ANNEXURE – A

(Tender Drawings)

5 x 800 MW YADADRI TPS			
Annexure - A			
Sl. No.	**Drawing Title**	**Drawing No.**	**Revision**
CABLE GALLERIES			
1	Cabling Layout Below MV Switchgear Room Unit - 1, 2, 3, 4 & 5	PE-DG-417-100-E109	03
2	Cabling Layout Below LV Switchgear Room Unit - 1, 2, 3, 4 & 5	PE-DG-417-100-E110	02
3	Cabling Layout Below CCR Room	PE-DG-417-100-E136	04
4	Cabling Layout Below Boiler Switchgear Room Unit - 1, 2, 3, 4 & 5	PE-DG-417-100-E113	02
5	Electrical Equipment & Cabling Layout in ESP Control Room Building Unit - 1, 2, 3, 4 & 5	PE-DG-417-100-E008	09
6	Electrical Equipment & Cabling Layout of FGD Control Room (Stage-1)	-	02
7	Electrical Equipment & Cabling Layout of FGD Control Room (Stage-2)	PE-DG-417-100-E118	00
8	Electrical Equipment & Cabling Layout of Switchyard Control Room	-	-
9	Equipment Layout : CHP ER-1 Near WT-1, 2 & TH-1	IS-1-EE-699-100-E002	2
10	Equipment Layout : CHP ER-2 Near WT-3, 4 & TH-2	IS-1-EE-699-100-E003	2
11	Equipment Layout : CHP ER-3 Near Crusher House cum Control Room	IS-1-EE-699-100-E004	5
12	Equipment Layout : CHP ER-4 Near Stockpile Area	IS-1-EE-699-100-E005	4
13	Equipment Layout : CHP ER-5 Near Bunker	IS-1-EE-699-100-E006	7
COAL CONVEYORS			
Sl. No.	**GA of Conveyor**	**Drawing No.**	**Revision**
1	BCN 1AB	IS-1-GA-699-101-M008	01
2	BCN 2AB	IS-1-GA-699-101-M009	02
3	BCN 3AB	IS-1-GA-699-101-M010	01
4	BCN 4AB	IS-1-GA-699-101-M011	01
5	BCN 5	IS-1-GA-699-101-M012	01
6	BCN 6AB	IS-1-GA-699-101-M013	01
7	BCN 7	IS-1-GA-699-101-M014	02
8	BCN 8AB	IS-1-GA-699-101-M015	02
9	BCN 9AB	IS-1-GA-699-101-M016	01
10	BCN 10AB	IS-1-GA-699-101-M017	03
11	BCN 11AB	IS-1-GA-699-101-M018	02
12	BCN 12AB	IS-1-GA-699-101-M019	03
13	BCN 13AB	IS-1-GA-699-101-M020	02
14	BCN 14AB	IS-1-GA-699-101-M021	02
15	BCN 15AB	IS-1-GA-699-101-M022	02

5 x 800 MW YADADRI TPS			
Annexure - A			
16	BCN 21AB	IS-1-GA-699-101-M023	01
17	BCN 22AB	IS-1-GA-699-101-M024	01
18	BCN 23AB	IS-1-GA-699-101-M025	01
19	BCN 24AB	IS-1-GA-699-101-M026	01
20	BCN 25	IS-1-GA-699-101-M027	01
21	BCN 26	IS-1-GA-699-101-M028	01
22	BCN 27AB	IS-1-GA-699-101-M029	01
23	BCN 28	IS-1-GA-699-101-M030	01
24	BCN 29AB	IS-1-GA-699-101-M031	01
25	BCN 30 AB	IS-1-GA-699-101-M032	01
26	BCN 31AB	IS-1-GA-699-101-M033	01
27	BCN 32AB	IS-1-GA-699-101-M034	01
28	BCN 33AB	IS-1-GA-699-101-M035	01
29	BCN 34AB	IS-1-GA-699-101-M036	02
30	BCN 35AB	IS-1-GA-699-101-M037	02
31	BCN 36AB	IS-1-GA-699-101-M038	02
32	BCN 37AB	IS-1-GA-699-101-M039	02
33	BCN 38AB	IS-1-GA-699-101-M040	02
34	BCN 39AB	IS-1-GA-699-101-M041	02
35	RBCN 1AB	IS-1-GA-699-101-M044	01
36	RBCN 2AB	IS-1-GA-699-101-M045	01
37	TPC 1AB	IS-1-GA-699-101-M042	01
38	TPC 2AB	IS-1-GA-699-101-M043	01

CABLING LAYOUT OF OVERALL PLANT

Sl. No.	Drawing Description	Drawing No.	Revision
1	Plot Plan	PE-DG-417-100-M001	06
2	Cabling Layout from ESP to Chimney	PE-DG-417-100-E042	02
3	Cabling Layout from Main Power House to Boiler Area	PE-DG-417-100-E041	03
4	Cabling Layout in TG Hall	PE-DG-417-100-E038	02
5	Layout of Cabling Interconnections Between Main Plant & Auxiliary Areas	PE-DG-417-100-E040	02

ANNEXURE – B

(Price Bid Format)

	Price Bid Format [Main Supply + Mandatory Spares + Services]	Annexure -[B] of PY51866
	Optical Linear Heat Sensing System	Rev.00
	Project: 5 x 800 MW Yadadri TPS	

BHEL ENQUIRY NO : Vendor Offer ref no:

Ref. date: Ref. date:

NOTES ::

1	This document details the price schedule format for the enquiry. **No other format will be entertained.** Applicable taxes and duties shall be indicated separately in commercial offer.
2	Duly signed & stamped un-priced price schedule format indicatinf "QUOTED" shall be submitted by vendor in the technical offer as a token of concurrence that price schedule would be submitted in this format. Any tampering / modification / additions, etc. are NOT allowed and not considered binding and is liable for rejection of the offer.
3	**Bidders shall be evaluated on overall L1 basis.**
4	For addition/reduction of quantity, unit rate quoted in the present offer shall be considered during order execution and shall be valid up to execution of the contract to the extent of + 10% to - 10% of overall order Value. These would include the cost up to engineering, installation of the item, wiring up in the panel and seamless integration with main system at works/site without any cost implications. All accessories as required for this purpose also shall be included in the Price Quoted
5	Components/Items for addition/deletion, spares shall be identical to the main equipment.
6	Billing will be as per BOM of actual supplied main equipment (including accessories) & spares.
7	Unit rates of components would be used for required additions/deletions of main equipment during order execution. These would include the cost up to engineering and seamless integration with main system at works/site without any cost implications. All accessories required for this purpose shall be included in the price quoted.
8	Unit rates list is indicative. Vendor has to include and quote unit rates for all items which are figuring in main supply & mandatory spares. Your offer will NOT be evaluated without unit rates. Any item/component, if not listed but required during execution, the same shall be supplied without any price implications.
9	The Bid Evaluation is on Overall L1 Basis. Partial offers will not be considered for evaluation and the same are liable for rejection.
10	Bidders will be required to quote Grand Total BASIC Price only in Price Bid Form in the e-procurement portal, considering all items as per this Price Format. Basic Prices of various line items shall be calculated by BHEL by multiplying the quoted Total Basic Price with the Weightages mentioned in this Price Format against the respective line items.

	Price Bid Format [Main Supply + Mandatory Spares + Services]						Annexure -[B] of PY51866
	Optical Linear Heat Sensing System						Rev.00
	Project: 5 x 800 MW Yadadri TPS						
S. No	**Material Code**	**Item Description**	**Quantity [I]**	**Unit**	**TOTAL PRICE (Rs.) [I*II]**	**Weightage (%) for Calculation of Line Item Prices**	**REMARKS**
[A]	**MAIN SUPPLY**						
		Design, Engineering & Supply of OLHS Package	1	Set	**Not to be filled by Bidder**	**96.01%**	
[B]	**MANDATORY SPARE**						
		Supply of Mandatory Spares for OLHS Package	1	Set	**Not to be filled by Bidder**	**2.04%**	
[C]	**SERVICES**						
(i)		Supervision of Erection & Commissioning Services charges at site including lodging, boarding, local travel, insurance, etc. [Unit Rate = Per man day charges]	96	Days	**Not to be filled by Bidder**	**1.83%**	
(ii)		Supervision of Erection & Commissioning visit charges [i.e. travel expenses like travel to & fro from vendors work to site, clearance charges like visa fee, etc.] [Unit rate = per visit travel expenses]	8	Visits	**Not to be filled by Bidder**	**0.12%**	
Grand Total Basic price for overall L1 evaluation ([A]+[B]+[C]) (Rs.) ::					**To be filled by Bidder** (Refer Note-10)	**100.00%**	

	Price Bid Format **[Main Supply + Mandatory Spares + Services]**	**Annexure -[B] of PY51866**
	Optical Linear Heat Sensing System	**Rev.00**
	Project: 5 x 800 MW Yadadri TPS	

Unit Rates for Main Plant Area

S. No	Equipment	Unit Rate	Remarks
1	Optical LHS Cable for Cable Galleries		
2	Optical LHS Cable for Coal Conveyors		
3	Controller along with Enclosure		
4	Converter / SMPS (230 V AC to 24 V DC)		
5	UPS		
6	OLHS Termination Accessories		
7	Relay Outputs		
8	Splicing Kit		
9	Splicing Accessories		
10	Laptop		
11	Programming Software		
12	Commissioning Software		
13	Batteries		
	(Refer NOTE - 8 for additional items)		

ANNEXURE – C

(Technical Specification for OLHS Cable & Controller)

D. **LINEAR HEAT SENSING CABLE**

1.00.00	Manufacturer	:	As per approved make	
2.00.00	Type	:	Non-electrically operated Fibre Optical type linear heat sensing cable. It shall be totally immuned to EMI/RFI	
3.00.00	Operating voltage	:	24 Volt D.C.	
4.00.00	Ambient temperature	:	-20^{o} C to 70 ^{o}C	
5.00.00	Operating temperature	:	Programmable type, with combination of fixed temperature and Rate of Rise in temperature.	
6.00.00	Cable Optical Parameter	:	62.5/125 µm graded index, Multimode Fiber	
7.00.00	Cable Jacket	:	Steel Type (for conveyor)	Thermoplastic (for cable tray)
	i) Nominal Cable Diameter	:	3.2mm	4 mm
	ii) Maximum weight	:	33 kg/km	23 kg/km
	iii) Minimum Bending Radius	:	75 mm	63 mm
8.00.00	Typical Performance	:		
	i) Sampling Resolution	:	1.0 meter	
	ii) Measurement Time	:	10 sec for 4 kms	
	iii) Measurement Range	:	-20^{o} C to 150^{o}C	

9.00.00	Detector/Control Unit Condition	:	LED for Power ON/Fault/Alarm It shall have freely programmable Relay Contact, minimum 16 nos.
10.00.00	Enclosure for Detector Unit	:	Weather tight and gasketed, IP-54 or better
11.00.00	All accessories such as fittings, fastenings, sleeves, straps, staples, clips (mounting) rings, test terminals, Junction Box etc. as may be required for interconnection of linear heat detector cables as well as interconnection to Control and Power Cable	:	Yes
12.00.00	Linear Heat Detector approved by FOC/FM/UL/ TAC/LPA/NFPA/VDS/LPCB	:	Yes
13.00.00	Interface	:	PC Interface via Ethernet/Mod-bus output etc.
14.00.00	Fire Detection	:	Unit should be able to detect abnormal/hot spot within 1 mtrs. Span. Further it shall be able to measure both side of the FO LHS cable in the event of wire break. So as to ensure continued fire protection over the entire length.

ANNEXURE – D

(List of Cable Galleries)

5 x 800 MW YADADRI TPS				
Annexure - D				
Sl. No.	**Drawing Title**	**Drawing No.**	**Revision**	**No. of MVWS Zones**
CABLE GALLERIES				
1	Cabling Layout Below MV Switchgear Room Unit - 1, 2, 3, 4 & 5	PE-DG-417-100-E109	03	20
2	Cabling Layout Below LV Switchgear Room Unit - 1, 2, 3, 4 & 5	PE-DG-417-100-E110	02	10
3	Cabling Layout Below CCR Room	PE-DG-417-100-E136	04	12
4	Cabling Layout Below Boiler Switchgear Room Unit - 1, 2, 3, 4 & 5	PE-DG-417-100-E113	02	8
5	Electrical Equipment & Cabling Layout in ESP Control Room Building Unit - 1, 2, 3, 4 & 5	PE-DG-417-100-E008	09	20
6	Electrical Equipment & Cabling Layout of FGD Control Room (Stage-1)	-	02	1
7	Electrical Equipment & Cabling Layout of FGD Control Room (Stage-2)	PE-DG-417-100-E118	00	1
8	Electrical Equipment & Cabling Layout of Switchyard Control Room	-	-	1
9	Equipment Layout : CHP ER-1 Near WT-1, 2 & TH-1	IS-1-EE-699-100-E002	2	4
10	Equipment Layout : CHP ER-2 Near WT-3, 4 & TH-2	IS-1-EE-699-100-E003	2	1
11	Equipment Layout : CHP ER-3 Near Crusher House cum Control Room	IS-1-EE-699-100-E004	5	1
12	Equipment Layout : CHP ER-4 Near Stockpile Area	IS-1-EE-699-100-E005	4	1
13	Equipment Layout : CHP ER-5 Near Bunker	IS-1-EE-699-100-E006	7	1

MVWS - Medium Velocity Water Spray System

ANNEXURE – E

(List of Coal Conveyors)

5 x 800 MW YADADRI TPS				
Annexure - E				
COAL CONVEYORS				
Sl. No.	**GA of Conveyor**	**Drawing No.**	**Revision**	**No. of MVWS Zones**
1	BCN 1AB	IS-1-GA-699-101-M008	01	15
2	BCN 2AB	IS-1-GA-699-101-M009	02	13
3	BCN 3AB	IS-1-GA-699-101-M010	01	17
4	BCN 4AB	IS-1-GA-699-101-M011	01	19
5	BCN 5	IS-1-GA-699-101-M012	01	1
6	BCN 6AB	IS-1-GA-699-101-M013	01	31
7	BCN 7	IS-1-GA-699-101-M014	02	4
8	BCN 8AB	IS-1-GA-699-101-M015	02	14
9	BCN 9AB	IS-1-GA-699-101-M016	01	17
10	BCN 10AB	IS-1-GA-699-101-M017	03	9
11	BCN 11AB	IS-1-GA-699-101-M018	02	1
12	BCN 12AB	IS-1-GA-699-101-M019	03	1
13	BCN 13AB	IS-1-GA-699-101-M020	02	1
14	BCN 14AB	IS-1-GA-699-101-M021	02	1
15	BCN 15AB	IS-1-GA-699-101-M022	02	1
16	BCN 21AB	IS-1-GA-699-101-M023	01	15
17	BCN 22AB	IS-1-GA-699-101-M024	01	9
18	BCN 23AB	IS-1-GA-699-101-M025	01	18
19	BCN 24AB	IS-1-GA-699-101-M026	01	21
20	BCN 25	IS-1-GA-699-101-M027	01	2
21	BCN 26	IS-1-GA-699-101-M028	01	3
22	BCN 27AB	IS-1-GA-699-101-M029	01	34
23	BCN 28	IS-1-GA-699-101-M030	01	1
24	BCN 29AB	IS-1-GA-699-101-M031	01	14
25	BCN 30 AB	IS-1-GA-699-101-M032	01	17
26	BCN 31AB	IS-1-GA-699-101-M033	01	6
27	BCN 32AB	IS-1-GA-699-101-M034	01	6
28	BCN 33AB	IS-1-GA-699-101-M035	01	6
29	BCN 34AB	IS-1-GA-699-101-M036	02	1
30	BCN 35AB	IS-1-GA-699-101-M037	02	1
31	BCN 36AB	IS-1-GA-699-101-M038	02	1
32	BCN 37AB	IS-1-GA-699-101-M039	02	1
33	BCN 38AB	IS-1-GA-699-101-M040	02	1
34	BCN 39AB	IS-1-GA-699-101-M041	02	1
35	RBCN 1AB	IS-1-GA-699-101-M044	01	10
36	RBCN 2AB	IS-1-GA-699-101-M045	01	9
37	TPC 1AB	IS-1-GA-699-101-M042	01	5
38	TPC 2AB	IS-1-GA-699-101-M043	01	1

MVWS - Medium Velocity Water Spray System

ANNEXURE – F

(Pre Bid Queries Format)

BHARAT HEAVY ELECTRICALS LIMITED
PROJECT ENGINEERING & SYSTEMS DIVISION

PROJECT: - 5 x 800 MW Yadadri TPS

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ANNEXURE-F

PREBID QUERIES FORMAT					
Sl. No.	**Bidding document Reference**			**Subject**	**Bidder's Query**
	Spec/Annexure	**Page No**	**Clause No**		

ANNEXURE – G

(Master Document List)

	Master Document Schedule	Annexure-G of PY51866
	Optical Linear Heat Sensing System	Rev-00
	Project: 5 x 800 MW Yadadri TPS	

S. NO	Drawing / Document Name	VENDOR Drg/ Document No	Category (A/I)	Schedule of submission from P.O. Date	First Submission (Rev -00)			Current Revision			Current Status (Approved / commented)	BHEL APPD CATEGORY
					Rev No	Actual Date of Submission	Return Date	Rev No	Actual Date of Submission	Return Date		
A.	**Project Execution Plan**											
1	Quality Plan		A	2 WEEKS								
2	Sub-vendor List		A	2 WEEKS								
B.	**Design Output documents**											
1	Schematic Diagram of OLHS System		A	4 WEEKS								
1	OLHS Layout of Coal Conveyor BCN 1AB		A	6 WEEKS								
2	OLHS Layout of Coal Conveyor BCN 2AB		A	6 WEEKS								
3	OLHS Layout of Coal Conveyor BCN 3AB		A	6 WEEKS								
4	OLHS Layout of Coal Conveyor BCN 4AB		A	6 WEEKS								
5	OLHS Layout of Coal Conveyor BCN 5		A	6 WEEKS								
6	OLHS Layout of Coal Conveyor BCN 6AB		A	6 WEEKS								
7	OLHS Layout of Coal Conveyor BCN 7		A	6 WEEKS								
8	OLHS Layout of Coal Conveyor BCN 8AB		A	6 WEEKS								
9	OLHS Layout of Coal Conveyor BCN 9AB		A	6 WEEKS								
10	OLHS Layout of Coal Conveyor BCN 10AB		A	6 WEEKS								
11	OLHS Layout of Coal Conveyor BCN 11AB		A	6 WEEKS								
12	OLHS Layout of Coal Conveyor BCN 12AB		A	6 WEEKS								

	Master Document Schedule	Annexure-G of PY51866
	Optical Linear Heat Sensing System	Rev-00
	Project: 5 x 800 MW Yadadri TPS	

S. NO	Drawing / Document Name	VENDOR Drg/ Document No	Category (A/I)	Schedule of submission from P.O. Date	First Submission (Rev -00)			Current Revision			Current Status (Approved / commented)	BHEL APPD CATEGORY
					Rev No	Actual Date of Submission	Return Date	Rev No	Actual Date of Submission	Return Date		
13	OLHS Layout of Coal Conveyor BCN 13AB		A	6 WEEKS								
14	OLHS Layout of Coal Conveyor BCN 14AB		A	6 WEEKS								
15	OLHS Layout of Coal Conveyor BCN 15AB		A	6 WEEKS								
16	OLHS Layout of Coal Conveyor BCN 21AB		A	8 WEEKS								
17	OLHS Layout of Coal Conveyor BCN 22AB		A	8 WEEKS								
18	OLHS Layout of Coal Conveyor BCN 23AB		A	8 WEEKS								
19	OLHS Layout of Coal Conveyor BCN 24AB		A	8 WEEKS								
20	OLHS Layout of Coal Conveyor BCN 25		A	8 WEEKS								
21	OLHS Layout of Coal Conveyor BCN 26		A	8 WEEKS								
22	OLHS Layout of Coal Conveyor BCN 27AB		A	8 WEEKS								
23	OLHS Layout of Coal Conveyor BCN 28		A	8 WEEKS								
24	OLHS Layout of Coal Conveyor BCN 29AB		A	8 WEEKS								
25	OLHS Layout of Coal Conveyor BCN 30 AB		A	8 WEEKS								
26	OLHS Layout of Coal Conveyor BCN 31AB		A	8 WEEKS								
27	OLHS Layout of Coal Conveyor BCN 32AB		A	8 WEEKS								
28	OLHS Layout of Coal Conveyor BCN 33AB		A	8 WEEKS								

	Master Document Schedule	Annexure-G of PY51866
	Optical Linear Heat Sensing System	Rev-00
	Project: 5 x 800 MW Yadadri TPS	

S. NO	Drawing / Document Name	VENDOR Drg/ Document No	Category (A/I)	Schedule of submission from P.O. Date	First Submission (Rev -00)			Current Revision			Current Status (Approved / commented)	BHEL APPD CATEGORY
					Rev No	Actual Date of Submission	Return Date	Rev No	Actual Date of Submission	Return Date		
29	OLHS Layout of Coal Conveyor BCN 34AB		A	8 WEEKS								
30	OLHS Layout of Coal Conveyor BCN 35AB		A	8 WEEKS								
31	OLHS Layout of Coal Conveyor BCN 36AB		A	8 WEEKS								
32	OLHS Layout of Coal Conveyor BCN 37AB		A	8 WEEKS								
33	OLHS Layout of Coal Conveyor BCN 38AB		A	8 WEEKS								
34	OLHS Layout of Coal Conveyor BCN 39AB		A	8 WEEKS								
35	OLHS Layout of Coal Conveyor RBCN 1AB		A	8 WEEKS								
36	OLHS Layout of Coal Conveyor RBCN 2AB		A	8 WEEKS								
37	OLHS Layout of Coal Conveyor TPC 1AB		A	8 WEEKS								
38	OLHS Layout of Coal Conveyor TPC 2AB		A	8 WEEKS								
39	OLHS Layout for Cable Cellar Below MV Switchgear Room Unit - 1, 2, 3, 4 & 5		A	4 WEEKS								
40	OLHS Layout for Cable Cellar Below LV Switchgear Room Unit - 1, 2, 3, 4 & 5		A	4 WEEKS								
41	OLHS Layout for Cable Cellar Below CCR Room		A	4 WEEKS								
42	OLHS Layout for Cable Cellar Below Boiler Switchgear Room Unit - 1, 2, 3, 4 & 5		A	4 WEEKS								
43	OLHS Layout for Cable Cellar ESP Control Room Building Unit - 1, 2, 3, 4 & 5		A	4 WEEKS								
44	OLHS Layout for Cable Cellar of FGD Control Room (Stage-1)		A	4 WEEKS								

	Master Document Schedule	Annexure-G of PY51866
	Optical Linear Heat Sensing System	Rev-00
	Project: 5 x 800 MW Yadadri TPS	

S. NO	Drawing / Document Name	VENDOR Drg/ Document No	Category (A/I)	Schedule of submission from P.O. Date	First Submission (Rev -00)			Current Revision			Current Status (Approved / commented)	BHEL APPD CATEGORY
					Rev No	Actual Date of Submission	Return Date	Rev No	Actual Date of Submission	Return Date		
45	OLHS Layout for Cable Cellar of FGD Control Room (Stage-2)		A	4 WEEKS								
46	OLHS Layout for Cable Cellar of Switchyard Control Room		A	4 WEEKS								
47	OLHS Layout for Cable Cellar of CHP ER-1 Near WT-1, 2 & TH-1		A	4 WEEKS								
48	OLHS Layout for Cable Cellar of CHP ER-2 Near WT-3, 4 & TH-2		A	4 WEEKS								
49	OLHS Layout for Cable Cellar of CHP ER-3 Near Crusher House cum Control Room		A	4 WEEKS								
50	OLHS Layout for Cable Cellar of CHP ER-4 Near Stockpile Area		A	4 WEEKS								
51	OLHS Layout for Cable Cellar of CHP ER-5 Near Bunker		A	4 WEEKS								
52	Complete Bill of Material (including erection hardware)		A	8 WEEKS								
53	Electrical Load List		I	2 WEEKS								
54	Earthing Layout		A	6 WEEKS								
	Data Sheets											
1	Technical Datasheet of OLHS Cable for Cable Galleries		A	2 WEEKS								
2	Technical Datasheet of OLHS Cable for Coal Conveyors		A	2 WEEKS								
3	Technical Datasheet of OLHS Controller		A	2 WEEKS								
4	Technical Datasheet of Converter / SMPS (230V AC to 24V DC)		A	2 WEEKS								
5	Technical Datasheet of UPS		A	2 WEEKS								

	Master Document Schedule	Annexure-G of PY51866
	Optical Linear Heat Sensing System	Rev-00
	Project: 5 x 800 MW Yadadri TPS	

S. NO	Drawing / Document Name	VENDOR Drg/ Document No	Category (A/I)	Schedule of submission from P.O. Date	First Submission (Rev -00)			Current Revision			Current Status (Approved / commented)	BHEL APPD CATEGORY
					Rev No	Actual Date of Submission	Return Date	Rev No	Actual Date of Submission	Return Date		
6	Technical Datasheet of Laptop		A	2 WEEKS								
7	Technical Datasheet of Termination Accessories (Lugs, Glands, Junction Boxes etc.)		A	2 WEEKS								
8	Technical Datasheet of Earthing Materials		A	2 WEEKS								
D.	ERECTION											
1	GA & Wiring Diagram of OLHS Controller		I	3 WEEKS								
2	Installation drawing for OLHS Controller		A	3 WEEKS								
3	Installation drawing for OLHS cable in cable galleries		A	3 WEEKS								
4	Installation drawing for OLHS cable in coal conveyors		A	3 WEEKS								
5	UPS Battery Sizing Calculation		A	3 WEEKS								
6	Erection & Commissioning procedures		I	3 WEEKS								
7	OLHS System Operating Manual		I	2 WEEKS								
8	Billing Break up		A	8 WEEKS								
9	Certificates(Factory tests, calibration reports, statutory approval certificates)		I	3 WEEKS								
10	Packing procedure + Packing list		I	3 WEEKS								

ANNEXURE – H

(Vendor List)

ANNEXURE - H

SUB – VENDOR LIST

Sl. No.	Vendor Name	Remarks
1.		
2.		
3.		
4.	-- NIL --	
5.		
6.		
7.		

NOTE: -

1. Bidder to comply with sub-vendor list as listed above. The sub-vendors for any item that is not appearing in the above list shall be proposed for BHEL's approval.

2. Non-acceptance of any proposed sub-vendor by bidder shall not have any commercial implication. While submitting sub-vendors for approval of BHEL, bidder shall furnish following documents:
   a) UL / FM / Vds / LPCB / CE etc. certificates of Sub-vendors
   b) Proven track record (references for makes and models supplied in the last 3 years along with supporting documents like unpriced PO, customer approved datasheets, proof of supply).

ANNEXURE – I

(Quality Requirements)

QAP GUIDELINES & FORMAT

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(ANNEXURE - I)

The QAP format and guidelines for filling up the format shall be used by vendor for preparation and submission of QAP after order placement.

Note :

1. Typical /Indicative /Standard QAP(s) for equipment /package attached is reference document and to use by successful bidder in future for preparation and submission of QAP for BHEL /CUSTOMER approval.

2. No deviation to reference document is acceptable.

GUIDELINES TO VENDORS FOR PREPARATION OF QUALITY ASSURANCE PLAN

1. QAP shall be made in landscape mode on A4 size paper as per the format enclosed. Font size shall be minimum 10.

2. Each page of QAP shall contain the following information.
   a) Vendor's name & address.
   b) Customer: BHEL, Hyderabad.
   c) Project.
   d) BHEL Product Standard Number/revision number as referred in P.O.
   e) BHEL Purchase Order Number & Date.
   f) Product as per P.O. description.
   g) QAP Number (unique and shall not repeat)/revision number/date.
   h) Page number and number of pages

3. QAP shall contain four parts / stages as follows.
   a) Raw materials and bought out items.
   b) In process Control / Inspection.
   c) Final assembly, Inspection & Testing.
   d) Painting, preservation & packing.

4. Under 'Component', indicate name of the component (say casing, rotor, pressure gauge, etc).

5. Under 'Characteristics', indicate appropriately (say chemical analysis, mechanical properties, NDT (UT,DP etc.), hydrostatic test, calibration check etc.)

6. Under 'Class', indicate minor, major or critical depending on the importance of characteristic.

7. Under 'Type of check', indicate appropriately (say chemical, mechanical, UT, DP etc.)

8. Under 'Quantum of check', indicate appropriately (say 100%, 10%, sample, per melt, per heat, all pieces etc.)

9. Under 'Reference document' and 'Acceptance norms', appropriate National & International standards, BHEL standards, approved drawing references etc. should be indicated. It is not correct to mention as "Vendor's internal standards or Vendor's standard practice etc.". If vendors' internal standards are referred, same shall be in line with BHEL Spec. indicated in the P.O. These may require review & approval by our Engineering dept.

10. Under 'Format of record', indicate appropriately supplier's test certificate, calibration certificate, lab report, inspection report etc.

11. Please refer 'Agency' in QAP format.
    Under P: Perform, W: Witness, V: Verify
    Indicate against each characteristic 1: (BHEL CQS/Nominated inspection agency), OR
    2: (Vendor / Sub vendor)

Note: Performing agency is normally vendor or his sub vendor (Legend 2). Where witness points are indicated in specification, P.O., Drawing etc., for such operations, under Witness (W) column use 1. Under 'Verify' column, use code1.

12. Under ‘D’ please put (□ Tick) against each characteristic where vendor proposes to submit test certificate/report etc. OR as required as per BHEL Specification.

13. Vendor’s signature & stamp should be available on each page of QAP.

14. Vendor should read the BHEL Product Standard thoroughly and QAP should be made only inline and relevant to the Specification & Approved Drawings.

15. The following operations/characteristics/check points may be included (AS APPROPRIATE)
   a) Visual check
   b) Dimensional check
   c) Mechanical and Chemical properties.
   d) Surface preparation before painting (by chemical cleaning, sand blasting, shot blasting etc. as the case may be.)
   e) Painting check for shade, Dry Film Thickness (DFT), Adhesion/ peel off test etc.
   f) Check for correctness for all components mounted as per General arrangement Drawing, Bill Of Materials (BOM), etc. for range, rating, make, color, size, location as per GA, quantity, label description including tag nos., annunciator facia, loose components, accessories, spares etc.
   g) Verification of test certificate for protection class for the enclosures.
   h) Mechanical functioning of switches.
   i) Continuity of earthing and provision of earth points.
   j) Colour coding of wiring, size, tightness & dressing of wiring.
   k) Review of test certificates of assembled items, raw materials, internal test reports etc.
   l) Witness of functional checks, which may include mechanical run & electrical run, H.V.test, IR measurement, Electrical and Mechanical tests etc.
   m) PQR, WPS, Welder Qualification Record, welding records (fit up, DP) etc.
   n) Material identification (for punch marks of serial numbers, Heat No, Melt No, Inspector's stamp etc.)
   o) Hydraulic Pressure Test, Pneumatic Pressure Test, Liquid Penetration Examination and other Non Destructive Tests.
   p) Tests on Galvanised items (Visual, Hammer Test, Knife Test, Thickness, Pierce Test (Copper sulphate test), Hydrogen evaluation test, Stripping test (for Mass of Zinc coating)
   q) All tests as per BHEL Product Standard & approved drawings including Type tests and Routine tests on individual items and on System as a whole.
   r) For loose items test certificate or COC is required.
   s) Packing and Preservation.
16. **QAP Format enclosed.**
17. **Typical Manufacturing QAP is attached.**

VENDOR'S NAME & ADDRESS:	**MANUFACTURING QUALITY PLAN**		QP. NO.:	
	CUSTOMER: BHEL, HYDERABAD – 32. PROJECT: PRODUCT:	BHEL P.O.NO.: P.O.DATE: BHEL SPEC: REV:	REV NO:	DATE:
			PAGE 1 OF 1	

SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
									D	P	W	V	
1.0	**RAW MATERIALS & BOUGHT OUT ITEMS**												
2.0	**INPROCESS INSPECTION**												
3.0	**FINAL INSPECTION & TESTING**												
4.0	**PRESERVATION & PACKING**												

VENDOR TO NOTE: THIS FORMAT IS IN MICROSOFT WORD. HEADER & FOOTER SHALL BE AVAILABLE IN EACH PAGE OF QP. QP SHALL BE IN LANDSCAPE & A4 SIZE ONLY. FONT SIZE SHALL BE MIN 10. VENDOR SHALL SIGN & STAMP IN EACH PAGE OF QP. LOI REF. & DATE ARE NOT ACCEPTABLE. P.O.NO. & DATE SHALL BE INDICATED. QP NO. SHOULD BE UNIQUE AND SHALL NOT REPEAT. ALL THE TESTS / CHECKS INDICATED IN THE BHEL SPEC. SHALL BE INDICATED IN THE QP.

LEGEND: P: PERFORM, W: WITNESS, V: VERIFICATION. INDICATE 1 FOR BHEL CQS (OR BHEL NOMINATED INSPECTION AGENCY) & 2 FOR VENDOR/SUB VENDOR AS APPROPRIATE AGAINST EACH COMPONENT /CHARACTERISTIC UNDER P, W & V COLUMNS. * FOR ITEMS MARKED ✓ (TICK) IN COLUMN 'D', TEST CERTIFICATES SHALL BE SUBMITTED TO BHEL FOR RECORDS.	PREPARED BY VENDOR'S SIGNATURE & STAMP	APPROVED BY BHEL QA SIGNATURE & STAMP	APPROVED BY CUSTOMER'S SIGNATURE & STAMP

VENDOR'S NAME & ADDRESS:	MANUFACTURING QUALITY PLAN		QP. NO : MASS-QAP-573-01
			REV NO: 01 | DATE: CURRENT
AP SENSING GMBH HERRENBERGER STR. 130, 71034 BÖBLINGEN, GERMANY	CUSTOMER: TSGENCO CLIENT: BHEL, HYDERABAD – 32. PROJECT: OPTICAL LHS SYSTEM 1 X 800 MW KOTHAGUDEM TPS PRODUCT: OPTICAL LHS SYSTEM	BHEL P.O.NO.: T717A00066 & 67 P.O.DATE: BHELSPEC: OLHS SYSTEM REV: 0	PAGE I OF I

SL NO	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE STANDARD/ACCEPTANCE CRITERIA	FORMAT OF RECORD	AGENCY			REMARKS
					P	W	V	
1.0	Verification of manufacturer name	100%	APPROVED DATA SHEET/OEM STANDARD	Mfr TC	2	2	1	
2.0	Visual inspection	100%	APPROVED DATA SHEET/OEM STANDARD	Mfr TC	2	2	1	
3.0	Calibration Test (for Controller)	100%	APPROVED DATA SHEET/OEM STANDARD	Mfr TC	2	2	1	
4.0	Attenuation test (for LHS Cable)	100%	APPROVED DATA SHEET/OEM STANDARD	Mfr TC	2	2	1	

LEGEND: P: PERFORM, W: WITNESS, V: VERIFICATION. INDICATE 1 - BHEL / TSGENCO & 2 – MANUFACTURER.	PREPARED BY	APPROVED BY	APPROVED BY
	VENDOR'S SIGNATURE & STAMP	BHEL QA SIGNATURE & STAMP	CUSTOMER'S SIGNATURE & STAMP

AP SENSING
advanced photonic
Herrenberger Strasse 130
71034 Boeblingen
Germany

02/01
Executive Director
Thermal Projects Construction
TSGENCO, Vidyut Soudha,
Khairatabad, Hyderabad-500 082.

ANNEXURE – J

(Checklist)

ANNEXURE - J

CHECK LIST FOR OFFER SUBMISSION

REV-00

SL No	Description	Bidder's Confirmation
1	Technical offer complies with the specifications and its associated annexures, pre-bid clarifications in Toto and there are no technical deviations. Signed and stamped copy of this specification along with annexures enclosed along with technical offer.	
2	Bidder to quote as per BHEL price format only. No other format is acceptable. Bidder to attach un-priced price bid format by indicating "QUOTED" and submit with technical offer duly signed & stamped.	
3	Bidder to submit Pre-Qualification criteria along with necessary docments like: 1) Unpriced Purchase Order copy 2) Commissioning Certificate / Job Completion Certificate / Performance Certificate from End Customer 3) Customer Approved Documents like Datasheets etc.	
4	All items are manufactured conforming to latest version of material grade standard and manufacturing standard mentioned in this specifications	
5	For addition/reduction of quantity, unit rate quoted in the present offer shall be considered during ordering and shall be valid up to execution of the contract to the extent as specified in the price bid format.	
6	In case of deviation, vendor to confirm that these are technically not feasible deviations and same are to be submitted in BHEL format during pre-bid stage only.	
7	It shall be bidder's responsibility to get all his queries and deviations addressed by the purchaser during the pre-bid stage itself. No queries / deviations shall be acccepted by purchaser from the bidder in their technical offer.	
8	Bidder to submit the No Deviation letter w.r.t. BHEL spec: PY51866, Rev-00 along with offer.	
9	Vendor shall supply all the material to meet the performance, sizing & technical requirement as per specification & its Annexures, scope matrix etc.	
10	Confirm that the quote includes training, commissioning spares, special tool & tackles, erection & mounting hardware/ accessories, terminations, networking components, licensence/dongle etc. as required for erection & commissioning activities.	
11	Bidder to confirm that supply of software and hardware as required for complete functioning and maintenance of the system shall be in the scope of the bidder.	
12	All the equipments / items / OLHS cable / Controller etc., supplied by bidder are having valid statutory approval certificates and same will be produced at any stage of contract execution to BHEL. The same were eligible to take local statutory regulatory body approval during commissioning of the system	
13	Bidder to agree that Bill of materials / list of equipment furnished in the offer is only for information. Vendor shall engineer the system as per the intent of specification and generate the BOQ accordingly The BOQ supplied for LHS system shall meet the performance, sizing & technical requirement as per specification & its Annexures, scope matrix etc.	

BIDDER'S SIGNATURE:
NAME:
DATE:
COMPANY SEAL:

ANNEXURE – K

(No Deviation Format)

ANNEXURE - K

LIST OF DEVIATIONS

Project: FDA SYSTEM FOR 5 x 800 MW Yadadri TPS

Sl. No.	Part No./ Volume	Page no.	Clause No.	Subject	Deviation/Clarification	Reason for Deviation
1						
2						
3	--- NO DEVIATION ---					
4						
5						

NOTES:

1. Any deviation shall be specified during prebid stage itself. No deviations shall be accepted by purchaser in bidder's technical offer.
2. Nature of Deviations shall only be of Design / Manufacturing constraints and non-availability of items / components / makes in market.
3. Reasons for the deviations shall be clearly specified in the above format.
4. In case, bidder submits any deviation in their technical offer; then their offer may be rejected without any prior intimation.
5. This 'NO DEVIATION" shall be signed, stamped and shall be part of bidder's technical offer.

SIGNATURE OF THE BIDDER_____

NAME_____

DESIGNATION_____

COMPANY SEAL DATE_____

ANNEXURE – L

(Domestic Packing)

DOMESTIC PACKING

COMMON GUIDELINES

1 GENERAL:

This standard lays down packing instructions for domestic packing of Components/Assemblies/Equipment to be despatched against Customer's contracts, for which there are no special instructions issued by the Engineering Departments.

The Components/Assemblies need to be packed suitably to avoid physical damage & corrosion during transit & storage. For specific applications the concerned engineering department shall issue a product standard. Reference of this product standard, must appear in the Shipping list/Packing List.

2 TYPES OF PACKING:

The following 5 types of packings have been standardized for packing of General Components/Assemblies.

1) '**OP**' - Open Type.
2) **'PP**' - Partially Packed.
3) '**CP**' – Crate/Box Packing - Components/Equipment requiring physical protection.
4) '**CQ**' - Case Packing - Small & Medium Components/ Assemblies/ Equipment which require corrosion & physical protection.
5) '**CR**' - Case Packing - Electrical Components/Assemblies, which require special packing viz. Water Proof, Shock Proof etc...

3 DESCRIPTION OF TYPES OF PACKING:

The various types of packing, as standardized above, are described below.

3.1 'OP' - Open Type

In case, of components which are not affected by water & dust and do not require special protection, are generally not machined, shall be sent as open packages. However, these components may be sent in crates, wherever necessary.

3.2 'PP' - Partially Packed

Components which need special protection at selected portions only shall be despatched partially packed. Machined surfaces should not be allowed to come directly in contact with the wood. Such surfaces should be protected with 70GSM(Colourless) Multi Layered Cross Laminated Polyethylene Film to Specification No.AA51420. All sharp corners and edges shall be protected by rubber mats to prevent damage to the polyethylene film

3.3 'CP' - Crate Packing

Assemblies/Components which need only physical protection from the point of view of handling shall be despatched duly packed in crates.

3.4 'CQ' - Case Packing - Machined Components/Assemblies/Equipment

Small and medium sized components/assemblies/equipment due to size/weight and to avoid handling and pilferage problems shall be packed in Case/Containers. Wherever required adequate quantity of

silica gel to AA55619 or VCI Powder/Tablets, packed in thin muslin cloth cotton bags shall be suitably placed. Small machines/components of less weight shall be provided with suitable cushioning by Rubberised coir. The components inside the case shall be entirely covered with 70GSM(Colourless) Multi Layered Cross Laminated Polyethylene Film Specification No. AA51420, wherever required.

3.5 'CR' - Case Packing - Electrical & Electronic Components/Assemblies

Delicate components likely to be damaged e.g. Gauges, Instruments etc. are to be wrapped in waxed paper or polyethylene air bubble film and packed in cartons. Adequate quantity of Silica gel to AA55619 packed in cotton bags of 100grams each are to be suitably placed in the cartons. The cartons shall be entirely covered with 70GSM(Colourless) Multi Layered Cross Laminated Polyethylene Film Specification No. AA51420 before being packed in the cases. VCI Powder/Tablets can be used as an alternative to Silica Gel to AA 55619.

Empty space in the cartons shall be filled with rubberized coir to get proper cushioning effect. The cartons shall be manufactured from corrugated Fiber Board, meeting requirements of AA51414.

4 PREPARATION OF PACKING CASES

4.1 DOMESTIC:

Based on the availability, the wood shall be Rubber wood (Havea Brasiliensis)/Pine wood for packing of cubicles, loose items, spares and photovoltaic items meant for customers in India**.**

4.2 DIMENSIONS:

a) Thickness of planks for Front, rear, top and bottom sides and binding, jointing battens shall be 25 +2/-3 mm.

b) Width of all planks including the tongue shall be more than 125mm and after plaining it shall be minimum 100mm.

c) Minimum number of planks shall be used for a shook.

d) Horizontal, vertical, diagonal planks shall be given for binding (number of such planks depend on the dimension of panel.

e) External sides of front and rear planks to be plained to facilitate writing of address and other markings.

f) Width of binding planks shall be minimum 100mm.

g) Distance between any 2 binding planks shall be less than 750mm.

h) diagonal planks shall be used in between vertical binding planks when distance between inner to inner of vertical planks is more than 750mm

i) Distance of the outer edges of these planks from the edge of case shall be less than 250mm.

j) Diagonal planks are not required for top planks and width side, if the width of pallet is less than 750mm.

4.3 JOINTING OF PLANKS

Single length planks shall be used for cubicles whose overall length is less than 2400mm. For cubicles of length more than 2400mm, jointing is permitted. The jointing shall be done with one single or maximum of 2 planks of wood same as other planks of width 250 mm (minimum) with two rows of nails on either side of the joint in zigzag manner. From the joint along height side, it shall be of lap joint with overlap of at least the width of plank.

4.4 TONGUE AND GROOVE JOINTS

Two Consecutive planks shall be joined by tongue and groove joint. Depth of tongue shall be 12+1 mm, thickness of tongue shall be 8 +1 mm. The groove dimensions shall be such that the tongue fits tightly into the groove to make a good joint. This type of joint can be done based on the product requirement wherever required.

4.5 PERMISSIBLE DEFECTS

Wood shall be free from knots, bows, visible sign of infection and any kind of decay caused by insects, fungus, etc.

End splits: Longest end splits at each end shall be measured and lengths added together. The added length shall not exceed 60mm per meter run of shook's. Wood pins shall be used to prevent further development of split.

Surface cracks: Surface cracks with a maximum depth of 3mm are permissible. A continuous crack of any depth all along the length is not allowed.

4.6 CHEMICAL TREATMENTS FOR PRESERVATION OF WOOD

1) This treatment provides protection to the packing wood against deterioration due to fungi and attack by termites, borers and marine organism and any kind of infections.
2) The wooden planks, after making tongues / grooves shall be treated with chemicals. For pine wood, treatment with ASCU/ CCA solution need not be done.
3) The chemical used shall be ready mix ASCU paste. This consists of Arsenic pent oxide, copper sulphate sodium dichromate. This Paste shall be mixed at the rate of 1 kg of paste per 10 liters of water to the extent of water used. Alternate this CCA paste as mentioned at Para 4.6.5) can also be used.
4) The chemical treatment shall be done at the premises of the contractor. A cement concrete tank of capacity to hold a minimum of 2000liters of solution shall be constructed. The solution shall be prepared in the presence of BHEL Representative by contractor. The wooden planks shall be soaked in the solution for a minimum of 12 hours. The solution shall be replenished after treating a maximum of 12 cubic meters of wood. A log book shall be maintained by the contractor to give the details of date of preparation of solution, quantity of solution prepared, quantity of chemicals used, Quantity of wood treated and the details of replenishment. Samples of solutions before mixing will be tested at the laboratories designated by BHEL. The testing fees to be paid to the laboratories will have to be borne by the contractor. The paste shall be tested as and when required.
5) Specifications for water soluble type wood preservatives: Copper – Chromium – Arsenic [CCA]: Copper – Chromium – Arsenic preservative formulation shall be as per IS:10013 Part – II – 1981 shall consist of following active ingredients in nominal proportions by weight as shown below:

– Arsenic Pent oxide	AS2O52H2O	12.5
– Copper Sulphate	CuSO45H2O	37.5
– Sodium Dichromate	Na2Cr2O75H2O	50.0
– Or Potassium Dichromate	K2Cr2O7	

4.7 OTHER MATERIALS

4.7.1 NAILS

The dia. of the nails shall be 3.15mm. The length of the nails shall be 65mm wherever two planks of 25mm thickness are joined and 75mm wherever a 25mm planks is joined to a 50mm plank.

4.7.2 BLUE NAILS

These are used for nailing bituminized Kraft paper/hessian cloth to the planks. The length of the nails shall be 16mm.

4.7.3 HOOP IRON STRIPS

These are used for strapping the boxes. The width of the strips shall be 19+1mm and thickness 0.6 +0.01mm. The material shall be free from rust.

4.7.4 CLIPS

These shall be used for strapping the hoop iron strips on the boxes.

4.7.5 BRACKETS

These brackets are used for nailing to the corners of cubicle boxes. The brackets shall be of mild steel of thickness min 2mm and width 25+1mm. The brackets shall be of "L" shape, the length of each side being 100+2mm. Two holes shall be provided towards the end of each side for screwing /nailing.

4.7.6 FASTENERS

Bolts, double nuts, spring washers will have to be used for packing of some special items like transformers, reactors, breakers, etc., to hold the job to the bottom plank of the box. The bolts, nuts, washers will be provided by the vendor. Drilling of holes will have to be done using contractor's tools.

4.7.7 MULTI LAYERED CROSS LAMINATED POLYTHELENE FILM

70GSM (Colourless) Multi Layered Cross Laminated Polythelene Film Specification No: AA51420 are used to make covers to the jobs individually. The cross lamination gives qualities of extra toughness, together with flexibility and lightness coupled with good weather resistance to ultra violet rays.

4.7.8 RUBBERISED COIR:

The rubberized coir is used as cushioning material. For the packing of loose items, items are to be arrested by using rubberized coir. For the packing of cubicles rubberized coir of thickness 25mm and width 75mm shall be used.

4.7.9 FOAM RUBBER / 'U' FOAM:

This is used for covering the delicate items. This material is provided by the vendor.

4.7.10 MARKING PLATE:

This shall be of anodized aluminium sheet. Details and specifications are given in Fig-4

4.7.11 PACKING SLIP HOLDER:

This shall be of galvanized iron tinned sheet /Aluminium sheet

4.7.12 SILICA GEL:

This shall be of indicating type to conform to IS: 3401/AA55619.

4.7.13 COTTON BAGS:

These are used for holding silica gel. The bags shall have the following matter indicated on them:

BHEL-UNIT NAME	PLACE-PINCODE
SILICA GEL	INDICATING TYPE
BLUE :	ACTIVE
ROSE :	REDUCED ACTIVITY
WHITE :	NO ACTIVITY. TO BE REPLACED WITH FRESH SILICA GEL

4.7.14 COTTON/ PLASTIC TAPE:

This is used for tying small items. And also to prevent vibrations of moving parts within the cubicles.

4.7.15 MARKING INK:

The ink used normally is black in color. In some special cases other color also will have to be used. The ink shall be non-fading/indelible and non-washable by water.

4.7.16 POLYETHYLENE BAGS:

These are to be used for keeping the Packing slips. The bag shall be of size 70mm X 100mm (minimum).

4.7.17 Hessian cloth, twine thread, paint will have to be used in packing certain items.

4.7.18 Mechanical Latching clamps:

For CLW Railway panels and similar Panels self-locking clamps can also be used on need basis in conjunction with or apart from regular bolt and nut fixing arrangement. For reusable boxes, these clamps provide easy locking and unlocking arrangement. These clamps will be made available from BHEL in some cases.

4.7.19 STICKERS

The following stickers to be put by the vendor on cubicles/Boxes after packing.

1. Case No sticker: 2 nos. Size 25.Cm x 0.45Cm
6) BHEL Monogram sticker: 1 no. Size 1.75Cm x 2.3Cm
7) Address sticker: 2 nos. Size 3.8Cm x 3.0Cm
8) Direction sticker " Front " & " Back " - 4 nos. Size 2.0Cm x 0.75Cm
9) Chain Mark Sticker: 4 Nos. Size – 3.0Cm x 0.75Cm
10) "Fragile " sticker: 2 Nos Size. 2.1Cm x 1.5Cm
11) "DO NOT STACK " sticker - 2 Nos. Size 3.0Cm x 2.2Cm

5 PACKING OF CUBICLES WITH RUBBER WOOD:

5.1 The packing is to be done as per clause 4 in all respects.

5.2 The cubicles are already fixed on wooden pallets. Hence the contractor need not arrange the bottom pallets normally.

5.3 The cubicles will be of different sizes both widthwise and lengthwise. The cubicles may be made up of single suite, 2 Suite, 3 Suite, 4 Suite, etc., The width of the cubicles generally varies from 400 mm to 1650mm.The length of the cubicle, generally varies from 1500 mm to 4800 mm. The height is normally 2430 mm. In some cases, the height may be less/more**.**

5.4 MULTI LAYER CROSS LAMINATED POLY FILM

The inner surface of 4 sides of shook's shall be nailed with Multi-layer cross laminated poly film (as per 4.7.7) using blue nails (as per 4.7.2) wherever 2 pieces of Cross laminated poly film are used, the joint shall have an overlap of minimum 20mm.

The inner surface of top cover shall be nailed with Multi-layer cross laminated poly film (as per 4.7.7). This sheet shall project outside on 4 sides by at least 100mm and shall be nailed properly on sides. Joining of sheets should have overlap of minimum 20mm.

The cubicles shall be covered with Multi-layer cross laminated poly film (as per 4.7.7).

5.5 SILICA GEL:

Silica gel (as per 4.3.15) packed in cotton bags shall be kept at different places inside the cubicle as per BHEL-Unit directions. Each suit of cubicle shall be provided with 1 kg of Silica gel (for a 4 suit cubicle 4 kgs of Silica Gel to be used. The bag containing silica gel to be as per 4.7.13).

5.6 LOOSE PARTS:

Any loose parts in the cubicles shall be tied using cotton/ plastic tape. Wooden battens shall be provided wherever necessary.

5.7 WOODEN BATTENS:

In case of cubicle which are not rectangular in shape like control desks, sufficient number of wooden rafters/battens of proper size shall be provided to give strength to the package.

5.8 RUBBERISED COIR:

Gap between the cubicle and the case shall be filled with rubberized coir (as per 4.7.8) with distance between consecutive layers less than 500mm.

5.9 CLAMPING:

Packing shall be bound at edges by nailing M.S. Clamps / Brackets (as per 4.7.5). Each vertical edge shall have minimum 3 clamps. Top horizontal edges will have one clamp for every meter length of package. However, minimum 4 clamps shall be nailed at the top for any cubicle.

5.10 PACKING SLIP:

Packing slip kept in the polyethylene bag (As per 4.7.16) shall be placed in the box at appropriate place. In addition, one more packing slip covered in polyethylene cover and packing slip holder (as per 4.7.11) shall be nailed to front / rear of case.

5.11 MARKING PLATE:

One no. (As per 4.7.10) shall be nailed to the front side of the case.

5.12 CASE MOUNTING:

After complete packing, stencil marking of various details and marking of symbols shall be done as per BHEL instructions using indelible / non washable marking ink.

5.13 Different types (Typical) of Cubicles with sizes for Packing

1. Single suite cubicle - 900 x 950 x2500
2. Two suite cubicle - 1650 x 950 x 2500
3. Three suite cubicle - 2400 x 950 x2500
4. Four suite cubicle - 3150 x 950 x 2500
5. Regulation cub - 1300 x 1350 x 2500
6. Thy cub - 2870 x 1350 x 2500
7. VFD Cub - 3800 x 1550 x 2500

5.14 PACKING OF CUBICLES WITH PINE WOOD

Packing of cubicles for export shall be done exactly in same manner as described at Cl.No 5 except for the following changes: -

Wood shall be Silver oak/ Pine wood instead of rubber wood.

– Double polyethylene petticoat instead of one.

– Fumigation may have to be done if required (BHEL Scope).

6 PACKING OF LOOSE ITEMS/SPARES USING RUBBER WOOD:

1) Shape of cases shall be square, rectangular with single gabled roof or with double gabled roof depending on the nature of the job to be packed. Construction shall be as per drawings enclosed. Only gable will be additional as required.
2) Wood shall be rubber wood with Tongue and Groove joint as per clause 4.4.
3) Chemical treatment as per Clause 4.6 to be done.
4) Width of planks shall be at least 100 mm. Width of binding planks (battens) shall be at least 75mm.
5) External surface of planks on front and rear shall be plane 100% (except bottom plank).
6) Inner surfaces of all 6 sides shall be lined with bitumen coated hessian polyethylene Kraft paper (as per clause 4.7.7) using blue nails.
7) Rubberized coir of minimum 25mm thickness and 100 mm width shall be nailed to inner surfaces of bottom and 4 sides of box.
8) Internal packing: Items that go into the box shall be packed using 70GSM, (Colourless) Multi Layered Cross Laminated Polyethylene Film Specification No: AA51420. Any space left Between the job and the sides and the top of the box shall be filled with rubberized coir to get proper cushioning effect .
9) Certain items like transformers, reactors, breakers, etc., shall be bolted to the bottom of the box using bolts, nuts and washers.

10) Silica gel as per clause 4.7.12 held in cotton bags as per clause 4.7.13 shall be kept at proper places in the box.

11) Packing slip kept in polyethylene bag (clause 4.7.16) shall be placed in the box.

12) Marking plate as per clause 4.7.10 shall be nailed to side of the box.

13) Two numbers of hoop iron strips as per clause 4.7.3 shall be strapped tightly on the case using clips.

14) Stencil marking of various details and marking of various symbols shall be done as per BHEL instructions using indelible/non-washable marking ink.

15) Loose items to be kept inside the cubicle

- The components which are removed from cubicle for shipping purpose only, such as meters shall be kept inside the cubicle individually, kept in wooden box and tied firmly in bottom of Cubicle.

- Other items which are given loose in addition to cubicle shall be packed in separate boxes.

7 BOX SIZES

7.1 BOX SIZES

Table 1 – SPARES WOODEN BOX DETAILS

SNO	BOX TYPE	BOX SIZE (in mm)	BOX Wt (in KG)	Carrying Capacity
1	A	800 X 200 X 200	15	
2	B	1500 X 200 X 200	22	
3	C	2000 X 200 X 200	27	
4	D	1100 X 200 X 200	15	
5	E	200 X 200 X 200	5	
6	F	320 X 250 X 260	13	
7	G	320 X 250 X 430	16	
8	H	430 X 370 X 430	23	
9	I	1100 X 400 X 400	45	
10	J	1500 X 500 X 400	65	
11	K	2000 X 500 X 400	93	
12	L	2500 X 500 X 400	88	
13	M	900 X 600 X 600	100	
14	N	3000 X 400 X 400	60	
15	P	600 X 500 X 400	35	
16	Q	710 X 630 X 600	90	
17	R	850 X 630 X 670	102	
18	S	1000 X 770 X 670	140	
19	T	2500 X 850 X 800	180	
20	U	1500 X 700 X 700	120	
21	W	1200X900X600	120	
22	Y	450 X 200 X 200	10	

7.2 BOX SIZES

Table 2 – VALVES WOODEN BOX DETAILS

BOX TYPE	BOX SIZE (in MM)	BOX Wt (in KG)	Carrying Capacity
1A	320X250X260	10	
1	320X250X430	15	
2	430X370X430	25	
3	670X670X470	65	
4	720X630X600	75	
6	1000X770X660	100	
7	1100X430X670	80	
8	1200X1200X900	80	
10	1300X770X1050	155	
11	2500X850X800	225	
12	2000X1500X1200	305	
14	1850X1050X1250	260	
15	2000X800X800	180	
17	2600X1500X1600	470	
21	250X250X600	20	
22	250X250X880	30	
23	300X300X700	25	
24	380X380X880	45	
25		25	
26	510X510X1400	60	
27	570X570X1400	80	
28	575X575X1875	105	
29	3600X1100X1100	390	
30	900X500X800	110	
52	2000X950X740	225	
53	1600X1120X700	220	
54	2500X2000X1200	490	
55	2900X1900X1400	525	
56	3000X1000X900	370	
57	3200X2200X950	450	
58	2150X1100X750	325	
61	2000X2000X700	130	
62	700X1200X1325	130	

TYPICAL PATTERN OF WOODEN BOX

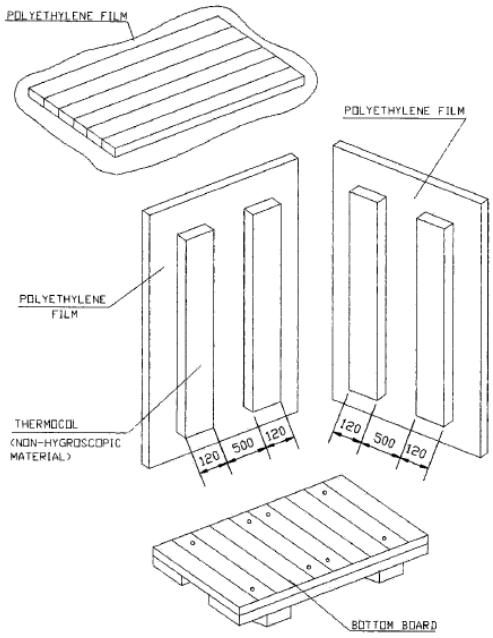


Figure 1

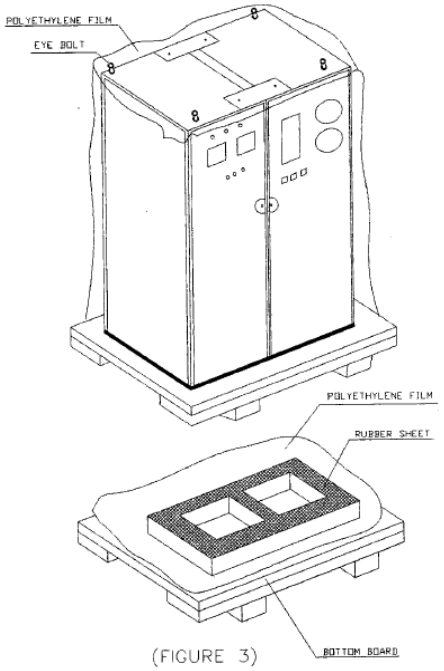


Figure 2

7.3 STANDARD BOX SIZES

WOODEN BOXES:

SL NO	TYPE	DIMENSION IN MM			WEIGHT	CARRYING CAPACITY (KGS)
		LENGTH	BREADTH	HEIGHT		
01	I	2370	1570	1650	675	4000
02	IIA	1570	720	885	200	2500
03	II	1200	900	600	150	2000
04	III	900	600	600	100	1000
05	IV	600	450	450	40	750
06	V	600	300	300	35	500

STEEL BOXES:

SL NO	TYPE	DIMENSION IN MM			WEIGHT	CARRYING CAPACITY (KGS)
		LENGTH	BREADTH	HEIGHT		
07	I	2480	1680	1500	339	4500
08	II	1200	900	600	061	2000
09	IIB	1800	850	950	115	2500
10	III	900	600	600	029	1000
11	IV	600	450	500	019	750
12	V	400	350	300	011	500

Table 3

7.4 STEEL CONTAINERS

Steel containers for packing can be used in case of repeated supplies of the same equipment. Empty steel containers are to be returned back from customer's end and to be reused for the next supplies. The containers are to be made of structural steel as per AA10108 with proper reinforcement with I, C and T Sections.

a) Following precautions are to be taken during packing: -

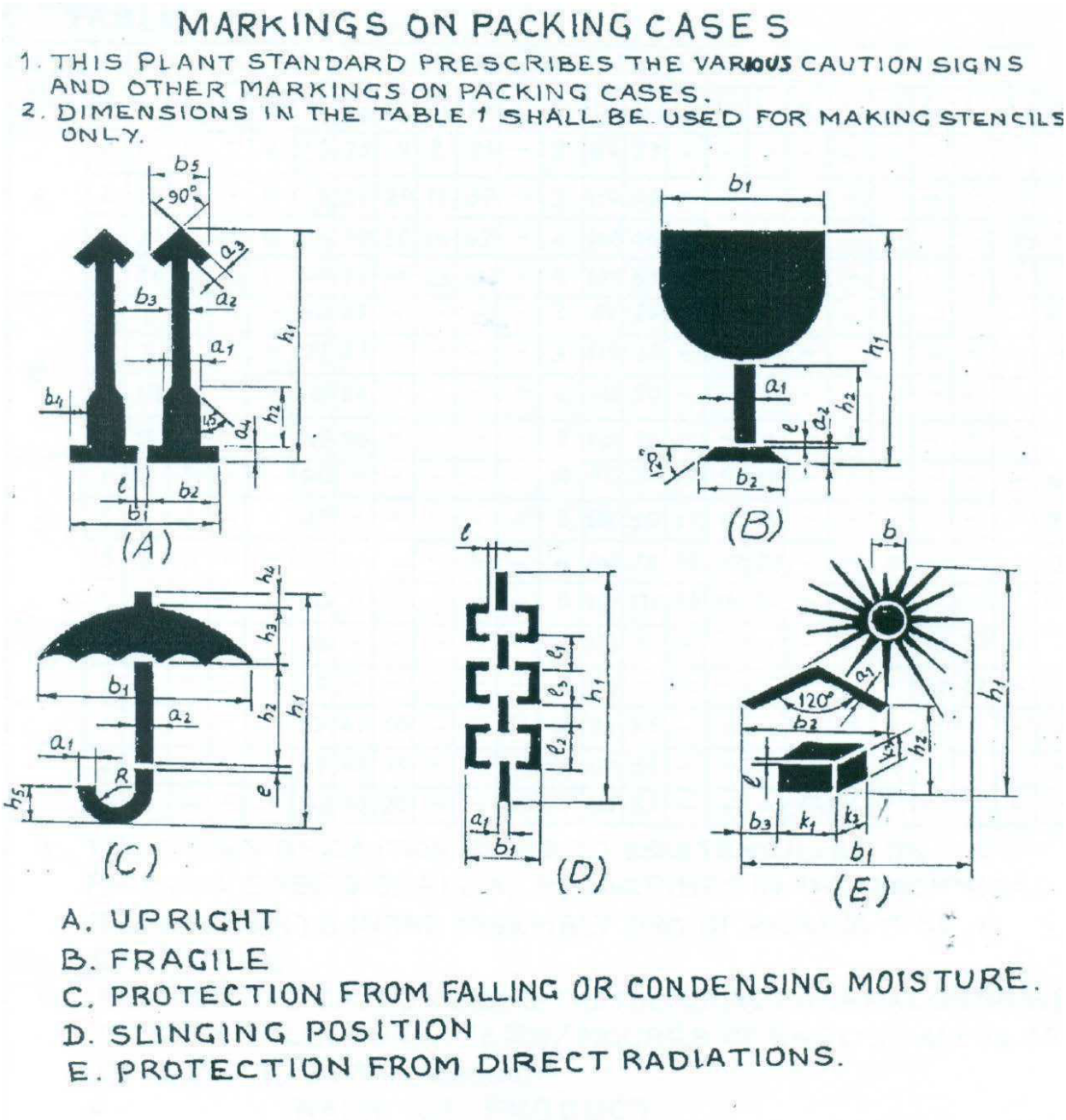
b) Put the machine in the steel container properly,

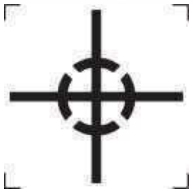
c) Cover the machine with polythene.

d) To arrest the movement in the steel container necessary wooden Blocks/Battons may be put.

e) Put cover on steel, container and Bolt Properly

8 MARKINGS/STENCILINGS





Center of Gravity

Figure 3

CORPORATE STANDARD

DESIGN-ATION		DIMENSION IN MM																						
		a1	a2	a3	a4	b1	b2	b3	b4	b5	b	l	h1	h2	h3	h4	h5	k1	k2	k3	l1	l2	l3	R
A	1	12	5	5	4	52	25	19	8	21		2	84	23										
	2	17	7	7	6	75	36	29	11	30		3	119	33										
	3	24	10	10	8	104	50	38	16	42		4	168	46										
	4	34	14	14	11	147	71	59	23	60		5	239	65										
B	1	5	5			50	33					2	84	25										
	2	7	7			71	47					3	119	36										
	3	10	10			100	66					4	168	50										
	4	14	14			142	94					5	239	71										
C	1	4	3			66						2	80	39	19	5	11							6
	2	6	4			85						3	114	55	27	7	16							9
	3	8	6			120						4	160	78	38	10	22							12
	4	11	9			170						5	227	110	54	14	31							17
D	1	6				30						4	148								30	30	10	
	2	9				42						5	209								42	42	14	
E	1	3				69	47	10			16	2	91	26				17	8	11				
	2	4				98	67	15			23	3	128	33				24	11	16				
	3	6				138	94	20			32	4	182	62				34	16	22				

Table 4

Black and Red Marking Ink to IS:1234 "Ink, Stencil, Oil Base, For Marking Porous Surfaces" or duplicating ink stencilling, oil base for marking porous surfaces.

All cases containing fragile items are to be stencilled with red marking and stencilling paint/ink

"HANDLE WITH CARE", "FRAGILE DO NOT TURN OVER".

Besides the caution signs the product information's shall be stencilled of letters with 13mm to 50mm height.

In case of consignment consists of more than one package, each package shall carry its package no as given in shipping list. All caution signs shall be stencilled in high quality full glossy out door finishing paint red in colour (AA56126). All other markings shall be carried out in black enamel(AA56126).

Caution signs & other markings shall be stencilled on both the end shooks & the side shooks.

Caution sign (for slinging) shall be stencilled only on side shooks at the appropriate place.

Note: Incase the size of package is small for using the stencils, then hand written letters/figures shall be allowed.

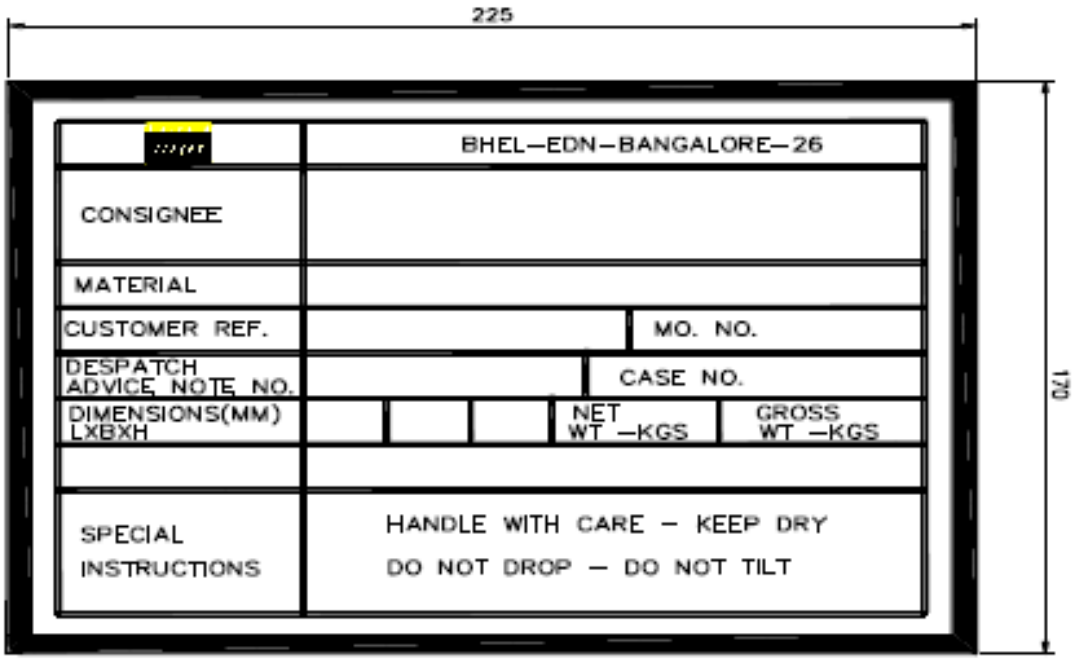


Figure 4 – TYPICAL MARKING PLATE

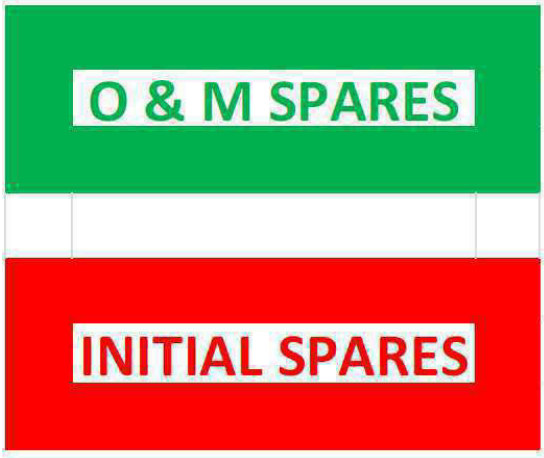


Figure 5

Easy spares [Initial and O&M] Traceability and Identification at units and as well as at sites:

9 RECYCLING OF INCOMING WOODEN PACKING CASES

OBJECTIVES

– To utilize useable wood of incoming packing cases, for manufacturing of new packing boxes.
– To recycle incoming wooden packing cases, as such, wherever possible.

1) All incoming wooden packing cases received from suppliers /customers will be opened carefully, with the intention of reusing them, by Shop.
2) After carefully taking out the contents, the empty wooden packing cases will be shifted by Shop to the specified locations i.e. bin / nearly spaces, already earmarked in stores.
3) Material shifting contractor engaged by store, will collect all such wooden packing cases and scrap wood from specified points, on a regular basis.
4) After collecting / loading the empty packing cases/ scrap wood, contractor will take thecarrier first to weighment bridge for weighment, thereafter, he will go to Carpentry, where Carpentry representative will identify the packing cases which can be used by Carpentry for manufacturing of New Packing Boxes. All such identified packing boxes will be unloaded and handed over to Carpentry by contractor.
5) These packing boxes will be made re-useable after necessary rectification and additional work.
6) Contractor will again take the carrier for weighment and this second reading will also berecorded on the same “Weighment Slip”.
7) Weight of empty packing cases / scrap wood taken will be calculated on thebasis of 1st and 2nd weighment readings recorded on the “Weighment Slip”. A copy of“Weighment Slip” (where both the weighment readings are recorded) will be given by the contractor to the carpentry representative. Based on this “Weighment Slip”, carpentry will maintain a register in which details of quantity received will be recorded.
8) All “Weighment Slips” will invariably be signed by carpentry representative (even when no boxes have been unloaded by carpentry). Store will accept the scrap wood only if “Weighment Slips” are signed by carpentry representative.
9) Balance empty packing cases / scrap wood will be handed over by contractor to Store, for storing in scrap yard.
10) A separate area in Scrap yard will be provided, for executing the work of de-nailingof wooden packing cases, under supervision of carpentry.
11) Carpentry contractor will identify packing cases / scrap wood for denailing, which will behanded over to him by Store, at Scrap yard, for denailing and further operation.
12) Quality and Carpentry will jointly inspect the wood generated by de-nailing process and will prepare “INSPECTION CUM RECEIPT REPORT OF USEABLE WOOD RECEIVED FROM TPS –STORE BY CARPENTRY”.
13) After acceptance of the wood by Quality and Carpentry, the same will be shifted to carpentry for receipt and its record will be maintained by carpentry.
14) This will be a Permanent Productivity Project executed by carpentry. “Productivity Savings “duly verified at the current Purchase Order rate of wood, will be sent every month to Resource Management Department, for highlighting it in their monthly progress report.

10 STANDARD METHOD OF PACKING

Table 5 –

STANDARD METHOD OF PACKING

DESCRIPTION	CASE	CRATE	SKID	BUNDLE	BARE	DRUM	METAL DRUM	FIBRE DRUM
PRESSUE VESSELS								
TOWERS					O			
TANKS					O			
VESSELS					O			
GASKETS	O							
FASTENERS	O							

STANDARD METHOD OF PACKING

DESCRIPTION	CASE	CRATE	SKID	BUNDLE	BARE	DRUM	METAL DRUM	FIBRE DRUM
COVERS		O						
EXCHANGERS								
HEAT EXCHANGERS					O			
TUBE BUNDLE	O							
SHELL					O			
AIR FIN COOLERS					O			
COLOUMNS, MOTOR SUSPENSIONS, PLENUM CHAMBERS, SCREEN GUARDS, ETC					O			
BEARING BLOCKS	O							
FANS	O	O						
MOTORS	O							
GASKETS	O							
FASTENERS	O							
TEST FLANGES			O					
TEST RINGS			O					
COVERS			O					

DESCRIPTION	CASE	CRATE	SKID	BUNDLE	BARE	DRUM	METAL DRUM	FIBRE DRUM
CRYOGENIC VESSELS								
COLD CONVERTERS					O			
HORIZONTAL STORAGE TANKS					O			
TRANSPORTATION TANK					O			
COLD BOX					O			
DRYING UNIT					O			
DRYING BOTTLES					O			
MOISTURE SEPARATORS					O			
SILENCERS					O			
ONGC SKIDS					O			
VAPORISER		O						
SPECIAL PRODUCTS								
SI/VI PIPING		O						
CRO BIO CONTAINERS	O							
AIR BOTTLES	O							
TITANIUM BOTTLE	O							
WAR HEAD CONTAINER	O							
MISSILE CONTAINER	O							
FUEL CONTAINER	O							
AIR LOCK ASSEMBLY	O							

DESCRIPTION	CASE	CRATE	SKID	BUNDLE	BARE	DRUM	METAL DRUM	FIBRE DRUM
BOILERS								

CORPORATE STANDARD

BOILER DRUMS					O			
BOILER ITEMS								
COILS			O					
PANELS					O			
HEADERS			O		O			
FEEDERS								
MACHINED ITEMS								
SHELL SEGMENTS					O			
SHELL SEGMENTS IN STACKS					O			
SPHERE PETALS								
COLOUMNS, BASE PLATES, TIERCOS, PIPES, NOZZLE E1, F1, INTERNAL PIPES, PADS ETC.					O			
ROLLERS	O							
VALVE TRAYS								
VALVE TRAY COMPONENTS	O							
LATTICE GIRDERS		O						
FASTENERS	O							
GASKETS	O							

DESCRIPTION	CASE	CRATE	SKID	BUNDLE	BARE	DRUM	METAL DRUM	FIBRE DRUM
SUB CONTRACTS								
FAB STRUCTURALS					O			
SUPPORTING STRUCTURALS					O			
STRUCTURE SUB ASSEMBLY					O			
FAB PIPES					O			
GRATINGS					O			
STAIR CASES					O			
HANDRAILS/ PLATFORMS					O			
BOUGHT OUT COMPONENTS								
IRON & STEEL (LIKE PLATES, BEAMS, ANGLES, CHANNELS ETC.)					O			
PIPE FITTINGS								
CS PIPES, TUBES					O			
SS PIPES, TUBES					O			
FIN TUBES	O							
ELBOWS		O			O			
FLANGES	O	O						
VALVES	O							
GAUGES	O							
DEMISTERS		O						
DESCRIPTION	CASE	CRATE	SKID	BUNDLE	BARE	DRUM	METAL DRUM	FIBRE DRUM

ABSCRBANTS (LIKE MOLECULAR SIEVES, ACTIVATED ALUMINA, MOBILE SORBID)						O		
PAINT TINS		O						
PAINT DRUMS						O		
IGNITORS	O							
SPRAY NOZZLES	O							
ELECTRICAL INSTRUMENTATION								
MOTORS, PUMPS, COMPRESSORS, TURBINES	O							
SWITCH BOARDS, DISTRIBUTION BOARDS, STARTERS, JUNCTION BOXES		O						
INDICATORS, VIBRATOR SWITCHES	O							
CABLE BUNDLES, CABLE DRUMS					O			
CABLE TRAYS, CABLE RACKS, EARTHING MATERIAL		O						
OPERATIONAL SPARES	O							

11 PROCEDURE FOR HANDLING OF COMPONENTS

The purpose of this procedure is to protect the quality of the components/equipment while handling in various stages of manufacturing packing & despatching.

11.1 Adequate care shall be taken in handling the material, and components to avoid damage during receipts, storage issue manufacture & despatch operations.

11.2 Appropriate material handling equipment like fork lifters, cranes etc. shall be used where needed.

11.3 Lifting by crane and transportation by trolley of critical items and large components like rotors castings etc. shall be done carefully.

11.4 For critical items, where specified, special handling fixtures shall be used for lifting.

11.5 Slings and shackles used for lifting the components/equipment shall be checked for fitness and suitability before use.

11.6 Slings used on machined surfaces shall be suitably padded. No slings shall be used on journal surfaces.

11.7 Precision machined components like blades, catches, rollers etc. shall be lifted using suitable wooden pallets.

11.8 HANDLING OF COMPONENTS ON RECEIPT/DESPATCH

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

a) The markings showing the upright position.

b) The markings showing the sling position

c) Markings showing the fragile contents.

d) Other required markings as per Cl.no:08

11.8.1 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.

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

11.8.3 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.

11.8.4 On receipt of the equipment it 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.

11.8.5 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.

11.8.6 Silica gel and such other chemicals kept in the box as desiccants and indicators should also be left in the box itself.

12 GENERAL GUIDELINES FOR ODC TRANSPORTATION/DESPATCH

Based on the Dimensions/Weight indicated in the Transportation Sketch, the type of Trailer is decided and indicated in the Tender Enquiry.

12.1 TRANSPORTATION:

1. LOW BED TRAILERS (LB 8):

Well Bed Length:	10000mm
Over Gooseneck:	13000mm
Width:	3000mm
Carrying Capacity:	40MT

2. LOW BED TRAILERS (LB 16):

Well Bed Length:	12000mm
Over Gooseneck:	16000mm
Width:	3000mm
Carrying Capacity:	75MT

3. TOW TYPE TRAILERS (WITH FRONT DOLLEY 16 TYRES): 12000MM length
(for Exceptional equipment length: 30000mm and above)

Bigger Dia equipment are loaded in the Well with overhanging.

Smaller Dia equipment with excess length are loaded over Gooseneck with rear hanging.

The Vehicle Dimensions are defined above are only guidelines for selection based on actual Dimensions/ Weight of the Consignment

12.2 PACKING:

For all ODCs, Wooden Saddles are cut to the diameter of equipment as per the Transportation Sketch.

For Diameter up to 4000mm

Wooden Saddles Length: 1836/2743mm (6'0"/9'0")
Width: 300mm (1'0")
Height: Saddle + one/two wedges a top.
For Diameter up to 4000mm
Wooden Saddles Length: 3353mm (11'0")
Width: 300mm (1'0")
Height: Saddle + three/four wedges a top.

NUMBER OF SADDLES:
Minimum: 3 in case of Loading inside Well
+ 1 when loaded on Gooseneck.
Maximum: 4 in case of Loading inside Well
+2 when loaded on Gooseneck.

For Securing the equipment firmly on the Trailer, 19mm (3/4"), wire rope with 25mm (1") Heavy Duty Turn Buckles / BD Clamps are used as Lashing for the equipment.

12.3 NUMBER OF LASHINGS ARE:

	CONSIGNMENT LOADED INSIDE WELL BED	CONSIGNMENT LOADED OVER GOOSENECK
a) up to 40MT	4 (2 Single Line lashing 2 Double Line Lashing)	5 (3 Single Line Lashing 2 Double Line Lashing)
b) 40MT to 60MT	5 (3 Single Line Lashing 2 Double Line Lashing)	5 (Single Line Lashing 3Double Line Lashing)
c) 60MT and above	5 (2 Single Line Lashing 3 Double Line Lashing)	6 (3 Single Line Lashing 3 Double Line Lashing)

13 GUIDELINES FOR HANDLING/LOADING/LASHING

13.1 HANDLING

Figure 6

Before unloading the jobs Completely painted and neatly stencilled will be checked.

Pipes with split type end cover will be checked

Figure 7

All Coil Tubes to be provided with End Caps.

Figure 8

Neatly stacked Coil Assemblies.

Figure 9

Columns to be lifted with Nylon belts. This protect painting, edges and attachments.

Figure 10

13.2 LOADING

All the components to be transported by putting inside the properly fabricated Crating

Figure 11

Small components may fall down while transporting without closed crating and there are chances of missing of small parts. Hence, it is always better to transport small components in closed containers/crating. Loose to be being shipped in a closed crating.

Figure 12

No component loaded over the crating.

Figure 13

Headers supported with wooden V blocks at 3 meters interval.

Figure 14

Spacers in between each coil assembly.

Figure 15

Goose pipe to be provided with rubber pad protects removal of painting and damage to the job.

Figure 16

13.3 LASHING

Use Nylon belts only for lashing of all components. It prevents removal off painting and cut in the materials.

Figure 17

Nylon Belts used for lashing the beams.

Figure 18

14 PRODUCT WISE SPECIAL INSTRUCTION

Additional instructions of packing not included in this standard shall be covered by individual product standard

15 REFERRED STANDARDS (Latest publications including amendments):

1) AA51420 2) AA55619 3) AA51414 4) IS:3401

5) AA10108 6) AA56126