

ANNEXURE – 1
(PRICE BID FORMAT)

ANNEXURE – 1 for PY51838

**PRICE BID FORMAT FOR
IGES – LUMP SUM TURNKEY
PROJECT- 1 x 660 MW SAGARDIGHI THERMAL POWER EXTENSION PROJECT (PHASE-III, UNIT#-5)**

Sl. No.	Description	Material Code	Qty.	Unit	PRICE in INR (Refer notes below)		Weightage
					Unit Price (INR)	Total Price (INR)	
1.	Supply of Inert Gas Extinguishing System	PY9751838010	1	Lot			93.53%
2.	Mandatory Spares Of Inert Gas Extinguishing System	PY9751838029	1	Lot			4.68%
3.	Supervision of erection, testing, commissioning & performance testing for Inert Gas Extinguishing System	PY9851838039	16	Days			1.60%
4.	Travel expenses (inclusive of all other charges like visa fee (if applicable), insurance etc.) from / to vendor works to site for Engineer per visit for erection & commissioning of Inert Gas Extinguishing System	PY9851838047	3	Visits			0.20%
	Grand Total						100.00%

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 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. Unit rates of components (Annexure –1A) would be used for effecting required additions/deletions of main equipment during order execution. 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 required for this purpose shall be included in the price quoted.
4. As the dimensions of the room are not finalized, 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 of (-)20% to (+)10% of 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 required for this purpose shall be included in the price quoted.

ANNEXURE – 1 for PY51838

5. In case of deletion of Inert gas extinguishing system, unit rates as indicated in (Annexure –1A) shall be used for deletion.
6. All the inert gas cylinders shall be supplied in filled condition to site.
7. For the purpose of tender total no of 15 man days to be covered in 3 visits have been considered. However, either or both of the number of man days or number of visits may change on either side based on the actual site requirement. Bidder to note that payment against Sl. No. 3 & 4 above shall be made as per the total number of visits and man days required for the supervision of the complete E&C activities.
8. Offer will be evaluated based on total price for Sl. No. 1, 2,3 & 4 of price format.
9. Bidder to quote the base rates only. Applicable taxes and duties to be indicated separately.

BIDDER'S SIGNATURE
NAME:
DATE
COMPANY SEAL

ANNEXURE – 1A for PY51838

UNIT PRICES

S. No	Item Description	Unit Rate (Rs.)	REMARKS
1.	1 no. of Inert Gas Cylinder and hooking up to Manifold		Note-3, 4 & 5 of Annexure – 1
2.	Electromagnetic release device for Master cylinder		
3.	Discharge Nozzles		
4.	Additional cost of selector valve, pilot manifold with fittings like SOV, pressure switch, etc. for addition of 1 no. of zone		
5.	Pressure relief vent		
6.	Gas inhibitor switch		
7.	Manual release switch		
8.	Discharge indicator		
9.	Pre-discharge indicator		
10.	Warning sign		
11.	10 metres of pipe(downstream of direction valve) along with associated fittings like elbows, tees, etc.		
12.	Pilot Manifold		
13.	Gas Release Panel		
14.	Selector Valve		

ANNEXURE – 2
(MASTER DOCUMENT LIST)

ANNEXURE - 2

1 x 660 MW SAGARDIGHI THERMAL POWER EXTENSION PROJECT (PHASE-III, UNIT#-5) - INERT GAS EXTINGUISHING SYSTEM - BIDDER DWGS/DOCS SCHEDULE

1	LIST OF SUPERCIDED DRAWINGS / DOCUMENTS			S	TO INDEX PAGE	NO COMMENTS							1
2	LIST OF ACTIVE DRAWINGS / DOCUMENTS			A	TODAY'S DATE	COMMENTS AS MARKED CLEARED FOR MANUFACTURE					2		
3	LIST OF DRAWINGS/DOCUMENTS UNDER PREPARATION			UP	25-Aug-22	NOT APPROVED & COMMENTS AS MARKED					3		
4	LIST OF BHEL APPROVED DRAWINGS			ADS		RETAINED FOR INFORMATION					4		
								A					1
1	Drawings & Documents Pending with BIDDER							A		P-BIDDER			2
2	Drawings & Documents Pending with BHEL							A		P-BHEL			3
3	Drawings & Documents Approved by BHEL							A		ADS			4
4	Supercided Drawings.							A		S			
S. NO	DRAWING/ DOCUMENTS	DWG. NO.	APPR (A/I)	SCHEDULE OF SUBMISSION	REV	SENT BY BIDDER (SOFT COPY)	HARD COPY RECEIVED FROM BIDDER	COMMENTS SEND TO BIDDER	STS	PEND	BHEL APP STATU S	REMARKS	
A) MECHANICAL													
A.01	P&I Diagram for IGES for TG Building		A	14 days from P.O Placement	0				UP	P-BIDDER			
A.02	Design Philosphy & Write-up		A	14 days from P.O Placement	0				UP	P-BIDDER			
A.03	Layout of IGES for TG Building		A	30 days from P.O Placement	0				UP	P-BIDDER			
A.04	Isometric View of IGES Piping system for TG Building		A	30 days from P.O Placement	0				UP	P-BIDDER			
A.05	Equipment Layout of Inert Gas Cylinder Room		A	30 days from P.O Placement	0				UP	P-BIDDER			
A.06	Clamping Arrangement of Inert Gas Cylinders		A	30 days from P.O Placement	0				UP	P-BIDDER			
A.07	GA of Cylinder Manifold		A	30 days from P.O Placement	0				UP	P-BIDDER			
A.08	GA of DV Pilot Manifold		A	30 days from P.O Placement	0				UP	P-BIDDER			
A.09	Control Logic Diagram		A	30 days from P.O Placement	0				UP	P-BIDDER			
A.10	Pressure Relief Vents G.A & location layout		A	30 days from P.O Placement	0				UP	P-BIDDER			
B) ELECTRICAL													


1 x 660 MW SAGARDIGHI THERMAL POWER EXTENSION PROJECT (PHASE-III, UNIT#-5) - INERT GAS EXTINGUISHING SYSTEM - BIDDER DWGS/DOCS SCHEDULE												
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									A		1	
1	Drawings & Documents Pending with BIDDER								A	P-BIDDER	2	
2	Drawings & Documents Pending with BHEL								A	P-BHEL	3	
3	Drawings & Documents Approved by BHEL								A	ADS	4	
4	Supercided Drawings.								A	S		
S. NO	DRAWING/ DOCUMENTS	DWG. NO.	APPR (A/I)	SCHEDULE OF SUBMISSION	REV	SENT BY BIDDER (SOFT COPY)	HARD COPY RECEIVED FROM BIDDER	COMMENTS SEND TO BIDDER	STS	PEND	BHEL APP STATU S	REMARKS
B.01	GA & Data Sheet of EPB Inhibitor Unit		A	14 days from placement of P.O	0				UP	P-BIDDER		
B.02	GA & Data Sheet of Gas Release Panel		A	14 days from placement of P.O	0				UP	P-BIDDER		
B.03	Circuit Diagrams		A	14 days from placement of P.O	0				UP	P-BIDDER		
B.04	G.A of Junction Box		A	14 days from placement of P.O	0				UP	P-BIDDER		
B.05	Cable Schedule		A	14 days from placement of P.O	0				UP	P-BIDDER		
C) QUALITY												
C.01	Quality Assurance Plan		A	14 days from placement of P.O	0				UP	P-BIDDER		
D) PROCEDURE												
D.01	System Write-Up		I	14 days from placement of P.O	0				UP	P-BIDDER		
D.02	Bill of Materials		A	30 days from placement of P.O	0				UP	P-BIDDER		
D.03	Testing & Commissioning Procedure		A	14 days from placement of P.O	0				UP	P-BIDDER		
D.04	Pre-Commissioning Procedure		I	14 days from placement of P.O	0				UP	P-BIDDER		
D.05	Job Procedure / Installation Procedure		I	14 days from placement of P.O	0				UP	P-BIDDER		

1 x 660 MW SAGARDIGHI THERMAL POWER EXTENSION PROJECT (PHASE-III, UNIT#-5) - INERT GAS EXTINGUISHING SYSTEM - BIDDER DWGS/DOCS SCHEDULE												
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E) OTHERS												
E.01	Flow calculations		I	30 days from placement of P.O	0				UP	P-BIDDER		
F) APPROVALS												
F.01	UL/FM/Vds/LPCB Approvals of IGES Components		I	14 days from placement of P.O	0				UP	P-BIDDER		
F.02	PESO Certificate for IGES Cylinders & Valves		I	14 days from placement of P.O	0				UP	P-BIDDER		
F.03	PESO Certificate for Refilling of IGES Cylinders		I	14 days from placement of P.O	0				UP	P-BIDDER		
G) DATA SHEETS												
G.01	Inert Gas Cylinder		A	14 days from placement of P.O	0				UP	P-BIDDER		
G.02	Pneumatic IGES Valve		A	14 days from placement of P.O	0				UP	P-BIDDER		
G.03	Release Unit With Solenoid		A	14 days from placement of P.O	0				UP	P-BIDDER		
G.04	Contact Guage Unit		A	14 days from placement of P.O	0				UP	P-BIDDER		
G.05	Discharge Hose		A	14 days from placement of P.O	0				UP	P-BIDDER		
G.06	Check Valve		A	14 days from placement of P.O	0				UP	P-BIDDER		

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2	Drawings & Documents Pending with BHEL							A	P-BHEL	3		
3	Drawings & Documents Approved by BHEL							A	ADS	4		
4	Supercided Drawings.							A	S			
S. NO	DRAWING/ DOCUMENTS	DWG. NO.	APPR (A/I)	SCHEDULE OF SUBMISSION	REV	SENT BY BIDDER (SOFT COPY)	HARD COPY RECEIVED FROM BIDDER	COMMENTS SEND TO BIDDER	STS	PEND	BHEL APP STATU S	REMARKS
G.07	Leak / Bleeder Unit		A	14 days from placement of P.O	0				UP	P-BIDDER		
G.08	Hi- Flex Hose		A	14 days from placement of P.O	0				UP	P-BIDDER		
G.09	Pressure Relief Device		A	14 days from placement of P.O	0				UP	P-BIDDER		
G.10	Non Return Valve for Pilot Line		A	14 days from placement of P.O	0				UP	P-BIDDER		
G.11	Nozzle Assembly		A	14 days from placement of P.O	0				UP	P-BIDDER		
G.12	Pressure Regulator		A	14 days from placement of P.O	0				UP	P-BIDDER		
G.13	Ball Valve WITH Pneumatic Actuator		A	14 days from placement of P.O	0				UP	P-BIDDER		
G.14	Pressure Guage		A	14 days from placement of P.O	0				UP	P-BIDDER		
G.15	Restrictor		A	14 days from placement of P.O	0				UP	P-BIDDER		
G.16	Solenoid Valves		A	14 days from placement of P.O	0				UP	P-BIDDER		
G.17	Warning Signs		A	14 days from placement of P.O	0				UP	P-BIDDER		
G.18	Pressure Operated Switch		A	14 days from placement of P.O	0				UP	P-BIDDER		
G.19	Pipes & Fittings		A	14 days from placement of P.O	0				UP	P-BIDDER		

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3	Drawings & Documents Approved by BHEL								A	ADS	4	
4	Supercided Drawings.								A	S		
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G.20	Cables		A	14 days from placement of P.O	0				UP	P-BIDDER		
G.21	Camcoupler & Hoses		A	14 days from placement of P.O	0				UP	P-BIDDER		
H) CALCULATIONS & OTHER GENERAL ITEMS												
H.01	Battery Sizing Calculations		I	30 days from P.O Placement	0				UP	P-BIDDER		
H.02	Electrical Load List		I	14 days from P.O Placement	0				UP	P-BIDDER		
H.03	List of Bought out Items		I	14 days from P.O Placement	0				UP	P-BIDDER		
H.04	Storage Procedures		I	14 days from placement of P.O	0				UP	P-BIDDER		
H.05	List of Tag Numbers		I	14 days from placement of P.O	0				UP	P-BIDDER		
H.06	O & M Manuals / Procedure		I	30 days from P.O Placement	0				UP	P-BIDDER		
H.07	Field Quality Plan		I	30 days from P.O Placement	0				UP	P-BIDDER		
G) INTERFACE DRAWINGS												
G.01	Interface between Fire Alarm Panel & Gas Release Panel		I	14 days from P.O Placement	0				UP	P-BIDDER		

ANNEXURE – 3
(STANDARD QUALITY PLAN)

		TYPICAL MANUFACTURING QUALITY PLAN							MQP. NO.:				
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032				PRODUCT:SOLENOID VALVE			REV NO:	DATE:			
PAGE 1 OF 2													
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	
1.0	RAW MATERIALS & BOUGHT OUT ITEMS												
	Body, Bonnet, Female outlet	Chemical, Physical	Major	Analysis Test	One/Lot	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	Lab. /Supp. Certificate	√	2	2	1	
	Spindle	Chemical, Physical	Major	Analysis Test	One/Lot	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	Lab. /Supp. Certificate	√	2	2	1	
	Spring	Chemical	Major	Analysis Test	One/Lot	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	Lab. /Supp. Certificate	√	2	2	1	
	Outer Washer, Seat Washer	Hardness	Minor	Measurement	10%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	Lab. /Supp. Certificate	√	2	2	1	
2.0	INPROCESS INSPECTION												
	Water tightness Seat Test	Leakage	Major	Hydro Test	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IIR	√	2	2	1	
	Hydrostatic Pressure Test	Leakage	Major	Hydro Test	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IIR	√	2	2	1	
	Operation Test	Open-close	Major	Functional	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IIR	√	2	2	1	
	Flow Test	Flow	Major	Flow	One/Lot	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IIR	√	2	2	1	
3.0	FINAL INSPECTION & TESTING												
		VISUAL & DIMENSION CHECK	Major	Visual	10%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	1	-	

LEGEND: P: PERFORM, W: WITNESS, V: VERIFICATION. INDICATE 1 FOR BHEL / BHEL NOMINATED INSPECTION AGENCY/END USER/END USER'S REPRESENTATIVE & 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.



TYPICAL MANUFACTURING QUALITY PLAN

MQP. NO.:

PROJECT ENGINEERING & SYSTEMS
DIVISION BHEL,
RC PURAM, HYD-502032

PRODUCT:SOLENOID VALVE

REV NO:

DATE:


PAGE 2 OF 2

SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	
		HV TEST	Major	Hydro Test	10%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	1	-	
		SEAT LEAKAGE TEST	Major	Leakage	10%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	1	-	
		IR TEST	Major	Electrical	One/Lot	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	1	-	
		PNEUMATIC TEST	Major	Pneumatic	10%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	1		
		OPERATIONAL TEST INCLUDING VERIFICATION OF PICKUP AND DROP VOLTAGE	Major	Operational test	10%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	1		
		BOM CHECK	Major	Verification	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	1		
4.0	PRESERVATION & PACKING												
	Identification	Marking & Stamping	Major	Verification & Stamping	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	2	1	
	Painting	Final finish & Paint DFT	Major	Visual & Measurement	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	Painting Report	√	2	1	-	
	Packing	Soundness of packing	Major	Verification	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	2	1	

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		TYPICAL MANUFACTURING QUALITY PLAN							MQP. NO.:				
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032				PRODUCT: PRESSURE SWITCH			REV NO:		DATE:		
		PAGE 1 OF 2											
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	
1.0	RAW MATERIALS & BOUGHT OUT ITEMS												
	RAW MATERIAL	Chemical, Physical	Major	Analysis Test	One/Lot	Approved BHEL Spec./Drawing/ datasheet	Approved BHEL Spec./Drawing/ datasheet	Lab. /Supp. Certificate	√	2	2	1	
2.0	INPROCESS INSPECTION												
		RAW MATERIAL	Major	Visual	100%	Approved BHEL Spec./Drawing/ datasheet	Approved BHEL Spec./Drawing/ datasheet	IIR	√	2	2	1	
		PROCESS CONNECTION	Major	Visual	100%	Approved BHEL Spec./Drawing/ datasheet	Approved BHEL Spec./Drawing/ datasheet	IIR	√	2	2	1	
		CABLE ENTRY	Major	Visual	100%	Approved BHEL Spec./Drawing/ datasheet	Approved BHEL Spec./Drawing/ datasheet	IIR	√	2	2	1	
		MOUNTING	Major	Visual	One/Lot	Approved BHEL Spec./Drawing/ datasheet	Approved BHEL Spec./Drawing/ datasheet	IIR	√	2	2	1	
		WORKMANSHIP(Cleanliness, Neatness of wiring)	Major	Visual		Approved BHEL Spec./Drawing/ datasheet	Approved BHEL Spec./Drawing/ datasheet	IIR	√	2	2	1	
3.0	FINAL INSPECTION & TESTING												
		DIMENSION, VISUAL	Major	Visual	10%	Approved BHEL Spec./Drawing/ datasheet	Approved BHEL Spec./Drawing/ datasheet	IR	√	2	1	-	
		PERFORMANCE TEST INCLUDING SET POINT CALIBRATION, REPEATABILITY, SWITCH DIFFERENTIAL & OVER RANGE I.R TEST ON ASSEMBLY	Major	Functional	10%	Approved BHEL Spec./Drawing/ datasheet	Approved BHEL Spec./Drawing/ datasheet	IR	√	2	1	-	

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		TYPICAL MANUFACTURING QUALITY PLAN							MQP. NO.:				
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032				PRODUCT: PRESSURE SWITCH			REV NO:	DATE:			
PAGE 2 OF 2													
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	
		IBR certificate	Major	Functional	10%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2		1	*if applicable
		Certificate of statutory approval authority like CCOE/PESO	Major	Functional	One/Lot	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2		1	
		I.P certificate review	Major	Functional	One/Lot	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2		1	
4.0	PRESERVATION & PACKING												
	Identification	Marking & Stamping	Major	Verification & Stamping	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	2	1	
	Packing	Soundness of packing	Major	Verification	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	2	1	

LEGEND: P: PERFORM, W: WITNESS, V: VERIFICATION. INDICATE 1 FOR BHEL / BHEL NOMINATED INSPECTION AGENCY/END USER/END USER'S REPRESENTATIVE & 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.



TYPICAL MANUFACTURING QUALITY PLAN

MQP. NO.:

PROJECT ENGINEERING & SYSTEMS
DIVISION BHEL,
RC PURAM, HYD-502032

PRODUCT: Forged, Seamless & Welded Fittings

REV NO:

DATE:

PAGE 1 OF 2

SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
										D	P	W	
1.0	RAW MATERIALS & BOUGHT OUT ITEMS												
	Billets, Rounds, Pipes,Coil,Plate s,etc.	Chemical, Physical	Major	Analysis Test	One/Lot	Approved BHEL Spec./Drawing/ datasheet	Approved BHEL Spec./Drawing/ datasheet	Lab. /Supp. Certificate	√	2	2	1	
2.0	INPROCESS INSPECTION												
	Cleaning & Finishing	Blast Cleaning	Major	Cleaning	100%	Approved BHEL Spec./Drawing/ datasheet	Approved BHEL Spec./Drawing/ datasheet	IIR	√	2	2	1	
	Finishing	Galvanizing	Major	Chemical	100%	Approved BHEL Spec./Drawing/ datasheet	Approved BHEL Spec./Drawing/ datasheet	IIR	√	2	2	1	
3.0	FINAL INSPECTION & TESTING												
		NDT	Major	NDT	10%	Approved BHEL Spec./Drawing/ datasheet	Approved BHEL Spec./Drawing/ datasheet	IR	√	2	1	-	
		Size,Thickness,Dimen sion	Major	Visual	10%	Approved BHEL Spec./Drawing/ datasheet	Approved BHEL Spec./Drawing/ datasheet	IR	√	2	1	-	
		Surface Quality,Marking,Color coding,etc	Major	Visual	10%	Approved BHEL Spec./Drawing/ datasheet	Approved BHEL Spec./Drawing/ datasheet	IR	√	2	1	-	
		PMI(Final inspected Fittings)	Major	PMI	One/Lot	Approved BHEL Spec./Drawing/ datasheet	Approved BHEL Spec./Drawing/ datasheet	IR	√	2	1	-	
4.0	PRESERVATION & PACKING												
	Identification	Marking & Stamping	Major	Verification & Stamping	100%	Approved BHEL Spec./Drawing/ datasheet	Approved BHEL Spec./Drawing/ datasheet	IR	√	2	2	1	
	Painting	Final finish & Paint DFT	Major	Visual & Measurem ent	100%	Approved BHEL Spec./Drawing/ datasheet	Approved BHEL Spec./Drawing/ datasheet	Painting Report	√	2	1	-	

LEGEND: P: PERFORM, W: WITNESS, V: TEST CERTIFICAT REVIEW. INDICATE 1 FOR BHEL / BHEL NOMINATED INSPECTION AGENCY/END USER/END USER'S REPRESENTATIVE & 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.

SL NO		COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
											P	W	V	
		Packing	Soundness of packing	Major	Verification	100%	Approved BHEL Spec./Drawing/datasheet	Approved BHEL Spec./Drawing/datasheet	IR	√	2	2	1	

LEGEND: P: PERFORM, W: WITNESS, V: TEST CERTIFICAT REVIEW. INDICATE 1 FOR BHEL / BHEL NOMINATED INSPECTION AGENCY/END USER/END USER'S REPRESENTATIVE & 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.

ANNEXURE – 4
(GUIDELINES FOR QUALITY PLAN)

TD-201
Rev No. 00

Form No.



PRODUCT STANDARD
PROJECT ENGINEERING & SYSTEMS DIVISION
HYDERABAD

ANNEXURE-4

Rev No. 00

Page 1 of 3


QAP GUIDELINES & FORMAT


(ANNEXURE-4 TO SPECIFICATION)

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It must not be used directly or indirectly in any way detrimental to the interest of the company.

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

Form No.	 HYDERABAD	PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD	ANNEXURE-4 Rev No. 00 Page 2 of 3
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.	<p><u>GUIDELINES TO VENDORS FOR PREPARATION OF QUALITY ASSURANCE PLAN</u></p> <ol style="list-style-type: none"> 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. <ol style="list-style-type: none"> 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. <ol style="list-style-type: none"> 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. 		
Ref. Doc			

Form No.	 HYDERABAD	PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD	ANNEXURE-4 Rev No. 00 Page 3 of 3
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.	<p>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.</p> <p>12. Under 'D' please put (<input type="checkbox"/> Tick) against each characteristic where vendor proposes to submit test certificate/report etc. OR as required as per BHEL Specification.</p> <p>13. Vendor's signature & stamp should be available on each page of QAP.</p> <p>14. Vendor should read the BHEL Product Standard thoroughly and QAP should be made only inline and relevant to the Specification & Approved Drawings.</p> <p>15. The following operations/characteristics/check points may be included (AS APPROPRIATE)</p> <ol style="list-style-type: none"> 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) Packing and Preservation. <p>16. <u>QAP Format enclosed.</u></p>		
Ref. Doc			


VENDOR'S NAME & ADDRESS:		MANUFACTURING QUALITY PLAN							QP. NO.:				
									CUSTOMER: BHEL, HYDERABAD – 32.		BHEL P.O.NO.:		
		PROJECT:		P.O.DATE:			BHEL SPEC:		REV:		PAGE 1 OF 1		
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										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	APPROVED BY	APPROVED BY
	VENDOR'S SIGNATURE & STAMP	BHEL QA SIGNATURE & STAMP	CUSTOMER'S SIGNATURE & STAMP

MFGR.'s LOGO	MANUFACTURER'S NAME AND ADDRESS	MANUFACTURING QUALITY PLAN		PROJECT :
		ITEM :	QP NO.:	PACKAGE :
		SUB-SYSTEM:	REV.NO.:	CONTRACT NO. :
			DATE:	MAIN-SUPPLIER:
			PAGE: OF....	

SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	CLASS TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					M	C/N						M	C	
1	2	3	4	5	6	7	8	9	D *	**	10	11	11	

		LEGEND: * RECORDS, INDENTIFIED WITH "TICK" () SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: MANUFACTURER/SUB-SUPPLIER C: MAIN SUPPLIER, N: NTPC P: PERFORM W: WITNESS AND V: VERIFICATION. AS APPROPRIATE, CHP: NTPC SHALL IDENTIFY IN COLUM "N" AS ' W"	 FOR NTPC USE	DOC. NO.:		REV..... CAT.....	
MANUFACTURER/ SUB-SUPPLIER	MAIN-SUPPLIER						
SIGNATURE				REVIEWED BY	APPROVED BY	APPROVAL SEAL	



**PROJECT ENGINEERING & SYSTEMS DIVISION
RC PURAM, HYDERABAD.
QUALITY & BUSINESS EXCELLENCE**

INSPECTION / TC REVIEW FORMAT

1	Vendor's Name:		5	Applicable BHEL Spec No:	
2	Project:		6	Approved Drawing No:	
3	PO No:		7	Approved Data Sheet No:	
4	Item Description:		8	Approved QAP No:	

OFFER LIST

S.No	BBU/ PO Sr. No.	Item Description	Total Qty as per PO/BBU	Qty. already accepted	Qty offered for TC review	Cumulative Qty	Balance Qty
A							
B							
C							
D							

TC REVIEW REQUISITION

BBU / PO Sr. No.	QAP Clause No.	Format of Record	Certificate No. & Date	Page No.	REMARKS
A. Item Description:					
B. Item Description:					
C. Item Description:					
D. Item Description:					
E. Item Description:					

SUPPLIER / VENDOR SIGNATURE WITH SEAL

BHEL/ BHEL's TPIA SIGNATURE WITH SEAL

Dt:

Dt:

ANNEXURE – 5
(FORMAT FOR DISPATCH DETAILS)

ANNEXURE-5

BILL OF MATERIALS

(SUB-VENDOR PACKAGES)

(NOTE: ASSEMBLED UNITS AND ALL LOOSE DESPATCHABLE ITEMS IDENTIFIED IN THIS BOM)

System Name		Supplier:	Project:			Supplier Doc. No.			
			Supplied Job No.	BHEL P.O.No.	Rev. No.		sh.	of	
				Date	Date		1		
Item Despatch Tag-No.	Ref. Drg. No.	Item No.	Item Description	Qty. (Nos./mts)	Wt (Kg)	Despatch Details			Remarks
						Packing box	LR No.	Date	
	Rev.	Rev.	Prepared By:		Approved By:		Supplier Doc. No.:		
					(xxx)				
			Sign :		Sign :				
			Date :		Date :				

ANNEXURE – 6

(TYPICAL BILLING BREAK UP FOR IGES
PACKAGE)

ANNEXURE-6

Client: Bharat Heavy Electricals Limited


System: INERT GAS EXTINGUISHING SYSTEM

TYPICAL BILLING BREAK UP SCHEDULE

Sl. No.	Item Description	Unit	Total Qty.	Supply		Freight & Insurance	
				Rate Rs	Amount Rs.	Rate Rs	Amount Rs.
(A)	(B)	(C)	(D)	(E)	(F)	(E)	(F)
1.0	Argonite Cylinder,with Pneumatic valve	Nos.					
2.0	Discharge Hose	Nos.					
3.0	Check Valve	Nos.					
4.0	Contact Pressure Gauge Unit	Nos.					
5.0	Release Unit with Solenoid, CPG & Actuator	Nos.					
6.0	Leak / Bleeder unit	Nos.					
7.0	Non Return Valve	Nos.					
8.0	Hi-flex hoses	Nos.					
9.0	Ball Valve with dual action pneumatic actuator	Nos.					
10.0	Pressure Relief device	Nos.					
11.0	Pressure Gauge	Nos.					
12.0	Argonite Discharge Nozzles						
13.0	Pressure Regulator	Nos.					
14.0	Solenoid valve	Nos.					
15.0	Restrictor	Nos.					
16.0	T-Piece for Pilot Line	Nos.					
17.0	Cros for Pilot Line	Nos.					
18.0	Pipes & Fittings	Lot					
19.0	Manifolds	Lot					
20.0	Pilot Line Manifold	No.					
21.0	Structural Steel for Cyl. Mounting Frame Bracket	Lot					
22.0	Gas Release Panel with Nicd Batteries	Set					
23.0	Pressure Operated Switch	Nos.					
24.0	Pressure Relief Vent	Nos.					
25.0	Gas Discharge EPB & Inhibitor unit	Nos.					
26.0	Argonite Warning sign	Nos.					
27.0	Junction box	Nos.					
28.0	Flame Retardent Cu. Conductor Control Flexible Wire, Cable and Conduit	Lot					
	Total						

ANNEXURE – 7
(PRE-BID QUERY FORMAT)

ANNEXURE-7

TD-106-2	Rev.No. 5 Form No.		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, HYDERABAD –32.	PESD/HYD-776 Rev No.: 00 Page 1 of 1								
<p align="center">COPYRIGHT AND CONFIDENTIAL</p> <p>The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.</p>		<p><u>PRE-BID QUERRIES FROM SPECIFICATION</u></p> <p>If the proposal submitted has got any Queries from the technical stipulations in the bidding document, the Bidder shall tabulate below the full particulars of such Queries and shall sign below. Additional sheets may be enclosed, if necessary. Queries are to be furnished with mention of specific clause numbers. Technical and commercial Queries to scope of supply and services shall be indicated separately.</p> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:15%;">SL.No.</th> <th style="width:20%;">Clause No.</th> <th style="width:40%;">Description as per specification</th> <th style="width:25%;">Queries by Bidder</th> </tr> </thead> <tbody> <tr> <td style="height: 200px;"> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>			SL.No.	Clause No.	Description as per specification	Queries by Bidder				
SL.No.	Clause No.	Description as per specification	Queries by Bidder									
Doc		<p>We confirm that all the Pre-Bid Queries to the Technical Specification, Job Specification and enclosures including reference documents attached are listed in this Annexure only. No other Pre-Bid Queries even if mentioned elsewhere shall be considered for any technical/ commercial evaluation or for ordering.</p> <p>Bidder's Signature.....</p> <p>Date:.....</p>										

ANNEXURE – 8
(LIST OF INPUT DRAWINGS)

ANNEXURE - 8

Package Name : Inert Gas Extinguishing system

Project : 1 x 660 MW SAGARDIGHI THERMAL POWER EXTENSION PROJECT (PHASE-III, UNIT#-5)

INPUT DRAWING LIST

SL NO.	Title of the Drawing (to be filled by Bidder)	INPUT DRG. NO. (to be filled by BHEL)	Rev. no.	DATE OF FURNISHING BY BHEL	Reference E Mail (to be filled by BHEL)	Drawing Type (to be filled by BHEL)	Remarks
1	Power House Building Arch. Plan at El.0.00M	PE-DG-475-611-C036	01a	Furnished along with tender specification	Furnished along with tender specification	-N.A-	Annexure - 10 of Tender specifications
2	Power House Building Arch. Plan at El.3.5M	PE-DG-475-611-C039	01a	Furnished along with tender specification	Furnished along with tender specification	-N.A-	Annexure - 10 of Tender specifications
3	Power House Building Arch. Plan at El.8.5M	PE-DG-475-611-C041	01a	Furnished along with tender specification	Furnished along with tender specification	-N.A-	Annexure - 10 of Tender specifications
4	Power House Building Arch. Plan at El.12.0M	PE-DG-475-611-C043	00a	Furnished along with tender specification	Furnished along with tender specification	-N.A-	Annexure - 10 of Tender specifications
5	Power House Building Arch. Plan at El.17.0M	PE-DG-475-611-C043	01a	Furnished along with tender specification	Furnished along with tender specification	-N.A-	Annexure - 10 of Tender specifications
6	Power House Building Arch. Plan at El.25.5M	PE-DG-475-611-C043	01	Furnished along with tender specification	Furnished along with tender specification	-N.A-	Annexure - 10 of Tender specifications
7	CCR/CER/Computer Room Layout (at El.17.0M)	PE-DG-475-145-I401	03	Furnished along with tender specification	Furnished along with tender specification	-N.A-	Annexure - 10 of Tender specifications
8	UPS, Battery, Battery Charger room Layout	PE-DG-475-145-I475	01	Furnished along with tender specification	Furnished along with tender specification	-N.A-	Annexure - 10 of Tender specifications

ANNEXURE – 9
(NO DEVIATION FORMAT)

ANNEXURE - 9

LIST OF DEVIATIONS

Project: IGES SYSTEM FOR 1 x 660 MW SAGARDIGHI THERMAL POWER EXTENSION PROJECT (PHASE-III, UNIT#-5)

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

NOTES:

1. Deviations, if any, shall be clearly brought out only in this format. Deviations mentioned / taken elsewhere or in any other format will be ignored.
2. Additional sheets in the same format can be attached by the vendor, if necessary.
3. Nature of Deviations shall only be of Design / Manufacturing constraints and non-availability of items / components / makes in market.
4. No price implications shall be entertained for deviations withdrawn during the technical scrutiny. If any deviations are accepted by BHEL during technical scrutiny then also there will be no price implication. Hence, in no case there will be consideration of Price implications.
5. Reasons for the deviations shall be specified in the Remarks column.
6. If there are no deviations from the specifications, bidder still has to submit the signed copy of this format by writing "NO Deviations" on this format.
7. If the "Deviation Schedule" is not submitted along with the offer, the bidder's offer is likely to be rejected without any further interaction with the bidder. Only the accepted deviations in conjunction with the original tender shall constitute the contract document for the award of job to the bidder

ANNEXURE – 10
(TENDER DRAWINGS)

ANNEXURE – 11
(CHECKLIST)

ANNEXURE - 11**CHECK LIST FOR OFFER SUBMISSION**

SL No	Description	Bidder's Confirmation
1	Bidder to confirm to the scope of supply and scope of services as per BHEL spec: PY51838, Rev-00	
2	Bidder to submit the No Deviation letter w.r.t. BHEL spec: PY51838, Rev-00 along with offer.	
3	Bidder to quote as per BHEL price format only. Bidder to attached unpriced bid format along with Annexure-A by indicating "QUOTED" against each item in the technical offer.	
4	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 of (-)20% to (+) 10% of order Value.	
5	In case of deviation, vendor to confirm that these are technically not feasible deviations and same are submitted in BHEL format. In case technically feasible deviations are proposed by the bidder and subsequently withdrawn, no commercial implications can be claimed by the bidder.	
6	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 accepted by purchaser from the bidder after the closure of pre-bid.	
7	Bidder to agree that Bill of materials / list of equipment furnished in the offer is only for information; Vendor shall supply all the material to meet the performance, sizing & technical requirement as per specification & its Annexures, scope matrix etc.	
8	Confirm that the quote includes training, commissioning spares, special tool & tackles, mounting hardware/ accessories, terminations, etc. as required for commissioning activities.	
9	All the equipments / items 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	

BIDDER'S SIGNATURE:

NAME:

DATE:

COMPANY SEAL:

ANNEXURE – 12
(SUB VENDOR LIST)

ANNEXURE - 12

S.No.	Item Description	Vendor
1	Inert Gas System	GingeKerr
		Ansul
		SRI
		Siemens
		UTC Fire & Security India Limited/(Kiddle)
2	SEALED MAINTENANCE FREE BATTERY	AMARA RAJA POWER SYSTEMS LTD
		EXIDE INDUSTRIES LIMITED
		HBL POWER SYSTEMS LTD
		HOPPECKE BATTERIEN GMBH & CO KG
3	LEAD ACID STORAGE BATTERY	EXIDE INDUSTRIES LIMITED
		HBL POWER SYSTEMS LTD
		HOPPECKE BATTERIEN GMBH & CO KG
4	NICKEL-CADMIUM BATTERY	HBL POWER SYSTEMS LTD
		HOPPECKE BATTERIEN GMBH & CO KG
		AMCO SAFT INDIA LTD.
5	Battery chargers	AMARA RAJA POWER SYSTEMS LTD
		HBL POWER SYSTEMS LTD
		KERALA STATE ELECTRONICS
		DUBAS ENGINEERING PVT LTD.
		CHHABI ELECTRICALS P LTD.
6	Fire Survival Cables	STATCON POWER CONTROLS LTD.
		POLYCAB
		RRKABEL
		KEI INDUSTRIES LIMITED
		DELTON
7	Cable Trays	PATNY SYSTEMS PVT. LTD
		JAMNA METAL COMPANY
		PARMAR METALS PVT. LTD
		METALEMMS BOMBAY PVT. LTD.
		VINFAB ENGINEERS INDIA PRIVATE
		PREMIER POWER PRODUCTS
8	CABLE GLANDS (WEATHER PROOF/EX.PROOF)	INDIA ELECTRICALS SYNDICATE
		UNITED AGRO ENGINEERING PVT. LTD.
		FLEXPRO ELECTRICALS PVT. LTD.,
		FCG POWER INDUSTRIES
		PROMPT ENGINEERING WORKS, MUMBAI
		FLAMEPROOF EQUIPMENTS PVT.LTD.
9	JUNCTION BOXES (WEATHER PROOF)	FCG FLAMEPROOF CONTROL GEARS
		ELECTROMAC INDUSTRIES
		PANAM CONTROLS,
		FLEXPRO ELECTRICALS PVT. LTD.,
		EX-PROTECTA
		FLAMEPROOF EQUIPMENTS PVT.LTD.
10	PRESSURE GAUGES	FCG FLAMEPROOF CONTROL GEARS
		PYROTECH ELECTRONICS PVT. LTD.
		FORBES MARSHALL (HYD) PVT LIMITED,
		PRECISION MASS PRODUCTS
		H.GURU INSTRUMENTS(S.I)PVT.LTD
		WALCHANDNAGAR INDUSTRIES LIMITED
		SCIENTIFIC DEVICES (BOMBAY) PVT. LT
		BAUMER TECHNOLOGIES
		GAUGES BOURDON INDIA
GENERAL INSTRUMENTS CONSORTIUM		
11	PRESSURE AND DIFFERENTIAL PRESSURE SWITCHES	A.N. INSTRUMENTS PVT. LTD.,
		PROTECH CONTROL INSTRUMENTS
		INDFOS INDUSTRIES LIMITED,
		TRAFAG CONTROLS INDIA PVT LTD
		BAUMER TECHNOLOGIES
		HIRLEKAR PRECISION ENGG. PVT. LTD.
12	FLANGES	KAUSTUBHA UDYOG
		GAUGES BOURDON INDIA
		SWITZER PROCESS INSTRUMENTS
		PRESHZINGER ENGINEERING
		THE PUNJAB STEEL WORKS,
		METAL FORGINGS P. LTD.
		TUBE PRODUCTS INCORPORATE
C.D. INDUSTRIES,		
CHW FORGE PRIVATE LIMITED		
KISAAN STEELS (PVT) LTD.,		
KUNJ FORGINGS PVT. LTD.		

S.No.	Item Description	Vendor
13	BUTT WELDED PIPE FITTINGS	U I PIPE FITTINGS PVT. LTD.
		WEIFANG HUODA PIPE FITTINGS
		TUBE PRODUCTS INCORPORATE
		GUJARAT INFRAPIPES PVT.LTD.,
		SAWAN ENGINEERS PVT. LTD.
		PETRO CHEM INDUSTRIES
		TRUE FORGE PVT.LTD.,
		DEE DEVELOPMENT ENGINEERS LTD.,
		TRUE FAB ENGINEER (P) LTD.
		P.K. TUBES & FITTINGS PVT. LTD.
		K. S. PIPE FITTINGS PVT. LTD.
		TUBE TURN (INDIA) P. LTD.
		POONAM ENTERPRISE
14	BOLTING MATERIAL	ATLAS FASTENERS
		MULTI FASTNERS PVT. LTD.
		BOLTMASER (INDIA)PVT.LTD.
		PRESIDENT ENGINEERING WORKS
		MEGA ENGINEERING PVT. LTD.
		PIONEER NUTS AND BOLTS PVT.LTD
		MORNING STAR INDUSTRIES,
		UDEHRA FASTENERS LIMITED
		SREE PAVITHRA INDUSTRIES,
15	CARBON STEEL (SEAMLESS) TUBES / PIPES OD UPTO AND INCLUDING 114.3 MM	JR SEAMLESS PRIVATE LIMITED
		WUXI SPECIAL STEEL MATERIAL CO LTD
		SHANDONG LIAOCHENG ZGL
		YANGZHOU LONTRIN STEEL TUBE
		JIANGSU CHENGDE STEEL TUBE
		ZHEJIANG GROSS SEAMLESS
		PATELS AIRFLOW LIMITED
		EVERGREEN SEAMLESS PIPES & TUBES
		MAHARASHTRA SEAMLESS LTD.,
		JINDAL SAW LIMITED,
		HEAVY METAL & TUBES LIMITED,
		ISMT LIMITED.,
		MOKSHI INDUSTRIES PVT. LTD.
		AMARDEEP STEEL CENTRE
		POONAM ENTERPRISE
		NAGARDAS KANJI SHAH
		SCORODITE STAINLESS
TUBOS REUNIDOS,S.A,		
LAL BABA SEAMLESS TUBES PVT. LTD.		
16	CARBON STEEL (SEAMLESS) TUBES / PIPES OD ABOVE 114.3 MM AND BELOW 219.1 MM	WUXI SPECIAL STEEL MATERIAL CO LTD
		SHANDONG LIAOCHENG ZGL
		YANGZHOU LONTRIN STEEL TUBE
		JIANGSU CHENGDE STEEL TUBE
		ZHEJIANG GROSS SEAMLESS
		EVERGREEN SEAMLESS PIPES & TUBES
		MAHARASHTRA SEAMLESS LTD.,
		JINDAL SAW LIMITED,
		HEAVY METAL & TUBES LIMITED,
		ISMT LIMITED.,
		MOKSHI INDUSTRIES PVT. LTD.
		AMARDEEP STEEL CENTRE
		POONAM ENTERPRISE
		NAGARDAS KANJI SHAH
		SCORODITE STAINLESS
		TUBOS REUNIDOS,S.A,
		17
SHANDONG LIAOCHENG ZGL		
YANGZHOU LONTRIN STEEL TUBE		
YANGZHOU CHENGDE STEEL PIPE		
JIANGSU CHENGDE STEEL TUBE		
ZHEJIANG GROSS SEAMLESS		
EVERGREEN SEAMLESS PIPES & TUBES		
MAHARASHTRA SEAMLESS LTD.,		
JINDAL SAW LIMITED,		
ISMT LIMITED.,		
MOKSHI INDUSTRIES PVT. LTD.		
AMARDEEP STEEL CENTRE		
POONAM ENTERPRISE		
NAGARDAS KANJI SHAH		
SCORODITE STAINLESS		
PRODUCTOS TUBULARES S.A.,		

S.No.	Item Description	Vendor
18	CARBON STEEL (SEAMLESS) TUBES / PIPES OD ABOVE 273.1 MM UPTO AND INCLUDING 355.6 MM	WUXI SPECIAL STEEL MATERIAL CO LTD
		SHANDONG LIAOCHENG ZGL
		YANGZHOU LONTRIN STEEL TUBE
		YANGZHOU CHENGDE STEEL PIPE
		JIANGSU CHENGDE STEEL TUBE
		ZHEJIANG GROSS SEAMLESS
		KAVIISH FOCUS PIPES PVT. LTD
		EVERGREEN SEAMLESS PIPES & TUBES
		MAHARASHTRA SEAMLESS LTD.,
		MOKSHI INDUSTRIES PVT. LTD.
		AMARDEEP STEEL CENTRE
		POONAM ENTERPRISE
19	CARBON STEEL (SEAMLESS) TUBE /PIPES OD ABOVE 355.6 MM	PRODUCTOS TUBULARES S.A.,
		WUXI SPECIAL STEEL MATERIAL CO LTD
		YANGZHOU LONTRIN STEEL TUBE
		YANGZHOU CHENGDE STEEL PIPE
		JIANGSU CHENGDE STEEL TUBE
		ZHEJIANG GROSS SEAMLESS
		KAVIISH FOCUS PIPES PVT. LTD
		EVERGREEN SEAMLESS PIPES & TUBES
		MOKSHI INDUSTRIES PVT. LTD.
		AMARDEEP STEEL CENTRE
		POONAM ENTERPRISE
		PRODUCTOS TUBULARES S.A.,
20	SOCKET WELDED / SCREWED WELDED PIPE FITTINGS	WUXI SPECIAL STEEL MATERIAL CO LTD
		YANGZHOU LONTRIN STEEL TUBE
		YANGZHOU CHENGDE STEEL PIPE
		JIANGSU CHENGDE STEEL TUBE
		ZHEJIANG GROSS SEAMLESS
		KAVIISH FOCUS PIPES PVT. LTD
		EVERGREEN SEAMLESS PIPES & TUBES
		MOKSHI INDUSTRIES PVT. LTD.
		AMARDEEP STEEL CENTRE
		POONAM ENTERPRISE
		PRODUCTOS TUBULARES S.A.,
		S.S.PIPE FITTINGS & FORGINGS
		UNIQUE ENGINEERING ENTPS. P. LTD.
		PRESHZINGER ENGINEERING
FLASH FORGE PVT LTD		
CARLO DYNATECH INDUSTRIES,		
U I PIPE FITTINGS PVT. LTD.		
TRUE FORGE PVT.LTD.,		
P.K. TUBES & FITTINGS PVT. LTD.		
K. S. PIPE FITTINGS PVT. LTD.		
SKY FORGE PRIVATE LIMITED		
PRECISION ENGINEERING INDS.,		
FITTECH INDUSTRIES PVT. LTD.		
LEADER VALVES LIMITED		
M.S. FITTINGS MANUFACTURING CO. PVT		
1	Bidder to note that all IGES equipment such as cylinders, contact gauges, pressure regulators, Gas release Panel etc. shall be UL/FM/LPCB/VdS approved.	
2	Cylinders shall also have PESO , Nagpur approval certificate.	
3	Any other item which is not indicated above and is required for completion of the system shall be as per BHEL PMD.	
4	Bidder shall take prior approval of BHEL w.r.to vendors for procurement of items which are not envisaged in the above list.	

ANNEXURE – 13
(TYPICAL BOQ FORMAT)

ANNEXURE-13

BOQ FOR INERT GAS EXTINGUISHING SYSTEM										
Sl.No.	Drawing Title	Unit	P&ID of IGES	Piping Layout of IGES	Isometric View of IGES	GA of Inergen cylinder storage room & supporting arrangement	GA of Cylinder Manifold	Pressure Vent Location Location Layout	Electrical Cabling Layout	TOTAL BOQ
	Vendor Documet No.									
	Drawing Approval status (By BHEL)									
	Remarks									
1.0	Inergen CYLINDER -300 BAR, CAPACITY. 140 LTRS.	Nos.								
2.0	LABEL FOR140 LTRS CYLINDER	Nos.								0
3.0	PNEUMATIC VALVE (INCLUDED IN CYLN. ASSEMBLY)	Nos.								0
4.0	CHECK VALVE 3/4"NPT X 1/2"BSP	Nos.								0
5.0	CONTACT GAUGE UNIT	Nos.								0
6.0	DISCHARGE HOSE 1/2" X 400 LG.	Nos.								0
7.0	NON RETURN VALVE 1/4 inch	Nos.								0
8.0	1/4 INCH CROSS FOR ACTUATION LINE	Nos.								0
9.0	HI-FLEX. HOSE FOR PILOT 1/4" X 365 Length.	Nos.								0
10.0	HI FLEX HOSE 1/4" X 500MM	Nos.								0
11.0	HI FLEX HOSE 1/4" X 400MM (1X90°)	Nos.								0
12.0	HI FLEX HOSE 1/4" X 700MM (1X90°)									0
13.0	PRESSURE GAUGE 1/2 NPT-300 Bar	Nos.								0
14.0	PRESSURE RELIEF DEVICE 300 BAR, BSP	Nos.								0
15.0	RELEASE UNIT 300 BAR(Automatic & Manual Release)	Nos.								0
16.0	1/4 Inch TEE PIECE FOR ACTUATOR LINE	Nos.								0
17.0	BALL VALVE, 1 1/2 INCH (DIVERter VALVE) FE - NPT	Nos.								0
18.0	HANDLE FOR 1 1/2 INCH BALL VALVE	Nos.								0
19.0	BALL VALVE, 1 INCH (DIVERter VALVE) FE - NPT	Nos.								0
20.0	HANDLE FOR 1 INCH BALL VALVE	Nos.								0

ANNEXURE – 14
(SPECIFICATION OF CABLES)



Annexure-E

FS POWER & CONTROL CABLE

1.1KV GRADE COPPER CONDUCTOR FS POWER CABLES

1100 V, copper conductor, heat resisting insulation, extruded inner sheath of low smoke and very low halogen content fire resisting material (for multi-core), single layer of copper wire armour for single core/ single layer of round galvanised steel wire for multicore, outer sheath of low smoke and very low halogen content fire resistant material, suitable for minimum temperature of 950 deg.C (Cat-C) for 3 hours. The cables shall be in compliance with BS 6387.

1.1KV GRADE COPPER CONDUCTOR FS CONTROL CABLES

1100 V, copper conductor, heat resisting insulation, extruded inner sheath of low smoke and very low halogen content fire resisting material (for multi-core), single layer of copper wire armour for single core/ single layer of round galvanised steel wire for multicore, outer sheath of low smoke and very low halogen content fire resistant material, suitable for minimum temperature of 950 deg.C (Cat-C) for 3 hours. The cables shall be in compliance with BS 6387.

[Note : For instrumentation signaling purpose, pair cable with screen on both inner sheath & outer sheath shall be used. For details refer section – VI of Vol.-IIE.]

ANNEXURE – 15

**(SPECIFICATION FOR SURFACE PREPARATION
& PAINTING)**

9.00.00 **PAINTING**

9.01.00 **Large Diameter Piping**

9.01.01 Before application of the paint, the internal and external surfaces shall be thoroughly cleaned with wire brush or sand blasting as per SA 2.5 standard as required for removal of loose dirt, mill scales etc. Manufacturer's recommendation shall strictly be followed in the application of paint.

9.01.02 Inner surface of each section of the pipe shall be given adequate number of coats of epoxy resin based red oxide primer paint or approved equal so as to achieve a dry thickness of minimum 500 micron. Inner surface painting shall be applied at the fabrication yard before laying the pipes in position, leaving about 200 mm at both ends for welding of joints. This portion shall be painted after completion of laying and jointing.

9.01.03 Outside surface of pipes and fittings including hangers and supports that will be overground or in a pit shall be given one (1) coat of red lead primer before despatch from fabrication yard. After installation, the part of the pipeline from where priming coat has been rubbed off shall be retouched with primer. Then two coats of Synthetic Enamel paint of approved quality and colour shall be applied.

9.01.04 Outside surface of all valves and accessories supplied by the Purchaser but erected on the piping system by the Bidder shall also be given one (1) coat of synthetic enamel paint of approved quality and colour.

9.01.05 **Specification for application of paints for external surfaces protection of steel pipes and fittings which are buried underground / laid inside a Hume Pipe & or submerged Under Water and laid under Pipe Trenches (in road/rail/pipe or trench crossings) shall be as follows:**

- a) Surface preparation by means of sand blasting and shall conform to SSPC SP10/NACE2/ Sa2½.
- b) External surface of the pipe, fittings etc to be painted with one coat of two part chemically cured polyurethane primer of min 30 micron dry film thickness followed by three or maximum four coats of two part solvent free polyurethane to provide a high build coating of dry film thickness of 1500 micron including primer coat.

Bidder shall submit detailed protection procedure for approval of Owner.

9.01.06 **Specification for application of paints for internal surfaces protection of steel pipes and fittings which are buried underground / laid inside a Hume Pipe & or submerged Under Water and laid under Pipe Trenches (in road/rail/pipe or trench crossings) shall be as follows:**

- a) Surface preparation by means of sand blasting which shall conform to SSPC SP10/NACE2/Sa2½ standard.
- b) All Internal surfaces of steel pipes, fittings, specialties etc. buried underground or located within pipe trenches shall be given epoxy coating to protect them from (except for drinking water service, where the compatible painting shall be so selected to meet relevant quality standards) corrosion.
- c) Internal surface of the pipe should be coated with one coat of two part epoxy primer with not less than 50 micron DFT (dry film thickness) followed by two part polyamide cured solvent less epoxy.
- d) The minimum dry film thickness (DFT) of internal lining shall be 500 micron.

9.01.07 The pipes that will be buried underground shall be spark tested after completion of wrapping of each sections/field jointing to check the quality of insulation that has been provided on the pipe.

ANNEXURE – 16
(SPECIFICATION FOR DOMESTIC PACKING)

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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

Revisions:			APPROVED: PROCEDURAL GUIDELINES COMMITTEE – PGC (Packing)		
Rev. No. 01	Amd. No.	Reaffirmed	Prepared HPBP, Trichy	Issued Corp. R&D	Dt. of 1 st Issue 31-05-2018
Dt: 12-06-2018	Dt:	Year:			



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 planing 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 planed 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.



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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	AS ₂ O ₅ 2H ₂ O	12.5
– Copper Sulphate	CuSO ₄ 5H ₂ O	37.5
– Sodium Dichromate	Na ₂ Cr ₂ O ₇ 5H ₂ O	50.0
– Or Potassium Dichromate	K ₂ Cr ₂ O ₇	

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).



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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 shoo'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 x 2500
2. Two suite cubicle - 1650 x 950 x 2500
3. Three suite cubicle - 2400 x 950 x 2500
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.



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- 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

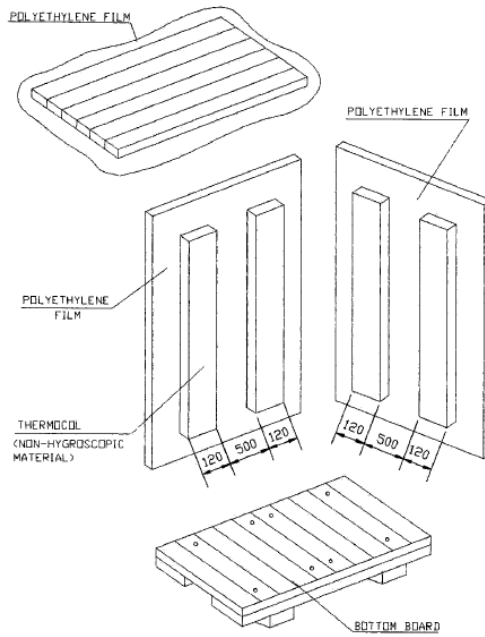


Figure 1

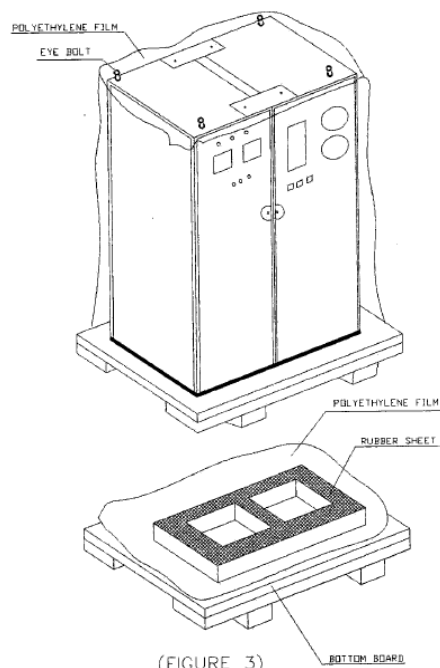


Figure 2

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**

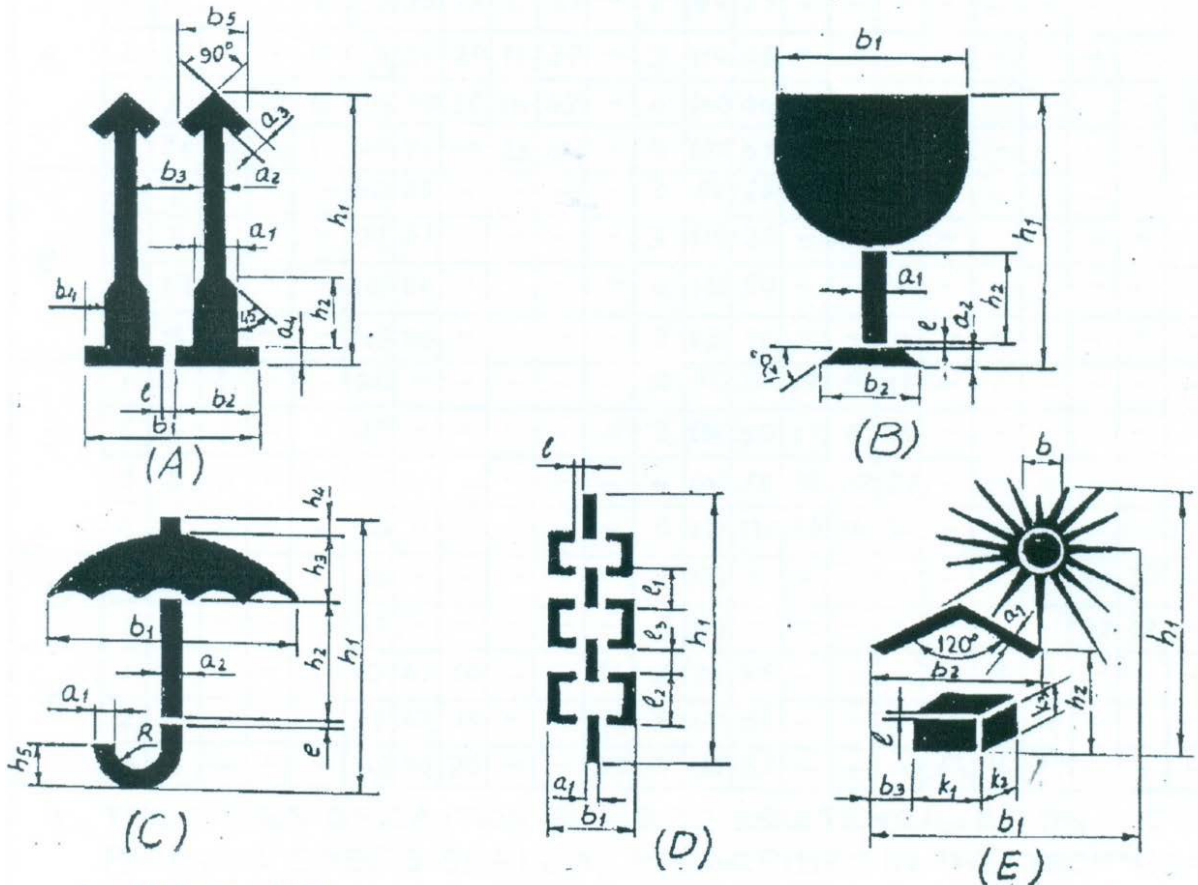
Steel containers for packing can be used in case of repeated supplies of the same equipment. Empty steel containers are to be returned back from customer's end and to be reused for the next supplies. The containers are to be made of structural steel as per AA10108 with proper reinforcement with I, C 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

MARKINGS ON PACKING CASES

1. THIS PLANT STANDARD PRESCRIBES THE VARIOUS CAUTION SIGNS AND OTHER MARKINGS ON PACKING CASES.
2. DIMENSIONS IN THE TABLE 1 SHALL BE USED FOR MAKING STENCILS ONLY.



- A. UPRIGHT
- B. FRAGILE
- C. PROTECTION FROM FALLING OR CONDENSING MOISTURE.
- D. SLINGING POSITION
- E. PROTECTION FROM DIRECT RADIATIONS.



Figure 3



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

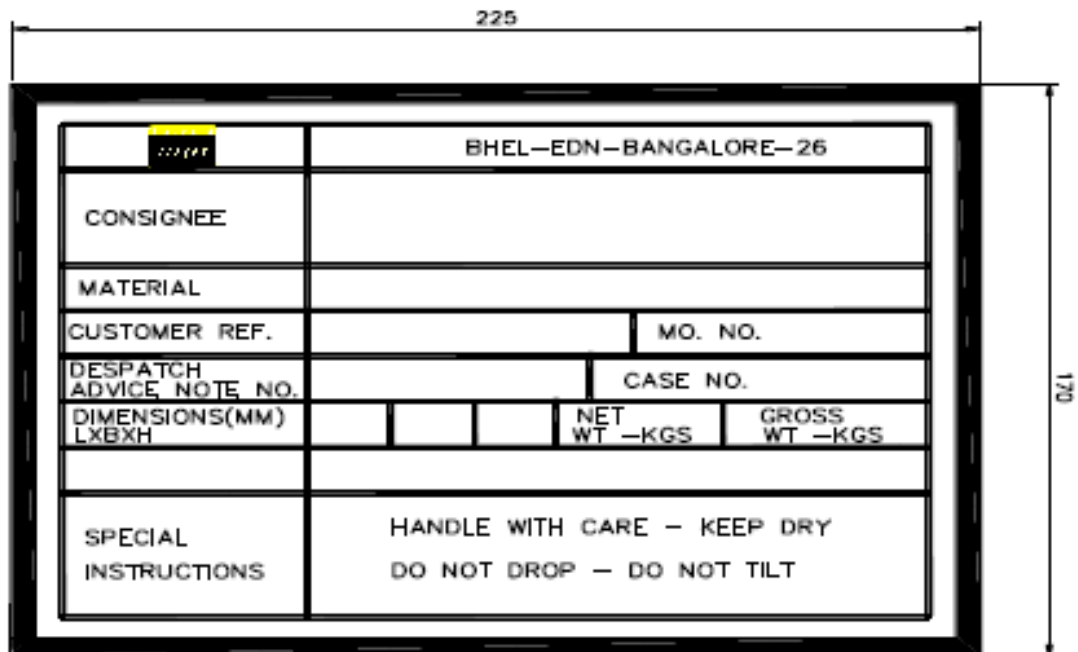


Figure 4 – TYPICAL MARKING PLATE

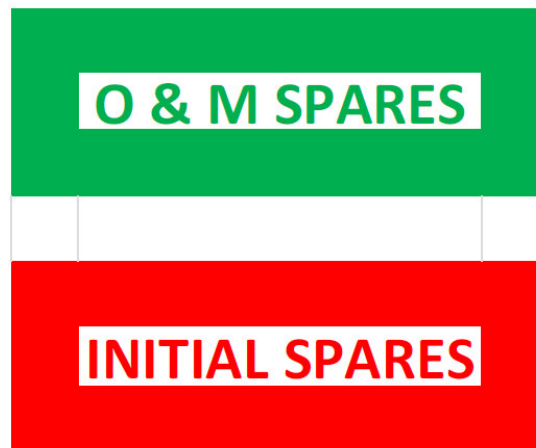


Figure 5

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.



- 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 15°.
- 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 3 Double 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 | | |