : 194m
2. Barometric pressure : 983 mb
3. Ambient temperature
 - a. Absolute maximum : 48°C
 - b. Absolute minimum : 6°C
4. Relative humidity (Maximum) : 65 %
5. Annual Average Rainfall : 2656.6 mm
6. Heaviest in 24 Hrs. : 257.8 mm
7. Seismic Zone : Zone-II (As per latest Revision of IS 1893 /2002) Part-I

General information related to the project and site is available in Volume I of NSPCL NIT enclosed along with this enquiry specification.

All equipment (including electrical & C&I) shall be suitable for operating satisfactorily in humid and dusty (coal & ash) atmosphere found in Thermal Power plants.

Availability of Infrastructure Facilities

Road - The site is connected by road of NH-23 through a link road from a road junction at Panposh located approx. 10 KM from proposed site.

Railway siding - The nearest railway station Rourkela is situated about one km from the proposed plant site. A new railway siding will be developed for receiving coal from the source.

Airport/Air strip - The nearest airport is at Ranchi which is about 170 KM by rail and 225 KM by road from the proposed site.

Seaport - The nearest seaport is at Paradip (Orissa) which is around 400 Kms from the proposed site.

- For the purpose of design an ambient temperature of 50 deg. C and relative humidity of 95% shall be considered.

II. BROAD SCOPE OF SUPPLY:

The scope of supply includes design, manufacture, testing & inspection at vendor's place and supply of conveyor Belts with splice length for each roll to NSPCL Rourkela Thermal Power Station, PP-III, Coal Handling Plant site.



- a. *Enquiry specification which includes submission of offer in 2 sets with data sheets, Catalogues and drawing along with offer. The price should be quoted in the BHEL price bid format only for which a separate "Price Bid" format is enclosed. Price shall not be indicated in the technical bid.*
- b. *Performance guarantee for the belt with the specification furnished by the bidder is to be demonstrated by the bidder at NSPCL Rourkela Site.*
- c. *All drawing, data / documents furnished by bidder along with the offer shall be subjected to final approval of customer / consultant during detailed engineering. If any changes are required during detailed engineering same shall be done by bidder without any cost implication.*
- d. *Bidder shall submit a signed copy of BHEL's enquiry specification along with all enclosures along with the technical bid without any deviations.*
- e. *Bidder shall submit following documents along with the offer:*
 - a. *Signed copy of BHEL's enquiry specification along with all annexure*
 - b. *Filled Datasheet, catalogue including selection of pulley, technical offer*
 - c. *Belt jointing/Splicing specification including consumables details.*

III. CODES AND STANDARDS

The design, manufacture, inspection and testing of Belts shall comply with all the current applicable statutory norms, regulations and safety codes in the locality where the equipment is to be installed. Belting shall conform to the latest edition of standards and codes. Other internationally acceptable standards/codes, which ensure equal or higher performance than those specified, shall also be accepted.

IS: 1891 (Part-I), IS 4776, 7175, 11592 :General Purpose Belting

CEMA rev-5: Code of practice for selection and design of Belt Conveyors

Canadian standard CAN/CSA M-422-M87



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IV. TECHNICAL DATA SHEET

Sl.No	Description	Specification
1.	Belt Conveyors	
1.3	Capacity of each conveyor	Refer conveyor schedule
1.4	Belt speed	Refer conveyor schedule
1.5	Belt	
1.5.1	Belt width	Refer conveyor schedule
1.5.2	Troughing Angle	35 deg.
1.5.3	Surcharge Angle	20 deg.
1.5.4	Belt specification	Belt shall be of NNcut edge skim coated FR grade. Duty condition shall be heavy duty type (24 hours).
1.5.5	Cover Grade	Fire resistant as per Canadian Bureau of Mines Standard No. CAN/CSA-M422-M87 grade C.
1.5.7	Thickness of cover	Refer belt schedule
1.5.8	No of plies	Minimum 4.
1.5.10	Minimum factor of safety	10
1.5.12	Conveyor Belt Rating	As per design/ CEMA
1.6	Material to be Handled:	Coal
1.7	Bulk Density of Coal:	a) For calculation of volume= 0.8 T/Cu.M b) For design of structural =1.2 T/Cu.M
1.8	Max. Moisture content in the material	20%
1.9	Ambient temperature :	50 deg
2.0	All Belt Splicing will be Hot Vulcanised	
3.0	Patch Repair Norms:	

IV.A. TECHNICAL INFORMATION OF CONVEYOR BELTING:

1. Vendor shall consider minimum no of splice joint and number of roll shall be specified accordingly in offer.
2. Bidder shall ensure that the length, conveyor no, rating, drum no, weight of each drum, manufacturer serial no. shall be clearly indicated on each drum of conveyor sending to site.
3. Supply of belts should be such so as to have minimum no. of joints during installation.
4. Belt shall have superior adhesive level and interplay and cover to ply adhesion levels with improved edge wear characteristics.
5. Recommended take-up length shall be furnished for each conveyor. Belt shall be pre-stretched. Belt elongation shall not be more than 2.5 % of conveyor length as per standard.
6. The cover thickness indicated in data sheets are minimum requirement. Suppliers should consider impact and loading cycle also for offering the recommended cover thickness.
7. Belt shall have sufficient impact resistance to withstand impact at loading.



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8. The design, construction, testing and performance of conveyor belt should comply with latest revision of IS:1891 and/or international standards. Belt shall be of fire resistant quality complying to relevant Indian Standards & Canadian Bureau of Mines Specification.
9. The carcass of belting shall be of synthetic fiber such as Nylon, as indicated in Belt Schedule. The no. of plies, cover thickness, factor of safety etc. shall be as per the recommendation of Belt manufacturer, but not less than the value indicated in data sheet.
10. Belt should be designed for continuous operation. All conveyor belts should be of same size and quality.
11. Belt shall have sufficient lateral flexibility so that it will trough adequately even when the belt is empty and shall have sufficient lateral stiffness to support the load.
12. Belts shall be of cut edge construction and shall have only hot vulcanized joints on erection. It shall have adequate longitudinal flexibility so that it can easily flex around pulleys. It should have superior adhesion level.
13. Conveyor belt shall be dispatched coiled on reels covered with wooden/metal crating. While using a hoist, a bar should be passed through the crate and attached to slings. Weight of each reel shall be mentioned in the offer.
14. While on despatch belts shall be kept in a vertical position and shall not be allowed to rest on their side.
15. Oil or grease shall not come in contact with the belts.
16. If small length of belt are required to be cut from belt in store, proper coating shall be applied on the exposed ends.
17. Splice length and design required per joint to be specified.
18. Latest detail catalogue for selection of pulley size to be enclosed along with the offer.
19. Vendor shall consider maximum no of patch allowable for acceptance with maximum size of patch and submit the same with the offer. Also vendor shall furnish patch repair norms with the offer.
20. Consumable required for splicing to be specified with the offer.
21. The belting shall be of synthetic fibre such as Nylon/Nylon with fire resistant covers of adequate flexibility to give the desired troughing angle.
22. Belt shall have sufficient lateral flexibility so that it will trough adequately even when the belt is empty and shall have sufficient lateral stiffness to support the load.
23. Belts shall have sufficient impact resistance to withstand impact at loading.
24. Maximum allowable belt tensions and belt designation of the selected belt should be mentioned in the offer. However, maximum belt tension developed in the belt corresponding to design capacity



during running condition should not exceed 80% of the maximum allowable belt tension of the selected belt as recommended by manufacturers and during starting condition it should not exceed 150% of maximum allowable belt tension.

25. Minimum tension in belt during running condition should be checked considering maximum allowable belt sag to be 2% of idler spacing.
26. Operating tension of the belt at specified full load shall not exceed 80% of the rated working strength.
27. Factor of safety shall be minimum 10.
28. Belting shall be designed for heavy duty condition and shall be suitable for 24 effective working hour's operations per day and 365 working days per year. It shall be suitable for installation over conveyor system having 35 deg. troughing angle and shall be suitable for operation at an ambient temperature of 50 deg.C. It shall have sufficient resistant against exposure to open sunlight so that its qualities do not deteriorate while working in open sun. It also may have to work in rain and / or in conditions where relative humidity goes upto 100%.
29. The belting shall be pre-stretched, straight ply, skin coated with open ends. It shall have sufficient strength to give required tension at 10 safety factor and 80% tension utilization.
30. The belt shall have sufficient lateral flexibility so that it suits the troughing angle requirements even when it is empty. The belt shall have sufficient longitudinal flexibility so that it can easily flex around different pulleys of the conveyor system. The belt shall have sufficient impact resistance to withstand impact at the loading points. The rubber cover used in the top and bottom cover of the belting shall be of Fire resistant grade. The edge shall be of cut edge construction.
31. Any opening up of factory joints within the period of defect liability at sites due to the issues related to quality of belt has to be attended by the OEM free of cost.

IV.B. GENERAL NOTES:

1. In case of any ambiguity, conflict in the standard & specification and/or interpretation of clauses in this enquiry spec. and its enclosures the decision of BHEL shall be final and binding and any change due to this shall have no price implication on BHEL and shall have to be absorbed by successful bidder.
2. Bidder shall strictly follow and adhere to the guidelines laid down in the enclosed BHEL's health, safety and Environment manual.
3. During detail Engg. this package bidder to strictly adhere to BHEL/NSPCL drawing formats, document numbering, QP & FQP formats.
4. **The design, manufacture, inspection and testing of the material shall comply with all the currently applicable statutes, regulations and safety codes in the locality where the equipment is to be**



installed and shall also confirm to the latest edition of Indian and other international standards and codes. Nothing in this specification shall be construed to relieve the contractor of the required statutory responsibility. In case of any conflict & ambiguity in the standard to be followed the decision of the customer shall be final and binding.

V. INSPECTION AND TESTING:

1. The supplier shall give 15 days advance written notice of item being ready for testing. Such tests shall be to the suppliers account except for the expenses of the inspector's. The customer / Inspector, unless the witnessing of the tests is virtually waived, will attend such tests within 15 days of the date on which the item is notified as being ready for test / inspection failing which, the contractor may proceed with the test which shall be deemed to have been made in the inspectors presence and he shall forth with forward to the inspector duly certified copies of tests in triplicate.
2. Type & routine test report / certificates shall include details of standard to which the tests are performed, test parameters, acceptance criteria, test set up etc. used during the testing along with the test piece details / rating and the detailed test record and final test result.
3. All inspection, measuring and test equipment used by the contractor shall be calibrated periodically. The supplier shall maintain all relevant records of periodic calibration, instrument identification, and shall provide for inspection by supplier wherever asked specifically, the supplier shall calibrate measuring / testing equipment in the presence of employer.
4. Manufacturing quality plan indicating the details of the checks/inspection/testing to be carried out for various components (MQP) as per BHEL format are to be submitted within one month from the date of purchase order by the supplier for BHEL/NSPCL approval. However, some indicative checks on different items are given below which should necessarily form part of the Quality Assurance Plan to be agreed with the customer.
 - a. Rubber cover shall be checked for tensile strength and elongation at break before and after ageing.
 - b. For finished belts, checks for elongation at 10% nominal tensile strength, tensile and elongation at break in longitudinal (Wrap) direction, tensile and elongation at break in traverse (Weft) direction shall be carried out.
 - c. Adhesion test between individual plies and cover and plies shall be carried out.
 - d. Troughability test shall be carried out.
 - e. Test for fire resistance of the belt shall be conducted.



- f. Test for procedure qualification for belt vulcanizing joint shall be done at shop. Procedure for belt vulcanizing joint shall be discussed and finalized during MQP finalization.
5. In no case shall the cover thickness or the width of the belt be less than that given in specification. No negative tolerances will be allowed in the same.
6. Rubber cover shall also be checked for abrasion, tear strength and shore hardness.
7. BHEL have right to inspect belt from any section of drum length by cutting the belt and splice joint shall be done by bidder after inspection without any cost implication.



VI. QUALITY ASSURANCE.

VI.A. QUALITY ASSURANCE DOCUMENTS

Bidder shall be required to submit in ten (10) copies the following quality assurance documents within two weeks after dispatch of the material:

- (i). Material test reports on components.
- (ii). The inspection plan with verification, inspection plan check points, verification sketches, if used and method used to verify that the inspection and testing points, in the inspection plan were performed satisfactorily.
- (iii). Factory tests results for testing required as per applicable codes and standards.
- (iv). Inspection records duly signed by Quality assurance personnel of the customer and contractor for agreed inspection hold points. The same shall be recorded during course of inspection. Also the copy of repair / upgrading process & procedures, requiring employer's approval shall be provided in documentation package.
- (v). Record of disposition of deviations duly authorized by customer if any.
- (vi). Notification of conformity certifying that the item is in compliance with finalized specification requirement. Sketches & drawings used for indicating the method of tractability of the radio graphics to the location on the equipment.

VI.B. GENERAL REQUIREMENTS - QUALITY ASSURANCE:

- (i). The detailed quality plans for manufacturing and field activities to be drawn up by bidder, separately as per BHEL format and should be submitted for customer approval.
- (ii). Rubber cover of finished belt shall be checked for tensile strength and elongation at break before and after ageing. Rubber cover shall also be checked for abrasion, tear strength and hardness.
- (iii). For finished belts, checks for elongation at 10% nominal tensile strength, tensile and elongation at break in longitudinal (warp) direction and tensile in transverse (weft) direction shall be carried out.
- (iv). Before dispatch, the finished material shall be subject to inspection by the Owner/Consultant. The inspection shall be carried out in the presence of Owner/ Consultant, in terms of up to date engineering practice and relevant IPSS, IS and International Standards in this respect, for which all facilities shall be provided by the Bidder at his cost. This shall interalia, include the following:
 - a) Full thickness belt test
 - i) Breaking load, Kg/sq. cm for wrap and weft.
 - ii) Elongation under reference load (%).
 - iii) Elongation at break (%).



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b) Rubber cover test (Top/Bottom)

i) Tensile strength of cover , Kg/sq. cm

ii) Elongation at break (%)

iii) Adhesion between ply to ply and between covers and ply.

iv) Abrasion loss of rubber cover

c) Physical dimension check

d) Flexibility Test

All relevant type test certificates shall have to be produced during inspection and along with supply for necessary verification and approval.

(v). Manufacturing quality plan will detail out all the components of equipment, various tests/inspection, to be carried out as per the requirement of the specification and standards mentioned and quality practices & procedures followed by bidder quality control organization, the relevant reference documents and standard, acceptance norms, inspection documents raised etc. during all stages of materials procurement, manufacture, assembly and final testing / performance testing.

(vi). Bidder shall also furnish copies of reference documents/plant standards/acceptance norms test and inspection, procedure, etc. as referred in quality plans. These quality plans and reference documents/standards etc. will be subject to customer approval without which manufacture shall not proceed.

(vii). No material shall be dispatched from the manufacturers work before the same is accepted subsequent to pre dispatch final inspection including verification of records of all previous tests / inspection by bidder's engineer/Authorized representative and duly authorized for dispatch, issuance of MDCC.

(viii). Test results of qualification tests and specimen testing shall be furnished for approval.

(ix). Quality plan submitted by bidder shall detail out, various stages of manufacture and installation , the quality practices and procedures, the relevant reference documents / standards used, acceptance level, inspection of documentation raised etc.

(x). Quality audit / Surveillance / approval of the results of tests and inspection will not however, prejudice the right of the customer to reject the equipment if it does not comply with the specification when erected or does not give complete satisfaction in service and the above shall in no way limit the liabilities and responsibilities of the contractor in ensuring complete conformance of the materials / equipment supplied to relevant specification, standard, data sheets, drawings, etc.

(xi). Repair / rectification procedures to be adopted to make the Job acceptable shall be subject to the customer approval.



(xii). There will be a limitation on the no. of repairs allowed on the belts. Following will be the acceptance norm for the cover repairs.

- A) The maximum size of a repair shall be limited to a size equivalent to one fifth the belt width. No single dimension shall exceed one fifth(1/5) of belt width
- B) Small local repair by dough filling of size 25mm x 25mm to a limited extent shall not be counted of repairs. However, in case of cluster of repairs, same shall be counted as a patch repair.
- C) The maximum number of patch repair shall not exceed 5 per 100 mts. However, the total number of patch and dough filling repairs shall not exceed 10 per 100 meters

VII. PACKING AND TRANSPORTATION

The equipment/material ready for dispatch shall be suitably protected, coated, covered in wooden/metal boxed and crated to prevent damage or deterioration during transit. The customer / inspector shall have the right to insist for completion of works at shop before dispatch of materials for transportation.

Unloading & Storage at site will be in scope of BHEL/Other agency. Bidder has to submit storage instruction & Packing details for the same.



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VIII. DRAWINGS AND DOCUMENTS

- (i). Bidder shall furnish the contain Full Details and Drawings of the Equipment, Furnished Data Sheet, Technical Particulars, Testing Procedures and O & M manuals of the Equipment.
- (ii). Bidder shall furnish the Drawings and Documents as per details given below.
- (iii). Schedule & number of copies required for submission should be as per the details given below:

Sl. No.	Description	Type of copies required	Number of copies required	Schedule of submission
1	Drawings / documents for approval	soft copies	NA	Two week from LOI
2	Revised drawings / documents incorporating NSPCL comments if any.	soft copies	NA	One week after receipt of comments from NSPCL/MECON forwarded by BHEL
3	Final approved drawings / data / documents	Prints & soft copies	10 Copies	One week after receipt of approved drawing from BHEL / Consultant.
4	Quality Assurance Plan	Prints + soft copies	06 Copies	One month from the date of placing LOI
5	Final operation & maintenance instruction manuals including belt splicing manual	Prints & soft copies	One (1) original & 10 Copies	One month before dispatch of material.

IX. LIST OF ENCLOSURES:

Following enclosures is an integral part of this technical enquiry and must be signed and stamped and submitted along with the offer:

- 01- ANNEXURE-1-
 - a) Conveyor schedule
 - b) Belt schedule
- 02- ANNEXURE-2 - BHEL HSE Manual (16 Pages)
- 03- ANNEXURE-3 – DATASHEET TO BE FILLED UP BY BIDDER
- 04- ANNEXURE-4
 - a) NSPCL CHP SPECIFICATION