DARLIPALI SUPER THERMAL POWER PROJECT
STAGE-I, 2X800 MW (SG PACKAGE)

TECHNICAL SPECIFICATION
OF
MILL REJECT HANDLING SYSTEM

SPECIFICATION NO.: PE-TS-403-160-A001

BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
PPEI, NOIDA, INDIA

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INTENT OF SPECIFICATION

INTENT OF SPECIFICATION

1.1 The specification is intended to cover the scope of supply and work for Mill Reject Handling System for **2X800 MW DARLIPALI SUPER THERMAL POWER PLANT, ODISHA** under the specification covers the design, engineering, manufacture, supply, assembly and testing at manufacturer's works, inspection, packing, forwarding, delivery FOR site, and handling, storage at site (i.e. taking delivery of materials from carriers, transportation to site), fabrication (as needed), construction, erection, commissioning, trial run, PG testing including painting protection of all items as specified hereinafter but without excluding any other necessary components, which are not mentioned herein but are required for the completeness and; efficient, easy and reliable operation of the system.

The supplier will provide the equipment including all necessary features, components, accessories, electrical and C&I accessories and appurtenances for efficient and reliable erection operation and maintenance whether mentioned in this specification or not. The equipment will consist of the following main components (however, not limited to the items listed in the tender specification).

All necessary tools and tackles required for the maintenance of the proposed system shall also be supplied along with mandatory spares.

1.2 It is not the intent to specify herein all the details of design and manufacture. However, the equipment shall conform in all respects to high standards of design, engineering and workmanship and shall be capable of performing the required duties in a manner acceptable to purchaser who will interpret the meaning of drawings and specifications and shall be entitled to reject any work or material which in his judgment is not in full accordance herewith.

1.3 The extent of work under the contract includes all items shown in the flow diagram, notwithstanding the fact that such items may have been omitted from the specification or schedules. Similarly extent of work also includes all items mentioned in the specification and/or schedules, notwithstanding the fact that such items may have been omitted in the drawing.

The bidder shall also specifically confirm compliance to the civil pit/trench layout drg attached with the tender specifications. Bidders shall specifically confirm the adequacy of space /layout provisions for installation of proposed mill reject equipment in the pit/trench arrangement shown in the civil pit/trench layout drg attached with the tender specifications.

1.4 While all efforts have been made to make the specification requirement complete & unambiguous, it shall be bidders' responsibility to ask for missing information, ensure completeness of specification, to bring out any contradictory requirement in

different sections of the specification and within a section itself to the notice of BHEL In case of any contradictory requirement, the more stringent requirement as per interpretation of Purchaser/Customer shall prevail and shall be complied by the bidder without any commercial implication on account of the same. Normally, in case of any contradiction in requirements between section-C and section-D, the requirements in Sec-C shall govern. Further in case of any missing information in the specification not brought out by the prospective bidders as part of pre-bid clarification, the same shall be furnished by Purchaser/ Customer as and when brought to their notice either by the bidder or by purchaser/ customer themselves. However, such requirements shall be binding on the successful bidder without any commercial & delivery implication.

1.5 Deviations, if any, should be very clearly brought out clause by clause in the enclosed schedule; otherwise, it will be presumed that the vendor's offer is strictly in line with NIT specification.

1.6 In the event of any conflict between the requirements of two clauses of this specification documents or requirements of different codes and standards specified, the more stringent requirement as per the interpretation of the owner shall apply.

Note:

Bidder to note that BHEL reserves the right for drawing/document submission through web based Document Management System. Bidder would be provided access to the DMS for drawing/document approval and adequate training for the same. Detailed methodology would be finalized during the kick-off meeting. Bidder to ensure following at their end.

- Internet explorer version – Minimum Internet Explorer 7.
- Internet speed – 2 mbps (Minimum preferred).
- Pop ups from our external DMS IP (124.124.36.198) should not be blocked.
- Vendor's internal proxy setting should not block DMS application's link (http://124.124.36.198/wrenchwebaccess/login.aspx).

VOLUME – II B

SECTION - B

PROJECT INFORMATION

1.00.00 **BACKGROUND**

Darlipali Integrated Thermal Power Project has been conceived as a 3200 MW capacity coal based power plant, for which about 3000 acres of land has been identified for plant, township and ash disposal areas. Water Resources Department, Govt. of Orissa vides letter dated 06.01.2010 accorded In-principle availability of 160 cusec water from Hirakud reservoir. First Stage Site Clearance is obtained from Ministry of Environment and Forests (MOEF). Presently, Darlipali Integrated TPP, Stage-I (2x800 MW) is proposed to be commissioned as an inter regional power project during XII Plan period for the benefit of States of Eastern Region and adjoining Regions.

1.01.00 **LOCATION AND APPROACH**

The site is located north of Raigarh-Jharsuguda NH-200 and is approachable from Gandhi Chowk (near Brajrajnagar) through 15 Kms long single lane village road. Nearest major town Jharsuguda is at a distance of about 25 Kms. Nearest rail head is Brajarajnagar Railway Station (20 Kms) on SEC Rly.(BG) main line.

Darlipali project site is about 330 kms from Bhubaneshwar Airport in Orissa and about 300 kms from Raipur Airport in Chhattisgarh State.

Vicinity Plan is enclosed as **Annexure – I**

1.02.00 **LAND**

About 3000 acres of land (mostly private, rain fed agricultural, yielding single crop) is available. In-principle availability of land received from District Magistrate & Collector, Sundargarh, Govt. of Orissa vide letter dated 22.11.2005.

Land Requirement

The Main Plant, Township, Ash disposal, Railway siding and reservoir etc. for this stage of project shall be accommodated in 2700 Acres.

1.03.00 **WATER**

Hirakud reservoir on Mahanadi river (approx. 30 Kms away) is the source of water for the project.

Water Resources Department, Govt. of Orissa vides letter dated 06.01.2010 accorded In-principle availability of 160 cusec water from Hirakud reservoir for the proposed power plant at Darlipali.

1.04.00 **Railway Siding**

Employer intends to construct the railway siding to the project site for bringing the equipment/ material and coal. However the same may not be available to the bidder for his use to transport equipment and material.
Bidder may visit the site and actuquaint themselves with the facilities available.

1.05.00 **COAL AVAILABILITY AND TRANSPORTATION**

Coal requirement for 1600 MW project is estimated as 9.40 Million Tonne Per Annum (MTPA) considering average GCV of 3100 kcal/kg. The envisaged mode of coal transportation from the coal mines to the power plant is by MGR through BOBR wagons and also through Indian Railways rakes in BOBR/BOXN wagons. Requirement of coal for ultimate

capacity of project will be met from Dulanga (7.0 MTPA) and 12.5 MTPA from Pakri Barwadih captive coal blocks allotted to NTPC.

1.06.00 **Coal Quality Parameters / Fuel Oil Characteristics**

The coal quality parameters and Fuel oil Characteristics are attached at SUB-SECTION-V, PART-A.

1.07.00 **Capacity**

Stage-I : 2x800 MW Present proposal

1.08.00 **Construction Power**

The construction power requirement of the project is envisaged approximately 5-6 MVA. The same is proposed to be availed at 33kV voltage level from Brajrajnagar of WESCO located at approximately 20 kms from plant. Necessary substation and 11kV ring main/ LT substation shall be provided for the power plant area as required.

1.09.00 **Metrological Data**

The metrological data from nearest observatory is placed at **Annexure-II.**

1.10.00 **Plant Water Scheme**

The Plant water scheme is described below.

1.10.01 **Condenser Cooling (CW) Water System**

It is proposed to provide recirculating type CW system with induced draft type cooling towers. For the recirculating type CW system it is proposed to supply clarified water as make up. Clarified water shall be pumped to the cold water channel of CW system. CW system shall be operated at a C.O.C of about 3. The expected circulating water analysis is given in this sub-section. CW blow down shall be drawn from the discharge of CW pumps and the same shall be led to a Service water Tank. For carrying circulating water from CW pump house to TG-area and from TG area to cooling tower, steel lined concrete encased duct would be provided. For interconnecting CW duct with CW pump, condenser and cooling towers, steel pipes would be used. Cooled water from cooling tower will be led to CW pump house through the cold water channel by gravity.

1.10.02 **Equipment Cooling Water (ECW) System (Unit Auxiliaries)**

The plant auxiliaries of Steam Generator and Turbine Generator shall be cooled by Demineralised (DM) water in a closed circuit. The primary circuit DM water shall be cooled through plate type heat exchangers by Clarified water. The hot secondary circuit cooling water shall be cooled in the cooling towers and shall be returned back to the system. It is proposed to provide independent primary cooling water circuit for Steam Generator & auxiliaries and TG & its auxiliaries.

1.10.03 **Station Auxiliaries Cooling Water System**

The station auxiliaries such as Air compressors, Compressors of ash handling plant, Cooling water circuit of Air Conditioning system, compressor of mill reject system etc. shall be cooled by clarified water pumped by station auxiliary cooling water system The hot station auxiliary cooling water shall be cooled in the auxiliary cooling towers and returned back to the system.

1.10.04 **Ash Water System**

a) It is proposed to operate ash water system in a closed circuit. The ash water from the ash dyke shall be recirculated . Make up to the ash water system (to compensate for the ash water system evaporation loss in ash dyke) shall be supplied from excess CW blow down water (Service water) and raw water supply from water source of the plant.

1.10.05 **Other Miscellaneous Water Systems**

a) CW system blow down water shall be used for the plant service water requirement, ash slurry pumps sealing, sealing of Vacuum pumps (if applicable) of Ash Handling plant, make-up to fire water storage tanks and cooling water requirement of hydrogen generation plant. The balance CW blowdown ,service (wash water) water collected from various areas shall be treated using oil water separators, tube settlers, coal settling pits etc. as per requirement and treated water from liquid effluent treatment plant shall be recycled back to the service water system for re-use. The excess service water shall be led to central monitoring basin for disposal.

b) Separate water Pre-treatment plants are proposed for Circulating Water (PT-CW) system and Demineralisation Plant (PT-DM) plant

c) The drinking water requirement of the plant and colony shall be provided from the above mentioned Water (PT-CW) pretreatment plant.

d) Steam Cycle make-up water, makeup to the primary circuit of ECW (unit auxiliaries) system, boiler fill water and makeup to the hydrogen generation plant shall be provided from Demineralising plant.

e) The quality of cooling water & DM water is given in this sub-section.

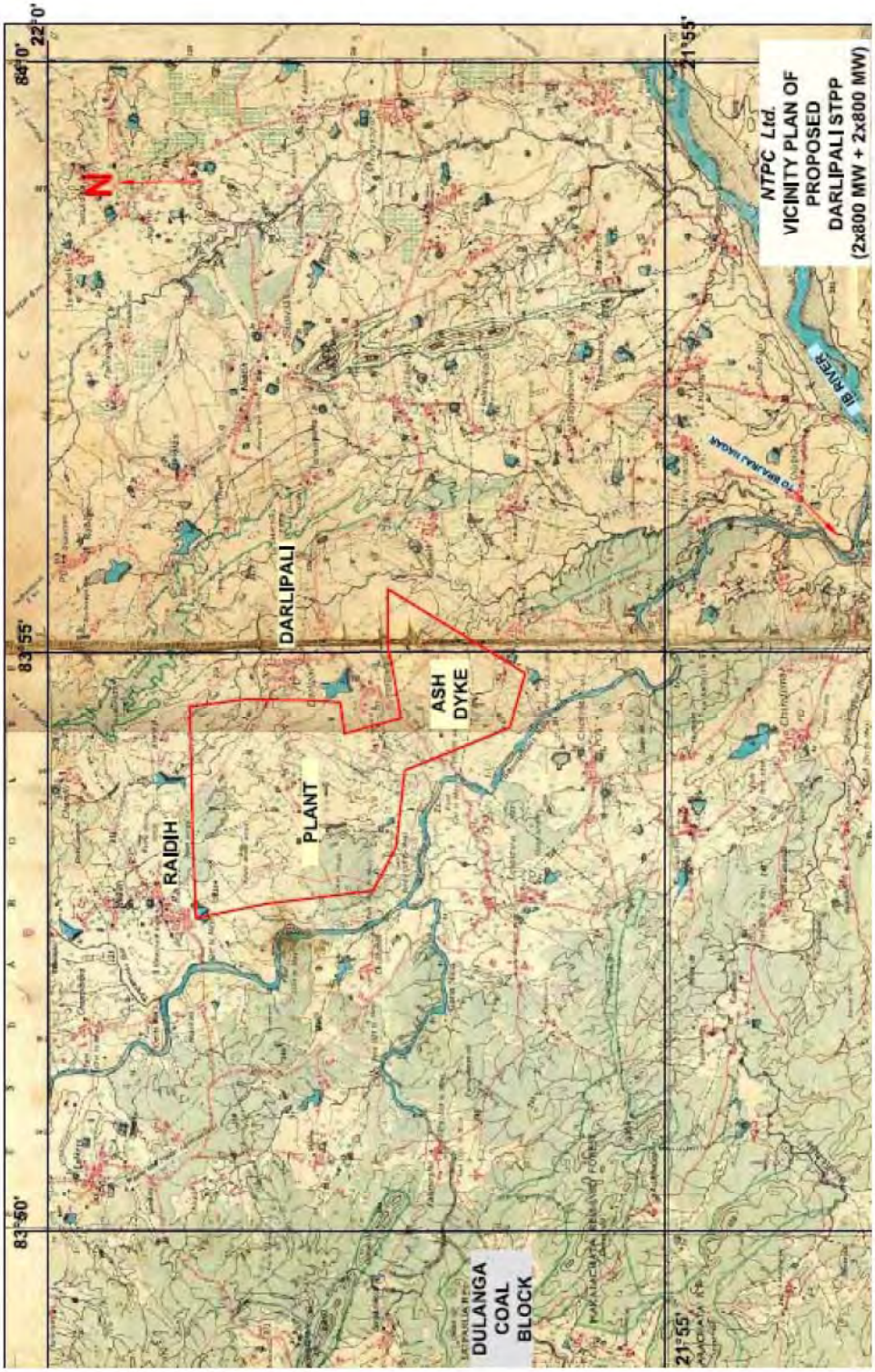
1.11.00 **Criteria for Earthquake Resistant Design of Structures and Equipment**

All power plant structures and equipment, including plant auxiliary structures and equipment shall be designed for seismic forces as given in this sub-section as **Annexure-V.**

1.12.00 **Criteria for Wind Resistant Design of Structures and Equipment**

All structures and equipment of the power plant, including plant auxiliary structures and equipment, shall be designed for wind forces as given as given in this sub-section as **Annexure-VI.**

ANNEXURE-I


NTPC Ltd.
VICINITY PLAN OF
PROPOSED
DARLIPALI STPP
(2x800 MW + 2x800 MW)
N
22°0'
21°55'
84°0'
83°55'
83°50'
IB RIVER
DARLIPALI
ASH
DYKE
PLANT
RAIDIH
DULANGA
COAL
BLOCK

Annexure-II

जलवायवी सारणी
CLIMATOLOGICAL TABLE

स्टेशन :झारसुगुडा STATION :Jharsuguda | अक्षांश LAT 21°55′ N | देशांतर LONG 84°05′ E | समुद्री तल माध्य से ऊँचाई HEIGHT ABOVE M. S. L. 230 मीटर METRES | 1951 से 1980 तक के प्रेक्षणों पर आधारित BASED ON OBSERVATIONS FROM 1951 TO 1980

माह MONTH		स्टेशन का सतह दाब STATION LEVEL PRESSURE	शुष्क बल्ब DRY BULB	नम बल्ब WET BULB	दैनिक अधिक तम DAILY MAX	दैनिक न्यून तम DAILY MIN	माह में उच्चतम HIGHEST IN THE MONTH	माह में निम्नतम LOWEST IN THE MONTH	उच्चतम HIGHEST	दिनांक और वर्ष DATE AND YEAR	निम्नतम LOWEST	दिनक और वर्ष DATE AND YEAR	सापेक्ष आर्द्रता RELATIVE HUMIDITY	वाष्प दाब VAPOUR PRESSURE	समस्त मेघ ALL CLOUDS	निम्न मेघ LOW CLOUDS	मासिक योग MONTHLY TOTAL	वर्षा के दिनों की संख्या NO. OF RAINY DAYS	सर्वाधिक सबसे नम महीने का योग TOTAL IN WETTEST MONTH WITH YEAR	सर्वाधिक शुष्कतम महीने का योग TOTAL IN DRIEST MONTH WITH YEAR	24 घंटों की सबसे भारी वर्षा HEAVIEST FALL IN 24 HOURS	दिनांक और वर्ष DATE AND YEAR	माध्य पवन गति MEAN WIND SPEED
		वायु तापमान AIR TEMPERATURE:	माध्य MEAN						चरम EXTREMES				आर्द्रता HUMIDITY		मेघ की मात्रा CLOUD AMOUNT		वर्षा RAINFALL						
		एच. पी. ए. hPa	डि.से. °C	डि.से. °C	डि.से. °C	डि.से. °C	डि.से. °C	डि.से. °C	डि.से. °C		डि.से. °C		प्रतिशत %	एच.पी.ए. hPa	आकाश के अष्टमांश Oktas of sky		मि.मि. mm		मि.मि. mm	मि.मि. mm	मि.मि. mm		कि.मी. प्र. घं. Kmph
जनवरी JAN	I	990.6	16.7	13.4	27.7	12.0	30.8	7.5	33.2	04	6.0	10	67	12.8	1.7	0.5	12.5	1.1	61.4	0.0	36.4	11	5.6
	II	986.5	23.9	16.4						1973		1976	43	12.7	2.1	0.8			1957			1968	
फरवरी FEB	I	988.6	20.1	15.1	30.8	14.7	35.0	9.9	37.9	22	7.2	02	57	13.2	1.7	0.6	18.0	1.3	116.7	0.0	46.7	06	6.3
	II	984.4	28.0	17.8						1967		1967	33	12.2	2.0	1.0			1961			1961	
मार्च MAR	I	986.2	25.4	17.6	35.5	19.0	40.0	13.9	42.7	31	11.1	01	44	14.0	1.8	0.5	21.0	1.8	97.8	0.0	58.7	26	6.9
	II	981.6	32.9	19.4						1955		1961	25	11.8	2.4	0.9			1951			1951	
अप्रैल APR	I	982.9	30.8	21.3	40.1	24.2	43.6	19.2	46.0	29	15.8	01	41	17.7	2.1	0.5	13.8	1.4	58.9	0.0	31.8	18	7.5
	II	977.6	37.2	21.4						1973		1957	21	12.8	3.2	1.7			1971			1952	
मई MAY	I	978.5	32.9	23.9	41.8	27.1	45.3	22.3	48.0	22	19.3	04	46	22.3	2.5	0.6	29.9	2.2	107.8	0.0	63.8	14	8.0
	II	973.5	38.9	23.1						1978		1963	24	15.5	3.8	2.1			1969			1963	
जून JUN	I	975.1	30.2	25.0	37.2	26.4	43.4	22.0	46.3	01	16.3	17	66	27.4	5.9	2.5	228.7	9.5	524.9	42.2	197.9	11	9.3
	II	971.3	33.4	25.1						1978		1973	54	25.1	6.6	3.5			1956	1975		1961	
जुलाई JUL	I	975.1	26.9	25.0	31.3	24.6	34.8	22.3	38.2	06	17.4	30	86	30.2	7.2	4.3	402.7	17.5	770.7	230.9	189.6	08	9.0
	II	972.2	28.5	25.6						1979		1976	79	30.5	7.3	4.5			1961	1955		1961	
अगस्त AUG	I	976.1	26.6	25.1	31.0	24.5	34.0	22.4	36.2	03	16.6	16	87	30.6	7.2	4.3	428.5	17.3	657.9	212.1	257.8	20	8.3
	II	973.2	28.1	25.5						1972		1976	81	30.6	7.3	4.5			1960	1965		1975	
सितम्बर SEP	I	979.7	27.2	25.0	31.8	24.3	34.4	22.3	37.0	11	16.7	05	83	29.9	6.0	3.2	233.1	11.7	714.5	42.5	190.9	03	6.8
	II	976.3	28.4	25.3						1968		1976	77	29.6	6.7	3.9			1961	1974		1973	
अक्तूबर OCT	I	985.4	25.7	22.6	31.9	21.6	34.3	17.0	36.1	19 @	12.1	28	75	24.9	3.6	1.5	65.0	4.0	181.5	0.2	110.2	09	5.5
	II	981.9	28.1	23.2						1974		1976	65	24.5	4.2	2.2			1961	1979		1952	
नवम्बर NOV	I	989.4	21.3	17.4	30.0	16.0	32.4	12.0	35.6	08	8.4	30	66	17.0	2.1	0.5	4.3	0.4	28.7	0.0	26.8	24	5.7
	II	985.8	25.3	18.9						1976		1970	52	16.8	2.6	0.9			1953			1972	
दिसम्बर DEC	I	991.1	17.2	13.8	27.6	12.0	30.2	6.3	32.0	02 @	6.1	29	67	13.2	1.8	0.3	3.4	0.5	22.0	0.0	18.8	01	5.3
	II	987.3	23.0	16.2						1977		1955	47	13.1	2.1	0.5			1978			1978	
वार्षिक योग या माध्य ANNUAL TOTAL OR MEAN	I	983.2	25.1	20.4	33.1	20.5	45.6	7.2	48.0		6.0		65	21.1	3.6	1.6	1460.9	68.7	2656.6	901.0	257.8		7.0
	II	979.3	29.6	21.5									50	19.6	4.2	2.2			1961	1979			
वर्षों की सं NUMBER OF YEARS	I	30	30	30	28	28	28	28	30		30		30	30	30	23	30	30	30	30	30		28
	II	30	30	30									30	30	30	23							

जलवायवी सारणी
CLIMATOLOGICAL TABLE

स्टेशन :झारसुगुडा
STATION : Jharsuguda

माह MONTH		वर्षण 0.3 मि.मि.या अधिक PPT 0.3mm or more	ओले HAIL	गर्जन THUNDER	कुहरा FOG	धूल भरी आंधी DUST STORM	चंड वात SQUALL	62 या अधिक 62 or more	20-61	1-19	0	उ N	उपू NE	पू E	दपू SE	द S	दप SW	प W	उप NW	शांत CALM	0	लै-2 T-2	3-5	6-7	8	0	लै-2 T-2	3-5	6-7	8	कुहरा FOG 8	1 कि.मी. तक UP TO 1 Km	1-4 कि.मी. 1-4 Kms	4-10 कि.मी. 4-10 Kms	10-20 कि.मी. 10-20 Kms	20 कि.मी. से अधिक OVER 20 Kms
		मौसम परिघटना WEATHER PHENOMENA — के साथ दिनों की संख्या No. OF DAYS WITH						पवन WIND — पवन की गति के साथ दिनों की संख्या (कि. मी. प्र. घं.) No. OF DAYS WITH WIND SPEED (Km. p. h.)				पवन की दिशा के दिनों की संख्या का प्रतिशत PERCENTAGE No. OF DAYS WIND FROM									मेघ CLOUD — मेघ मात्रा (सभी मेघ) सहित दिनों की संख्या - अष्टमांश No. OF DAYS WITH CLOUD AMOUNT (ALL CLOUDS) OKTAS					निम्न स्तरी मेघ मात्रा सहित दिनों की संख्या - अष्टमांश No. OF DAYS WITH LOW CLOUD AMOUNT OKTAS						दृश्यता VISIBILITY — दृश्यता सहित दिनों की संख्या No. OF DAYS WITH VISIBILITY				
जनवरी JAN	I	1.7	0.0	0.9	0.4	0.0	0.1	0	0	28	3	32	45	7	1	1	1	0	3	10	16	6	5	3	1	26	3	2	0	0	0	0.1	0.3	22.9	7.4	0.3
	II							0	0	19	12	6	10	3	4	14	12	9	6	36	14	7	5	4	1	22	5	4	0	0	0	0.0	0.0	19.4	10.3	1.3
फरवरी FEB	I	2.2	0.1	1.3	0.2	0.0	0.2	0	0	25	3	33	41	6	3	3	1	0	3	10	16	5	4	2	1	23	3	2	0	0	0	0.0	0.1	19.2	6.7	0.0
	II							0	0	22	6	6	10	4	4	16	13	15	10	22	13	6	5	3	1	18	6	4	0	0	0	0.0	0.0	14.6	13.2	0.2
मार्च MAR	I	3.1	0.0	3.7	0.1	0.1	0.5	0	1	25	5	23	31	7	7	5	3	3	4	17	18	5	4	3	1	26	3	2	0	0	0	0.0	0.4	22.1	8.1	0.4
	II							0	1	25	5	7	5	3	4	19	14	19	13	16	13	6	6	5	1	19	8	4	0	0	0	0.0	0.1	17.3	12.3	1.3
अप्रैल APR	I	2.9	0.0	4.5	0.0	0.2	1.1	0	1	24	5	9	12	7	12	17	15	8	5	15	13	6	6	4	1	24	4	2	0	0	0	0.0	0.3	19.2	9.6	0.9
	II							0	2	24	4	4	5	3	5	20	20	20	14	9	6	7	9	6	2	11	11	7	1	0	0	0.0	0.2	15.2	13.7	0.9
मई MAY	I	4.1	0.0	8.7	0.0	0.4	2.2	0	1	26	4	3	8	5	19	22	18	7	4	14	9	9	8	4	1	22	6	3	0	0	0	0.0	0.1	18.7	12.1	0.1
	II							0	3	25	3	5	5	4	9	18	15	20	15	9	3	6	11	8	3	8	10	12	1	0	0	0.1	0.5	17.2	12.9	0.3
जून JUN	I	13.0	0.0	12.6	0.1	0.4	1.8	0	3	24	3	1	6	4	9	15	28	23	4	10	1	2	7	11	9	8	8	10	4	0	0	0.0	0.2	19.3	10.2	0.3
	II							0	4	23	3	5	6	6	10	14	21	22	7	9	0	1	5	13	11	2	6	18	4	0	0	0.1	0.7	19.1	9.6	0.5
जुलाई JUL	I	22.7	0.0	10.4	0.0	0.0	0.4	0	3	26	2	2	6	3	4	17	31	26	4	7	0	0	3	11	17	1	4	17	9	0	0	0.0	1.9	21.8	7.2	0.1
	II							0	3	26	2	2	5	4	7	15	30	24	5	8	0	0	2	11	18	1	3	19	8	0	0	0.0	1.0	22.0	7.9	0.1
अगस्त AUG	I	22.4	0.0	12.9	0.0	0.0	0.1	0	2	26	3	2	8	4	8	15	25	25	4	9	1	0	3	11	16	1	4	17	9	0	0	0.0	0.8	22.0	8.0	0.2
	II							0	2	25	4	2	4	4	8	15	26	24	5	12	0	0	1	13	17	0	3	20	8	0	0	0.0	1.7	20.5	8.6	0.2
सितम्बर SEP	I	18.6	0.0	12.0	0.2	0.0	0.2	0	1	23	6	4	13	8	10	11	14	16	5	19	0	2	7	12	9	4	7	14	5	0	0	0.0	0.3	19.0	10.6	0.1
	II							0	1	23	6	4	7	7	11	12	16	18	6	19	0	1	4	14	11	1	5	19	5	0	0	0.0	0.3	20.8	8.8	0.1
अक्तूबर OCT	I	6.1	0.0	3.7	0.4	0.0	0.1	0	0	24	7	16	34	11	6	4	3	3	3	20	9	5	7	7	3	16	6	7	2	0	0	0.0	0.2	20.9	9.8	0.1
	II							0	0	19	12	5	12	10	10	7	7	7	4	38	3	7	8	9	4	7	11	11	2	0	0	0.0	0.2	22.3	8.5	0.0
नवम्बर NOV	I	0.9	0.0	0.1	0.1	0.0	0.0	0	0	26	4	35	43	5	2	1	0	0	2	12	14	6	5	4	1	24	4	2	0	0	0	0.0	0.2	21.9	7.7	0.2
	II							0	0	16	14	6	15	11	6	5	4	3	3	47	9	7	7	5	2	19	7	4	0	0	0	0.0	0.1	24.3	5.6	0.0
दिसम्बर DEC	I	0.6	0.0	0.3	0.1	0.0	0.0	0	0	28	3	40	43	3	1	0	0	0	2	11	15	6	6	3	1	28	2	1	0	0	0	0.0	0.5	26.4	4.1	0.0
	II							0	0	18	13	7	13	6	3	10	9	6	3	43	12	9	6	3	1	25	4	2	0	0	0	0.0	0.1	27.2	3.8	0.1
वार्षिक योग या माध्य ANNUAL TOTAL OR MEAN	I	96.3	0.1	69.6	1.6	1.1	6.7	0	12	305	48	17	24	6	7	9	12	9	4	12	112	52	65	75	61	203	54	79	29	0	0	0.1	5.3	253.4	103.5	2.7
	II							0	16	265	84	5	8	5	7	14	16	16	8	21	73	57	69	94	72	133	79	124	29	0	0	0.2	4.9	239.9	115.0	5.0
वर्षों की सं। NUMBER OF YEARS	I	30						24				27									27					27						27				
	II							24				27									26					26						26				

Annexure – III

DESIGN CLARIFIED WATER ANALYSIS

S.No	Constituent	As	mg/l
1	Calcium	$CaCO_3$	135
2	Magnesium	$CaCO_3$	88
3	Sodium	$CaCO_3$	40
4	Potassium	$CaCO_3$	9
	Total cations	$CaCO_3$	272
4	HCO3	$CaCO_3$	173
5	P-alkalinity	$CaCO_3$	0
6	Chloride	$CaCO_3$	36
7	Sulphate	$CaCO_3$	63
	Total Anions	$CaCO_3$	272
8	Silica, Reactive	Si	8
9	Iron (Total)	Fe	0.5
10	pH		7.0- 7.8
11	Turbidity	NTU	10
12	Total Dissolved Solids		210-270
13	Temperature	^0C	20 - 35

Note : The C.W system is expected to operate at about 3 Cycles of Concentration. As CW blow down water (Service Water) is tapped from discharge of CW pumps, the water quality of CW Blow down water shall be same as that above.

Annexure – IV

ANALYSIS OF DM WATER TO BE USED FOR MAKE-UP WATER TO CONDENSER

S.No.	Characteristics		Value
i)	Silica (Max.)	-	0.02 ppm as SiO2
ii)	Iron as Fe	-	Nil
iii)	Total hardness	-	Nil
iv)	pH value	-	6.8 to 7.2
v)	Conductivity	-	Not more than 0.1 excluding the effects of free CO_2

Annexure - V

1.01.00 CRITERIA FOR EARTHQUAKE RESISTANT DESIGN OF STRUCTURES AND EQUIPMENT

All structures and equipment shall be designed for seismic forces adopting the site specific seismic information provided in this document and using the other provisions in accordance with IS:1893 (Part 1):2002 and IS:1893 (Part 4):2005. Pending finalisation of Parts 2, 3 and 5 of IS:1893, provisions of part 1 shall be read along with the relevant clauses of IS:1893:1984, for structures other than the buildings and industrial structures including stack-like structures.

A site specific seismic study has been conducted for the project site. The peak ground horizontal acceleration for the project site, the site specific acceleration spectral coefficients (in units of gravity acceleration 'g') in the horizontal direction for the various damping values and the multiplying factor (to be used over the spectral coefficients) for evaluating the design acceleration spectra are as given at APPENDIX-A to Annexure-V.

Vertical acceleration spectral values shall be taken as 2/3rd of the corresponding horizontal values.

The site specific design acceleration spectra shall be used in place of the response acceleration spectra, given at figure-2 in IS:1893 (Part 1) and Annex B of IS:1893 (Part 4). The site specific acceleration spectra along with multiplying factors specified in APPENDIX-A to Annexure-V includes the effect of the seismic environment of the site, the importance factor related to the structures and the response reduction factor. Hence, the design spectra do not require any further consideration of the zone factor (Z), the importance factor (I) and response reduction factor (R) as used in the IS:1893 (Part 1 and Part 4).

1.01.01 Damping in Structures

The damping factor (as a percentage of critical damping) to be adopted shall not be more than as indicated below for:

a)	Steel structures	:	2%
b)	Reinforced Concrete structures	:	5%
c)	Reinforced Concrete Stacks	:	3%
d)	Steel stacks	:	2%

1.01.02 **Method of Analysis**

Since most structures in a power plant are irregular in shape and have irregular distribution of mass and stiffness, dynamic analysis for obtaining the design seismic forces shall be carried out using the response spectrum method. The number of vibration modes used in the analysis should be such that the sum total of modal masses of all modes considered is at least 90 percent of the total seismic mass and shall also meet requirements of IS:1893 (Part 1). Modal combination of the peak response quantities shall be performed as per Complete Quadratic Combination (CQC) method or by an acceptable alternative as per IS:1893 (Part 1).

In general, seismic analysis shall be performed for the three orthogonal (two principal horizontal and one vertical) components of earthquake motion. The seismic response from the three components shall be combined as specified in IS:1893 (Part 1).

For buildings, if the design base shear (V_B) obtained from modal combination is less than the base shear ($\bar{V}_B$) computed using the approximate fundamental period (T_a) given in IS:1893:Part 1 and using site specific acceleration spectra with appropriate multiplying factor, the response quantities (e.g. member forces, displacements, storey forces, storey shears and base reactions) shall be enhanced in the ratio of $\bar{V}_B / V_B$. However, no reduction is permitted if $\bar{V}_B$ is less than V_B.

For regular buildings less than 12m in height, design seismic base shear and its distribution to different floor levels along the height of the building may be carried out as specified under clause 7.5, 7.6 & 7.7 of IS:1893 (Part 1) and using site specific design acceleration spectra. The design horizontal acceleration spectrum value (Ah) shall be computed for the fundamental natural period as per clause 7.6 of IS:1893 (Part 1) using site specific spectral acceleration coefficients with appropriate multiplying factor given in APPENDIX-A to Annexure-V.Further, the spectral acceleration coefficient shall get restricted to the peak spectral value if the fundamental natural period of the building falls to the left of the peak in the spectral acceleration curve.

1.01.03 **Design/Detailing for Ductility for Structures**

The site specific design acceleration spectra is a reduced spectra and has an in-built allowance for ductility. Structures shall be engineered and detailed in accordance with relevant Indian/International standards to achieve ductility.

1.02.00 **SITE SPECIFIC SEISMIC PARAMETERS FOR DESIGN OF STRUCTURES AND EQUIPMENT**

For site specific seismic parameters for design of structures and equipment refer Appendix-A to Annexure-V.

APPENDIX-A TO ANNEXURE-V

The various site specific seismic parameters for the project site shall be as follows:

1) Peak ground horizontal acceleration (MCE) : 0.10g

2) Multiplying factor to be applied to the site specific horizontal acceleration spectral coefficients (in units of gravity acceleration 'g') to obtain the design acceleration spectra

   a) for ordinary moment resisting steel frames designed and detailed as per IS:800 : 0.029

   b) for braced steel frames designed and detailed as per IS:800 : 0.022

   c) For special moment resisting RC frames designed and detailed as per IS:456 and IS:13920 : 0.018

   d) for steel chimney : 0.044

   e) for design of structures not covered under 2 (a) to 2 (d) above and under 3 below : 0.029

3) Multiplying factor to be applied to the site specific horizontal acceleration spectral coefficients (in units of gravity acceleration 'g') for design of equipment and structures where inelastic action is not relevant or not permitted : 0.058

Note: g = Acceleration due to gravity

The horizontal seismic acceleration spectral coefficients are furnished in subsequent pages.

APPENDIX-A TO ANNEXURE-V

HORIZONTAL SEISMIC ACCELERATION SPECTRAL COEFFICIENTS
(In units of 'g')

Time Period	Damping Factor (as a percentage of critical damping)		
(Sec)	2%	3%	5%
0.000	1.000	1.000	1.000
0.030	1.000	1.000	1.000
0.031	1.031	1.026	1.020
0.050	1.618	1.502	1.371
0.060	1.921	1.736	1.534
0.070	2.221	1.963	1.687
0.080	2.519	2.183	1.832
0.086	2.697	2.312	1.915
0.088	2.756	2.355	1.943
0.090	2.815	2.398	1.970
0.095	2.962	2.503	2.036
0.098	3.050	2.566	2.076
0.100	3.109	2.607	2.102
0.103	3.196	2.669	2.141
0.108	3.342	2.772	2.204
0.110	3.401	2.813	2.229
0.112	3.459	2.854	2.254
0.115	3.546	2.914	2.291
0.118	3.633	2.975	2.328
0.121	3.720	3.035	2.364
0.122	3.749	3.055	2.376
0.125	3.836	3.114	2.412
0.127	3.893	3.154	2.436
0.129	3.951	3.193	2.460
0.130	3.980	3.213	2.471
0.132	3.980	3.252	2.495
0.134	3.980	3.291	2.518
0.140	3.980	3.408	2.587
0.141	3.980	3.410	2.598
0.150	3.980	3.410	2.700
0.200	3.980	3.410	2.700
0.250	3.980	3.410	2.700
0.300	3.980	3.410	2.700
0.350	3.980	3.410	2.700
0.400	3.980	3.410	2.700
0.431	3.980	3.410	2.700

APPENDIX-A TO ANNEXURE-V

HORIZONTAL SEISMIC ACCELERATION SPECTRAL COEFFICIENTS
(In units of 'g')

Time Period	Damping Factor (as a percentage of critical damping)		
(Sec)	2%	3%	5%
0.442	3.980	3.410	2.700
0.450	3.980	3.410	2.700
0.474	3.980	3.410	2.700
0.495	3.980	3.410	2.700
0.500	3.980	3.410	2.700
0.517	3.849	3.298	2.611
0.525	3.790	3.248	2.571
0.542	3.672	3.146	2.491
0.550	3.618	3.100	2.455
0.562	3.541	3.034	2.402
0.576	3.455	2.960	2.344
0.588	3.384	2.900	2.296
0.597	3.333	2.856	2.261
0.603	3.300	2.828	2.239
0.609	3.268	2.800	2.217
0.615	3.236	2.772	2.195
0.625	3.184	2.728	2.160
0.640	3.109	2.664	2.109
0.658	3.024	2.591	2.052
0.667	2.984	2.556	2.024
0.690	2.884	2.471	1.957
0.700	2.843	2.436	1.929
0.750	2.653	2.273	1.800
0.755	2.636	2.258	1.788
0.800	2.488	2.131	1.688
0.850	2.341	2.006	1.588
0.900	2.211	1.894	1.500
0.950	2.095	1.795	1.421
1.000	1.990	1.705	1.350
1.050	1.895	1.624	1.286
1.100	1.809	1.550	1.227
1.150	1.730	1.483	1.174
1.200	1.658	1.421	1.125
1.250	1.592	1.364	1.080
1.300	1.531	1.312	1.038
1.350	1.474	1.263	1.000
1.400	1.421	1.218	0.964

APPENDIX-A TO ANNEXURE-V

HORIZONTAL SEISMIC ACCELERATION SPECTRAL COEFFICIENTS
(In units of 'g')

Time Period	Damping Factor (as a percentage of critical damping)		
(Sec)	2%	3%	5%
1.450	1.372	1.176	0.931
1.500	1.327	1.137	0.900
1.550	1.284	1.100	0.871
1.600	1.244	1.066	0.844
1.650	1.206	1.033	0.818
1.700	1.171	1.003	0.794
1.750	1.137	0.974	0.771
1.800	1.106	0.947	0.750
1.850	1.076	0.922	0.730
1.900	1.047	0.897	0.711
1.950	1.021	0.874	0.692
2.000	0.995	0.853	0.675
2.050	0.971	0.832	0.659
2.100	0.948	0.812	0.643
2.150	0.926	0.793	0.628
2.200	0.905	0.775	0.614
2.250	0.884	0.758	0.600
2.300	0.865	0.741	0.587
2.350	0.847	0.726	0.574
2.400	0.829	0.710	0.563
2.450	0.812	0.696	0.551
2.500	0.796	0.682	0.540
2.550	0.780	0.669	0.529
2.600	0.765	0.656	0.519
2.650	0.751	0.643	0.509
2.700	0.737	0.631	0.500
2.750	0.724	0.620	0.491
2.800	0.711	0.609	0.482
2.850	0.698	0.598	0.474
2.900	0.686	0.588	0.466
2.950	0.675	0.578	0.458
3.000	0.663	0.568	0.450
3.050	0.652	0.559	0.443
3.100	0.642	0.550	0.435
3.150	0.632	0.541	0.429
3.200	0.622	0.533	0.422
3.250	0.612	0.525	0.415

APPENDIX-A TO ANNEXURE-V

HORIZONTAL SEISMIC ACCELERATION SPECTRAL COEFFICIENTS
(In units of 'g')

Time Period	Damping Factor (as a percentage of critical damping)		
(Sec)	2%	3%	5%
3.300	0.603	0.517	0.409
3.350	0.594	0.509	0.403
3.400	0.585	0.501	0.397
3.450	0.577	0.494	0.391
3.500	0.569	0.487	0.386
3.550	0.561	0.480	0.380
3.600	0.553	0.474	0.375
3.650	0.545	0.467	0.370
3.700	0.538	0.461	0.365
3.750	0.531	0.455	0.360
3.800	0.524	0.449	0.355
3.850	0.517	0.443	0.351
3.900	0.510	0.437	0.346
3.950	0.504	0.432	0.342
4.000	0.498	0.426	0.338

ANNEXURE-VI

1.01.00 **CRITERIA FOR WIND RESISTANT DESIGN OF STRUCTURES AND EQUIPMENT**

All structures shall be designed for wind forces in accordance with IS:875 (Part-3) and as specified in this document. See APPENDIX – B TO ANNEXURE-VI for site specific information.

Along wind forces shall generally be computed by the Peak (i.e. 3 second gust) Wind Speed method as defined in the standard.

Along wind forces on slender and wind sensitive structures and structural elements shall also be computed, for dynamic effects, using the Gust Factor or Gust Effectiveness Factor Method as defined in the standard. The structures shall be designed for the higher of the forces obtained from Gust Factor method and the Peak Wind Speed method.

Analysis for dynamic effects of wind must be undertaken for any structure which has a height to minimum lateral dimension ratio greater than "5" and/or if the fundamental frequency of the structure is less than 1 Hz.

Susceptibility of structures to across-wind forces, galloping, flutter, ovalling etc. should be examined and designed/detailed accordingly following the recommendations of IS:875(Part-3) and other relevant Indian standards.

It should be estimated if size and relative position of other structures are likely to enhance the wind loading on the structure under consideration. Enhancement factor, if necessary, shall suitably be estimated and applied to the wind loading to account for the interference effects.

1.01.01 **Damping in Structures**

The damping factor (as a percentage of critical damping) to be adopted shall not be more than as indicated below for:

a) Welded steel structures	:	1.0%
b) Bolted steel structures	:	2.0%
c) Reinforced concrete structures	:	1.6%
d) Steel stacks	:	As per IS:6533 & CICIND Model Code whichever is more critical.

APPENDIX-I TO ANNEXURE-VI

SITE SPECIFIC DESIGN PARAMETERS

The various design parameters, as defined in IS: 875 (Part-3), to be adopted for the project site shall be as follows:

a) The basic wind speed "Vb" at ten metres above the mean ground level	:	39 metres/second
b) The risk coefficient "K1"	:	1.06
c) Category of terrain	:	Category-2

Note: Notwithstanding the values of the above mentioned parameters, the design wind pressure so computed at any point shall not be taken less than 1500 N/Sq. metre for all classes of structures, i.e. A, B & C, as defined in IS: 875 (Part-3).

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SECTION – C

SPECIFIC TECHNICAL REQUIREMENTS

1.0 SCOPE OF WORK

The specification is intended to cover the scope of supply and work for Mill Reject Handling System for **2X800 MW DARLIPALI SUPER THERMAL POWER PLANT AT ODISHA** under the specification covers the design, engineering, manufacture, supply, assembly and testing at manufacturer's works, inspection, packing, forwarding, delivery FOR site, and handling, storage at site (i.e. taking delivery of materials from carriers, transportation to site), fabrication (as needed), construction, erection, commissioning, trial run, PG testing including painting protection of all items as specified hereinafter but without excluding any other necessary components, which are not mentioned herein but are required for the completeness and; efficient, easy and reliable operation of the system.

The supplier will provide the equipment including all necessary features, components, accessories, electrical and C&I accessories and appurtenances for efficient and reliable erection operation and maintenance whether mentioned in this specification or not. The equipment will consist of the following main components (however, not limited to the items listed in the tender specification).

All necessary tools and tackles required for the maintenance of the proposed system shall also be supplied along with mandatory spares.

1.1 SCOPE OF SUPPLY

Scope of supply shall comprise of but not necessarily limited to the following:

a) 18 nos. of pneumatic Cylinder operated plate/ knife gate valve (200 Nb) with open and close limit switches at mill outlet/pyrite hopper inlet.

b) 18 nos. of pyrite hoppers complete with sizing grid, flexible/expansion joint at its inlet, rupture disc, by pass chute, oversize material chute, water spray nozzles & supporting structures.

c) 36 nos. (2 Nos. per pyrite hopper) of Level probes for pyrite hoppers.

d) 18 nos. of Temperature Switches for pyrite hoppers.

e) 18 nos. of pneumatic operated plate/knife gate valve (200 Nb) at pyrite hopper outlet for pyrite hopper isolation with open and close limit switches for interlock.

f) 18 nos. of pneumatic operated plate/knife gate valve (200 Nb) at oversize discharge chute of pyrite hopper provided with open & close limit switches for interlock with pyrite hopper inlet knife gate valve.

g) 18 nos. of pneumatic Cylinder operated plate/knife gate valve (200 Nb) at by pass chute of pyrite hopper provided with open & close limit switches for interlock with pyrite hopper inlet knife gate valve.

h) 18 nos. of transporter vessel / denseveyor complete with pneumatically operated dome/ material handling valve, Alloy CI outlet bend, local control panel etc.

i) 18 sets of MS ERW Heavy grade pipe for mill reject conveying from denseveyor/ transporter vessel to Mill Reject Storage bunker.

j) One lot of Alloy CI bends (400BHN).

k) 4 sets of terminal boxes (Two set per unit) with up stand on bunker top for terminating the reject convening pipes.

l) Two (2) nos. mill reject bunker along with structure, complete with SS-304 lining and lever operated bunker discharge gate with canvas chute at bunker outlet, operating & maintenance platform, interconnecting platforms required at two levels between TP staircase and reject bunker operating platform, hand railing, bag filter, level probe (RF type level Probe), pressure relieve valve, chain pulley block with traveling trolley and monorail arrangement etc.

m) 2 nos. (1W+1S) non lubricated reciprocating type skid-mounted air compressor with drive motor, local control panel, instruments and all other accessories.

n) Four (4) nos. air receivers (i.e. two no. per unit) complete with drain traps, safety relief valve, instruments and all accessories.

o) 4 Nos. fixed type sump pump complete with suction (min 5 m long) & discharge hose (min 10 m long) for pumping out water drains from local pit to nearest plant drain, control panel, instruments and all other accessories.

p) 1 lot of piping , fittings, valves & instruments for conveying air, instrument air, cooling water for dome valve top plate (if applicable), cooling water quenching in the pyrite hopper, cooling water for air compressor etc

q) 1 lot of Local Control Panel/pneumatic panels/JBs (1 no. for each pyrite hopper) properly mounted on rack. (supplier's scope)

r) 1 lot of insulation & cladding, if required, to maintain surface temperature of pyrite hopper within 60° C

s) All structures including pipe cum cable rack required for supporting of various pipes in bidder's scope. Bidder may take support from existing mill bunker bay structures wherever possible.

t) All insert plates, embedment plates, foundation bolts/ anchor bolts etc. required for bidder's equipment.

u) Initial charge of all lubricants and fluids.

v) Electrical and C&I scope as per enclosure elsewhere in the specification.

w) One set of Erection & commissioning spares as required for the complete system.

x) One set of mandatory spares as per annexure VII for all 3 units.

y) One set of special maintenance tools & tackles, if any. These tools shall not be used for erection/ commissioning purposes and shall be in an unused and new condition when they are handed over to the customer at site. Each tool shall be stamped so as to be identified easily for its use. The tools shall be supplied in a steel toolbox.

z) All counter- flanges with nuts, bolts and gaskets at all the terminal points.

aa) Relevant scope of supply as per GTR (ANNEXURE-IX), GCC & SCC.

bb) Any other instrument, item required for making the installation complete in all respect within battery limits and for satisfactory operation of the system, unless specifically EXCLUDED from scope under Clause No. 2.0 below.

cc) DCS based control system as specified in C&I specification.

1.2 SCOPE OF SERVICES

Scope of services shall include but not necessarily limited to the following:

a) Unloading, Storage, handling and transportation at site

b) Minor civil work like pinning, chipping of foundation, grouting supply of EPs/ insert plates etc.

c) Pre-Commissioning work such as flushing, hydraulic testing etc. Necessary instrumentation for pre-commissioning activities shall be arranged by the successful bidder at their own cost.

d) Erection & Commissioning of Mill Reject Handling System.

e) Inspection & testing, PG test/Functional Guarantee (FG) test

f) Painting of all equipment within the battery limit

g) Electrical scope of services as per enclosure elsewhere in the specification

h) Preparation of Civil input drawings & documents for foundation details (including load data, GA, foundation pocket details etc.) of storage bunkers/silos, compressors, air receivers, pipe rack and pit / trench details for denseveyor / transporter vessel and reject conveying pipes.

i) Review of Civil drawings prepared by BHEL based on civil input drawing furnished by the successful bidder.

j) Preparation of all necessary drawings/data/ documents for obtaining necessary approval of statutory authorities on behalf of the customer. Necessary fee for obtaining such approval shall also be borne by the bidder.

k) Relevant scope of services as per GTR (ANNEXURE-IX), GCC, ECC & SCC.

l) Guarantee parameters is defined as in Annexure-X.

m) Any other service required for making the installation complete in all respect within battery limits and for satisfactory erection & commissioning of the system, unless specifically EXCLUDED from scope under Clause .No. 2.0 below.

2.0 EXCLUSION

a) Civil work for Mill Reject Handling system including
   i) Road approach for various facilities related to Mill Reject Handling System.
   ii) Denseveyor/ Transporter vessel foundation
   iii) Pit & Trench as required in mill bay
   iv) Mill Reject compressor & Air receiver foundation
   v) Mill Reject bunker foundation
   vi) Various cable trenches, pipe pedestals & pipe rack foundation
   vii) Graphical interface unit (GIU) based local operation along with fibre optics cable.

However, location, sizing and loads and any other input related to above as applicable for above shall be given by the successful bidder within 8 weeks of placement of LOI.

b) Fire Protection system for compressor house

c) Lighting of Mill bay, Compressor house & bunker area

d) Electrical exclusion as per Electrical scope sheet enclosed elsewhere in the specification

e) Relevant exclusion as per GTR (ANNEXURE-IX), GCC, SCC & ECC.

3.0 SERVICES TO BE PROVIDED BY THE CUSTOMER

(A) Instrument air: Tapping terminated with an isolation valve for Instrument air shall be provided at first column of each bunker bay at pressure of 5-7 Kg/Sq cm.

(B) Service water: Tapping terminated with an isolation valve for service water shall be provided at first column of each bunker bay at pressure of 2.5-3 Kg/Sq cm.

(C) Auxiliary Colling Water Water: Supply and return water Tapping terminated with an isolation valve for ECW circuit. Equipment water shall be provided at 5m from compressor at a pressure of 5 Kg/sq cm (Approx). Pressure drop will be of 7 MWC.

4.0 TERMINAL POINT

Mill Reject inlet towards pyrite hopper side	:	Mill reject spout (tramp iron) as per details indicated in enclosed GA of Mills. Work downstream up to mill reject bunker outlet with canvas chute and discharge gate is by bidder.
Mill Reject outlet towards road tanker	:	Mill reject bunker outlet with canvas chute. Bidder shall terminate his work with the canvas chute and lever operated discharge gate.
Cooling water (ECW)	:	At Inlet & Outlet header at distance of 5m from MRS compressor house (Location)
Service Water	:	At First Col of each mill bay
Instrument Air	:	At First Col of each mill bay.

5.0 PERFORMANCE /FUNCTIONAL GUARANTEES & LIQUIDATED DAMAGES

PG /FG test shall comprise of

Category – I Guarantees (Liquidated damages are applicable for these guarantees).

i) Guaranteed auxiliary power consumption for each conveying air compressor at its

rated duty point (refer schedule- Vol III)
If the contractor is not able to demonstrate the guarantees, CLIENT/ BHEL will have the right to Reject the equipment / system / plant and recover the payments already made or accept the equipment / system after levying liquidated damages.

Category – III Guarantees

i) Continuous effective discharge and conveying at the rated capacity of the mill rejects without spillage or blockage in the system.

ii) Capacity and discharge pressure of each air compressor

iii) Particulate emission rate from bag filters less than 50 mg/nm^3 of air shall be demonstrated at site

iv) Vibration and noise level of each compressor and any other rotating equipment shall be demonstrated at site.

All the plant, equipment and systems covered under this specification shall perform continuously without exceeding the noise level over the entire range of output and operating frequency.

Noise level measurement shall be carried out using applicable and internationally acceptable standards. The measurement shall be carried out with a calibrated integrating sound level meter meeting the requirement of IEC 651 or BS 5969 or IS 9779.

The equivalent 'A' weighted sound pressure level measured at a height of 1.5 m above floor level in elevation and at a distance of one (1) metre horizontally from the nearest surface of any equipment / machine, furnished and installed under these specifications, expressed in decibels to a reference of 0.0002 microbar, shall not exceed 85 dBA

A minimum of 6 points around each equipment shall be covered for measurement. Additional measurement points shall be considered based on the applicable standards and the size of the equipment. The measurement shall be done with slow response on the A - weighting scale. The average of A-weighted sound pressure level measurements expressed in decibels to a reference of 0.0002 micro bar, shall not exceed the guaranteed value. Corrections for background noise shall be considered in line with the applicable standards. All the necessary data for determining these corrections, in line with the applicable standards, shall be collected during the tests.

In case during test it is found that the equipment/system has failed to meet the guarantees, the contractor shall carry out all necessary modifications and/or replacements to make the equipment/system comply with the guaranteed requirements at no extra cost to the Employer. However, if the contractor is not able to demonstrate the guarantees, even after the above modifications/replacements within a reasonable period allowed by CLIENT/BHEL, after the tests have been completed, CLIENT/BHEL will have the right to Reject the equipment / system / plant and recover the payments already made or accept the equipment

/ system after assessing the deficiency in respect of the various ratings, performance parameters and capabilities and recover from the contract price an amount equivalent to the damages as determined by Client/BHEL.

6.0 ERECTION, PRE-OPERATIONAL TESTING/STARTUP & COMMISSIONING PROCEDURE

This shall be as furnished by the successful bidder during detail engineering for customer's review and acceptance.

7.0 PAINTING / CORROSION PROTECTION REQUIREMENT

Successful bidder shall furnish detailed Painting Schedule for Mill Reject System (based on painting schedule attached with specification elsewhere) for customer / client approval during detail engineering

8.0 LAYOUT REQUIREMENTS

Piping and equipment installation shall be according to the regulations and recommendations of recognized Indian / International Standards, Codes and Statutes, as and where applicable, practice in vogue (to be supported with back up document to the satisfaction of customer)

The mill reject compressors will be located in Main Plant Compressor room. Area required for locating the same shall be indicated by the bidder in their bid.

9.0 EQUIPMENT DESIGN CRITERIA

9.0.1 The minimum design criteria to be followed for various equipment shall be as per requirements indicated under Annexure-II, standard technical specifications & Data Sheet-A for Mill Reject Handling System. In case of *any contradictory requirement* in specification of particular equipment, the requirement given in section C shall prevail over those indicated in Section-D. Further in case of any contradictory requirement within the same section and clarifications not having been sought by the bidders wrt the same within the stipulated period, the most stringent requirement as per interpretation of the customer will prevail. Successful bidder will furnish detailed data sheets/ specifications/design calculations for various equipment for customer / consultant's approval during detail engineering. All comments made by customer/ consultant shall be incorporated by the successful bidder without any commercial and delivery implication.

9.0.2 Technical details (constructional features, MOC etc) of non-lubricated reciprocating conveying air compressor, if being offered by any of the bidders, shall be finalized during detail engineering and the same shall be subject to customer's /client's acceptance without any commercial implication.

9.0.3 Properties of Mill Rejects to be considered for sizing /selection /design of various equipments shall be as follows:

Normal size : (~) 25 mm (about 80-85% of total reject)

Maximum size to be handled pneumatically	:	40 mm (about 10-15% of total reject)
Maximum size rejected by mill	:	50 mm (about 10-15% of total reject)
Temperature °C (Normal/Design)	:	180/200 (**)
Bulk density	:	1.6 T/m3 for volumetric calculation
	:	2.4 T/m3 for structural calculation

(**) Note: Mill Reject System design shall also consider the presence of occasional burning coal particles along with the rejects, which would increase the reject temperature.

Note: All pipe sizing and equipment sizing, capacity of pyrite hopper and pyrite vessel shall be subject to customer's approval during detail engineering without any cost implication to the customer.

10.0 QUALITY PLANS, INSPECTION & TESTING PROCEDURE

All QPs / CLs shall be submitted by the bidder for Customer/Consultant's review and approval. All comments made by customer/ consultant shall be incorporated by the successful bidder without any commercial and delivery implication.

11.0 DRAWINGS/ DOCUMENTS REQUIRED WITH THE BID

The drawings and documents to be submitted with the bid shall strictly be as per clause 15.0.1 below. Any documents other than those indicated therein will not be reviewed and will not form part of contract.

12.0 DRAWING/DOCUMENT SUBMISSION SCHEDULE AFTER AWARD OF CONTRACT

Refer Annexure VIII.

13.0 DRAWINGS ENCLOSED WITH THE SPECIFICATION

The following drawings/ sketches enclosed will form part of the specification.

a) Flow Diagram - Mill Reject Handling System
b) Mill handling arrangement drawing
c) General Arrangement of HP 1203 MILL (with planetary gear box)

The flow diagram shows the minimum requirement to be followed including minimum requirement of instruments. Any additional equipment/instruments required for safe, efficient & reliable operation of the system within the battery limit shall also be considered as included in bidder's scope without any commercial/ cost implication to BHEL.

14.0.1 LIST OF DRAWINGS / DOCUMENTS TO BE FURNISHED ALONG WITH OFFER

Refer Volume III – Annexure V

15.0 SPECIFIC C&I REQUIREMENT

15.0.1 The bidder will terminate all signals from instruments/sensors on each pyrite hopper/ transporter vessel on local control panel/ pneumatic panel dedicated to each pyrite hopper/ transporter vessel. Analogues & binary signals shall be terminated on separate Terminal

boxes for wiring to SG C&I. Alternatively bidder may provide JBs for each pyrite hopper/ denseveyor. In such case, separate JBs shall be provided for terminating analogue & binary signals.

15.0.2 The bidder will terminate all signals from local & field instruments /sensors related to compressor on compressor control panel. Analogues & binary signals shall be terminated on separate terminal boxes for wiring to SG C&I. Alternatively bidder may provide JBs properly mounted on rack and local to the compressor for terminating field & local signals from compressor control panel. In such case, separate JBs shall be provided for terminating analogue & binary signals.

15.0.3 Signals from mill reject bunker, air receivers, service water & instrument air line shall be directly connected to SG C&I.

SUB-SECTION - III-A4

MILL REJECT HANDLING SYSTEM

MILL REJECT HANDLING SYSTEM

1.00.00 To handle the Mill Rejects on a continuous basis, the Bidder shall provide a Mill Reject Handling System. The Mill Reject Handling System shall comprise of a pneumatic conveying system. The Rejects shall be stored in storage silo. From the storage silo the Mill Rejects shall be disposed off in trucks.

1.01.00 The scope of supply for mill reject handling system shall include but not limited to the following:

(a.) One (1) no. pyrite hopper *with* discharge chute, emergency chute work etc. for each mill as required.

(b.) One (1) no. pneumatically operated isolation gate for inlet and one (1) no. manual isolation gate at outlet of each pyrite hoppers complete with compressed air pipe work, solenoid valves & supporting arrangement for each pyrite hopper.

(c.) Conveying pipe work from individual mill reject handling equipment to the reject storage silos with all accessories such as bends, fixtures, flange joints, structural steel supports, anchors/inserts trestles, walkways etc. as required.

(d.) Mill reject storage silos, one (1) no. for each unit in steel construction each having an effective storage capacity of sixteen (16) hrs. considering all the working mills of the unit in operation and rejecting @ of 1% of mill capacity for the worst coal conditions. Necessary supporting steel structure, platforms, staircase, manual operated unloading gate, 3 mm thick SS plate liners covering straight length portion and conical portion of mill reject storage hoppers (bunkers), level switches, air relief devices, etc. shall also be provided.

The storage silos shall be designed to provide a clear access of 4.5 m for a Road Tanker/Trucks to come under the silo & receive the rejects using suitable chute work.

(e.) Suitable spray quenching system, to cool the mill reject in pyrite hoppers.

(f.) Two (2) nos. air receivers of adequate capacity for each unit with all accessories, Interconnecting piping, support etc.

(g.) Two nos. (1 no. operation + 1 no. stand by) air compressors for 2 x 800 MW project /Three (3) nos. (2 nos. operating + I no. standby) for 3 x 800 MW project (with drives and accessories) to cater the compressed air requirements of mill reject handling system for all units working simultaneously. Compressors shall be located in the main compressor house.

(h.) Necessary lifting devices of adequate capacity to handle the mill reject handling equipment.

(i.) Complete control & instrumentation as specified in C&I section.

(j) Necessary electrical equipment as specified.

(k) Civil structural works associated with mill reject handling system including foundation bolts, pockets, grouting and underpinning etc.

SUB-SECTION–II:M4

MILL REJECT HANDLING SYSTEM

MILL REJECT HANDLING SYSTEM

1.00.00 **MILL REJECT HANDLING SYSTEM**

Dense phase pneumatic conveying system shall to be employed for handling of the mill rejects. Each mill reject discharge hopper shall be fitted with a positive pressure pneumatic conveying vessel which shall discharge the mill rejects through pipe lines in storage 'SILO'. Each unit shall be provided with an independent 'SILO' having a collection capacity of 16 hours. The transmitting vessel shall operate on level probe mode with timer back-up.

100% standby capacity compressor shall be provided by the bidder. The capacity of the compressors shall be selected considering all the working mills of all units operating simultaneously for the worst coal condition.

2.00.00 **MILL REJECT HANDLING SYSTEM OF PNEUMATIC TYPE MEETING THE FOLLOWING REQUIRMENT SHALL BE PROVIDED.**

Sl.No.	System Parameter	Pneumatic Handling System
1.	Duty	Continuous
2.	Number of mill reject storage bins and capacity	(a) One (1) no. for each unit (b) 16 hours storage capacity considering all the working mills of the unit for worst coal condition
3.	Number of mills working per boiler	As specified by Boiler/ Mill manufacturer
4.	Design value of 1% of the mill capacity for the worst coal rejects	condition.
5.	Maximum temp. of rejects	As specified by boiler/ mill manufacturer.
6.	Maximum size of mill reject to be handled	(-) 40 mm *
7.	Bulk density of mill rejects for volumetric computation	1600 kg/m^3
8.	Bulk density of mill rejects for LOADS/ STRENGTH Computation	2400 kg/m^3
9.	Inlet/outlet** valves of mill reject discharge hopper	Pneumatically operated knife edge gate valve.
10.	Inlet valve of the vessel	Plate valve/dome valve/butterfly valve/cone valve.
11.	Sizing grid	40 mm x 40 mm

12.	Emergency ** discharge chute with manually operated knife edge gate valves	Yes
13.	Piping	MS IS:3589
14.	Bends/Fittings Laterals	Alloy Cl to hardness 400 BHN

* In case the bidder expects higher size from pyrite hopper outlet then suitable capacity crusher shall be provided to bring down the size of reject to (-) 40 mm for pneumatic type system offered, which shall be base offer.

** The wearing parts of all the valves shall be provided with abrasion resistant material of hardness of 350-400 BHN.

ANNEXURE – I

DATASHEET – A