



BHARAT HEAVY ELECTRICALS LIMITED
Heavy Power Equipment Plant
Ramachandrapuram, Hyderabad – 502 032,

ANNEXURE-A

1.0.0 Intent Of The Specification

The intent of the specification is to procure “wear parts” (*Grinding Rolls and bull Ring Segments*) for XRP–1003 type coal pulverisers of BHEL Make operating at NTPC-Singrauli.

It is not the intent to specify completely herein, all aspects of material selection and manufacturing process, nevertheless, the wear parts shall conform in all aspects to high standards of material quality, manufacturing process and workmanship and shall be capable of performing in continuous commercial operation, in a manner acceptable to the owner, who will interpret the meaning of specification, drawings and shall have right to reject or accept any work or material which in his assessment is not complete to meet the requirement of this specification.

Bidder is requested to carefully examine and understand the specification and seek clarifications, if required, to ensure that they have understood the specification. The Bidder’s offer should not carry any sections like clarifications, interpretations and/or assumptions.

2.0.0 Not Applicable

3.0.0 Applicable Drawings

The drawings listed below and forming part of the specification is for Bidder’s information. All these drawings are indicative of Owner’s requirement to enable the Bidder to make a suitable offer. It shall, however, be responsibility of the Contractor to ensure fitment of the supplied material.

- | | | |
|-----|---------------------------|--------------------|
| i. | Drawing No. : 472630050 M | Grinding Rolls |
| ii. | Drawing No. : 472620253 M | Bull Ring Segments |

Any variation/alteration from the listed drawings shall be clearly brought out in the technical deviation schedule with implications, if any. Such variations may be acceptable, after assessment of its implication and shall be subject to Owner’s approval.

4.0.0 Scope of the Proposal

The scope of the proposal shall include manufacturing, testing, packaging, transportation, delivery on F.O.R (BHEL Hyderabad) basis of wear parts of XRP–1003 type coal Pulverisers comprising of the following:

- i. Grinding Rolls
- ii. Bull Ring Segment
- iii. Additional Pulveriser Components (refer Note 1)

The scope of proposal shall also include supervision of installation (supervision of installation of 1st set of wear parts in each mill) of above wear parts.

Note 1: *In case the installation and fitment, commissioning, operation, grinding process optimization and/or achievement of guaranteed wear life of wear parts require some additional components (other than grinding roll and bull ring segment) to be installed on the pulveriser or to replace some of the pulveriser components (other than grinding roll and bull ring segment) with new design/material of components, same shall also be included in the scope of supply of the Contractor in such quantities that they last the complete period of wear life guarantee of 10000 hrs of pulveriser operation for each pulveriser. It is responsibility of the Bidder to familiarize himself with the design of specified pulveriser model, its grinding roll and bull ring segment and requirement of additional components for the same. In case Bidder's proposal does not include the additional components mentioned above and/or their adequate quantities and if same become necessary for installation and/or satisfactory operation of the pulveriser and/or to achieve the guaranteed wear life of the grinding rolls and bull ring segment over stipulated period of pulveriser operation i.e 10000 hrs, the Contractor will be required to supply the same without any cost implication to the Owner. Pulveriser components which are not required to undergo design/material change for installation and fitment, commissioning, operation, grinding process optimisation and/or achievement of guaranteed wear life of part offered by the Bidder during stipulated period of 10000 hrs shall, however, be replaced by the Owner as per past established maintenance practice. The delivery schedule of wear parts shall be considered to be completed by the Contractor only on such date when all the wear parts (all sets of grinding rolls and bull ring segments) are supplied with adequate quantity of above mentioned additional mill components so as to last for 10000 hours of pulveriser operation for each pulveriser .*

4.1.0 The scope of supply of Contractor shall include supply of mill wear parts, that is set of grinding rolls, set of bull ring segments and additional mill components (refer Note 1 and Note 2) for 10 number of coal pulveriser such that these wear parts are compatible with each other.

Note 2: *Together three nos ,grinding rolls required for one pulveriser shall form "One set of Grinding rolls" and bullring segment quantity required for one pulveriser shall form "One set of Bull ring segment" .The required quantity of additional pulveriser components (as per Note 1) for entire period of guaranteed wear life of each set of grinding rolls and bullring segments shall deemed to be included in scope of each set of grinding rolls/each set of bull ring segments and the price of these additional mill components shall deemed to be included in the price of respective sets of grinding rolls and/or bull ring segments.*

4.2.0 The quantity of wear parts shall be such that 10000 hrs (Ten thousand hrs)of operation of each mill can be achieved with pulveriser capacity not less than 90% of its maximum capacity at rated fineness (refer note 3) for the specified range of coals. The Bidder shall guarantee the life of each type of wear part (i.e grinding roll, bull ring segments) and this guaranteed life of respective wear parts shall be the basis for calculating the quantity of wear parts. The guarantee for wear parts life shall be in accordance with the guarantee requirement specified in subsequent sections.

Note 3: The rated Fineness not be less than 70% thru 200 mesh.

4.3.0 In the bid proposal the Bidder is required to offer the wear parts in such quantities that the cumulative wear life (based on guarantee provided by the Bidder for wear life of wear parts) for each type of wear part (i.e grinding roll, bull ring segments etc) is not less than the number of hours resulting from multiplications of ‘number of coal pulverisers for which wear part are being procured’ X “10000 operating Hrs”. The required Quantity/sets of wear parts shall be arrived at by rounding off the fractional part of the set to next higher whole number.

4.4.0 The wear life guarantee for each type of wear parts shall be from within the range of 5000Hrs. – 10000 Hrs. and the quantity of wear parts shall be calculated based on guaranteed wear life from within above range only. An example for arriving at number of sets of wears parts for the purpose of Bidder’s quotation is given below at Table - 1:

Example:

S. No.	Description	Bidder A	Bidder B
1.	Number of coal Pulverisers	08	08
2.	Guaranteed Wear Life of each set of grinding rolls	5000	7000
3.	Guaranteed Wear Life of each set of bull ring segments	5000	7000
4.	Number of sets of grinding rolls required to be quoted.	10000/5000 x 8 = 16 sets	10000/ 7000 x 8 = 11.4 i.e 12sets
5.	Total number of sets of bull ring segments required to be quoted.	10000/5000 x 8 = 16 sets	10000/ 7000 x 8 =11.4 i.e. 12 sets

5.0.0 Evaluation Criteria

The bids guaranteeing wear life less than 5000 Hrs. will not be considered for evaluation and shall be rejected. Further, no evaluation credit will be given for guaranteed wear life in excess of 10000 Hrs.

The evaluation of the bids shall be based on the total price of (a) sets of bull ring segments and (b) sets of grinding rolls quoted by the Bidder in accordance with the clause 4.0.0 “Scope of the Proposal”. Any additional component required as per Note 1 will be deemed to be included in the total quoted price of wear parts. (i.e. grinding rolls and bull ring segments).

6.0.0 Material of Construction

The material of construction of wear parts shall be selected taking into account highly abrasive nature of coal resulting from coal contamination with silica sand and Alpha-quartz. The coal and ash data is specified elsewhere in the specification and same shall be considered for selection of wear part material and offering guarantee for wear life.

S. No.	Name of Wear Part	Material
1.	Bull Ring Segments	Ni Hard, High Chrome
2.	Grinding Rolls	Ni Hard, High Chrome, Carbide Insert.

Note : *The Ni-Hard Rolls shall be manufactured using centrifugal casting method.*

The materials selected by the Contractor for the mill wear parts and additional mill components (if, required) must have been used satisfactorily in at least six (6) numbers of coal Pulverisers having similar or higher rated capacity.

7.0.0 Coal Characteristics

The range of coal and ash characteristics, which is likely to be supplied to the mills, is enclosed at Annexure - 1. Bidder is requested to familiarize themselves with the detailed coal and ash characteristics, if required.

The material of construction of wear parts shall be selected taking into account highly abrasive nature of coal resulting from coal contamination with silica sand and Alpha-quartz. Bidders shall consider the effect of these shale, sand stone and alpha quartz content for offering guaranteed wear life of Mill wear parts.

8.0.0 Guarantees

The quantity of wear parts shall be such that 10000 hrs of operation of each mill can be achieved.

The Bidder shall guarantee the wear life and the fitment of the wear parts in the existing mills and furnish these guarantees in Schedule – I

8.1.0 Guaranteed Wear Life:-The “wear parts” , i.e. each set of grinding rolls, each set of bull ring segments shall be guaranteed for wear life in number of hours of mill operation with mill capacity not less than 90 %of its maximum capacity at rated fineness for the specified range of coals during this period

8.1.1 The guarantee on wear life shall be provided for each type of wear part separately (i.e. Grinding Rolls and Bull Ring Segments). The guaranteed wear life for each set of grinding rolls and each set of bull ring segments shall be from within the range of 5000 - 10000 “Operating Hours of mill” (with mill capacity not less than 90% of its maximum capacity at rated fineness for specified range of coals). Bidders offering wear life guarantee less than 5000 operating hours shall not be considered for evaluation. Further, Bidders offering wear life guarantee higher than 10000 operating hours shall not be given any evaluation credit beyond 10000 hrs. The guaranteed wear life of set of bull ring segments may be in multiples of wear life guaranteed for set of grinding rolls(i.e if wear life of set of grinding rolls is guaranteed as 5000 hrs, the wear life for set of bullring segments shall either be 5000 hrs or 10000 hrs).

The material and design of additional mill components shall be so selected by the Contractor that their replacement coincides with the replacement of set of grinding rolls and/or set of bullring segments.

8.1.2 The mill wear part guarantee shall be valid for complete range of coal and ash characteristics specified in this specification. No correction in guaranteed wear life shall be allowed within the above range of coal and ash characteristics. However, for variation in YGP Index of coal beyond the specified range the Bidder may submit the correction curve, indicating change in wear life w.r.t. YGP Index, along with Bid. The correction curve shall be subject to Owner's approval.

8.2.0 Wear Part Warrantee : - The Bidder shall guarantee the wear life of wear parts in number of mill operating hours. The guarantee/warrantee on wear life shall be demonstrated on all the pulverisers.

Note 4 : - operating hours of mill for the purpose of wear part warrantee are defined as hours of mill operation at or near to its maximum capacity but not less than 90% of maximum mill capacity at mill fineness not less than 70 % thru 200 mesh.

8.3.0 Demonstration of Pulverisers Wear Part Guarantee:-

8.3.1 The Guarantee/warrantee for the life of mill wear parts shall be demonstrated by the Contractor during the Guarantee Trial Period (GTP). The GTP shall commence after successful operation of the Pulverisers established continuously for a period of not less than 12 hrs at or near to maximum capacity and fineness not less than 75% thru 200 mesh with the newly installed wear parts. The GTP shall end as soon as first set of Grinding rolls and first set of bull ring segments have completed their actual wear life or the guaranteed wear life (whichever is earlier) in first four pulverisers. However, in case the wear parts are supplied in more than one lot, the Pulverisers Wear Part Guarantee demonstration as per the above shall be repeated for each lot of wear parts.

8.3.2 Each type of wear part (i.e set of grinding rolls and set of bull ring segments) shall be considered to have completed their guaranteed/warranted wear life when during GTP the first set of these parts have successfully demonstrated their capability to achieve at least 90% of the maximum pulveriser grinding capacity (at Pulverised coal fineness not less than 75% thru 200 mesh) during the guaranteed wear life of wear parts. In case the capacity of the pulveriser falls by more than 10% and / or pulverized coal fineness falls below 75% thru 200 mesh necessitating replacement of particular type of wear part (i.e set of grinding roll and /or set of bull ring segments) to restore the capacity and / or fineness, the wear (set of wear parts) part shall be deemed to have outlived its wear life. The capacity of mill shall be tested on all mills during the GTP at following intervals, viz. (i) at commencement of GTP,(ii) at completion of 25% of guaranteed wear life of grinding rolls ,(iii) at completion of 75% of guaranteed wear life of grinding roll and (iv) at the end of wear life of grinding rolls. In case the wear life of set of bull ring segments is guaranteed more than the guaranteed life of grinding rolls the capacity test on mill shall continue for second set of grinding rolls as per sl. No (ii), (iii) and (iv) above until the wear life of bull ring segments is achieved.

Note: 5 No allowance will be given for Operation and Maintenance practices while applying this criteria under normal conditions.

8.3.3 Further in case any of the wear parts has worn out to such an extent that either the normal or safe operation of the Pulverisers is jeopardized if this part is not replaced/ repaired or continuous use with this part may lead to exposure or wear of other parts which are not meant for the purpose of checking the shortfall in wear life,

even if there is no reduction in Pulveriser rated capacity or fineness, then the part shall be deemed to have outlived its wear life.

8.3.4 Average Wear Life during GTP to be considered for pulveriser wear part warrantee shall be arrived at from the station record for each pulveriser and as corrected for variation in YGP index of coal being fired during GTP (The correction for variation in YGP index is applicable only when the average YGP index falls beyond the range as indicated in Annexure 1 for coal characteristics). For this purpose the coal YGP shall be the average tested value during GTP. The coal samples shall be collected periodically (The frequency of sampling shall be mutually agreed between Owner and Contractor). The YGP index testing shall be done as per the BS standard. A jointly signed record shall be maintained during GTP.

8.4.0 Liquidated Damage for Shortfall in Guaranteed/Warranted Wear Life: -

8.4.1 Liquidated damages shall be levied for shortfall in wear life of wear parts for each set of wear part. For the purpose of ascertaining the wear life achieved following method shall be adopted:

8.4.2 The wear life of set of wear parts shall be recorded for all pulverisers. The average wear life of first sets of wear parts in four pulverisers(in which the wear parts have completed their wear life earlier than other pulverisers) shall be considered as wear life achieved by that type of wear part.

Table – II below explains how the wear life is to be calculated for the purpose of establishing compliance to guaranteed wear life and levying liquidated damages in case of shortfall.

Table - II

Sl. NO.	Description	Guaranteed Wear Life (Hours)	Life achieved for 1 ST set of grinding rolls /bullring segments/vane wheel assembly					
			Mill 1	Mill 2	Mill 3	Mill 4	Mill 5	Mill 6
1.	1 ST Set of Grinding roll Hrs)	2500	3500	2600	2650	2550	2625	2450
2	Set of bullring segments	2500	3500	2600	2650	2550	2625	2450

Note: As the set of bull ring segments are required to be guaranteed for wear life in multiples of operating hours guaranteed for set of grinding rolls the replacement of bull ring segments shall be at the time of replacement of one of the sets of grinding rolls.

Table –II Shows life of first set of grinding rolls achieved in six pulverisers. As per records in Mill Nos. 6, 4, 2 and 5 the first set of wear parts have completed their wear life earlier than others. (in terms of time from installation of wear parts).Therefore for the purpose of establishing the wear life achieved by the set of grinding rolls , average of life achieved in mills # 6,4,5 and 2 shall be considered i.e. $(2450 + 2550 + 2625 + 2600)/4 = 2556$ Hrs).

8.4.3 In case the wear parts do not fulfill the guaranteed wear life, the credit shall be provided after the GTP to the Employer at the rate of one and a half times the shortfall worked out for each set of grinding roll and each sets of bullring segments. for wear parts as per example: a wear parts have a price of Rs 10000 (Rupees Ten Thousand) and the wear life guaranteed for the wear parts is 6000 Hrs,& the set of wear parts which fail to meet the warrantee test, lasts only 4000 Hrs, out of guaranteed 6000 Hrs, a credit of Rs. $(10,000 \times 1.5 \times 2000) / 4000 =$ Rs. 7500 would apply towards the

Employer for each set of wear parts. This credit shall apply to all wear parts by multiplying the credit per set of wear parts for total number of wear parts sets and shall be considered as Liquidated Damage for shortfall in wear life. The wear part credit shall be worked out separately for grinding roll and separately for bullring segments.

8.4.4 At the end of GTP if it is found that any of the wear parts sets have achieved life of 50% or less than the guaranteed wear life the Contractor shall replace the wear part set free of cost and commence the GTP again till such time the wear parts are able to achieve wear parts life higher than 50% of guaranteed wear life. For wear life between 50% and 100% the liquidated damages as described above shall apply.

8.4.5 In case the wear parts are supplied in more than one lot the liquidated damages as per the above shall be levied for each lot of wear parts.

8.5.0 Fitment Guarantee

8.5.1 Fitment of the supplied material in the identified Pulverisers is the responsibility of contractor and same shall be guaranteed by the Bidder. In case it is found that the supplied material (wear parts) do not fit into the pulveriser and/or the normal and safe operation of the pulveriser cannot be sustained with the supplied wear parts during the during the GTP, the Contractor shall within one week supply fresh lot of modified wear parts (not less than 25% of the quantity) to replace the wear parts which have failed in fitment and/or have restricted normal/ safe operation of pulverisers. The balance sets of such wear parts shall be supplied within one month. In case the normal/safe operation is jeopardized due to wear of grinding rolls and bull ring segments the same shall be considered under the guarantee for wear life and not nder fitment guarantee.

9.0. Quality Assurance & inspection

9.1.0 Bidder shall provide the necessary information on Quality Assurance Program containing the overall Quality management and Procedures, which the Bidder proposes to follow during various stages of manufacturing of the specified wear parts. The contractor shall also submit a detailed manufacturing quality plan in the format enclosed at Annexure – II detailing out the tests/checks carried out by the manufacturer, during various stages of manufacturing, for BHEL's customer approval. The quality Plan shall be accompanied with all the entire plan standards, reference documents, acceptance norms, procedures and specifications. The indicative tests/checks, which shall necessarily form part of the Quality plan, are as follow:

- i. Chemical Composition and heat treatment.
- ii. Mechanical properties and measurement of hardness.
- iii. Wear – resistant parts shall be UT/RT tested to check soundness after suitable heat treatment. In case of bi-metallic castings, UT shall be carried out for ensuring the proper bonding.
- iv. Metallurgical test: Micro-structure examination will be carried out on samples selected at random.
- v. Surface defects of the wear resistant parts shall be examined by DPT.
- vi. To ensure proper fitment at site each grinding roll shall be subjected to blue-matching check for proper bore surface contact. In case of bull ring segment trial assembly shall be carried out for each set on the test bowl.

- vii. Weldments on any other mill component shall be checked with suitable NDT.

9.2.0 The approved Quality Plan shall indicate BHEL's customer witness points (customer hold points) for which the contractor shall give 15 days inspection advance notice for undertaking inspection.

Note: The technical specification includes following forms which need to be duly filled by the Bidder and submitted along with the bid:

Schedule – I : Guarantee Declaration, Schedule – II : Technical Data Sheets, Schedule – III : Information Regarding Quality Assurance Plan, Schedule – IV : Schedule of Rates and prices, Schedule – V : Delivery Schedule Schedule – VI : Qualifying requirement

Annexure - I

COAL / ASH CHARACTERISTICS

Proximate Analysis of coal	UNIT OF MEASUREMENT	RANGE	
		FROM	TO
Moisture	%	14	21
Ash	%	30	40
HGI	Index	60	72
YGP Index	mg/Kg of coal	40	60
ASH ANALYSIS			
SILICA	%	55	70
ALUMINA	%	20	30

TECHNICAL SPECIFICATION FOR PROCUREMENT OF WEAR PARTS FOR XRP 1003 TYPE COAL PULVERISERS

Tender Document No.:

(GUARANTEE DECLARATION)

Bidder's Name & Address

BHEL-Hyderabad

Dear Sir,

We declare that the wear life of wear parts, their fitment and material specification for wear parts offered in this bid are guaranteed by us. We further declare that in the event of any deficiencies in meeting the guarantees indicated below as established in accordance the bidding documents, you may at your discretion accept the wear parts after assessing the liquidated damages as specified in clause 8.4.0 of bidding documents or reject the wear parts and recover the payment already made.

S. No.	Guaranteed Parameter	Guaranteed Figures
1.0	Wear Life of Wear parts	
1.1	Wear life of each set of grinding Rolls in Operating Hours as per Clause 8.0.0	
1.2	Wear life of each set of bull ring Segments in Operating Hours at as per clause 8.0.0	
2.0	Guarantee for fitment as per bidding document, Clause 8.5.0	

Date: (Signature)
Place: (Printed Name)
(Designation)
(Common Seal)

Note : B) Any Variation to the stipulated conditions under which Guarantees are to be met will not be permitted and Bids with such variation are liable to be rejected.

Schedule- II

TECHNICAL SPECIFICATION FOR PROCUREMENT OF WEAR PARTS FOR XRP 1003 TYPE COAL PULVERISERS

Tender Document No.:

(Technical Data Sheets)

S. No	Description	Grinding Rolls	Bull Ring Segments
1	Name of manufacturer		
2	Location of Manufacturing Unit		
3	Model of Coal Pulveriser		
4	Number of Pulverisers		
5	Number of sets		
6	Number of items in each set (Bidder to list all the additional mill components as per Note 1.		
7	Wear life of each set		
8	Weight of each item (Bidder to Provide item wise list)		
9	Weight of each set		
10	Compliance to specified dimensions	Yes	Yes
11	Name of material		
12	Surface hardness		
13	Physical properties of material		
14	Chemical composition of material		

Date:
Place:

(Signature)
(Printed Name)
(Designation)
(Common Seal)

Schedule- III

**TECHNICAL SPECIFICATION FOR PROCUREMENT OF
WEAR PARTS FOR XRP 1003 TYPE COAL PULVERISERS**

Tender Document No.

(Information regarding Quality Assurance program)

Bidder's Name & Address

BHEL-Hyderabad

Dear Sirs,

**We hereby provide the necessary information on Quality Assurance program
Containing the overall Quality management and Procedures, which we propose to
follow during various stages of manufacturing the specified wear parts.**

**Date:
Place:**

**(Signature)
(Printed Name)
(Designation)
(Common Seal)**

**Note : Continuation sheets of like size and format may be used as per Bidder's
requirement and shall be annexed to this Attachment.**

SCHEDULE - IV

TECHNICAL SPECIFICATION FOR PROCUREMENT OF WEAR PARTS FOR XRP 1003 TYPE COAL PULVERISERS

Tender Document No.

(Schedule of Rates and prices)

Bidder's Name & Address

BHEL-Hyderabad

Item	Description	Quantity (No. of Sets)	Unit Price	Total Price
1	2	3	4	5

1. Grinding Rolls

2. Bull Ring Segments

Note : Number of sets shall be quoted as per clause 4.0.0

Date:
Place:

(Signature)
(Printed Name)
(Designation)
(Common Seal)

SCHEDULE - V

**TECHNICAL SPECIFICATION FOR PROCUREMENT OF
WEAR PARTS FOR XRP 1003 TYPE COAL PULVERISERS**

Tender Document No.

(Delivery Schedule)

Bidder's Name & Address

BHEL –Hyderabad

-
- 1 Grinding Rolls**

 - 2. Bull Ring Segments**

 - 3. Additional Mill Components as per Note 1**

Note : Bidder to provide list of additional pulverizer components.

Date:
Place:

(Signature)
(Printed Name)
(Designation)
(Common Seal)