COMPRENSIVE RESPONSE SHEET			
Project ID & Description		**Flue Gas Desulphurization for NTPC Korba**	
Equipment Name & System Details		**Wet Ball Mill & Limestone Slurry Preparation System**	
Name of Document		**Sizing & General Arrangement of Mill circuit Tank**	
NTPC Doc No		**2100-109-PVM-B-204**	Rev No : 0
BHEL Doc No		**2100-109-PVM-B-204**	Rev No : 0
Sl .No.	**NTPC Comments dated 02.08.2022**	**BHEL Reply dated 29.08.2022**	
1	should'nt it be the gap between low-low and high high level	As per the tkII standard practice, retention time is calculated as per the effective height between pump suction nozzle to Overflow nozzle. Based on the tkII standard and practice for close loop operation, retention time for operating volume of 5 minutes is sufficient.	
2	Plot plan to be added to indicate the location and the orientation	Plot plan added.	
3	Handling arrangement details for the agitator to be proivded.	Handling of agitator is thru EOT crane.	
4	height from the bottom appears to be on the higher side. Can be optimized.	As per design & layout requirement, height is decided.	
5	earthing boss	Considered.	
6	spare connection on the roof?	Spare Nozzle indicated.	
7	Wear life not less than 8000 hrs	Noted & indicated.	
8	gap between high-high level and overflow nozzle bottom	20mm gap is maintained between high-high level and overflow nozzle bottom.	
9	holds to be removed.	Next revision it is ensured.	
10	Overflow to be connected to the nearest drain	Overflow is connected to nearest drain and it is part of piping arrangement drawing.	

Signature Not Verified

Digitally signed by ARUP GHOSHAL
Date: 2022.09.20 13:37:11 IST
Reason: CAT II
Location: NTPCEOC

01	07.09.2022	Revised in-line customer comments	UDAY	PVS	AMAN
00	15.07.2022	First Submission	UDAY	PVS	AMAN
REV	DATE	DESCRIPTION / NOTE	PRD	CHD	APD

REVISIONS

DRAWING TITLE: Sizing & General Arrangement of Mill circuit Tank

OWNER/PROJECT: KORBA SUPER THERMAL POWER PROJECT(KSTPP) KORBA I,II & III (3X200 MW + 3X500 MW + 1X500 MW) – FGD SYSTEM PACKAGE

EPC CONTRACTOR:
BHARAT HEAVY ELECTRICALS LTD.

	NAME	DATE	
PREPARED BY	UDAY	15.07.2022	**STATUS :** ***FOR APPROVAL***
CHECKED BY	PVS	15.07.2022	**VENDOR DRAWING No.:**
APPROVED BY	AMAN	15.07.2022	**REV NO :** 01

NTPC DRG./DOC NO. : 2100-109-PVM-B-204

Mill Circuit Tank Sizing and Selection:

The Mill tank is sized and selected to hold as well as to dilute the circulating slurry of the mill circuit for desired operation of the Ball mill for limestone grinding.

Now, from the mass balance of the mill circuit, the overall circulating liquid flow rate through the mill circuit tank is 291 m^3/hr. (4.85 m^3/min). Refer drawing no. 2100-109-PVM-B-004.

Selected tank diameter & height considering the plant layout: Dia. 3.7m x Height 3.2m
For this tank, overall volume = π x 3.7 x 3.7 x 3.2 / 4 = 34.4 m3

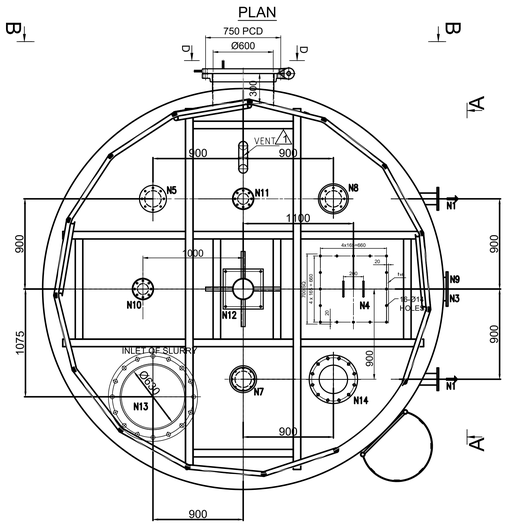
The height between Pump suction nozzles to overflow nozzle is 2.3m as per the tank GA drawing.

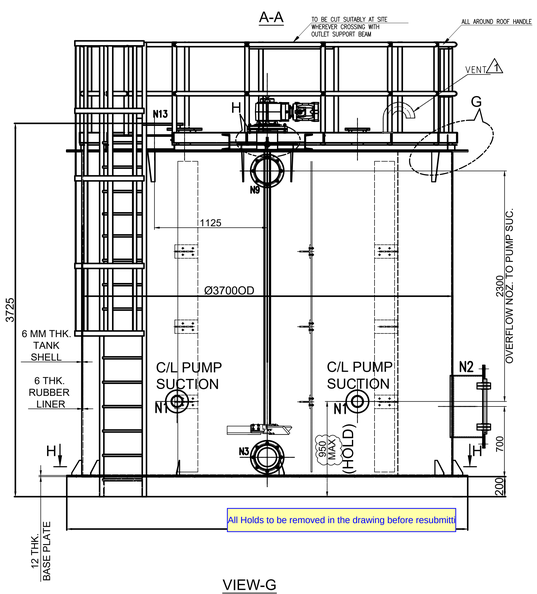
Accordingly, the effective capacity of mill circuit tank = π x 3.7 x 3.7 x 2.3 / 4 = 24.7 m^3.
The retention time = 24.7 m^3/ 4.85 m^3/min = ~5 minutes.

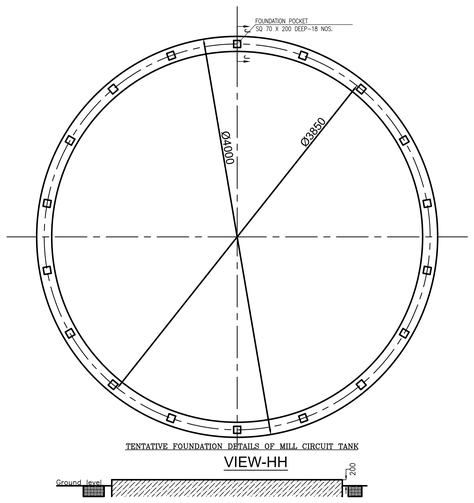
Based on the tkIl standards for close loop operation, this time is sufficient for Wet ball mill circuit.

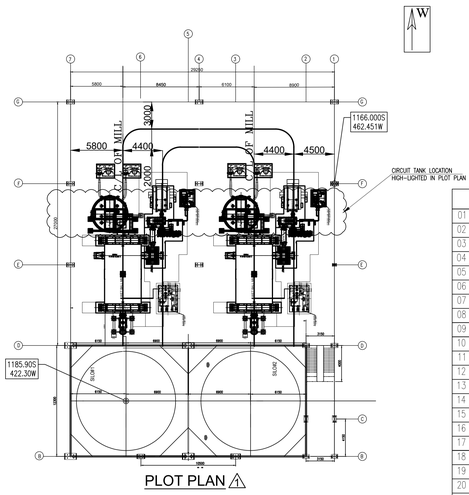
Hence, the selected tank size is sufficient.

DRAWING NO. X-XX-XXX-XX-XXXXX









DESIGN DATA		
01	DESIGN CODE	IS: 803
02	TAG NO.	00HTK00BB001 & 00HTK00BB002
03	QUANTITY	2 NOS.
04	ORIENTATION	VERTICAL
05	DESIGN PRESSURE	ATMOSPHERIC + STATIC (~3300 MM)
06	DESIGN TEMPERATURE	70°
07	OPERATING PRESSURE	ATMOSPHERIC
08	OPERATING TEMPERATURE	61°
09	HYDRO TEST PRESSURE	FULL OF WATER
10	FLUID TYPE	LIME STONE SLURRY
11	FLUID DENSITY	1450 Kg./M^3
12	CORROSION ALLOWANCE	1.5 MM
13	POST WELD HEAT TREATMENT	NA
14	JOINT EFFICIENCY	0.7
15	RADIOGRAPHIC REQUIREMENT	NIL
16	EFFECTIVE CAPACITY	22° CU.M
17	TOTAL CAPACITY	32° CU.M
18	WIND DESIGN CODE	IS: 875
19	SEISMIC DESIGN CODE	IS: 1893
20	WEIGHT	
A	EMPTY JNC. AGITATOR & LINER	5000 KGS.(TENTATIVE)
B	OPERATING (UPTO HHL)	30000 KGS(TENTATIVE)

MATERIAL OF CONSTRUCTION		
01	SHELL /HEADS/R.F. PADS	IS: 2062 E250 GR. BR
02	NOZZLE FROM PLATE	IS: 2062 E250 GR. BR
03	NOZZLE FROM PIPE	ERW IS:1978
04	NOZZLE FLANGE/BLIND FLANGE	IS:2062
05	MANHOLE FLANGE	IS: 2062 E250 GR. BR
06	FITTINGS	A 234 Gr.WPB/ASTM A105/IS: 1239 (UPTO 150 NB)
07	GASKET	SPIRAL WOUNDED METALLIC GASKET WITH GRAPHITE FILLER
08	EARTHING LUG	A240-304
09	STUDS BOLT/NUTS	A 193 Gr.B7/A 194 Gr.2h
10	NAME PLATE	ANSI-316
11	FOUNDATION BOLT	CAST STEEL GR. 8.8
12	LADDER	IS:2062
13	HAND RAIL	ERW PIPE, IS:1239

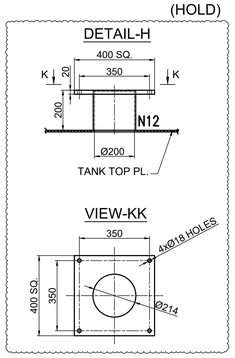
⚠1 NOZZLE DATA

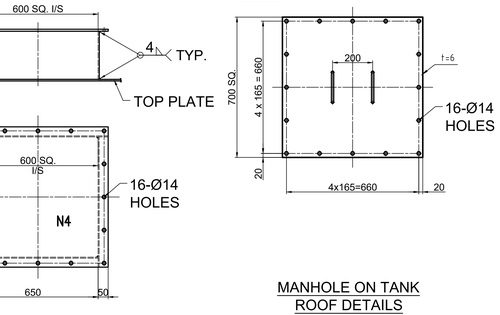
POSITION	DIMENSION	FLANGE TYPE	STD. FOR DIMENSION	R-PAD	QTY	LOCATION
N1	DN200	SORF TYPE	ASMEB16.5, 150#	Ø356 mm	2	PUMP SUCTION (AT SHELL)
N2	Ø600	FF	IS:803/API 650	Ø900mm	1	MAN HOLE (AT SHELL)
N3	DN150	SORF TYPE	ASMEB16.5, 150#	Ø305 mm	1	DRAIN PIPE (AT SHELL)
N4	600 x 600	FF	---	900X900	1	MAN HOLE (ON ROOF)
N5	DN150	SORF TYPE	ASMEB16.5, 150#	Ø305 mm	1	MILL CIRCUIT TANK LEVEL TRANSMITTER-A (ON ROOF)
N6	DN50	SORF TYPE	ASMEB16.5, 150#	Ø102 mm	1	DRAIN PIPE/FLUSH COVER WITH BLIND FLANGE (AT SHELL)
N7	DN150	SORF TYPE	ASMEB16.5, 150#	Ø305 mm	1	MILL CIRCUIT TANK LEVEL TRANSMITTER -B (ON ROOF)
N8	DN150	SORF TYPE	ASMEB16.5, 150#	Ø305 mm	1	DILUTION WATER (ON ROOF)
N9	DN200	SORF TYPE	ASMEB16.5, 150#	Ø356 mm	1	OVER FLOW (AT SHELL)
N10	DN100	SORF TYPE	ASMEB16.5, 150#	Ø203 mm	1	SPARE NOZZLE (ON ROOF)
N11	DN100	SORF TYPE	ASMEB16.5, 150#	Ø203 mm	1	SLURRY NOZZLE FOR LINE AREA SUMP (ON ROOF)
N12	450x450 mm	-	---	-	1	CUTOUT FOR AGITATOR (ON ROOF)
N13	Ø630	-	---	-	1	INLET SLURRY NOZZLE (ON ROOF)
N14	DN250	SORF TYPE	ASMEB16.5, 150#	Ø407 mm	1	HY.CYCLONE TO TANK SLURRY NOZZLE (ON ROOF)

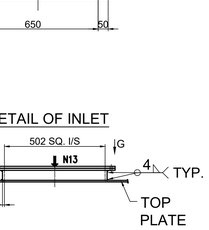
NOTES:
1. ALL DIMENSION ARE IN MM.
2. ALL INTERNAL SURFACES OF LIME SLURRY TANK IS LINED WITH 6MM THK. REPLACEABLE CHLOROBUTYL /BROMOBUTYL RUBBER.
3. ALL FLANGES FACES ARE LINED WITH 6MM THK CHLOROBUTYL /BROMOBUTYL RUBBER.
4. Painting–

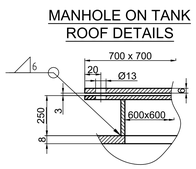
Surface preparation at shop	Primer at shop	Intermediate	Final	Total DFT (In micrometer)	Paint shade
SA 2 1/2	Epoxy resin based zinc phosphate primer nominal 100 micron @ shop	Epoxy resin based paint pigmented with titanium dioxide or m10 > 100 micron @ shop	Polyamide cured colour pigmented epoxy based paint 75 micron and polyurethane based colour pigmented paint DFT–25 micron(min)	300	RAL–9002, Gray for external body

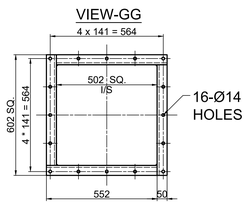
5. F.F.L. IN THIS AREA CORRESPONDS TO IS EL(+)7.5 M WHICH IS RL. 159.5M.
6. THE SHOWN ARRANGEMENT AS PER DRAWING ARE SAME FOR TANK–A & TANK–B.
⚠1 7. WEAR LIFE IS NOT LESS THAN 8000 HOURS.

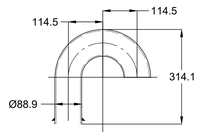


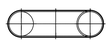




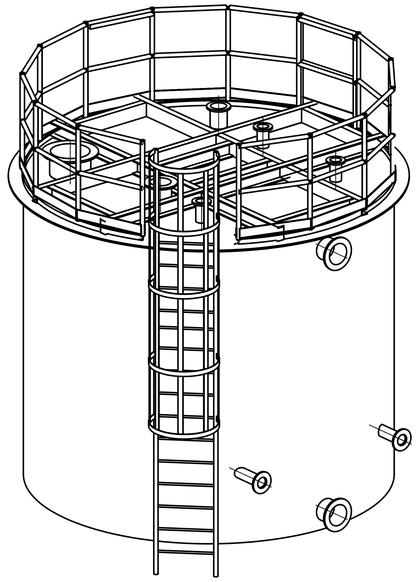




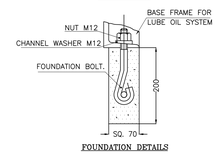




⚠ VENT PIPE



ISOMETRIC VIEW



FOUNDATION DETAILS

REV.	DATE	DESCRIPTION	DSGN	PPD	CHD	APPD
01	02.09.2022	REVISED AS PER NTPC COMMENTS	UDAY	PVS	AMAN	KHRK
00	06.07.2022	ISSUED FOR APPROVAL	UDAY	PVS	AMAN	KHRK

NTPC DRG NO: 2100-109-PVM-B-204

OWNER/ PROJECT:
KORBA SUPER THERMAL POWER PROJECT(KSTPP)
KORBA I,II & III (3X200 MW + 3X500 MW + 1X500 MW) – FGD SYSTEM PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED, UNIT: HEAVY POWER EQUIPMENT PLANT RAMACHANDRAPURAM, HYDERABAD-500032

DEPT CODE		NAME	SIGN	DATE
M	DRN	UDAY		06.07.2022
	CHD	PVS		06.07.2022
	APPD	AMAN		06.07.2022

TITLE:
GENERAL ARRANGEMENT OF MILL CIRCUIT TANK

DRAWING NO. 2100-109-PVM-B-204
SCALE : NTS
SHEET 1 OF 1
REV 01

Size A0

ANNEXURE-2

Project Name : ……..ENQ/ NIT No: _____(Vendor to fill & submit along with offer)

LIST OF DEVIATIONS/ EXCEPTIONS (IF ANY, vendor to fill and submit along with offer)

Sl No	Clause No	Page No	Description of Deviation

Note: Enlarge the table to incorporate items

SIGNATURE OF BIDDER ----------

NAME ----------

DESIGNATION ----------

Analysis of limestone, water & instrument air

Lime-Stone:

Absorbent

Absorbent Name	LIMESTONE
Grain Size	Medium
Bond Index	13kWh/short-ton

Type of Absorbent	☑ Rock ☐ Powder ☐ Slurry ☐ Others :

Feed Condition to Absorber	☐ Powder ☑ Slurry 30 wt% ☐ Others :

Absorbent Composition			Limestone			Note
			Design	Normal	Guarantee	
$CaCO_3$		wt%-d	79 (*1)	-	89 (*1)	
Dolomite($MgCa(CO_3)_2$)		wt%-d	0	-	0	
	CaO	wt%-d	47-51.0 (*1)	-	-	
	MgO	wt%-d	0.9-2.0	-	-	
Inert	Cl_2	wt%-d	<0.015	-	-	
	Al_2O_3	wt%-d	1.19-2.1	-	-	
	Si_2O_3	wt%-d	2.1-4.5	-	-	
	Fe_2O_3	wt%-d	0.45-1.0	-	-	
	TiO_2	wt%-d	<0.02	-	-	
	Na_2O	wt%-d	<0.16	-	-	
	K_2O	wt%-d	<0.01	-	-	
	P_2O_5	wt%-d	Traces	-	-	
	LOI	wt%-d	39.0-41.3	-	-	
	Total Sulphur	wt%-d	<0.1	-	-	
	Mn_2O_3	wt%-d	<0.12	-	-	
Density		kg/m^3	1400			For volume
		kg/m^3	1700			For torque, drive calculation and structual load calculation

N/D : Not detectable

(*1) Design condition limestone purity $CaCO_3$ 79%; Guarantee condition limestone purity $CaCO_3$ 89%

Process Water:

			CW Blow down water (*1)		
			Normal (Stg-I)	Normal (Stg-II)	Maximum
Temperature at B.L.		deg.C	27	27	45
Pressure at B.L.		MPaG	-	-	-
pH		-	6.5-6.9	6.5-6.9	-
S.S.		mg/l	-	-	-
Composition					
	Ca^{2+}	ppm CO_3Ca	237	316	-
	Mg^{2+}	ppm CO_3Ca	219	292	-
	Na^{+}	ppm CO_3Ca	195	260	-
	K^{+}	ppm CO_3Ca	18	24	-
	Oil and Grease	mg/l	-	-	-
	N_2H_4	mg/l	-	-	-
	HCO_3^{-}	ppm CO_3Ca	-	-	-
	CO_3^{2-}	ppm CO_3Ca	-	-	-
	Cl^{-}	ppm CO_3Ca	189	252	-
	SO_4^{2-}	ppm CO_3Ca	120	160	-
	Silica	mg/l	45	60	-
	To-NH_4	mg/l	-	-	-
	Fe^{2+}	mg/l	0.36	0.48	-
	Cd	mg/l	-	-	-
	NO_3^{-}	ppm CO_3Ca	6.6	8.8	-
	B	mg/l	-	-	-
	To-Inorganic	mg/l	-	-	-
	Cu	microg/l	-	-	-
	Hg	microg/l	-	-	-
	Pb	microg/l	-	-	-
	NO_2^{-}	microg/l	-	-	-
	F^{-}	microg/l	-	-	-
	Cr^{6+}	microg/l	-	-	-
	Ni	microg/l	-	-	-
	To-Zn	microg/l	-	-	-
BOD5		mg/l	-	-	-
COD	Cr	mg/l	-	-	-
Total alkalinity		ppm CO_3Ca	120	120	-
Total Hardness		ppm CO_3Ca	-	-	-
Turbidity		NTU	4.5	6	-
Conductivity		micro m/m	-	-	-

(*1)CW blow down water Analysis is taken from tender documents Amendment No:CS-0011-109(3)-9-AMDT-TECH-01 & Annexure

Cooling Water

Cooling Water

Water Source		DM Water					
		Available Value			Design Value		
		Minimum	Normal	Maximum	Minimum	Normal	Maximum
Supply Temp. at TP	deg.C	-	-	-	-	38	-
Return Temp. at TP	deg.C	-	-	-	-	45	-
ΔT	deg.C	-	-	-	-	10	-
Supply Press. at TP	MPaG	-	-	-	-	0.6(*1)	-
Return Press. at TP	MPaG	-	-	-		0.3(*1)	-

(*1) Assumed value

Instrument Air:

Air Source		-
Dew Point (atmospheric)	deg.C	≦-40
Oil Mist Contamination		☐ Contaminated ☑ Not Contaminated

		Available Value			Design Value		
		Minimum	Normal	Maximum	Minimum	Normal	Maximum
Temperature at TP	deg.C	-	-	-	-	**45(*1)**	-
Pressure at TP	MPaG	-	-	-	**0.55**	-	**0.8**

(*1) In summer

Service Air

Air Source	-

		Available Value			Design Value		
		Minimum	Normal	Maximum	Minimum	Normal	Maximum
Temperature at TP	deg.C	-	-	-	-	45(*1)	-
Pressure at TP	MPaG	-	-	-	0.55	-	0.8

(*1) In summer

	~~furnish the minimum ball diameter below which the balls shall be replaced.~~
~~6.05.06~~	~~Facility shall be provided for on-load loading of steel balls to the mill.~~
~~6.05.07~~	~~The ball mill shall be driven by a motor through a peripheral gear/ central drive system. An auxiliary motor shall also be provided for inching of mills after trip and during maintenance.~~
~~6.05.08~~	~~The lube oil system shall have 100% stand by arrangement for lube oil pumps and oil coolers of each circuit with independent~~ pump / cooler. Wherever required duplex oil filters shall be provided.
6.05.09	The mill auxiliaries like separator tanks, ~~mill circuit pump, hydro cyclones and all connecting pipes handling~~ limestone slurry shall have replaceable rubber linings.
6.06.00	**Limestone Slurry Preparation / Storage Tank**
6.06.01	~~The contractor shall provide two (2 nos.) slurry storage tank, common for all mills. Each tank shall be sized to meet 12 hours continuous limestone requirement of all the units operating at Design point. For tank volume calculation, solid concentration (by weight) in the slurry shall be assumed, not more than 20% or actual required whichever is lower.~~
6.06.02	The storage tanks shall be equipped with sufficient number of agitators, to avoid settling of limestone, as per the proven practice of the supplier. ~~The agitators shall be designed to meet the requirements stipulated in Cl. No. 11.00.00 of this Sub-Section.~~
6.06.03	The limestone mill circulation tanks shall be installed indoor beneath the hydro cyclone stations. The slurry storage tank shall be located outdoor.
6.06.04	The slurry preparation tank shall be CS construction with replaceable chlorobutyl/bromobutyl rubber lining of minimum 5 mm thickness.
~~**6.07.00**~~	~~**Limestone Slurry Supply Pumps & Piping**~~
~~6.07.01~~	~~2x100% centrifugal type limestone slurry pump shall be provided for each unit. Each limestone slurry pump shall be sized to supply the limestone requirement of one (1 no.) unit, under the following conditions all occurring together.~~

~~(i)~~	~~Load~~	~~Design point~~
~~(ii)~~	~~Flow~~	~~110% of one absorber requirement with the limestone requirement at Design point~~.

	(iii)	Head	As per system requirement.
	(iv)	Margins	Flow 10% (minimum) Heads 15% (minimum)
	(v)	Solids Concentration	Max. 30% by weight or actual as per suppliers practice, whichever is minimum.

6.07.02 The limestone slurry pumps shall be designed to meet the requirements stipulated in Cl. No.8.00.00. of this Sub-Section.

6.07.03 The limestone slurry pipes shall be sized to minimize erosion and avoid settling of the limestone at part load operation. The slurry pipes shall be lined with replaceable wear resistant natural rubber lining of minimum 6 mm thickness. Additional thickness of 2 mm in rubber lining shall be provided at bends.

6.07.04 Automatic flushing equipment for all lime slurry pumps and pipes shall be supplied.

7.00.00 GYPSUM DEWATERING SYSTEM

7.01.00 A common gypsum dewatering system for all the units operating at Design point is envisaged. Contractor shall supply a two stage gypsum dewatering system, consisting of a primary stage of sets of hydro-cyclones and secondary stage of vacuum belt filters for dewatering of gypsum from absorber up to less than 10% moisture. All the equipments supplied shall be proven design with previous installations for similar capacities.

7.02.00 The Contractor shall provide 2x100% gypsum dewatering system with each stream sized to dewater 110% of the maximum gypsum produced by all the units operating at Design point. All other stipulations with respect to sizing and design of the dewatering system, auxiliaries and other systems shall be in line with this specification.

7.03.00 Primary Dewatering Hydro-cyclones

7.03.01 Each set of primary dewatering hydro-cyclone shall be sized to dewater the gypsum slurry produced by all the units operating at Design point with an additional 10% margin. The outlet water content in the gypsum shall be as per the requirement of the vacuum belt filters.

7.03.02 Each set of primary hydro-cyclone shall be provided with 10% spare hydro-cyclones. The capacity defined in the previous clause shall be met with spare hydro-cyclones out of service.

7.03.03 The primary hydro-cyclone shall be installed directly above the belt filters. The overflow of the hydro-cyclones shall be taken to Hydro-cyclone Waste Water tank via secondary hydro-cyclone feed tank and secondary waste water hydrocyclone as

PART – B (DETAILED TECHNICAL SPECIFICATION)

SUB-SECTION- V-Q (QUALITY ASSURANCE)

(MECHANICAL)

SUB-SECTION-V-QM1

FLUE GAS DESULPHURISATION SYSTEM

FLUE GAS DESULPHURISATION SYSTEM

1.00.0	**FLUE GAS DESULPHURISATION SYSTEM**
1.01.0	**Mills:**
1.01.01	Raw material for shaft, coupling, gears and pinions, top and bottom races and other rotating components shall be subjected to UT. MPI/LPI shall be carried out to check surface soundness.
1.01.02	Wear-resistant parts shall be UT/RT tested to check soundness after suitable heat treatment. Check for chemical composition, hardness and microstructure shall be carried out.
1.01.03	Butt welds in the tube/separator/body casing of the mill shall be tested by RT and MPI. All other welds in main tube/separator shall be tested by MPI/LPI for acceptance. The tube shall be statically balanced.
1.01.04	All gearboxes shall be run tested for adequate duration to check rise in oil temperature, noise level and vibration. Check for leak tightness of gear case also shall be performed.
1.02.0	**Feeders:**
1.02.01	Any welds in the casing/pulley fabrication shall be checked with MPI.
1.02.02	Routine tests shall be done as per relevant Indian Standards or equivalent International Standards.
1.02.03	All major items like plates for casing, head pulley, tail pulley, pulley shaft and major castings shall be procured with respective material test certificates.
1.02.04	Calibration check shall be carried out on all feeders.
1.03.0	**Dampers:**
1.03.01	All the dampers shall be subjected to operational test/checks.
1.03.02	Gas tight Dampers shall be subjected to shop leakage test to demonstrate the guaranteed tightness as per NTPC Tech Specification.
1.04.0	**PIPING, VALVE AND SPECIALITIES:**
1.04.01	All pipes and fittings shall be tested as per applicable code.
1.04.02	All valves shall be hydraulically/Air tested for body, seat and back-seat (if applicable) as per relevant standard.
1.04.03	NDT on valves shall be as per relevant standard.
1.04.04	Valves shall be offered for hydro test in unpainted conditions.
1.04.05	Functional checks of the valves for smooth opening and closing shall also be done.

1.05.00 **TANKS / VESSELS:**

1.05.01 **Atmospheric tanks:**

i) All welds joints shall be DP tested and complete tanks shall be water fill tested.
ii) All atmospheric storage tanks fabricated and erected at site shall be subjected to tests (Hydro, NDT and Vacuum) according to design code as applicable.
iii) Rubber lining shall be tested for hardness and spark test, as applicable.

1.05.02 **Pressure vessels:**

1) NDT on weld joint shall be as per respective code requirements or the minimum as specified as below:

   i) 100% DPT on root run of butt weld, nozzle welds and finished fillet welds.
   ii) 10% DPT on all finished butt welds.
   iii) 10% RT (covering all 'T'/cross joints) of butt welds.

2) Butt welds of dished ends shall be stress relieved and subjected to 100% RT.

3) Each finished vessels shall be hydraulically tested to 150% of the design pressure for a duration of 30 minutes.

1.06.00 **HEAT EXCHANGER/HEATER:**

1.06.01 All material shall be tested for chemical and mechanical properties and NDT as per relevant standard.

1.06.02 NDT on welds and other checks shall be as per relevant code.

1.06.03 Air heaters shall be subjected to dimensional and clearance checks as per standard practice

1.06.04 Lub. oil system, drive system, soot blowing system etc. of Air heaters shall be checked suitably as per standard practice

1.07.00 **PUMPS:**

1.07.01 UT on shaft forgings (greater or equal to 40mm) and MPI/DPT shall be done on shafts and impeller to ensure freedom from defects.

1.07.02 The pump casing shall be hydraulically tested at 200% of pump rated head or at 150% of shut off head, whichever is higher. The test pressure shall be maintained for at least half an hour.

1.07.03 The pump rotating parts shall be subjected to static and dynamic balancing.

1.07.04 All pumps shall be tested at shop for capacity, head efficiency and brake horse power at rated speed as per relevant/applicable standard.

1.07.05 Noise and vibration shall be measured during the performance testing at shop.

1.08.00	**STRUCTURES , DUCTS, HOPPERS:**
1.08.01	All materials shall be tested for chemical and mechanical properties as per relevant standard. All plates above 40mm shall be 100% Ultrasonically tested.
1.08.02	Visual inspection of all welds shall be performed in accordance with AWSD1.1.
1.08.03	NDT requirements of structural steel welds shall be as under: i) 100% RT/UT on butt-welds of plate thickness>= 32mm. ii) For plates of 25mm<=thickness<32mm-10% RT and 100% MPI. iii) For plates of thickness <25mm-10% MPI/LPI.
1.08.04	Edge for shop and field weld shall be examined by MPI for plate thickness >= 32mm.
1.09.00	**VACUUM BELT FILTER SYSTEM:**
1.09.01	Impeller, casing and shaft of vacuum pumps shall be tested for chemical and mechanical properties as per relevant standard. All plates above 40mm shall be 100% Ultrasonically tested.
1.09.02	UT on shaft (if greater or equal to 40mm) and impeller shall be carried out.
1.09.03	All vacuum pumps shall be tested at shop for capacity, power, pressure, efficiency, noise and vibration etc.
1.09.04	Filter cloths and belts shall be tested for physical properties as per relevant standard
1.09.05	Hydro cyclones shall be checked by visual, dimensional etc.
1.10.00	**SPRAY NOZZLES:**
1.10.01	Spray nozzles shall be tested for physical properties
1.10.02	Spray nozzles also shall be subjected to performance test.
1.11.00	**AGITATORS:**
1.11.01	Rubber lining shall be tested for hardness and spark test
1.11.02	Impellers shall be tested for dimensional and balancing check
1.11.03	Gear Boxes shall be tested for run test as per standard practice
1.12.00	**FANS:**
1.12.01	Rotor components shall be subjected to ultrasonic test at mill and magnetic particle inspection / liquid penetrant examination after rough machining.
1.12.02	Butt welds in rotor components shall be subjected to 100% RT and all welds shall be magnetic particle/dye penetrant tested after stress relieving.

1.12.03 All rotating components and assemblies of fan shall be balanced dynamically

1.12.04 Performance test shall be carried out on fans as per Technical specification/ Relevant standard

1.12.05 Test for Natural Frequency and hardness of Fans blades shall be carried out as per Technical specification/ Relevant standard

1.13.00 Thermal Insulation, Lagging & Cladding:

(a) **Lightly resin bonded mineral wool:**

LRB mattresses/sections of Rockwool/ Glasswool shall conform to & tested as per relevant clauses of Indian Standards and shall meet the requirements of NTPC data sheet. Type tests except Thermal Conductivity shall be regularly carried out once in three months, Thermal Conductivity Type Test shall be carried out minimum once in twelve months by the manufacturer. Requirements of various components like Binding wires, Lacing wires, Wire mesh, etc. shall be as per NTPC approved data sheet / as given in respective Sub-Section of Technical Requirements of Steam Generator & Auxiliaries.

(b) **Lagging & Cladding:**

All insulation shall be protected by means of an outer covering of Aluminium sheeting confirming to ASTM B-209-1060 temper H14 from reputed manufacturer meeting the requirements of NTPC data sheet.

1.14.00 OTHER CRITICAL EQUIPMENTS:

1.14.01 Checks/ NDTs shall be done as per relevant Indian Standards or equivalent International Standards.

TYPICAL QUALITY PLAN

MANUFACTURING QUALITY PLAN

ITEM : WET LIMESOTNE GRINDING MILL

SUB ITEM : MILL SLURRY STORAGE TANK

Sl.No.	Component/Operation	Characteristics	Cl	Type of Check	Quantum of Check		Reference Doc.	Acceptance Norm	Format of Record		Agency**			Remarks
					M	C / N					M	C	N	
1	2	3	4	5	6		7	8	9	D°	10			
1	Raw Materials													
1.1	Plates	Chemical, Mech. Properties, Dimension & Visual	MA	MTC Review /Visual	100%	100%	Approved Drawings	Approved Drawing & Material Specification	MTC/ Lab TC	√	P	V	V	
		Soundness of plate (Only for Thk >40 mm)	MA	UT	100%	100%	Approved Drawings	ASTM-A 435	MTC/Lab TC / UT Reports	√	P	V	V	Check Test shall be carried out only if correlated MTC is not avilable
1.2	Rolled Section	Chemical, Mech. Properties, Dimension & Visual	MA	MTC Review /Visual	100%	100%	Approved Drawings	Approved Drawing & Material Specification	MTC/ Lab TC	√	P	V	-	
1.3	Pipe	Chemical, Mech. Properties, Dimension & Visual	MA	MTC Review /Visual	100%	100%	Approved Drawings	Approved Drawing & Material Specification	MTC/ Lab TC	√	P	V	---	
2.0	In process control													
2.1	Welding Procedure Qualification	Procdure Qualification (Welding Strength)	MA	Document Review	100%	100%	ASME Sec .IX	ASME Sec .IX	WPS , PQR Record	√	P	V	V	
2.2	Welding Personnel Qualification	Personnel Qualification (WPQ)	MA	Document Review	100%	100%	ASME Sec .IX	ASME Sec .IX	WPQ Record	√	P	V	---	
2.3	Marking & Cutting	Dimension & Visual	MA	Measurement & Visual	100%	-	Approved Drawings	ApprovedDrawing & Loesche Approved Tolerance Sheet	-	-	P	-	-	
2.4	Fit-up inspection	Dimension & Visual	MA	Measurement & Visual	100%	-	Approved Drawings	ApprovedDrawing & Loesche Approved Tolerance Sheet	-	-	P	-	-	

LEGENDS : CL : Class (MA : Major, MI : Minor)

** M : Manufacturer / Sub-contractor,
C : BHEL / Nominated Inspection agency. N : Customer
CHP: NTPC shall identify in column "N" as "W"
P : Perform, W : Witness, V : Verification, ND : NDT Lab.
R : Test/Dimensional Reports
* Records, Identified with Tick (√) shall be essentially Included in QA Documentation

SIGNATURE	REVIEWED BY	APPROVED BY	APPROVAL SEAL

MANUFACTURING QUALITY PLAN

ITEM : WET LIMESOTNE GRINDING MILL

SUB ITEM : MILL SLURRY STORAGE TANK

Sl.No.	Component/Operation	Characteristics	Cl	Type of Check	Quantum of Check		Reference Doc.	Acceptance Norm	Format of Record		Agency**			Remarks
					M	C / N					M	C	N	
		3	4	5	6		7	8	9	D°	10			
3.0	NDE	soundness check of all longitudinal and circumferential butt weld	MA	RT & Visual	100% 10%	10%	Approved Drawing / ASME SEC.V	ASME Sec.VIII . Div-1	RT Report	√	P	V	V	RT film review by NTPC/BHEL
		Soundness check of all butt weld	MA	DPT & Visual	100%	10%	ASME SEC.V	ASME Sec.VIII . Div-1	DPT Report	√	P	V	V	
4.0	Final Inspection													
4.1	Final Inspection of Individual Part	Dimension, Alignment , Orentation , template check & Visual	MA	Visual and measurement	100%	10%	Approved Drawing	Approved Drawing & Approved Tolerance Sheet	Report	√	P	W	W	
4.2	Haet Treatment (As applicable)	Thermo couple location & Calibration Record	MA	Time - Temoerature graph varification	100%	100%	Approved Drawing	Approved Drawing & Heat treatment procedure	Graph	√	P	V	V	
4.3	Water fill test of Tanks (As Applicable)	Absence of leakage	MA	Visual check	100%	100%	Approved Drawing / Procedure	Approved Drawing / Procedure	Report	√	P	W	W	If tanks are supplied in partial condition for site assembly water fill test is not applicable at vendor shop.
4.5	Surface Preparation	Surface Profile	MA	Visual and measurement	100%	100%	NTPC Approved Painting Procedure		Report	√	P	V	---	Random area.
4.6	Rubber Lining, If applicable	Shore Hardness	MA	Visual and measurement	100%		Data sheet / Manufacturer Standard		Report	√	P	W	W	
		Spark Test	MA	Visual and measurement	100%	100%	Data sheet / Manufacturer Standard		Report	√	P	W	W	10% For NTPC.
4.7	Painting	Colour shade, Dry film Thickness & Adhesion	MI	Visual and measurement	100%	100%	NTPC Approved Painting Procedure		Paint Report	√	P	V	---	
5.0	Release for Dispatch													
5.1	Packing / Shipping	Packing condition	MI	Visual / sturdiness	100%	100%	Approved Packing Procedure	Approved Packing Procedure	Packing list , packing photo	√	P	V	---	
5.2	Final Document Dossier	Review of record	MI	Document Review	100%	100%	As per QCP Stages		Final Dossier	√	P	V	---	COC shall be submitted for Items not covered in MQP

LEGENDS : CL : Class (MA : Major, MI : Minor)

** M : Manufacturer / Sub-contractor,
C : BHEL / Nominated Inspection agency. N : Customer
CHP: NTPC shall identify in column "N" as "W"
P : Perform, W : Witness, V : Verification, ND : NDT Lab.
R : Test/Dimensional Reports

* Records, Identified with Tick (√) shall be essentially Included in QA Documentation

Drawings / Data sheet identified in MDL are NTPC approved, documents not in MDL are OEM approved.

SIGNATURE	REVIEWED BY	APPROVED BY	APPROVAL SEAL

Annexure-5

LIST OF MAKES OF SUB-VENDOR ITEMS
MISCELLANEOUS TANKS

SUB-VENDORS - MISCELLANEOUS TANKS				
S.NO	**ITEM**	**SUB-VENDORS**	**PLACE**	**TECHNICAL LIMIT**
1	**CS PIPES ERW**	TISCO	JAMSHEDPUR	UP TO 350 NB
		SAIL	ROURKELA	
		SURYA ROSHNI	BAHADURGARH	UP TO 400 NB
		JINDAL	GHAZIABAD	UP TO 350 NB
		RATNAMANI	KUTCH	UP TO 400 NB
		MAHARASHTRA SEAMLESS	RAIGARH	UP TO 500 NB
		WELSPUN	ANJAR	UP TO 400 NB (IS 3589)
2	**CS PIPES SEAMLESS**	MAHARASHTRA SEAMLESS	RAIGARH	UP TO 350 NB
		ISMT	AHMEDNAGAR	UP TO 150 NB
		JINDAL SAW	NASHIK	
		REMI METAL GUJRAT LTD	BHARUCH	UP TO 150 NB HOT FINISH & UPTO 100NB COLD FINISH
		ISMT	BARAMATI	UP TO 200 NB
3	**STRUCTURAL STEEL / MS-PLATE**	SAIL		
		ESSAR STEEL		
		TISCO		
		RINL		
		JINDAL		
		M/S UTTAM VALUE STEEL (LLOYDS)		
		ISPAT		
		JSW		
		INDIAN IRON & STEEL CO. LTD		
4	**GATE, GLOBE AND CHECK (CS STEEL VALVES)**	A.V. VALVES LTD	AGRA	
		MICON VALVES(INDIA) PVT LTD	MUMBAI	**GATE VALVES:** Up to 50NB – Class-800 with MOC as FCS. Class 150 with MOC as CSS. Size 65 NB to 600 NB- Class up to 600 with MOC as CCS/CSS. **NR VALVES:** Up to 50NB – Class-800 with MOC as FCS. Class 150 with MOC as CSS. Size 65 NB to 700 NB- Class up to 600 with MOC as CCS/CSS. **GLOBE VALVES:** Up to 50NB – Class-800 with MOC as FCS. Class 150 with MOC as CSS. Size 65 NB to 80 NB- Class 150 with MOC as CCS.
		ATAM VALVES PVT. LTD.	JALANDHAR	
		FLUIDLINE VALVES COMPANY PVT.LTD.	GHAZIABAD	
		M/S GM ENGINEERING	RAJKOT	

		INTERVALVE (INDIA) LTD.	PUNE	A) STEEL GATE VALVES: UPTO 50NB, #800 AND 65NB TO 150NB, #150 B) STEEL GLOBE VALVES: UPTO 50NB, #800 AND 65NB TO 100NB, #150 C)SUPPLIER NOT REGISTERED FOR NR VALVES
		LEADER VALVES LTD.	JALANDHAR	
		NITON VALVE INDUSTRIES PVT LTD	MUMBAI	
		NSSL LIMITED.	NAGPUR	
		STEEL STRONG VALVES (I) PVT.LTD.,	MUMBAI	LIMIT AS PER VD FILE AS ATTACHED IN SHEET 2
		VENUS PUMPS AND ENGG. WORKS	KOLKATA	CC/CSS-GATE-BBT-UPTO600NB CL UPTO300,GATE-PSBT UPTO250NB CL 1500,GLV-BBT-UPTO300NB CL UPTO600,SCNRV-BBT-UPTO600NB CL UPTO150,SCNRV-BBT-UPTO300NB CL 300,SCNRV-PSBT-UPTO150NB CL UPTO900
		VALTECH INDUSTRIES	MUMBAI	CAST CARBON & ALLOY STEEL - VALVE/RATING/SIZE- GV/150/900,GV/300/400, GV/600/300 , GV/GLV/NRV/900/250 , GLV/300/300,GLV/150/350/ , SCNRV/150/700, SCNRV/300/350, SCNRV/600/250.
		V.K. VALVES PVT. LTD.,	JALANDHAR	
		WEIR BDK VALVES	NEW DELHI	
		AUDCO -L&T	CHENNAI / COIMBATORE	
		OSWAL INDUSTRIES		
		HITECH	AHMEDABAD	
		KSB WATER PUMPS / VALVES	COIMBATORE	
		KBL	KONDHAPURI	
		HAWA ENGINEERS	AHMEDABAD	
		BHEL	GOINDWAL	
		FOURESS ENGG	MUMBAI	UPTO 600 NB, CL-300 & 300NB CL-600
		FOURESS ENGG	AURANGABAD	
5	**PAINT**	ASIAN PAINT		
		BERGER		
		KANSAI NEROLAC		
		JOTUN		
		SHALIMAR		
		JENSON & NICHOLSON (I) LTD		
		CDC CARBOLINE (I) LTD.		
		ADDISON PAINTS LTD		
		GRAND POLYCOAT		
		BOMBAY PAINTS		
		HEMPLE PAINTS (SINGAPORE)		
		AKZONOBEL COATINGS		
6	**FITTINGS (MS/SS)**	PIPE FIT ENGINEERS	VADODARA	
		GUJRAT INFRA PIPES	VADODARA	
		MS FITTINGS	KOLKATA	
		TUBE PRODUCT	VADODARA	
		SIDDARTH & GAUTAM	FARIDABAD	

		EBY	MUMBAI	
		NL HAZRA	KOLKATA	
		EXCEL METAL		
		INTERTECH		
		FITTECH		
		METAL LLOYDS	MUMBAI	
		TRUE FORGE	FARIDABAD	

The make of Sub-vendor items shall be generally as indicated above which is subject to customer / BHEL approval during detail engineering.

Make of any unlisted items shall be subject to customer / BHEL approval during detail engineering. For such items, bidder to furnish list of sub-vendors during detail engineering stage for Customer / BHEL's review and approval. Bidder shall furnish following supporting documentation within 1 month of placement of LOI. Thereafter no request for additional sub-vendor shall be entertained.

a) Documentation to show that the equipment /system has been supplied for a plant of similar or higher capacity.

b) Documentation in the form of certificate that the equipment/system has been operating satisfactorily for two years as on the scheduled date of bid opening.

The successful bidder will get the makes of all items approved from Customer/ Consultant during detail engineering within two months of placement of LOI. The complete list will be necessarily be submitted within one month of placement of LOI to ensure timely placement of order for BOIs

Bidder to assess the capability of their proposed sub-vendors in terms of preparation of drawings, calculations, documents, quality assurance, supply of material etc. as per project schedule before placing the order on them.

Dealers are not acceptable for any item of the package. Bidder shall procure all items including plates, structural, flanges; counter flanges etc. from approved sub vendor only.

QUALIFYING REQUIREMENTS FOR RUBBER / GLASS FLAKE LINING FOR SLURRY TANKS/SUMPS

Rubber / Glass flake Lining for the Wet Limestone based Flue Gas Desulphurisation (FGD) System offered by the bidder shall be only from such manufacturer(s) who has supplied rubber/glass flake lining application for coal based thermal power station for Wet Limestone based FGD application or similar application in other process industry. The lining shall be guaranteed for uninterrupted minimum life of 25,000 hrs. Proof of such guarantee may be established from performance certificate/Test Certificates.

Categorization for QP and Vendor Category

SL. NO	ITEM	QP Category	Vendor Category	PROPOSED SUBVENDORS BY MAIN CONTRACTOR	Remarks
1	CS/MS Seamless Fittings	III	III	BHEL APPROVED SOURCES	
2	MS Plate / MS structural steel	III	I	NTPC accepted sources directly from SAIL/Arcelor Mittal (ESSAR Steel) / TISCO /IISCO/ JSPL/JSW/ RINL/ Lloyds steel	MS-Plate Mill TC to be submitted along with COC.
3	Rubber Lining	II	III	BHEL APPROVED SOURCES	
4	Flake Glass lining	III	III	BHEL APPROVED SOURCES	
5	Paint	III	III	BHEL APPROVED SOURCES	

NOTE-

1. SYSTEM SUPPLIER / SUB-SUPPLIER STATUS CATEGORY (SHALL BE FILLED BY OWNER/BHEL).

A – For those items proposed vendor accepted to BHEL/OWNER. To be indicated with letter "A" in the list a l o n g with condition of approval, if any.

DR - for those items "Details required "for BHEL/OWNER review.

Noted: For those items accepted by BHEL/OWNER without specific sub-vendor approval from BHEL/OWNER and indicated as "NOTED" in the list.

INSPECTION CATEGORY:

1. CAT I : For these items the quality plans are approved by NTPC/owner and final acceptance will be after physical inspection witness by NTPC/owner.
2. CAT II: For these items the quality plans are approved by NTPC/owner. However no physical inspection will be done by NTPC/owner. The final acceptance by NTPC shall be on the basis of review of documents as per QP.
3. CAT III: For these items Main Supplier approves quality plans. The final acceptance by NTPC/owner shall be on the basis of certificate of conformance (COC) by Main Supplier. _

4. Vendor category

Category-I : Acceptable to/Approved by NTPC.

Catergory -III: No specific vendor approval is required by NTPC.

5. All other items which are not indicated in the above list, are to be considered as Cat-III items.

SEAWORTHY PACKING FOR EXPORT ORDERS

1.0 SCOPE:

This standard specifies the seaworthy packing methods for export orders.

2.0 PACKING WOOD:

2.1 The timber used shall be of non-coniferous type as per specification HY51463 for Beams & Runners.

2.2 Ply Wood planks as per specification IS:303 Gr. "MR" Type A,B are used for the Sides, Top & Bottom of the Packing Cases.

3.0 The packing cases are covered with GI sheet on outside for sides and top; inside for bottom as per the Sketch-I.

4.0 PACKING CASES:

4.1 Categorisation of Packing Cases:

The packing cases are categorised as follows:

4.1.1 Open packed consignment. Packing subjected to BHEL approval.

4.1.2 Closed packing cases:

a) All the export seaworthy packing of the items shall be covered with GI sheet covering as per the sketch – I enclosed.

b) Any other special or export seaworthy packing (improvement or equivalent to the above) shall be subjected to BHEL Engg & QC approval).

4.2 Packing procedure for closed packing cases:

4.2.1 Inner surfaces of the sides & bottoms, outer surfaces of top of all the categories of closed packing cases shall be covered with hessain bitumen coated polyethylene kraft paper/HDPE Tarpaulin 150 GSM weight (refer sketch 1).

4.2.2 Adequate battens (lined with water proof bitumenised paper/HDPE Tarpaulin 150 GSM together with rubber sheet) shall be provided at appropriate places to prevent the movement of equipment/component inside the packing cases.

4.3 Sealed Packing:

4.3.1 Components, sub-assemblies and assemblies sensitive to climatic conditions shall be packed seal tight wherever required.

All the openings of the sensitive components, sub-assemblies and assemblies shall be blanketed to prevent the ingress of dust and moisture wherever required.

4.3.2 The components, sub-assemblies and assemblies are completely covered with 2 layers of polyethylene sheet. All sharp corners and edges are to be protected by rubber mats to prevent the polyethylene sheet from damage. Excelsior, corrugated cardboard, felt or other hygroscopic materials shall not be used. The top surface of the case shall be free from dents to prevent rain water pockets.

Note: Seal tight packing case shall not be opened during transportation till destination. Therefore customs authorities and shipping agents shall be informed in advance of the arrival of item. Suitable arrangements shall be made with the authorities for customs clearance.

4.3.3 Certain special precautions are required for sealtight packing of Turbogenerator rotor and the same are specified in product standard no. TG 55507.

5.0 Turbogenerator stator is a special open consignment and the same shall be packed in accordance with product standard TG 55506 for compliance.

6.0 DESICCANT:

6.1 Desiccant (silicagel to spec IS:3401) is filled into dust free, air permeable linean bags. Silicagel bags inside the packing consignments such as boxes with or without sealed polyethylene sheets excluding Turbogenerator rotor and and stator need not be arranged in any particular way. However, these silicagel bags shall be arranged in a particular way as specified in the respective product standards/drawings for Turbogenerator rotor and stator.

6.2 Desiccant Quantity for Components:

The desiccant quantity depends on the dimensions of the polyethylene sheet as well as transit and storage time.

T A B L E - 1

Desiccant Quantity in units of TROCKEN EINHEITN (TEH)
(Drying Effectiveness Unit) (1 TEH = 35g)

Parameters \ Transit & Storage time	Upto 1 month	Upto 3 months	Upto 6 months	Upto 12 months
i) Sealed packages a) For 1m^2 surface area of sealed polyethylene sheet for Turbogenerator rotor.	14 TEH (450 g)	-	42 TEH (1470 g)	-
b) For 1m^2 surface area of sealed polyethylene sheet for other components.	-	9 TEH (315 g)	18 TEH (630 g)	36 TEH (1260 g)
c) For each kg of wood within sealed polyethylene sheet.	8 TEH (260 g)			
d) For each kg of foam rubber or other padding material within sealed polyethylene sheet.	1 TEH (35 g)			
e) For 1m^3 of air within the case.	15 TEH (525 g)			
ii) For closed packing cases without sealtight packing and special open consignment like Turbogenerator stator. a) For 1m^3 of air within the case.	15 TEH (525 g)			

6.3 Humidity indicators shall be fixed wherever specified in product standards, packing drawings.

7.0 SURFACE PROTECTION:

7.1 Volatile Corrosion Inhibitor (VCI) Paper:

Un-protected surfaces of steel and cast iron components, tools, bearings, shaft seals etc., are covered with VCI paper. VCI paper has been impregnated with corrosion inhibitors which by evaporation and chemical conversion, protect metals in an enclosed area against corrosion.

7 m^2 VCI paper is necessary for 1m^3 of packed item approximately.

7.1.1 Application limitations:

VCI paper shall not be used for components made aluminium, aluminium alloys as well as zinc, copper, brass, cadmium and silver.

7.2 VCI powder is sprinkled inside the piping components and ends shall be protected with end covers as specified in plant standards, drawings.

8.0 GENERAL INSTRUCTIONS:

8.01 For packing and despatch of components, plant standard No. HY 0490572 – 'Code of practice for storage, handling, packing and despatch of components' shall be applicable.

8.02 For storage of different products and their components, plant standard no. HY 0490564 – 'Code of practice for storage of different products and their components' shall be applicable.

8.03 For handling, storage and preservation, plant standard no. HY 0490570 – 'Instructions on handling, storage, preservation, represervation and transport of export order components at works and site, shall be applicable.

8.04 For nitrogen blanketing of heat exchangers, plant standard no. HY 0490562 – Preservation of heat exchangers prior to shipment' shall be applicable.

8.05 All openings of components shall be blanketed to prevent the ingress of dust and moisture.

8.06 All packing cases shall contain a packing list inside a waterproof envelope. In addition, a copy of packing list will be kept in a metallic pocket outside the case.

8.07 All markings on the case shall be made of waterproof materials to prevent obliteration during transit.

8.08 All concerned designers shall identify the packing cases including direct despatch (DD) items as per the categories of packing indicated in clause 4. Components requiring special packing not included in this standard shall be covered by product standards.

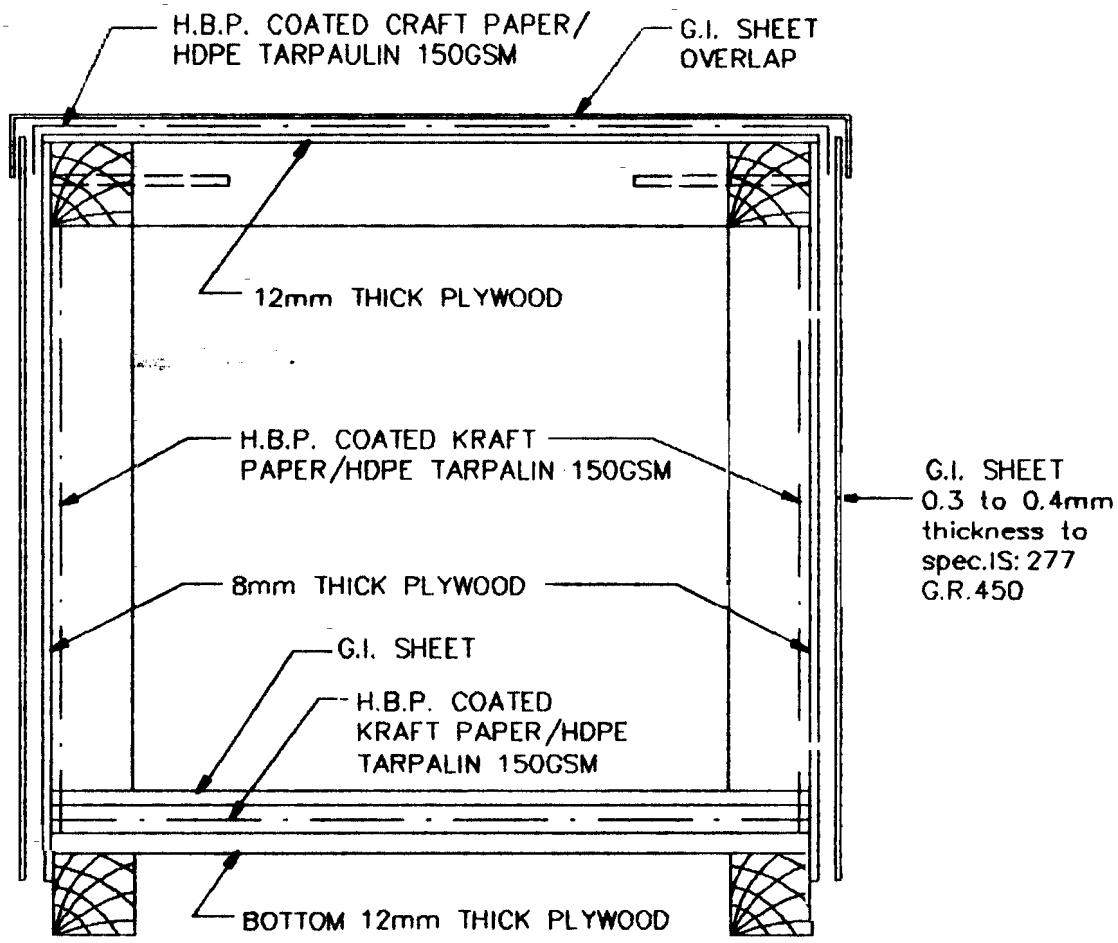
Suitable instructions for packing of DD items shall be incorporated in the purchase orders as per relevant product standards.

8.09 The details of packing materials are indicated in Sketch-I.

8.10 The following details shall be marked on the packing case:

a) W.O. No.
b) Case No.
c) Net weight
d) Gross weight
e) Dimensions of box
f) Markings showing:

i) Upright position.
ii) Sling position
iii) Storage position (P, Q, R, S)
iv) Fragile components
v) Any other special markings required by the customer



CLOSED PACKING CASE WITH
G.I.SHEET SHOWING LAYERS
OF PACKING MATERIALS

SKETCH–I

NON-CONIFEROUS TIMBER FOR GENERAL PACKING PURPOSES

1. GENERAL:

This specification governs the quality of non-coniferous timber supplied in the form of planks, battens, beams and sleepers.

2. APPLICATION:

Used for the manufacture of packing cases/crates.

3. COMPLIANCE WITH NATIONAL STANDARDS:

Assistance has been derived from the following Indian Standards in preparing this specification.

IS: 399 – 1963 : Classification of commercial timbers and their zonal distribution.

IS: 1326 – 1992 : Specification for non-coniferous sawn timber (Baulks and Scantlings)

IS: 5966 – 1993 : Specification for non-coniferous timber in converted form for general purposes.

IS: 6662 – 1993 : Timber species suitable for wooden packaging - Specification.

4. TERMINOLOGY:

For the purpose of this specification, the definitions given in IS: 707 (Glossary of terms applicable to timber and timber products) shall apply except for the beam which is defined as below.

Beam is defined as converted timber whose cross-sectional dimensions exceed 50 mm in both directions.

5. SPECIES:

The species of non-coniferous timber shall be as per annexure I.

6. DIMENSIONS AND TOLERANCES:

6.1 Sizes: Width, thickness and length of timber shall be clearly stated on the order/drawing.

6.2 Tolerance:

6.2.1 Width:

Width, mm	Tolerance, mm
50, 75, 100	+ 3
125, 150, 200, 225, 250	+ 6 / - 3

6.2.2 Thickness:

Thickness, mm	Tolerance, mm
20, 25, 35, 40, 50	+ 3
75, 100, 125, 150, 175, 200, 250	+ 6 / - 3

6.2.3 Length:

Standard length:

1 to 12 metres in multiples of 0.5 metre.

Tolerance:

± 2% or ± 50 mm whichever is less.

Note: The minus tolerances for width, thickness and length shall not be permitted in more than 10% of the timber supplied.

7. SEASONING AND MOISTURE CONTENT:

7.1 Timber for packing purpose other than export orders:

The timber shall have a moisture content of 30% maximum for planks and battens and 35% maximum for beams within a depth of 15 mm from the surface excluding a length of 30 cm from each end, at the time of inspection any time in the year. The moisture content will be determined in accordance with IS:287, IS:11215. This does not apply to timber procured in sleeper form for further conversion.

7.2 Timber for packing purpose for export orders:

The moisture content shall not exceed the maximum of 18%.

7.3 The moisture content % shall be specified in the order.

8. FREEDOM FROM DEFECTS:

Timber shall be free from the following defects:

Brashness, splits across the grain, shakes, cup, spring, twist insect attack, any kind of decay (rot) visible infection, open centre heart, centre heart on planks and any other defect.

The extent to which defects are permitted are given in Annexure II.

9. END COATING:

Timber shall be coated with any of the following effective compositions, upto a distance of 80 mm from each end or 20 mm more than the longest split, whichever is higher.

9.1 Thick coal tar or bituminous paint.

9.2 Resin and lamp black (10:1), melted, mixed and applied hot.

9.3 Hardened gloss oil.

9.4 Paraffin wax.

9.5 Molasses and lime (3:1).

10. END STRAPPING:

Timber above 200 mm x 200 mm cross section shall be strapped with steel clamps to prevent end splitting.

11. TREATMENT OF WOOD:

Supplier shall ensure the following:

All wood packaging material used in packaging of export consignments are required to be rendered free from all pests either by heat treatment or by fumigation with Methyle Bromide as per ISPM-15 (International Standards for Phytosanitary Measures) by the accredited fumigation agencies recognised by the Government. Supplier should submit certificate to that extent.

The treated wood packaging material shall carry prescribed treatment mark as per ISPM-15 in addition to standard markings of ISPM-15 on his material.

12. CERTIFICATES:

The supplier shall furnish a certificate with each lot/consignment in support of the type of species, treatment (Fumigation/Chemical) and moisture content.

13. MARKING:

The timber shall be marked/painted in order to identify the source of supply in accordance with our instructions.

ANNEXURE - I

SPECIES OF NON–CONFEROUS TIMBER RECOMMENDED FOR HEAVY PACKING CASES/CRATES

Sl. No.	Botanical Name	Standard Trade Name	Local Names	Abbre-viated Symbol
1.	Fagara burdrunga	MULLILAM	MUTTILAM (Tamil), RHETSA (Telugu); BEPULI (Uudu)	MUY
2.	Careya arborea	KUMBI	KUMBHI (Assam & Bengali), KAMBI (Hindi)	KUM
3.	Syzygium Cumini	JAMAN	JAMUN (Hindi & MP); JAMUK (Assam); JAM (Bengali); KUDA (Koli); JAMU (Oriya); JAMBU (Gujarati); NERLU, NERULA (Kannada); JAMBUL (Marathi); NAVAL (Malayalam & Tamil); NEREDU (Telugu)	JAM
4.	Apha – namixis Polystachya	PITRAJ	BOGA, AMARI (Assam); LOCHUNI, LOSHUNE (Bengali); RAKTATOHIDA (Marathi), MULLUMUTTAGA (Kannada); KARAGIL (Malayalam), VEKKALI, VELLAKONGU (TAMIL)	PIT
5.	Albizzia procera	SAFID-SIRIS	SAFED- SIRIS (Hindi); SIT (Andamans); KOROI (Assam & Bengali); TENTHRA (Koli); DHALASIRISH (Oriya); KINHAI, KILAI (Marathi); GURER (MP); KARANGRO (Gujarati); BELLATI, SALVAGAI (Kannada); VELLAVAKA (Malayalam); VELVAGAI (Tamil); TELLACHINDUGA (Telugu)	SSI
6.	Terminalia bellirica	BAHERA	BAHERA (Hindi & Marathi); BHAIRA (Punjabi); BHOMARA (Assam); LUMPUNG (Koli); BAHADA (Oriya); BAHETA (Gujarati); THARE, TARE, TARI (Kannada); BAHELA (Marathi); THANNI (Malayalam); TANI (Tamil & Telugu)	BAH
7.	Logerstroe mia parviflora	LENDI	ASIDH, DHAURI'SIDA (Hindi); MECHI (Assam); SIDHA (Bengali & Oriya); GARASEKRE (Koli); BURI – DHAMERO (Nepali); LENDIA – SENHA (Marathi); KALIASAJA, LENDI (MP) BONDARO (Gujarati); NANAGU (Malayalam); PEIKADUKKAI (Tamil); CHENNANGI (Kannada & Telugu)	LEN

Sl. No.	Botanical Name	Standard Trade Name	Local Names	Abbre-viated Symbol
8.	Acrocarpus Fraxini folius	MUNDANI	MANDANE (Nepali); BELANJI (Kannada); KURANYAN, MALAVEPPU (Malayalam); MALAMKOMAI (Tamil)	MUN
9.	Dysoxylum Mala baricum	WHITE CEDAR	BILIDEVADARI (Kannada); VELLA – GIL (Malayalam & Tamil)	WCE
10.	Mangi fera India	MANGO	AM (Hindi & Assam); AMB (Punjabi); ULI (Koli); AMBA(Oriya & Marathi); MAVU (Kannada) MAMARAM (Tamil); MAMIDI (Telugu)	MAN
11.	Lagerstroemia Speciosa	JARUL	AJHAR (Assam); GARASEKRE (Koli); PUNIPATULI (Oriya); NIRMARUTHU (Malayalam); POOMARUTHU, PUMARUDU (Tamil)	JAR
12.	Adina Corodifolia	HALDU	HALDU, KARAM (Hindi); TARAK COPA (Assam); RANGKAT (Bengali) KUMBHA (Koli); KURUMA (Oriya); HALDU, HEDU (Marathi); KARAM (MP); HALWDWAR, HALDWAN (Gujarathi); HEDDI, YETAGAL, YETTAGA (Kannada); BIMBU (Malayalam); KADAMBERI, MANJAKADAMBAI (Tamil); HALDAWA (Urdu); BANDARU (Telugu)	HAL
13.	Dipterocarpus Indicus	GURUJAN	GARJAN (Assam); YENNEMARA (Coorg); KALPAYINI, KALPINE (Malayalam); ENNEY, VELLAYINI (Tamil); KALPINE (Kannada); GURGAL (Urdu).	GUR
14.	Lagerstroemia Lonceolata	BENTEAK	Nana (Gujarati & Marathi); NANDI, BENDEKU (Kannada); VENTEAK (Malayalam); BETHEKKU, VENTHEKHU (Tamil); BILLINANDI, BOLULTAR (Telugu)	BEN
15.	Dipterocarpus macrocarpus	HOLLONG	HOLLONG (Assam)	HON
16.	Mitragyna Parvifolia	KAIM	GURI, KALAM, PHALDU (Hindi); HAMSABETI (Koli); MITUKUNIA (Oriya)	KAM

Sl. No.	Botanical Name	Standard Trade Name	Local Names	Abbre-viated Symbol
17.	Terminalia procera	WHITE BOMBWEE	DADAM (Andaman)	WBO
18.	Artocarpus hirsuta	AINI	HEBBALASU, HEBHULSINA (Kannada); PATHPHANAS (Marathi); AINIPILAVU (Malayalam); AINIPILA ANJILI (Tamil)	ANI
19.	Terminalia Myriocarpa	HOLLOCK	PANISAG (Nepali)	HOL
20.	Protium Serratum; Bursera Serreta	MURTENGA	ERRA KARRA (Telugu)	MUR
21.	Grewia- Ti Lifolia	DHAMAN	TADA (Telugu); DADSAL, THADSAL (Kannada); CHADACHI (Malayalam) THADACHI (Tamil); PEDDA JANA (Telugu)	DHA
22.	Albizzialebbeck	KOKKO	SIRIS (Hindi & Oriya); SARIN, SHRIN (Punjabi); HIRIH (Assam); SIRISH (Bengali); CHICHOLA (Marathi); BAGE (Kannada); VAKA (Malayalam); VAGAI (Tamil); DIRISINAM (Telugu)	KOK
23.	Holoptelea-Intergrifolia	KANJU	KANJU, PAPRI (Hindi); KUMKAR, RAJAIN (Punjabi); ANJAN (Bengali); CHIBIL, DHAURANJO (Oriya); PAPARA (Marathi); CHILWAL, CHIROL, KARANJI (MP) THAPSI (Kannada); AVAL (Malayalam) AYILI (Tamil)	KAJ
24.	Schimawallichi Choisy	CHILAUNI	GOGRA, MAKRISAL (Assam)	CHL
25.	Xyliaxylocarpa	IRUL	KONGRA, TANGAN (Oriya); SURIA (Marathi); SAURIYA (MP) JAMBE (Kannada); IRUL (Tamil), KONDATANGEDU (Telugu)	IRU
26.	Hopea	HOPEA	BOGIMAR (Kannada); IRUMBOGAM (Malayalam); VELLAI – GONGU (Tamil)	HOP
27.	Teriminalia-tomentosa	LAUREL	ASNA, SAIN (Hindi); AISAN (Punjabi); HATANA (Koli); PUCCASAJ (Nepali); SAHAJA (Oriya); AIN, SADAR, SAJ (MP) KARUMARUDU(Malayalam); KARIMARUDU, MATTI (Tamil); NALLAMADDI (Telugu)	LAU

Sl. No.	Botanical Name	Standard Trade Name	Local Names	Abbre-viated Symbol
28.	Shorearobusta	SAL	SAKHU, SAL, SAKHUA (Hindi); SARJAM (Koli); RAIGAL –A SARGI (Oriya)	SAL
29.	Mesuaferrea	MESUA	GANGANE (Andaman); NAHOR(Assam); NAGESWAR, NAGKESAR (Bengali); NAGESWAR (Oriya); NAGASAMPIGI (Kannada); CHURULI (Malayalam); NANGAL, NANGU (Tamil); NAGAKESARI (Telugu)	MES
30.	Terminaliapani-culata	KINDAL	HONAL, HONAGALU (Kannada); KINDAL (Marathi); PILLAMARUDU (Malayalam & Tamil); NALLAPULAGA (Telugu)	KIN
31.	Grevillea robusta	A CUNN	SILVER OAK	SOA

ANNEXURE –I I

PERMISSIBLE DEFECTS

Sl. No.	Defects	Extent Permissible
1.	BOW	Shall be permissible upto a maximum of 2 mm for 300 mm length of the piece.
2.	CUP	Shall not be permissible.
3.	END SPLITS	The longest end split at each end shall be measured and the lengths added together. The total length of the longest end split shall not exceed 60 mm per metre of the length of the piece.
4.	KNOTS	Live knots measuring from 20 to 35 mm in diameter and dead knots measuring upto 15 mm in diameter shall be permissible provided they are not so numerous or so grouped or located as to affect unduly the strength of the pieces.
5.	BORER HOLE (DAED INFE-STATION)	Borer holes (dead infestation) shall be permissible, on one face only provided such holes are not deeper than 10 mm and are well scattered
6.	SAP WOOD WANE	Shall be permissible.
7.	WANE	Wane shall be permissible upto 1/5 of the width on a broad face, subject to amaximum of 60 mm and upto 1/3 of the width on the narrow face provided that one broad face and one narrow face is completely free from this defect. Wane shall not be present in more than 30% of the total number of pieces accepted at any one time.
8.	CROSS GRAIN	Shall be permissible upto a maximum deviation of 1 in 10.
9.	SURFACE CRACK	Depth of the deepest crack on any one face (excluding the ends) shall be permissible upto a maximum of 2 mm in case of planks and beams upto 50 mm thick, 3 mm for beams above 50mm and upto 100mm thick and 6mm for beams above 100mm thick. A continuous crack of any depth, all along the length, is not permissible.

CODE OF PRACTICE FOR STORING, HANDLING, PACKING AND DESPATCH OF COMPONENTS

1.0 SCOPE:

This standard covers technical instructions for packing and despatch of components. The related packing materials are indicated in Annexure 1. This standard supersedes company standard HY0490301 Rev.01.

2.0 PACKING CASE:

2.1 Packing cases for special components like rotor, casings and other items shall be designed by central packing design cell based on the component drawing and the fixing and supporting methods indicated by engineering department.

2.2 The wood for packing cases shall conform to plant purchase specification no. HY51463 and HY51461.

2.3 Suitable stiffners, steel brackets at corners, sides and for lifting shall be fixed to the packing case, wherever required.

2.4 Nailing procedure:

2.4.1 In the case of nailing two or more layers of the board together, having total thickness not exceeding 7.5 cm, the nail end shall be bent 0.9 cm or more to the direction making a right angle to the timber grain.

2.4.2 Nailing must be carried out carefully by arranging nails zigzag so as not to cause cracking of the planks. Further, each nail must be driven adequately so that its head shall not protrude above the plank surface or excessively sink below the board surface.

3.0 ORIGINAL PACKING CASES:

Care shall be taken while opening the packing cases at the stores receipt stage. The despatch from stores (DS) items like valves, precision instruments, condenser tubes etc. shall be despatched in the original packing cases received from supplier to avoid damage during transit, wherever possible.

4.0 RIGDITY OF COMPONENTS IN THE CASE:

4.1 The movement of components in the packing case shall be arrested by fixing suitable wooden sections at proper places.

5.0 STABILITY OF THE CASE IN THE WAGON:

The movent of case in the wagon shall be arrested by providing necessary wooden support and suitable lashing.

6.0 PROTECTION AGAINST INGRESS OF MOISTURE:

Component shall be wrapped with VCI paper, waxed paper polythene sheet as applicable for the components/ products. 2 bags of indicating type silicagel in bleached and finished plain weave cloth bag each containing 0.5 Kg/m³ volume of the case shall be placed in the packing case, wherver required.

7.0 MEASURING INSTRUMENTS & DELICATE ITEMS:

7.1 Temporary preservative shall be applied on the unpainted surfaces. The instruments shall be wrapped with waxed paper and packed preferably in the original packing/ thermocol boxes with suitable cushioning.

7.2 Glass instruments shall be covered with suitable cushioning material and preferably packed in original packing cases/ thermocol boxes.

7.3 Pressure gauge connections shall be protected with plastic caps.

7.4 The packing shall be fastened with adhesive tape and placed in a wooden case with cushioning material.

7.5 Fragile items shall be packed in separate boxes.

8.0 PUMPS, ELECTRIC MOTORS, VENTILATORS ETC.

8.1 The components of pumps, electrical motors, ventilators etc. Shall be cleaned to remove the presservative, dust etc and represerved.

8.2 Spare bearings shall be cleaned and then presservative grease shall be applied. The bearing shall be packed in cartons. Heavier bearings shall be packed in wooden cases.

9.0 LOOSE PARTS LIKE FASTENERS, PIPE UNIONS ETC:

9.1 These items shall be suitably preserved and wrapped in waxed paper. The items shall be packed in corrugated boxes.

9.2 Loose parts pertaining to one individual group shall be packed in one fibreboard corrugated box as far as possible.

9.3 Fibre board boxes shall be packed in wooden boxes.

10.0 PIPES, FLATS, ANGLES:

10.1 Pipe and flange end covers:

10.1.1 The pipe end covers (external) for pipe sizes 6-610 mm O.D shall be as per plant standard HY7790962.

10.1.2 The flange end covers (external) for flange sizes ID=45mm, OD=70mm to ID-530mm, OD=600mm shall be as per plant standard HY7790963.

10.1.3 The stub end covers (external) for stub sizes 16.3 mm OD to 83 mm OD shall be as per plant standard HY7790964.

10.1.4 The pipe end covers (internal) for pipes on nom. Size 9 mm to 75mm shall be as per plant standard HY7790965.

10.1.5 Protective caps shall be provided for pipe/flange ends.

10.2 Steel tubes for general purpose upto and including 50 mm dia shall be bundled with 2 stranded mild steel wire. The steel wire dia shall not be lesser than 2 mm.

10.2.1 The recommended bundling places are as per table below:

Product weight	Upto 200 Kg.	>200 ≤300 Kg.	>300≤500	>700≤1000 Kg.
Number of bundling places	3	4	7	8

10.2.2 Steel tubes above 50 mm dia shall be shipped loose.

10.3 Special purpose and heat exchanger tubes & pipes:

10.3.1 Suitable rust preventive shall be applied to the items as per HY0490563.

10.3.2 The gross weight of the standard case for HE tubes shall not exceed 1500 Kg.

10.3.3 **U Tubes**:

10.3.3.1 U tubes shall be packed in moisture proof cases. Cloth bags of silicagel shall be placed in the case as per clause 6.

10.3.3.2 Longitudinal & transverse movement of tubes within the case shall be avoided by providing soft packing.

10.3.3.3 A horizontal layer of tubes shall be seperated by polythene sheet.

10.3.3.4 Vertical rows of tubes shall be seperated by wooden spacers to avoid rubbing and movement of tubes.

10.3.3.5 The two legs of the inner most U tube shall be seperated by wooden spacers.

10.4 FIN TUBES:

10.4.1 Suitable cushioning material and soft pads shall be provided inside the case on all the sides.

10.4.2 Soft pads shall be kept between two horizontal layers of the tubes.

10.4.3 Spacers of soft material shall be kept between the 2 adjacent vertical rows to avoid interlocking of tubes.

10.5 Brass rods shall be wrapped with polythene sheet and packed in longitudinal boxes.

10.6 Straight lengths like bars, flats, angles shall be bundled with annealed steel wire of diameter 3 to 6 mm.

11.0 IDENTIFICATION:

The tag number as per completion schedule shall be painted on metal tag and tied with thin wire or tack welded to the individual items being despatched.

12.0 PACKING SLIP HOLDER:

The packing slip shall be fixed on the packing case at suitable location. The packing list shall be sealed in a polythene bag against the ingress of moisture and placed in the packing slip holder.

13.0 MARKING:

13.1 The following data shall be marked on two opposite sides of the case with waterproof black paint.

a) BHEL and sender's address
b) Company Monogram
c) Consignee's full and correct address
d) Identification number of the case

e) Net weight and gross weight of the case
f) Rough dimenssions of the case in cm
g) Position of slings or chains for handling
h) Indication of top of the case
i) Name of the consignment (eg:"Instrument Panel", "Middle part MP casing", Miscellaneous" etc.)
j) Special remarks wherever applicable (eg: "Turbine rotor with care", "Glass instruments with care" etc.)
k) The remark "NOT TO BE LOOSE SHUNTED", wherver applicable.
l) Storage instruction code

e.g. P - Storage in a totally enclosed shed under controlled conditions.
Q - Storage in a totally enclosed shed.
R - Storage in a shed having roof but no side walls.
S - Storage in open yard on elevated platform/ wooden sleepers.

14.0 HANDLING:

Procedure for handling shall be as per HY0490571.

15.0 NOTE:

The following are the related documents on packaging and despatch of components.

15.1 OMI 064 - Procedure for packing and despatch of finished products.

15.2 AA 0232601 - Pictorial markings for handling, labling of goods in general.

15.3 AA 0232801 - Technical information on loading and transportation of consignments by railway wagons.

15.4 AA 0232802 - Loading particulars of standard railway wagon broad gauge and metre gauge.

15.5 AA 0232803 - Standard moving dimensions on indian railways broad gauge and metre gauge (for bogie goods stock).

15.6 HY0490563 - Code of practice for preservation of different products and their components

15.7 HY0490564 - Code of practice for storage of different products and their components.

15.8 HY0490571 - Procedure for handling of components.

15.9 HY0490569 - Seaworthy packing for export orders.

15.10 HY51463 - Non - conifer timber for general packing purposes.

15.11 HY51461 - Rubber wood for general packing purposes.

15.12 HY0490562 - Preservation of heat exchangers prior to shipment

15.13 HY0490570 - Instructions on handling, storage, preservation, represervation and transport of export order components at works and sites

15.14 HY0490571 - Procedure for handling of components

TABLE - 1

PACKING MATERIALS

Sl. No.	Description	IS No. and Grade	BHEL Spec./ Std. No.
1.	Waxed grease proof paper 0.3mm thkx900mmx100 mtrs	IS: 3962	AA51407
2.	Packing paper water proof bitumen laminated type 1	IS: 1398 Type 1	AA51410
3.	Polythene coated bitumen hessian kraft paper	IS: 1398 Type 3	AA51409
4.	Pressure sensitive adhesive tapes with poly-propylene plastic base	IS:13262	AA51412
5.	Pressure sensitive adhesive cloth	IS: 3687	AA51411
6.	Cotton tape for electrical purpose	IS: 1923	AA23107
	CUSHIONERS		
7.	Wood wool	IS:1707	AA51404
8.	Rubberised coir sheets	IS: 8391	AA51415
9.	Woolen felt hard (Proofed) (Grey colour)	IS: 1719	AA23121
10.	Polythelene air bubbled film	IS:12787/89	HY78489

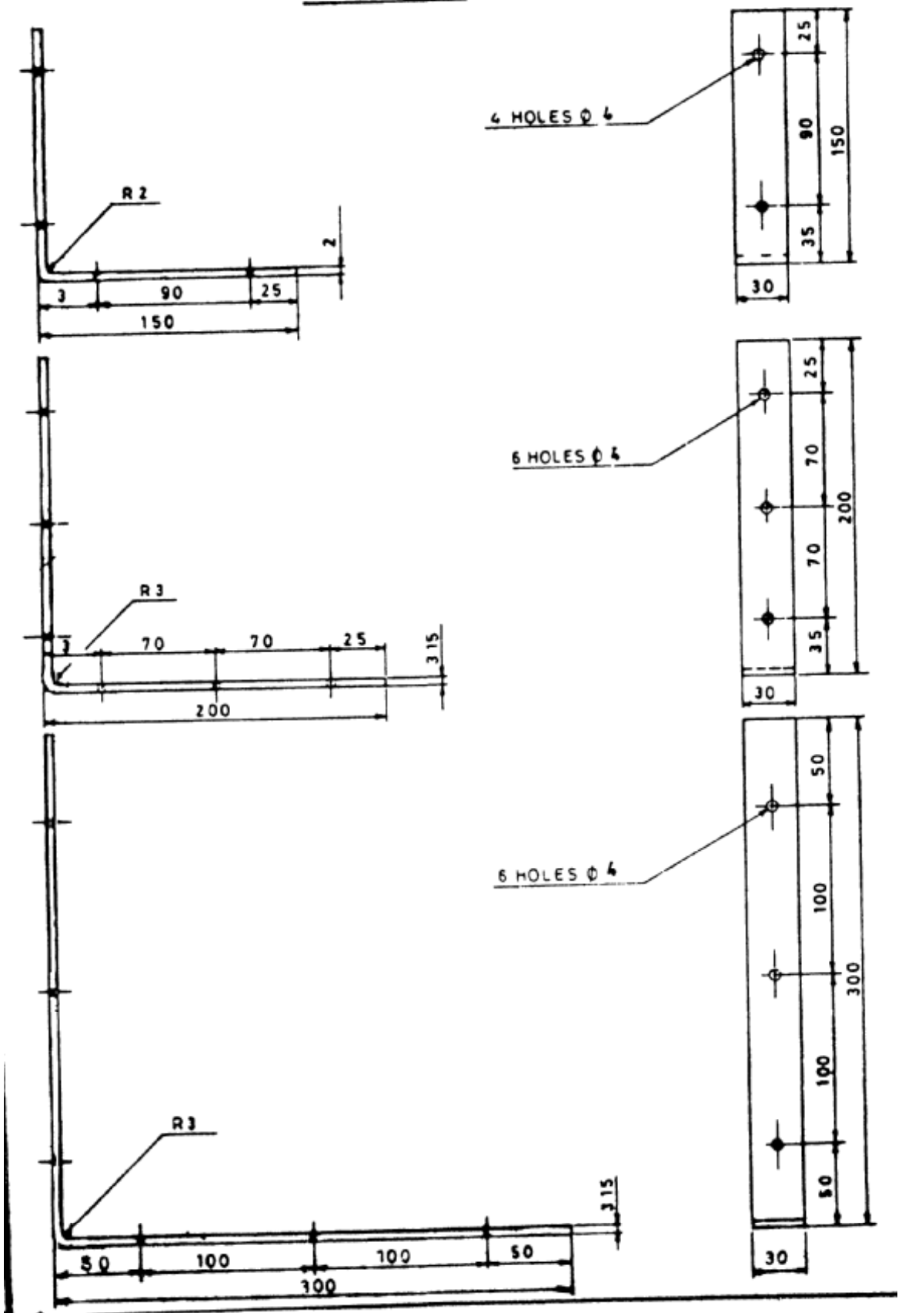
Sl. No.	Description	IS No. and Grade	BHEL Spec./ Std. No.
11.	Rubber sheets	IS: 638 Gr. 1 Type A	AA59001
12.	Expanded polysterele (Thermocol) sheet	IS: 4671 Type- 2	AA51416
	BINDING & FIXING MATERIALS		
13.	MS binding wire galvanised		AA10110
14.	Hot rolled steel strip (baling)	IS: 1029	HY10189
15.	Metal seal (Tin) with BHEL emblem to suit steel strip		HY78462
16.	Steel counter sunk head wire nails	IS: 723	AA7177001
	MARKING MATERIALS		
17.	High quality full glossy out door paint (Block)	IS: 2932	AA56126
18..	Non - yellowing full glossy white paint		AA56127
	OTHERS		
19.	Corrugated fibre board boxes	IS: 2771 (Part 1)	AA51414
20.	Low density polyethylene film	IS: 2508	AA51408
21.	Low density polyethylene bags with BHEL Emblem printed on one side with one colour		AA51408
22.	Bleached cloth bag		HY78464

PLANT STANDARD
HYDERABAD

Sl. No.	Description	IS No. and Grade	BHEL Spec./ Std. No.
23.	Plywood MR/AB	IS:303	AA51101
24.	G I sheet for name plate	IS:277	AA10166
25.	G I sheet plain		AA10166
26.	Pipe end covers (internal)		HY7790965
27.	Indicating type silicagel size 5 to 3 mm	IS: 3401	AA55619
	STANDARD FASTENERS		
28.	Square head bolt, nut & washer		HY9601101
29.	Netlon protective sleeving		HY7840797
30.	MS clamps		
31.	HDPE Tarapaulin 60' x 40'	IS:7903	HY78133
	NYLON ROPES Ø 10 MM		HY78499
32.	VCI Rusto paper VCI Rusto powder		AA51406 AA55120
33.	Packing stud two sq. nuts & two sq. washers		HY9601411
34.	G I Binding wire		AA10110
35.	Metallic pouches Blue Red		

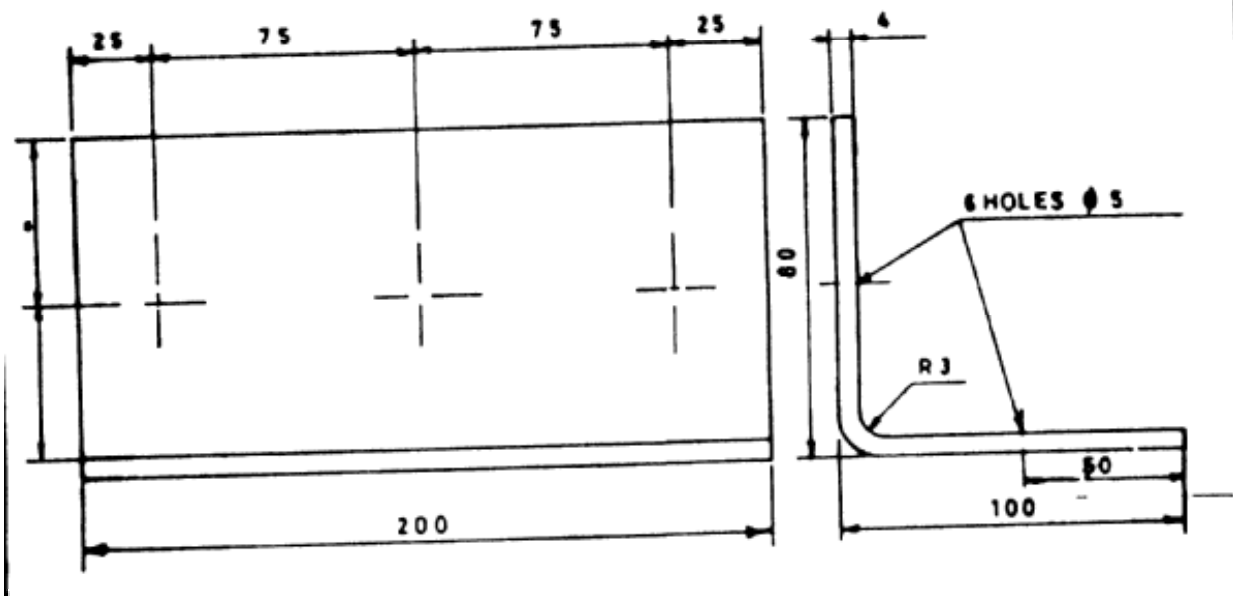
L CLAMPS

ANNEXURE I



SHIELDING PLATE (LIFTING ANGLE)

ANNEXURE-II



	AMENDMENT-NOTIFICATION	HY049 05 70 REV. 00 PAGE 1 OF 1

INSTRUCTIONS ON HANDLING, STORAGE, PRESERVATION, REPRESERVATION AND TRANSPORT OF EXPORT ORDER COMPONENTS AT WORKS AND SITES

1. In cl.1.1.1 in place of unloading read as loading/unloading.
2. In cl.1.1.1 (C) Delete "and C.G position".

REF:	Amd.No.	APPROVED	ISSUED	DATE	CUM.Sr.No
	01	AGM (E & CC)	STDS. ENGG	OCT.93	0119

INSTRUCTIONS ON HANDLING STORAGE, PRESERVATION, REPRESERVATION AND TRANSPORT OF EXPORT ORDER COMPONENTS AT WORKS AND SITES

1.0 HANDLING:

1.1 General:

1.1.1 Before unloading a packing case from the carrier look for the following shipping instructions painted on the packing case.

a) Weight of the package.
b) The markings showing the upright position.
c) The markings showing the sling position and C.G. position.
d) Markings showing the fragile contents.
e) Marking showing type of storage required as per HY 0490564.

1.2 Appropriate cranes and slings should be used for different components/cases. Slings should normally make an angle as minimum as possible (width wise) but in no case more than 15º.

1.3 Handling and lifting should be done without jerks or impacts.

1.4 Immediately after receipt of the goods the packing should be examined all-round for any sign of damage. If necessary lift the cover or a number of boards of the case so as to make the contents visible. In the event of sealed packing being used the plastic sheeting should not be damaged. It is imperative that the packing material is restored in original condition after the inspection.

1.5 On receipt of the equipment is should be checked with the shipping list and missing or damage if any should be reported immediately.

It is important to arrange for immediate examination to determine the extent of the damage, the cause of the damage and , where applicable, the person or persons responsible for the damage. According to general practice when transporting by railway or by road vehicle the carrier concerned should be immediately called upon (within specified periods) for jointly establishing a statement of the damage. This is essential as a basis for a subsequent claim and possible damage report to the insurance company.

1.6 Protective coating applied on machined surfaces should not be disturbed. The plastic covering should be put back carefully so that it prevents ingress of dust and moisture. Some packing may have vapour phase inhibitor (VPI) paper enclosed inside the packing cases. This should be restored to its original place as far as possible.

1.7 Silicagel and such other chemicals kept in the box as desiccants and indicators should also be left in the box itself.

2.0 STORAGE AND REPRESERVATION INSTRUCTIONS:

2.1 Storage of different products and their components shall be as per HY0490564.

2.2 General Instructions:

2.2.1 The ware house or the covered area where equipment is to be stored should be clean, dry and well ventilated. The platform and the store house should be built in conformity with the fire prevention rules and standards. It must be treated with pesticides/insecticides against white ants other insects, fungus etc. The stage premises should be kept rodent free as far as possible. Adequate gateway should be left for inspection and cleaning.

2.2.2 Immediately after receipt of the packing cases the condition of the desiccant shall be ascertained by examining the humidity indicator which are visible out side the packing case (see cl.6.0 of the standard) and take correct action as required. The packings cases should be periodically inspected specially after damp weather for fungus, dampness or any sign of deterioration of packing material. If desired the ware house should be suitably fumigated.

2.2.3 Periodic inspection at least once in three months should be carried out for all the components to ensure that the protective coating (preservation) etc. are intact and no damage has occurred to the equipment. If any damages are observed the same shall be repaired/ represerved immediately.

2.2.4 Pipes including lubricating oil pipes are supplied in cleaned, pickled, sprinkled with VCI powder inside and protected at ends. They should not be kept open to rain and inclement weather. It is recommended all pipes should be stored in suitable racks to facilitate access and easy handling. It must be ensured that ends of the pipes are properly blanked before storing to prevent ingress of dirt, dust and moisture.

NOTE: For steam turbine rotor preservation and represervation refer Std. No. TC51761.

2.2.5 Insulating materials sent loose before curing have definite shelf life. It is recommended not to send these materials such as epoxy resins, resin treated tapes bitumen varnishes etc. too early to site. Still there might be some occasion when these materials have to reach site early. These materials are usually sent in sealed tins with a label indicating shelf life. If these materials can not be used immediately these are to be stored preferably at a temperature not exceeding 5º C.

2.2.6 While opening the cases of such materials care should be taken not to push the tool too deep in the box.

2.2.7 When the case is to be reclosed for further storage after inspection, case should be taken to cover these items with polyethylene sheets fully, leaving no gaps. The desiccants such as silicagel have to be reactivated if necessary and restored in the packing.

2.2.8 Motors and windings in storage should be inspected and I.R. values checked at periodic intervals. The suggested intervals are once in two months in dry weather and monthly in humid weather. These readings should be preferably recorded in a log. Any significant drop in I.R. values should be reported immediately.

2.2.9 A few roles of VPI coated paper should always be kept at site for replacing spoiled or ineffective paper due to expiry of shelf life.

3.0 PRESERVATION:

3.1 Preservation of different products and their components shall be as per HY0490563.

3.2 For steam turbine component refer product Std. No. ST33004.

3.3 For preservation of components like stampings and punchings a special TRP "SPRAY PEEL" of M/s. PLASTIPEEL CHEMICAL, PLASTIC INDIA LIMITED, THANE may be adopted.

4.0 TAKING OUT OF STORAGE:

4.1 Remove any rust from painted area with a steel wire, brush or sand paper. Treated area must be bright and free from grease. Give them a new coat of primer and the requisite No. of finishing coats of paints.

The machined parts should be removed from their packings only just before they are required for installation. They should preferably be brought to the point of installation still packed and arranged in the sequence in which they are to be installed. Heavy parts should be secured against slipping or over turning.

5.0 TRANSPORT:

5.1 Greatest care and attention should be exercised when transporting the materials to the site. The means of transport must be suitable for the purpose with regard to weight, lifting and to the any marking with regard to permissible method of transport.

When loading and unloading particularly, heavy machine parts must removed with the aid of wrenches, jacks, crow bars and the like, the transport vehicle should be packed up with props and jacks to prevent subsidence or the tilting of the loading surface when the brakes are applied. The machine parts should be so secured that they can not move in transit. Steel ropes should be cushioned with wooden block to prevent any damage by rubbing.

5.2 Special methods if any for transporting for different product components shall be given in each product standard.

6.0 CHECKING AND REACTIVATION:

6.1 The moisture absorption capacity of the desiccant must be checked after completion of shipment, after interruption in transit involving a storage period of more than one month and during normal storage at the site. To do this use the moisture indicator inserted in the plastic sheeting cover at a distance of not less than 5 cm. from the sheeting. The moisture indicators are marked with their respective location and show the relative humidity inside the cover in three ranges (>30%, >40% and >50%). With the packing in dry condition all circles are blue. A change in colour to pink in the respective circle indicates the relative humidity in percent. As soon as the 40% indicator changes to the pink colour the desiccants must be removed and replaced or reactivated by drying.

Make sure that sufficient replacements, desiccants or the necessary drying facility for reactivation is available. After opening the plastic sheeting cover should be provisionally resealed, but shall not be left in sealed condition for more than 20 hours.

For reactivation of desiccant the pouches should be dried in a drying oven at a temperature of 110º C for 12 hours. If a drying oven is not available the desiccant should be removed from the pouch, spread out in a thin layer on a metal plate and dried at 110º C to 130º C for several hours until the weight of the desiccants remains constant. The desiccants should then be filled back into the pouches which are to be closed and reinstalled into the plastic sheeting cover as quickly as possible. Care should be taken to ensure that the pouches do not come in contact with metal parts. The opening in the plastic sheeting cover should then be resealed with a heat sealing unit.