ANNEXURE – A

(BILL OF MATERIAL)

	Bill of Material	Annexure -[A] of PY51868
	Framework for Fire Detection & Alarm System	Rev 00

BHEL MATERIAL CODE: PY9751868017

S. No.	Item Description	Quantity	Unit	Remarks
1	Fire Alarm Panel (Each panel shall have 12 Loops) Floor Mounted	2	No.'s	Refer Note-1,2,3 & 6
2	Fire Alarm Panel (Each panel shall have 8 Loops) Floor Mounted	6	No.'s	Refer Note-1,2,3 & 6
3	Fire Alarm Panel (Each panel shall have 6 Loops) Floor Mounted	4	No.'s	Refer Note-1,2,3 & 6
4	Fire Alarm Panel (Each panel shall have 4 Loops) Floor Mounted	2	No.'s	Refer Note-1,2,3 & 6
5	Fire Alarm Panel (Each panel shall have 2 Loops) Floor Mounted	2	No.'s	Refer Note-1,2,3 & 6
6	Loop Card	4	No.'s	Refer Note-3
7	Repeater Panel	12	No.'s	230V AC, 1-Phase Operated Repeater Panel
8	Multisensor Detectors with detector base and mounting back box (Analogue addressable) along with PVC cable glands	6600	No.'s	Refer Note-12
9	Heat Detectors with detector base and mounting back box (Analogue addressable) along with PVC cable glands	132	No.'s	Refer Note-12
10	Probe Detectors (ROR type) with Flameproof Junction box for Fuel tanks *(Min. 50 ft x 50 ft coverage for each detector along with counter flange and gasket) (Addressable)*	15	No.'s	If addressable detector is not available in offered make, then Module (1 Input) with IP-65 enclosure to be provided along with detector. 'Refer Note-12
11	Beam Detectors (Addressable) along with PVC cable glands	132	No.'s	If addressable detector is not available in offered make, then Module (2 Input + 1 Output) with IP-65 enclosure to be provided along with detector. 'Refer Note-12
12	Air Sampling Type Smoke Detection System for Control Rooms and Control Equipment Rooms of TG Building (including modules for interfacing with fire detection & alarm system)	6	Sets	Engineering and supply of related BOQ along with erection hardware is in Bidder scope.
13	Infrared Ember Detector with Air Purge Unit along with Accessories	15	No.'s	24V DC Operated
14	Module for Interface with IR Ember Detector (1 Input + 1 Output) with IP-65 enclosure along with PVC cable glands	15	No.'s	
15	Dual Wavelength Infrared Flame Detector with Accessories	6	No.'s	24V DC Operated
16	Module for Interface with Dual Wavelength IR Flame Detector (1 Input + 1 Output) with IP-65 enclosure along with PVC cable glands	6	No.'s	
17	Indoor Manual Call Points with mounting back box (Addressable type) along with PVC cable glands	473	No.'s	Refer Note-12
18	Outdoor Manual call points with mounting back box (IP-65 min.) (Addressable type) along with PVC cable glands	546	No.'s	Refer Note-12
19	Flameproof Manual call points with mounting back box (Addressable type) along with PVC cable glands	2	No.'s	If addressable MCP (Flameproof) is not available in offered make, then Module (1 Input) with flameproof enclosure to be provided along with detector. Refer Note-12
20	Indoor Hooter cum Strobe with mounting back box (Addressable type & Loop powered) along with PVC cable glands	700	No.'s	Conventional hooter cum strobe or conventional hooter and conventional strobe with addressable module is not acceptable. Bidder to consider addressable loop powered hooter cum strobe or loop powered hooter and loop powered strobe only. Refer Note-12
21	Response Indicators	605	No.'s	

	Bill of Material	Annexure -[A] of PY51868
	Framework for Fire Detection & Alarm System	Rev 00

BHEL MATERIAL CODE: PY9751868017

S. No.	Item Description	Quantity	Unit	Remarks
22	Siren (10 km) with Siren Control panel	1	No.'s	415 V, 3-Phase Operated Siren and 230V, 1-Phase Operated Siren Control Panel
23	Siren (3 km) with Siren Control panel	1	No.'s	415 V, 3-Phase Operated Siren and 230V, 1-Phase Operated Siren Control Panel
24	Siren (1 km) with Siren Control panel	6	No.'s	230 V, 1-Phase Operated Siren and 230V, 1-Phase Operated Siren Control Panel
25	Interface module for Siren Operation with IP-65 enclosure	8	No.'s	Refer Note-12
26	Digital LHS Cable (Thermoplastic Type) for Cable Galleries	82500	Mtr.	Refer Note-15
27	Digital LHS Cable (Steel Braided Type) for Conveyors	28600	Mtr.	Refer Note-15
28	End of Line Resistance with IP-65 enclosure	350	No.'s	
29	LHS Cable Jointing Box (IP-65 rated)	200	No.'s	
30	Digital LHS Controller (2 kms range)	30	No.'s	
31	Module for LHS Cable (1 Input) with IP-65 enclosure along with PVC cable glands	350	No.'s	Refer Note-12
32	Module for Deluge Valve (2 Input + 1 Output) with IP-65 enclosure along with PVC cable glands	350	No.'s	Refer Note-12
33	Module for Tripping (1 Output) along with PVC cable glands	150	No.'s	Refer Note-12
34	Module for Monitoring Pumps Status (1 Input) with IP-65 enclosure along with PVC cable glands	5	No.'s	Refer Note-12
35	Module for Interface with DCS (1 Output) with IP-65 enclosure along with PVC cable glands	100	No.'s	Refer Note-12
36	Module for Interface with IGES (1 Input + 1 Output) with IP-65 enclosure along with PVC cable glands	5	No.'s	Refer Note-12
37	230V AC Back-Lit Exit Sign Board with Battery Back Up	100	No.'s	Min. battery backup time shall be 180 minutes
38	24V DC Back-Lit Exit Sign Board	100	No.'s	
39	Self Illuminating Exit Sign Board	350	No.'s	Min. sheet thickness shall be 1 mm
40	24 V DC Power Supply Modules with Battery Back Up with (IP - 20 enclosure)	20	No.'s	5A, 24V DC, min. 7AH batteries with backup time of 30 min. Refer attached specification (Annexure-E) for technical details.
41	24 V DC Power Supply Modules with Battery Back Up with (IP - 66 enclosure)	30	No.'s	5A, 24V DC, min. 7AH batteries with backup time of 30 min. Refer attached specification (Annexure-E) for technical details.
42	Operator Workstation & Color Laser Jet Printer along with Commissioning software with Licence / Dongle + Graphic software with License /Dongle	16	Sets	Min. requirements are:- Processor - I7 RAM - 4 GB Hard Disk - 500 GB SATA CD Drive Graphics Card 24" Flat Monitor Optical Mouse & Keyboard Printer Memory - 256 MB Printer Paper Size - A4 & A3
43	Operator Workstation along with OPC Server & Client Software + License + Accessories	2	Sets	Refer note - 13 below
44	UPS for Operator Work Station + Printer	16	Sets	

	Bill of Material	Annexure -[A] of PY51868
	Framework for Fire Detection & Alarm System	Rev 00

BHEL MATERIAL CODE: PY9751868017

S. No.	Item Description	Quantity	Unit	Remarks
45	Laptop along with Fire Alarm Panel Commissioning Software with License /Dongle	1	No.'s	Min. requirements are:- Processor - I7 RAM - 4 GB Hard Disk - 500 GB SATA 17" Screen
46	Furniture for Operator Workstation & Printer	16	Sets	
47	6F Fiber Optic Cable for Networking Fire Alarm Panels & Repeater Panels along with 2" rodent proof HDPE Conduit	49500	Mtr.	
48	Cable Tags for 1P x 1.5 Sqmm Cable	100	No.'s	
49	Cable Tags for 2C x 2.5 Sqmm Cable	100	No.'s	
50	Cable Saddle + Saddle Bars along with fixing screws and rawl plugs for 1P x 1.5 sqmm Cable	75000	Sets	These saddles are used for laying BHEL supplied cables.
51	Cable Saddle + Saddle Bars along with fixing screws and rawl plugs for 2C x 2.5 sqmm Cable	40000	Sets	These saddles are used for laying BHEL supplied cables.
52	50 mm Cable Tray	7500	Meter	
53	Networking Components for Fire Alarm Panel, Repeater Panels & OWS	15	Sets	
54	Fuses (100% of population)	15	No.'s	
55	Indicating Lamps (100% of population)	15	Sets	
56	Push Buttons (10 Nos of each type and rating)	15	Sets	
57	Power supply Modules (10% or 1 Nos of each type and rating whichever is more)	15	Sets	
58	LCD display of each type unit of panel (1 No / project)	15	Sets	
59	LED's of each type (100% of population / project)	15	Sets	
60	Power Supervision Relay (4 Nos of each type)	15	Sets	
61	Alarm buzzer (1 Nos of each type)	15	Sets	
62	Cartridge for Printers (2 Nos of each type)	15	Sets	
63	CPU Card (2 Nos. of each type)	2	Sets	
64	Network Card (2 Nos. of each type)	2	Sets	
65	Zone Card (2 Nos. of each type)	2	Sets	
66	Audio Control Module (2 Nos. of each type)	2	Sets	
67	Batteries (2 Nos. of each type)	2	Sets	
68	All mounting Accessories & Erection Hardware Software required for installing above components and establishing the networking between all fire alarm panels, repeater panels, DCS, PCs, Printers etc shall be considered.	1	Lot	Refer Note-7 below

Technical Notes:

1)	Battery sizing of FDA panels is in the scope of bidder. Bidder to considering the panels as fully loaded for sizing purpose. The standby power source (battery bank to power fire detection and alarm system) should be sized for 24 hours of continuous load + 30 minutes in alarm condition (at least 25% devices considered active in alarm condition). Fire alarm panels and repeater panels shall be provided with 1 x 100% battery bank and 1 x 100 % battery charger.
2)	Power supply to all the detectors/components specified in the BOQ above, should be extended from the Fire alarm Panels Only. Sizing of power supply modules, batteries size for secondary power, calculation of notification appliance circuit voltage drops, selection of internal components of FDA Panels etc. to be carried out by bidder & panel model need to be selected accordingly. Battery & Power supply calculation sheet verified by OEM shall be submitted to BHEL during detailed Engg for approval.
3)	In case the bidder offered system is having multiple variants of loop cards, bidders are advised to select loop cards which cater to largest/longest distance. **All the above addressable devices shall be looped in CLASS-A wiring.**
4)	Bidder to note that all the above detectors/devices shall be loop powered. In case loop powered devices are not available in the make offered, bidder shall consider the necessary modules.
5)	NIL

	Bill of Material	Annexure -[A] of PY51868
	Framework for Fire Detection & Alarm System	Rev 00

BHEL MATERIAL CODE: PY9751868017

S. No.	Item Description	Quantity	Unit	Remarks
6)	Fire alarm panels shall be floor mounted only. All batteries, battery chargers, neworking hardware etc. shall be installed inside the floor mounted panel. Each fire alarm panel shall have required no. of switches/MCBs, sockets, illumination lamps etc.			
7)	Refer Annexure - C for minimum erection BOQ inline with typical erection drawings i.e. Annexure - M. Bidder to supply this minimum erection BOQ (including 10% additional margin). In addition to this BOQ, if any other erection hardware is required for installing the main items listed in the above BOQ shall be supplied by bidder.			
8)	All interface modules shall be provided with enclosure suitable for outdoor application. All output modules shall have relay outputs contacts.			
9)	Unit rates for addition/deletion (+10% to -20%) for Main and mandatory spares shall be applicable			
10)	Also necessary erection hardware (jointing kits, termination kits, LIU, patch card, media converter, pit tails, etc) for FO cable shall be considered in the scope bidder. In addition, splicing and termination of FO cable and it's accessories are in bidder scope. Minimum BOM for 1 SET is: **Splicing tool kit=1 Set, 12 Port LIU (along with pigtails based on FO cable) = 6 No's, Patch Cords = 80 No's, Media converters= 6 No's, bidder to add other items (if any) for completeness of the system.**			
11)	Fire alarm panels, repeater panels specified in the specification are to be connected in redundant ring topology using single mode fiber optic cable.			
12)	Inbuilt fault isolators for all addressable devices will be preferred. If bidder selects a make in which there are no inbuilt fault isolators, then **bidder shall supply 1 no. of fault isolator module for every 10 addressable dvices with enclosure suitable for outdoor application.**			
13)	NIL			
14)	LIUs (Fiber Patch Panels / Light interface units) - are to be used for routing, terminating and managing optical cable terminations and should be mounted inside the FAPs & Repeater Panel enclosures			
15)	Alarm Temperature of LHS cable shall be 60 Deg (min.) for cable galleries and 80 Deg (min.) for conveyors.			
16)	Supply items for which no definite “make/brand” is indicated, shall be procured only from reputed makes & models having proven records of accomplishmet and requires purchaser approval.			
17)	FAP, Repeater panel, Detectors, Devices, Modules etc. shall be under regular manufacturing range of OEM and have proven track record.			
18)	Information/Status of all panels shall be available in all the workstations using GUI Software			
19)	All the network switches shall be of high quality and shall be sized to meet the functional requirements as specified. The common switch to which all networks are connected shall be Layer-III switch/router. All the interconnecting cables between network switches shall be fiber optic only. All fiber optic cables shall be terminated directly to network switches through optical fiber port without using media converters.			

ANNEXURE – B

(TYPICAL BOQ OF ERECTION HARDWARE)

BHEL	Typical Erection Hardware Bill of Material Framework for Fire Detection & Alarm System				Annexure -[B] of PY51868		
Sl. No.	**Main Item**	**Main Item Quantity**	**Erection Items Required for Erection of Main Item**	**Erection Item Quantity**	**Total Erection Hardware**	**Total Erection Hardware to be Supplied with 10% Margin**	**Units**
1	Multisensor Detectors on True Ceiling	6025	MS Backbox	1	6025	6628	Nos.
			Rawl Plug for back box fixing	2	12050	13255	Nos.
			Screw for back box fixing	2	12050	13255	Nos.
			Screw for base plate & detector base fixing	2	12050	13255	Nos.
			Cable gland for 1.5 sqmm loop cable in/out	2	12050	13255	Nos.
			1.5 sqmm tinned copper lugs	4	24100	26510	Nos.
2	Multisensor Detectors on False Ceiling	575	Screw for detector base fixing	2	1150	1265	Nos.
			Cable gland for 1.5 sqmm loop cable in/out	2	1150	1265	Nos.
			1.5 sqmm tinned copper lugs	4	2300	2530	Nos.
3	Heat Detectors on True Ceiling	102	MS Backbox	1	102	113	Nos.
			Rawl Plug for back box fixing	2	204	225	Nos.
			Screw for back box fixing	2	204	225	Nos.
			Screw base plate & detector base fixing	2	204	225	Nos.
			Cable gland for loop cable in/out	2	204	225	Nos.
			1.5 sqmm tinned copper lugs	4	408	449	Nos.
4	Heat Detectors on False Ceiling	30	Screw for detector base fixing	2	60	66	Nos.
			Cable gland for 1.5 sqmm loop cable in/out	2	60	66	Nos.
			1.5 sqmm tinned copper lugs	4	120	132	Nos.
5	Response Indicator on False Ceiling	605	Screw for response indicator fixing	2	1210	1331	Nos.
			Cable gland for 1.5 sqmm loop cable in/out	2	1210	1331	Nos.
			1.5 sqmm tinned copper lugs	4	2420	2662	Nos.
6	Probe detector	15	MS Base Plate	2	30	33	Nos.
			Anchor Fastner	8	120	132	Nos.
			Nut Bolt Washer Assembly	4	60	66	Nos.
			Cable Gland for 1.5 sqmm loop cable	2	30	33	Nos.
			1.5 sqmm tinned copper lugs	6	90	99	Nos.
			ISMC 75 (1 meter long)	4	60	66	Nos.
			MS Counter Flange with Hole	1	15	17	Nos.
			Flame Proof Junction Box with provision for mounting probe detector	1	15	17	Nos.
7	Beam Detector	132	Backbox for Beam detector	1	132	146	Nos.
			Backbox for Transmitter	1	132	146	Nos.
			Backbox Remote Indicator	1	132	146	Nos.
			Rawl Plug for beam detector backbox fixing	4	528	581	Nos.
			Rawl Plug for transmitter backbox fixing	4	528	581	Nos.
			Rawl Plug for remote indicator backbox fixing	2	264	291	Nos.
			Screw for beam detector backbox fixing	4	528	581	Nos.
			Screw for transmitter backbox fixing	4	528	581	Nos.
			Screw for remote indicator backbox fixing	2	264	291	Nos.
			Cable gland for loop cable	4	528	581	Nos.
			1.5 sqmm tinned copper lugs	8	1056	1162	Nos.
8	Air Sampling Smoke Detector (Refer notes below)	6	MS Backbox	0	0	0	Nos.
			Rawl Plug for back box fixing	4	24	27	Nos.
			Screw for back box fixing	4	24	27	Nos.
			Screw for base plate & detector base fixing	4	24	27	Nos.
			Nozzles	-	1	1	Lot
			PVC Pipe & Fittings	-	1	1	Lot
			End Caps	-	1	1	Lot
			Hole Stckers	-	1	1	Lot
			GI Saddles for PVC Pipe	-	1	1	Lot
			Screw for fixing saddle	-	1	1	Lot
9	Infrared Ember Detector with Air Purge Unit along with Accessories	15	MS Base Plate	4	60	66	Nos.
			Nut & Bolt	8	120	132	Nos.
			MS Angle (25 x 25 x 5) - (1 meter long)	2	30	33	Nos.
			Hose for Purge Unit	5	75	83	Mtr.
10	Dual Wavelength Infrared Flame Detector with Accessories	6	MS Base Plate	2	12	14	Nos.
			Nut & Bolt	4	24	27	Nos.
			MS Angle (25 x 25 x 5) - (1 meter long)	1	6	7	Nos.
11	Digital LHS Cable for Conveyors	28600	GI Chain (1 meter long)	1	28600	31460	Nos.
			MS Base Plate	1	28600	31460	Nos.
			Saddle	1	28600	31460	Nos.
			J - Bolt	1	28600	31460	Nos.
			J - Bolt with Rubber Bush, Washer & Nut	1	28600	31460	Nos.
12	Digital LHS Cable for Cable Cellar	82500	J - Bolt with Rubber Bush, Washer & Nut	1	82500	90750	Nos.
13	Digital LHS Controller	30	Rawl Plug	2	60	66	Nos.
			Screws	2	60	66	Nos.
			Cable gland	1	30	33	Nos.
			Tinned copper lugs	2	60	66	Nos.
14	230V AC Back-Lit Exit Sign Board with Battery Back Up	100	Rawl Plug	4	400	440	Nos.
			Screws	4	400	440	Nos.
			Cable gland	1	100	110	Nos.
			Tinned copper lugs	3	300	330	Nos.
15	24V DC Back-Lit Exit Sign Board	100	Rawl Plug	4	400	440	Nos.
			Screws	4	400	440	Nos.
			Cable gland	1	100	110	Nos.
			Tinned copper lugs	3	300	330	Nos.
16	Self Illuminating Exit Sign Board	350	Rawl Plug	4	1400	1540	Nos.
			Screws	4	1400	1540	Nos.
			MS Backbox	1	473	521	Nos.

	Typical Erection Hardware Bill of Material Framework for Fire Detection & Alarm System				Annexure -[B] of PY51868		
Sl. No.	**Main Item**	**Main Item Quantity**	**Erection Items Required for Erection of Main Item**	**Erection Item Quantity**	**Total Erection Hardware**	**Total Erection Hardware to be Supplied with 10% Margin**	**Units**
17	Indoor Manual Call Point	473	Rawl Plug for back box fixing	2	946	1041	Nos.
			Screw for back box fixing	2	946	1041	Nos.
			Screw for base plate & MCP base fixing	2	946	1041	Nos.
			Cable gland for loop cable	2	946	1041	Nos.
			1.5 sqmm tinned copper lugs	4	1892	2082	Nos.
18	Outdoor Manual Call Point	546	MS Backbox	1	546	601	Nos.
			Rawl Plug for back box fixing	2	1092	1202	Nos.
			Screw for back box fixing	2	1092	1202	Nos.
			Screw for base plate & MCP base fixing	2	1092	1202	Nos.
			Cable gland for loop cable	2	1092	1202	Nos.
			1.5 sqmm tinned copper lugs	4	2184	2403	Nos.
19	Flameproof Manual Call Point	2	MS Base Plate	1	2	3	Nos.
			Anchor Fastners	4	8	9	Nos.
			ISMC 75 (1.5 meter long)	1	2	3	Nos.
			Nut Bolt Washer Assembly	2	4	5	Nos.
			Cable gland for loop cable	2	4	5	Nos.
			1.5 sqmm tinned copper lugs	4	8	9	Nos.
20	Indoor Hooter cum Strobe	700	MS Backbox	1	700	770	Nos.
			Rawl Plug for back box fixing	2	1400	1540	Nos.
			Screw for back box fixing	2	1400	1540	Nos.
			Screw for base plate & hooter base fixing	2	1400	1540	Nos.
			Cable gland	2	1400	1540	Nos.
			1.5/2.5 sqmm tinned copper lugs	4	2800	3080	Nos.
21	Siren	8	Anchor Faster	4	32	36	Nos.
			Cable gland	2	16	18	Nos.
			Tinned Copper Lugs	4	32	36	Nos.
			MS Base Plate	1	8	9	Nos.
22	Siren Control Panel	8	Anchor Faster	4	32	36	Nos.
			Cable gland	3	24	27	Nos.
			Tinned Copper Lugs	6	48	53	Nos.
23	Interface Module	990	Enclosure for Module	1	990	1089	Nos.
			Rawl Plug for Enclosure fixing	2	1980	2178	Nos.
			Screw for enclosure fixing	4	3960	4356	Nos.
			Cable gland for loop cable	4	3960	4356	Nos.
			1.5 sqmm tinned copper lugs	8	7920	8712	Nos.
24	Power Supply Module	50	Anchor Faster	4	200	220	Nos.
			Cable gland	5	250	275	Nos.
			Tinned Copper Lugs	10	500	550	Nos.

NOTES: -

1. Calculation and supply of erection hardware like PVC pipe, fittings, nozzles etc. for air sampling detectors indicated as 'LOT' above is in bidder scope.

ANNEXURE – C

(FORMAT FOR PRE-BID QUERIES)

BHARAT HEAVY ELECTRICALS LIMITED
PROJECT ENGINEERING & SYSTEMS DIVISION

PROJECT: - Framework For Fire Detection & Alarm System

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ANNEXURE-C

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

ANNEXURE – D

(PRICE BID FORMAT)

	Price Bid Format	Annexure -[D] of PY51868
	Framework for Fire Detection & Alarm System	Rev.00

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%, - 20% 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 the individual package items shall be derived by multiplying the "% Weightage" with the Grand Total BASIC Price quoted. Unit Rates of the Individual items thus arrived, shall be binding on the bidder, in case of any repeat order/Amendment of Purchase Order as per this specification and BHEL policies. Please refer sheet 3 & 4 for this purpose and information.
8	Nil
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					Annexure -[D] of PY51868	
	Framework for Fire Detection & Alarm System					Rev.00	
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**						
	PY9751868017	Main Supply of Fire Detection and Alarm System for Main Plant	1	Set	**Not to be filled by Bidder**	**98.02%**	
[B]	**SERVICES**						
(i)	PY9751868033	Supervision of Erection & Commissioning Services charges at site including lodging, boarding, local travel, insurance, etc. [Unit Rate = Per man day charges]	110	Days	**Not to be filled by Bidder**	**1.70%**	
(ii)	PY9751868041	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]	15	Visits	**Not to be filled by Bidder**	**0.28%**	
Grand Total Basic price for overall L1 evaluation [A]+[B] (Rs.) ::					**To be filled by Bidder** (Refer Note-10)	**100.00%**	

	Unit Rates for FDA Components	Annexure -[D] of PY51868	
	Framework for Fire Detection & Alarm System		Rev.00

S. No	Type of instrument	% Weightage for calculation of Line Item Unit Price (Refer Note-7)	Remarks
1	Fire Alarm Panel (Each panel shall have 12 Loops) Floor Mounted	0.46614%	
2	Fire Alarm Panel (Each panel shall have 8 Loops) Floor Mounted	0.59152%	
3	Fire Alarm Panel (Each panel shall have 6 Loops) Floor Mounted	0.31317%	
4	Fire Alarm Panel (Each panel shall have 4 Loops) Floor Mounted	0.55519%	
5	Fire Alarm Panel (Each panel shall have 2 Loops) Floor Mounted	0.29374%	
6	Loop Card	0.05114%	
7	Repeater Panel	0.21280%	
8	Multisensor Detectors with detector base and mounting back box (Analogue addressable) along with PVC cable glands	0.00239%	
9	Heat Detectors with detector base and mounting back box (Analogue addressable) along with PVC cable glands	0.00227%	
10	Probe Detectors (ROR type) with Flameproof Junction box for Fuel tanks *(Min. 50 ft x 50 ft coverage for each detector along with counter flange and gasket) (Addressable)*	0.03015%	
11	Beam Detectors (Addressable) along with PVC cable glands	0.04281%	
12	Air Sampling Type Smoke Detection System for Control Rooms and Control Equipment Rooms of TG Building (including modules for interfacing with fire detection & alarm system)	0.16400%	
13	Infrared Ember Detector with Air Purge Unit along with Accessories	0.09052%	
14	Module for Interface with IR Ember Detector (1 Input + 1 Output) with IP-65 enclosure along with PVC cable glands	0.00300%	
15	Dual Wavelength Infrared Flame Detector with Accessories	0.14585%	
16	Module for Interface with Dual Wavelength IR Flame Detector (1 Input + 1 Output) with IP-65 enclosure along with PVC cable glands	0.00300%	
17	Indoor Manual Call Points with mounting back box (Addressable type) along with PVC cable glands	0.00273%	
18	Outdoor Manual call points with mounting back box (IP-65 min.) (Addressable type) along with PVC cable glands	0.00672%	
19	Flameproof Manual call points with mounting back box (Addressable type) along with PVC cable glands	0.00825%	

S. No	Type of instrument	% Weightage for calculation of Line Item Unit Price (Refer Note-7)	Remarks
20	Indoor Hooter cum Strobe with mounting back box (Addressable type & Loop powered) along with PVC cable glands	0.00494%	
21	Response Indicators	0.00009%	
22	Siren (10 km) with Siren Control panel	0.33432%	
23	Siren (3 km) with Siren Control panel	0.33256%	
24	Siren (1 km) with Siren Control panel	0.15187%	
25	Interface module for Siren Operation with IP-65 enclosure	0.00307%	
26	Digital LHS Cable (Thermoplastic Type) for Cable Galleries	0.00014%	
27	Digital LHS Cable (Steel Braided Type) for Conveyors	0.00029%	
28	End of Line Resistance with IP-65 enclosure	0.00031%	
29	LHS Cable Jointing Box (IP-65 rated)	0.00044%	
30	Digital LHS Controller (2 kms range)	0.08871%	
31	Module for LHS Cable (1 Input) with IP-65 enclosure along with PVC cable glands	0.00291%	
32	Module for Deluge Valve (2 Input + 1 Output) with IP-65 enclosure along with PVC cable glands	0.00292%	
33	Module for Tripping (1 Output) along with PVC cable glands	0.00290%	
34	Module for Monitoring Pumps Status (1 Input) with IP-65 enclosure along with PVC cable glands	0.00291%	
35	Module for Interface with DCS (1 Output) with IP-65 enclosure along with PVC cable glands	0.00296%	
36	Module for Interface with IGES (1 Input + 1 Output) with IP-65 enclosure along with PVC cable glands	0.00300%	
37	230V AC Back-Lit Exit Sign Board with Battery Back Up	0.00460%	

S. No	Type of instrument	% Weightage for calculation of Line Item Unit Price (Refer Note-7)	Remarks
38	24V DC Back-Lit Exit Sign Board	0.00228%	
39	Self Illuminating Exit Sign Board	0.00043%	
40	24 V DC Power Supply Modules with Battery Back Up with (IP - 20 enclosure)	0.03498%	
41	24 V DC Power Supply Modules with Battery Back Up with (IP - 66 enclosure)	0.03498%	
42	Operator Workstation & Color Laser Jet Printer along with Commissioning software with Licence / Dongle + Graphic software with License /Dongle	0.29852%	
43	Operator Workstation along with OPC Server & Client Software + License + Accessories	0.29852%	
44	UPS for Operator Work Station + Printer	0.02616%	
45	Laptop along with Fire Alarm Panel Commissioning Software with License /Dongle	0.06542%	
46	Furniture for Operator Workstation & Printer	0.02275%	
47	6F Fiber Optic Cable for Networking Fire Alarm Panels & Repeater Panels along with 2" rodent proof HDPE Conduit	0.00007%	
48	Cable Tags for 1P x 1.5 Sqmm Cable	0.00001%	
49	Cable Tags for 2C x 2.5 Sqmm Cable	0.00001%	
50	Cable Saddle + Saddle Bars along with fixing screws and rawl plugs for 1P x 1.5 sqmm Cable	0.00001%	
51	Cable Saddle + Saddle Bars along with fixing screws and rawl plugs for 2C x 2.5 sqmm Cable	0.00001%	
52	50 mm Cable Tray	0.00020%	
53	Networking Components for Fire Alarm Panel, Repeater Panels & OWS	2.30384%	
54	Fuses (100% of population)	0.00171%	
55	Indicating Lamps (100% of population)	0.00068%	

	Unit Rates for FDA Components	Annexure -[D] of PY51868	
	Framework for Fire Detection & Alarm System		Rev.00
S. No	**Type of instrument**	**% Weightage for calculation of Line Item Unit Price (Refer Note-7)**	**Remarks**
56	Push Buttons (10 Nos of each type and rating)	0.00044%	
57	Power supply Modules (10% or 1 Nos of each type and rating whichever is more)	0.03775%	
58	LCD display of each type unit of panel (1 No / project)	0.02614%	
59	LED's of each type (100% of population / project)	0.00017%	
60	Power Supervision Relay (4 Nos of each type)	0.00218%	
61	Alarm buzzer (1 Nos of each type)	0.00494%	
62	Cartridge for Printers (2 Nos of each type)	0.00310%	
63	CPU Card (2 Nos. of each type)	0.05114%	
64	Network Card (2 Nos. of each type)	0.05114%	
65	Zone Card (2 Nos. of each type)	0.05114%	
66	Audio Control Module (2 Nos. of each type)	0.05114%	
67	Batteries (2 Nos. of each type)	0.01543%	
68	All mounting Accessories & Erection Hardware Software required for installing above components and establishing the networking between all fire alarm panels, repeater panels, DCS, PCs, Printers etc shall be considered.	8.36388%	

ANNEXURE – E

(TECHNICAL SPECIFICATION)

Specification for Power Supply Modules (SMPS with Battery)

1. SCOPE

This technical specification covers the Design, Engineering, Manufacturing, Assembly, testing at vendor works, inspection by purchaser, packing and transportation to site with necessary documentation like data sheets, statutory approvals, O&M manuals etc., as required for Power supply modules.

2. SCOPE of SUPPLY – As per enquiry

3. INSTRUCTIONS TO BIDDERS

3.1 Bidders are advised to contact BHEL for essential technical queries in writing within one week of issue of Enquiry. Offers with incomplete information will not be considered for evaluation, and are likely to be rejected outright without any further interaction with the Bidder.

3.2 Any technical features [over & above BHEL enquiry specification requirements] proposed by Bidder will not be given preference for the purpose of evaluation.

3.3 In the event of any conflict between these specifications, data sheets, related standards, codes etc. the vendor shall refer the matter to the purchaser for clarifications and only after obtaining, the same shall proceed with the manufacture of the items in question.

4. APPLICABLE CODES & STANDARDS

4.1 The design engineering and testing of the item shall be as per IS 60950, IS 13252, IEC 60950 and any other relevant & applicable international codes/standards.

5 TECHNICAL SPECIFICATIONs

5.1 SMPS with batteries shall be shall be supplied in fully wired condition. BHEL terminal point shall be 230V AC ± 10% incomer (cable size: 3C x 6 sq.mm) and 24V DC outgoing feeders. 24V DC outgoing cables shall be provided by BHEL (cable size: 2C x 2.5 sq.mm). Suitable cable terminations shall be provided by bidder in their SMPS.

5.2 All our cables (indicated in S.no. 4.2 above) are armoured cables. Hence, bidder shall include suitable cable glands & lugs to meet the IP-class in scope of supply for all incoming / & outgoing cables of SMPS.

5.3 Bidder shall supply all the erection material required for installation/mounting of SMPS.

5.4 Batteries shall be 2 x 12V SMF type. Back up time shall be for 30 min. at full load condition.

5.5 The Power Supply Module shall be provided with AC to DC conversion circuits and the battery charger circuits. The SMPS panels having requirement of equal to and less than 16 Amp., A.C. power supply shall be suitable to receive, 240 Volt ±10%, single phase, 50 Hz ±5%, phase and neutral, through MCB.

5.6 The Power Supply Module shall provide 24V DC outputs with a current capacity of 6A. Two nos. of 24V DC outputs shall be provided in each Power Supply Module. The application of Power Supply module shall be such that only one output of 6A current capacity or two outputs with a total current capacity of 6A shall be used. Accordingly, each 24 V DC output shall be designed for 6A.

5.7 Each power supply module shall have provision to take two tap offs from incomer to extend incoming power supply to other two power supply modules as shown below.

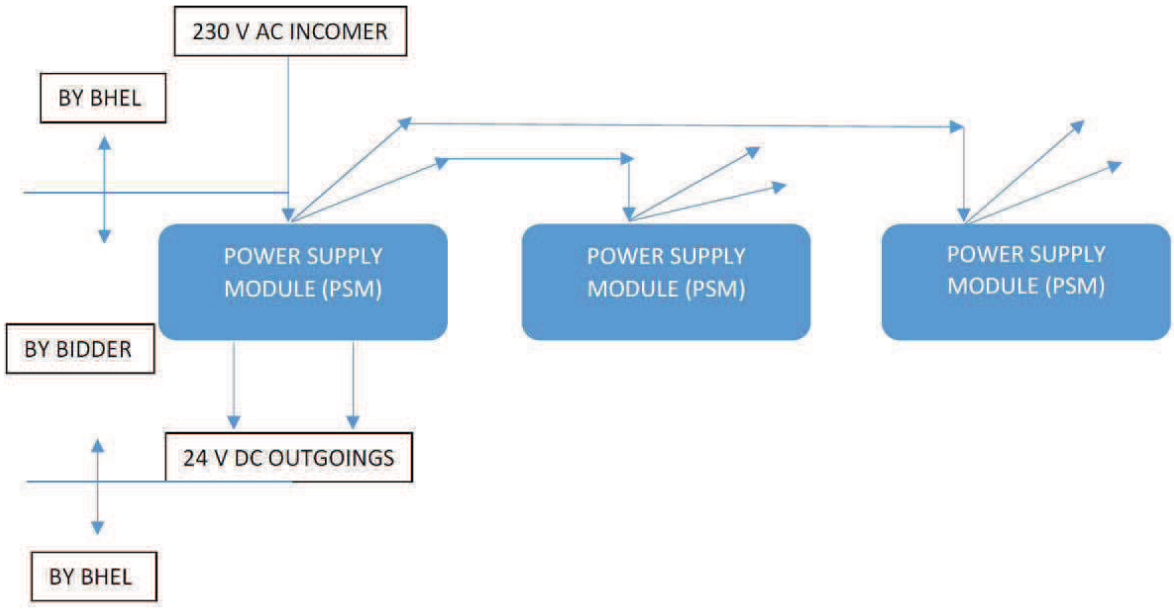
5.8 Incomer and tap off cables shall be 2C x 4 sq.mm. CU. These cables are in BHEL scope of supply. However, necessary cable lugs & glands for termination shall be in bidder scope.

5.9 The panel shall have in-built stabilized power supply unit for its electronic circuitry, which rectifies A.C. power supply to D.C. for system operation.

5.10 Output of SMPS shall be field/site adjustable in the range of 24 V DC + 10% to 24V DC - (minus) 0% as per end user requirement.

5.11 Irrespective of AC input variation (230V AC ± 10%); output of SMPS shall be constant i.e. in the range of 24 V DC + 10% to 24V DC - (minus) 0%.

5.12 Brief scope demarcation is indicated below:-



6 BILL OF QUANTITY

BOQ shall be supplies as per specification. IP certificates shall be submitted by bidder along with data sheets.

7 INSPECTION & TESTING

7.1 Inspection & testing of the item shall be as per IS 60950, IS 13252, IEC 60950 and any other relevant & applicable international codes/standards.

HYDERABAD

PRODUCT STANDARD
PROJECT ENGINEERING & SYSTEMS DIVISION
HYDERABAD

RECORD OF REVISIONS

Rev. No.	Date	Revision Details	Revised By	Approved By
00	22.05.2021	Original issue	--	P Chandra Sekhar

Ref. Doc.

Annexure – E

SPECIFICATION FOR CABLE TRAY

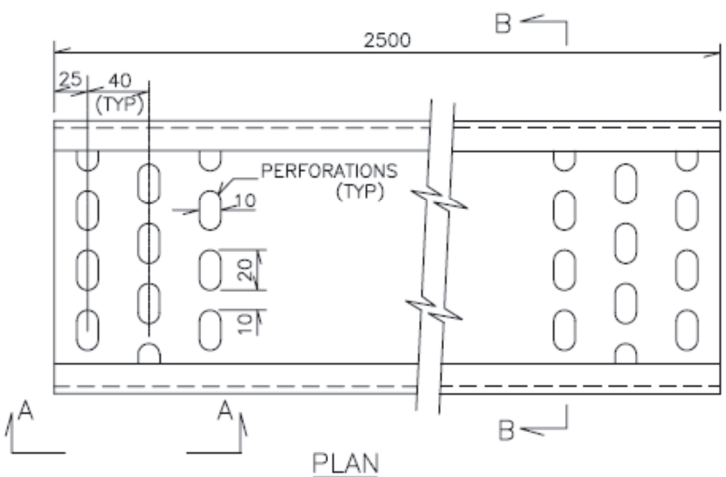
- Applicable Standards
  - IS-1079: For hot rolled carbon steel sheets and strips specifications.
  - IS-2629: For practice of hot dip galvanising & adhesion test
  - IS-1363: For heat bolts, screws and nuts.
  - IS-1367: For threaded steel fasteners.
  - IS-5986: For hot rolled steel plates, sheets, strips and flats for flanging & forming operation.

- Constructional Requirements
  - The cable trays and accessories such as coupler plates shall have rigid welded constructions and shall be fabricated out of minimum 2mm thick hot rolled sheet steel.
  - Hot dip galvanizing shall be done after fabrication as per relevant Indian standards. The amount of galvanizing shall be min. 610 g/m2.
  - All hardware and fittings like bolts, nuts, washers etc. shall be hard chrome or Cadmium plated or Zinc passivated.
  - Straight run for perforated cable tray shall include 2 sets of coupler plates along with accessories like nut, bolts and washers

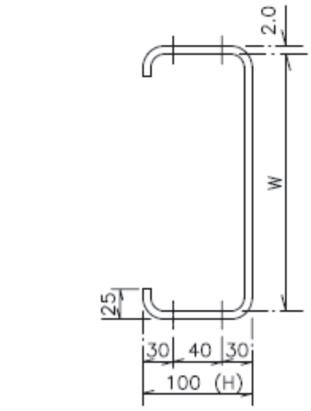
- Inspections & Tests

  - Test for thickness of Galvanized coating by Elcometer.
  - Test for mass of Galvanized coating by stripping test.
  - Test for determination of uniformity of Galvanized coating.

TYPICAL ARRANGEMENT FOR PERFORATED TYPE STRAIGHT RUN CABLE TRAY ALONG WITH ACCESSORIES & COUPLER PLATES

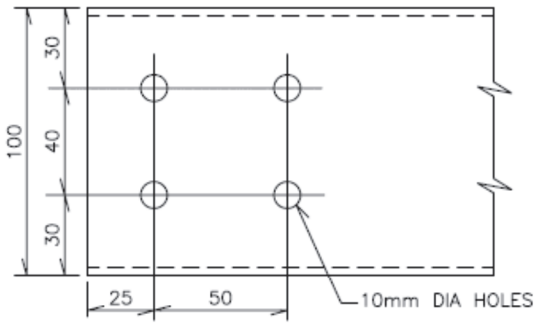


PLAN

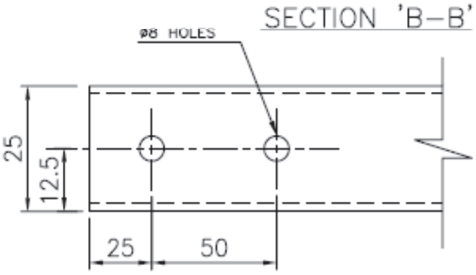


H=100mm for 450/600/750mm width Tray
H=75mm for 150/300mm width Tray
H=25mm for 50mm width Tray

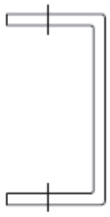
SECTION 'B–B'



SECTION 'A–A'

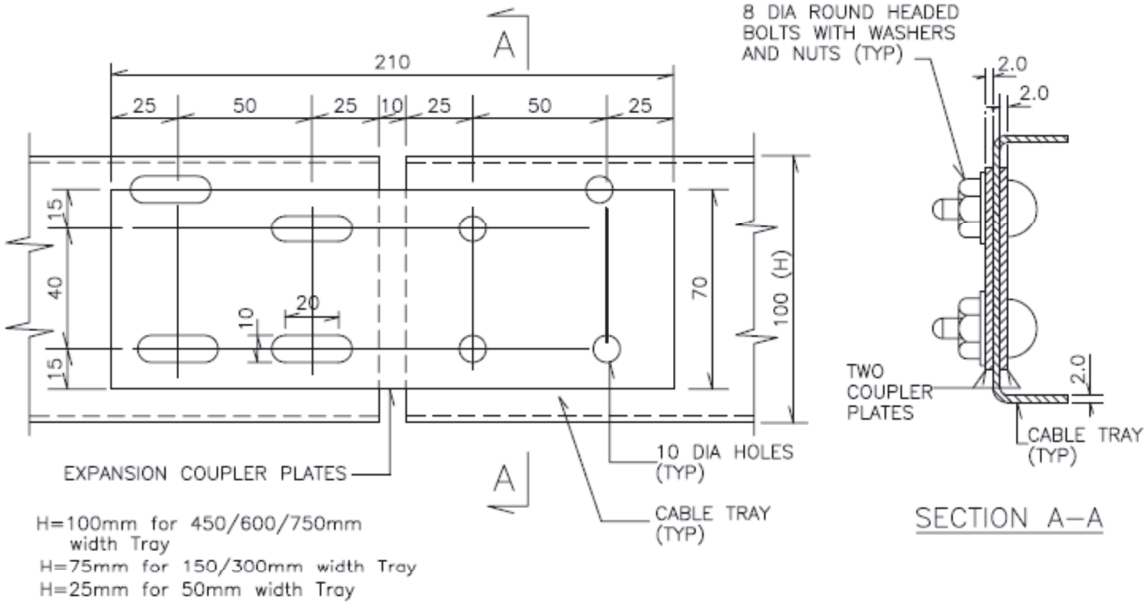


SECTION 'A–A' FOR 50mm TRAY

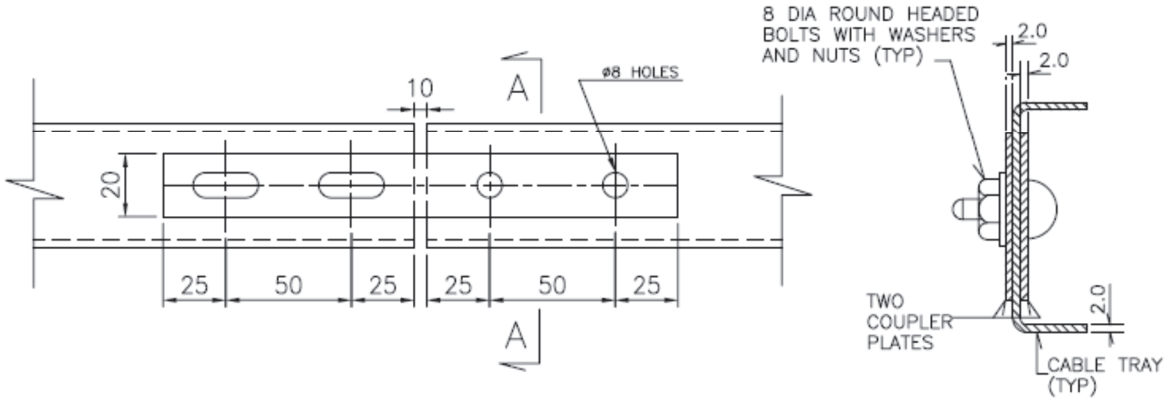


SECTION 'B–B' FOR 50mm TRAY

TYPICAL ARRANGEMENT FOR COUPLER PLATE SET ALONG WITH ACCESSORIES FOR PERFORATED TYPE CABLE TRAYS



TYPICAL ARRANGEMENT FOR COUPLER PLATE SET ALONG WITH ACCESSORIES FOR 50mm PERFORATED TYPE CABLE TRAYS



NOTES

ANNEXURE – F

(MASTER DOCUMENT SCHEDULE)

Master Document Schedule

Annexure-F of PY51868

Project: Framework for Fire Detection & Alarm System

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	Aspiration Detector Layout		A	4 WEEKS								
4	Complete Bill of Material		A	2 WEEKS								
5	Electrical Load List		I	2 WEEKS								
6	Earthing Layout / Scheme		A	2 WEEKS								
	Data Sheets											
1	Technical Datasheet of Fire Alarm Panel & its Components along with Battery		A	2 WEEKS								
2	Technical Datasheet of Repeater Panel		A	2 WEEKS								
3	Technical Datasheet of Loop Card		A	2 WEEKS								
4	Technical Datasheet of Multisensor Detector with detector base and back box		A	2 WEEKS								
5	Technical Datasheet of Heat Detectors with detector base and back box		A	2 WEEKS								
6	Technical Datasheet of Probe Detectors (ROR type) for Fuel tanks with Flameproof Junction box		A	2 WEEKS								
7	Technical Datasheet of Beam Detector		A	2 WEEKS								

	Master Document Schedule	Annexure-F of PY51868
	Project: Framework for Fire Detection & Alarm System	

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		
8	Technical Datasheet of Air Sampling Detector and Accessories		A	2 WEEKS								
9	Technical Datasheet of Infrared Ember Detector with Air Purge Unit along with Accessories		A	2 WEEKS								
10	Technical Datasheet of Dual Wavelength Infrared Flame Detector with Accessories		A	2 WEEKS								
11	Technical Datasheet of Digital LHS Cable (Thermoplastic Type)		A	2 WEEKS								
12	Technical Datasheet of Digital LHS Cable (Steel Braided Type)		A	2 WEEKS								
13	Technical Datasheet of Digital LHS Controller		A	2 WEEKS								
14	Technical Datasheet of LHS Cable Jointing Box		A	2 WEEKS								
15	Technical Datasheet of End of Line Resistance Box		A	2 WEEKS								
16	Technical Datasheet of Manual Call Point (Indoor, Outdoor & Flame Proof)		A	2 WEEKS								
17	Technical Datasheet of Addressable Loop Powered Hooter cum strobe		A	2 WEEKS								
18	Technical Datasheet of Interface Modules		A	2 WEEKS								
19	Technical Datasheet of Response Indicator		A	2 WEEKS								
20	Technical Datasheet of Siren with Siren Control Panel and Interface Module		A	2 WEEKS								
21	Technical Datasheet of Graphics Software		A	2 WEEKS								
22	Technical Datasheet of Work Station		A	2 WEEKS								
23	Technical Datasheet of Printer		A	2 WEEKS								

	Master Document Schedule	Annexure-F of PY51868
	Project: Framework for Fire Detection & Alarm System	

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		
24	Technical Datasheet of Laptop		A	2 WEEKS								
25	Technical Datasheet of Furniture		A	2 WEEKS								
26	Technical Datasheet of Back-Lit Exit Sign Board with Battery Back Up		A	2 WEEKS								
27	Technical Datasheet of Self Illuminating Exit Sign Board		A	2 WEEKS								
28	Technical Datasheet of Fiber Optic Cable with HDPE Conduit		A	2 WEEKS								
29	Technical Datasheet of OWS + Printer		A	2 WEEKS								
30	Technical Datasheet of UPS		A	2 WEEKS								
31	Technical Datasheet of 24V DC Power Supply Modules with Battery-Back UP		A	2 WEEKS								
32	Technical Data Sheet of Cable Saddles + Saddle Bar		A	2 WEEKS								
33	Technical Data Sheet of Cable Tags		A	2 WEEKS								
34	Technical Data Sheet of Cable Glands & Lugs		A	2 WEEKS								
35	Technical Data Sheet of Cable Tray		A	2 WEEKS								
36	Technical Data Sheet of LIU		A	2 WEEKS								
37	Technical Data Sheet of Media Converter		A	2 WEEKS								
38	Technical Data Sheet of Network Switch		A	2 WEEKS								

	Master Document Schedule	Annexure-F of PY51868
	Project: Framework for Fire Detection & Alarm System	

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		
D.	**ERECTION**											
1	GA & Wiring Diagram of Fire Alarm Panel		I	3 WEEKS								
2	Installation diagram for Fire alarm componenets		I	3 WEEKS								
3	Termination details of Fire alarm componenets		I	3 WEEKS								
4	Fire Alarm networking details (Interconnection between FAP & RP)		I	3 WEEKS								
5	Battery Sizing Calculation		I	3 WEEKS								
6	Erection & Commissioning procedures		I	3 WEEKS								
7	Fire Detection & Alarm System Operating Manual		A	3 WEEKS								
8	Billing Break up		A	3 WEEKS								
9	Certificates(Factory tests, calibration reports, statutory approval certificates)		I	3 WEEKS								
10	Packing procedure + Packing list		I	3 WEEKS								

ANNEXURE – G

(VENDOR LIST)

ANNEXURE - G

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 – H

(QUALITY REQUIREMENTS)

QAP GUIDELINES & FORMAT

`

(ANNEXURE - H)

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

ANNEXURE – I

(INSPECTION & TC REVIEW FORMAT)

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

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 – J

(REFERENCE QAP)

QUALITY ASSURANCE PLAN

ITEM:FIRE DETECTION AND ALARM SYSTEM
PO No: T716A00417

PROJECT	**1x800MW Kothagudem TPS FPS Package**
CUSTOMER	**M/s. TSGENCO**
CONSULTANT	**M/s. DCPL, Kolkatta**
VENDOR	**TECHNICO (INDIA) PVT. LTD.**

Rev. No.	Date	Details of Revision	Revised By.
03	21.03.2017	Revised inline with DCPL comments received vide mail dated 18.03.2017	
02	08.03.17	Revised as per DCPL comments on 1.03.2017	
01	15.02.17	Revised as per DCPL comments on 13.02.2017	
00	30.01.17	First submission	

FORMAT NO: PPM-9011-00	PROJECT ENGINEERING AND SYSTEMS DIVISION BHEL, RAMACHANDRAPURAM, HYDERABAD- 502032.	CHECKED (SKS)	APPROVED (KPP)	DATE 08.03.17	DOC.NO. TIPL/KTPS-BHEL/16 - 17/14A	REV.NO.03

OWNER : TSGENCO	SUPPLIER : TECHNICO (INDIA) PVT. LTD.	QUALITY ASSURANCE PLAN	PROJECT : KOTHAGUDEM THERMAL POWER STATION STAGE-VII, UNIT # 12, (1X800 MW)-
CONSULTANT : M/S DCPL	BHEL PO NO : T716 A00417 DATE: 09.01.2017	ITEM : FIRE DETECTION AND ALARM SYSTEM (FOR IMPORTED ITEMS)	QAP No TIPL/KTPS-BHEL/16 - 17/1<A REVNC: 03 DATE : 07.03 .2017
CONTRACTOR: BHARAT HEAVY ELECTRICALS LTD.HYDERABAD			PACKAGE: FIRE DETECTION AND ALARM SYSTEM

Sl. No.	COMPONENTS / OPERATION	CHARECTERISTICS TO CHECKS	CLASS	TYPE OF CHECKS	QUANTUM OF CHECKS			REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORD		INSP. AGENCY			REMARKS
					M	C	N					M	C	N	
1	2	3	4	5	6			7	8	9	D	10			11
1.	Fire Alarm Control Panel	a) Make & Marking	Major	Visual	100%	--	--	App. Data Sheet/Drg.	App. Data Sheet/Drg.	MTC / COC	--	P	V	V	IMPORTED ITEMS (As per approved Inspection categorization plan, Sl. no. 4, 5, 14 fall under Cat-III)
		b) Functional Test	-do-	Performance Check	100%	--	--				√	P	V	V	
2	Repeater Panel	a) Make & Marking	Major	Visual	100%	--	--	App. Data Sheet/Drg.	App. Data Sheet/Drg.	MTC / COC	--	P	V	V	
		b) Functional Test	-do-	Performance Check	100%	--	--				√	P	V	V	
3.	Multi Criteria Smoke & Heat Detector	a) Make & Marking	Major	Visual	100%	--	--	App. Data Sheet/Drg.	App. Data Sheet/Drg.	MTC / COC	--	P	V	V	
		b) Functional Test	-do-	Performance Check	100%	--	--				√	P	V	V	
4.	Manual Call Point	a) Make & Marking	Major	Visual	100%	--	--	App. Data Sheet/Drg.	App. Data Sheet/Drg.	MTC / COC	--	P	V	V	
		b) Functional Test	-do-	Performance Check	100%	--	--				√	P	V	V	
5.	Hooter Cum Strobe	a) Make & Marking	Major	Visual	100%	--	--	App. Data Sheet/Drg.	App. Data Sheet/Drg.	MTC / COC	--	P	V	V	
		b) Functional Test	-do-	Performance Check	100%	--	--				√	P	V	V	
6.	Monitor Modules	a) Make & Marking	Major	Visual	100%	--	--	App. Data Sheet/Drg.	App. Data Sheet/Drg.	MTC / COC	--	P	V	V	
		b) Functional Test	-do-	Performance Check	100%	--	--				√	P	V	V	
7.	Control Module (Relay)	a) Make & Marking	Major	Visual	100%	--	--	App. Data Sheet/Drg.	App. Data Sheet/Drg.	MTC / COC	--	P	V	V	
		b) Functional Test	-do-	Performance Check	100%	--	--				√	P	V	V	
8.	LHS Cable	a) Make & Marking	Major	Visual	100%	--	--	App. Data Sheet/Drg.	App. Data Sheet/Drg.	MTC / COC	--	P	V	V	
		b) Functional Test	-do-	Performance Check	100%	--	--				√	P	V	V	
9.	LHS Controller	a) Make & Marking	Major	Visual	100%	--	--	App. Data Sheet/Drg.	App. Data Sheet/Drg.	MTC / COC	--	P	V	V	
		b) Functional Test	-do-	Performance Check	100%	--	--				√	P	V	V	
10.	Infrared Detector	a) Make & Marking	Major	Visual	100%	--	--	App. Data Sheet/Drg.	App. Data Sheet/Drg.	MTC / COC	--	P	V	V	
		b) Functional Test	-do-	Performance Check	100%	--	--				√	P	V	V	
11.	Control Unit of IRD	a) Make & Marking	Major	Visual	100%	--	--	App. Data Sheet/Drg.	App. Data Sheet/Drg.	MTC / COC	--	P	V	V	
		b) Functional Test	-do-	Performance Check	100%	--	--				√	P	V	V	

CONTRACTOR /SUPPLIER

TECHNICO (INDIA) PVT. LTD. Q.C.

LEGEND

RECORDS IDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION
M-MANUFACTURER/SUB-SUPPLIER, C-MAIN SUPPLIER, N-OWNER/OWNER AUTHORISED REPRESENTATIVE, P-PERFORM, W-WITNESS V-VERIFICATION, AS APPROPRIATE, CHP: OWNER SHALL IDENTIFY IN COLMN 'N' AS 'W'
TC- TEST CERTIFICATE, IR-INSPECTION REPORT, JR- JOINT INSPECTION REPORT, MTC- MANUFACTURER'S TEST CERTIFICATE
MTC : MANUFACTURER TEST CERTIFICATE

OWNER

Reviewed By	Approved By	Approval Seal
BHEL PE & QA HYDERABAD		

Chief Engineer,
Thermal Projects Construction,
TSGENCO, Vidyut Soudha,
Khairatabad, Hyderabad - 82.

OWNER : TSGENCO	SUPPLIER : TECHNICO (INDIA) PVT. LTD.	**QUALITY ASSURANCE PLAN**	PROJECT : **KOTHAGUDEM THERMAL POWER STATION STAGE-VII, UNIT # 12, (1X800 MW)-**
CONSULTANT : M/S DCPL	**BHEL PO NO : T716 A00417** **DATE: 09.01.2017**	**ITEM : FIRE DETECTION AND ALARM SYSTEM (FOR IMPORTED ITEMS)**	**QAP No: TIPL/KTPS-BHEL/16 - 17/14A** **REV NO: 03** **DATE : 07.03 .2017**
CONTRACTOR: BHARAT HEAVY ELECTRICALS LTD.**HYDERABAD**			PACKAGE: FIRE DETECTION AND ALARM SYSTEM

Sl. No.	COMPONENTS / OPERATION	CHARECTERISTICS TO CHECKS	CLASS	TYPE OF CHECKS	QUANTUM OF CHECKS			REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORD		INSP. AGENCY			REMARKS
					M	C	N				D	M	C	N	
1	2	3	4	5	6			7	8	9		10			11
12	Probe Type Heat Detector	a) Make & Marking	Major	Visual	100%	--	--	App. Data Sheet/Drg.	App. Data Sheet/Drg.	MTC / COC	--	P	V	V	IMPORTED ITEMS
		b) Functional Test	-do-	Performance Check	100%	--	--				√	P	V	V	
13.	Beam Detector	a) Make & Marking	Major	Visual	100%	--	--	App. Data Sheet/Drg.	App. Data Sheet/Drg.	MTC / COC	--	P	V	V	
		b) Functional Test	-do-	Performance Check	100%	--	--				√	P	V	V	
14.	Conventional Hooter cum Strobe	a) Make & Marking	Major	Visual	100%	--	--	App. Data Sheet/Drg.	App. Data Sheet/Drg.	MTC / COC	--	P	V	V	
		b) Functional Test	-do-	Performance Check	100%	--	--				√	P	V	V	
15.	Graphic Software	a) Make & Marking	Major	Visual	100%	--	--	App. Data Sheet/Drg.	App. Data Sheet/Drg.	--	--	P	V	V	
		b) Functional Test	-do-	Performance Check	100%	--	--			--	--	P	V	V	
16	Zone Monitor Module for Beam Detector	a) Make & Marking	Major	Visual	100%	--	--	App. Data Sheet/Drg.	App. Data Sheet/Drg.	--	--	P	V	V	
		b) Functional Test	-do-	Performance Check	100%	--	--			--	--	P	V	V	

CONTRACTOR /SUPPLIER	LEGEND	OWNER		
TECHNICO (INDIA) PVT. LTD. Q.C.	RECORDS IDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION M-MANUFACTURER/SUB-SUPPLIER, C-MAIN SUPPLIER, N-OWNER/OWNER AUTHORISED REPRESENTATIVE, P-PERFORM, W-WITNESS, V-VERIFICATION, AS APPROPRIATE, CHP: OWNER SHALL IDENTIFY IN COLMN 'N' AS 'W' TC- TEST CERTIFICATE, IR-INSPECTION REPORT, JIR- JOINT INSPECTION REPORT, MTC- MANUFACTURER'S TEST CERTIFICATE	**Reviewed By**	**Approved By**	**Approval Seal**
		BHEL PE & SHEL HYDERABAD QA		

NOTE : THIS QAP IS ALSO APPLICABLE FOR SPARE

Chief Engineer,
Thermal Projects Construction,
TSGENCO, Vidyut Soudha,
Khairatabad, Hyderabad - 82.

OWNER : M/s. TSGENCO	SUPPLIER : TECHNICO (INDIA) PVT. LTD.	QUALITY ASSURANCE PLAN	PROJECT : KOTHAGUDEM THERMAL POWER STATION STAGE-VII, UNIT # 12, (1X800 MW)-
CONSULTANT : M/s. DCPL	BHEL PO NO : T716 A00417 DATE: 09.01.2017	ITEM : FIRE DETECTION AND ALARM SYSTEM (FOR INDIGENOUS ITEMS)	QAP No: TIPL/KTPS-BHEL/16 - 17/14B REV NO: 03 DATE : 14.02 .2017
CONTRACTOR: BHARAT HEAVY ELECTRICALS LTD.HYDERABAD			PACKAGE: FIRE DETECTION AND ALARM SYSTEM

Sl. No.	COMPONENTS / OPERATION	CHARECTERISTICS TO CHECKS	CLASS	TYPE OF CHECKS	QUANTUM OF CHECKS			REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORD		INSP. AGENCY			REMARKS
					M	C	N					M	C	N	
1	2	3	4	5	6			7	8	9	D	10			11
01.	Response Indicator	a) Make & Marking	Major	Visual	100%	--	--	App. Data Sheet/Drg.	App. Data Sheet/Drg.	--	--	P	V	V	
		b) Functional Test	-do-	Performance Check	100%	--	--			MTC /COC	√	P	V	V	
02.	Exit Sign	a) Make & Marking	Major	Visual	100%	--	--	App. Data Sheet/Drg.	App. Data Sheet/Drg.	COC	√	P	V	V	
03.	Siren	a) Make & Marking	Major	Visual	100%	--	--	App. Data Sheet/Drg.	App. Data Sheet/Drg.	--	--	P	V	V	
		b) Functional Test	-do-	Performance Check	100%	--	--			MTC /COC	√	P	V	V	(As per approved Inspection categorization plan, Sl. no. 02, 03, 04 fall under Cat-III)
04.	PC & Printer	a) Make & Marking	Major	Visual	100%	--	--	App. Data Sheet/Drg.	App. Data Sheet/Drg.	--	--	P	--	--	
		b) Functional Test	-do-	Performance Check	100%	--	--			--	--	P	--	--	
05.	UPS for PC & Printer	a) Make & Marking	Major	Visual	100%	--	--	App. Data Sheet/Drg.	App. Data Sheet/Drg.	--	--	P	--	--	
		b) Functional Test	-do-	Performance Check	100%	--	--			--	--	P	--	--	
06.	Network Cable with Conduit	a) Material Inspection	Major	Physical Inspection – i)Damages, ii)Dimension iii)Identification Lable	100%	--	--	App. Data Sheet/Drg.	App. Data Sheet/Drg.	--	--	P	V	V	
		b) In-process Inspection i) Continuity Check	-do-	Electrical	100%	--	--			MTC /COC	√	P	V	V	
		Final Inspection- i)Routine Test – Acceptance Test	-do-	Electrical	100%	--	--			MTC /COC	√	P	V	V	
07.	Mounting Accessories & Erection Hardware	a) Make & Marking	Major	Visual	100%	--	--	App. Data Sheet/Drg.	App. Data Sheet/Drg.	--	--	P	--	--	

CONTRACTOR /SUPPLIER	LEGEND	OWNER		
TECHNICO (INDIA) PVT. LTD. Q.C.	RECORDS IDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION M-MANUFACTURER/SUB-SUPPLIER, C-MAIN SUPPLIER, N-OWNER/OWNER AUTHORISED REPRESENTATIVE, P-PERFORM, W-WITNESS, V-VERIFICATION, AS APPROPRIATE, CHP: OWNER SHALL IDENTIFY IN COLMN 'N' AS 'W' TC- TEST CERTIFICATE, IR-INSPECTION REPORT, JIR- JOINT INSPECTION REPORT MTC : MANUFACTURER TEST CERTIFICATE	Reviewed By	Approved By	Approval Seal

NOTE : THIS QAP IS ALSO APPLICABLE FOR SPARE

Chief Engineer,
Thermal Projects Construction,
TSGENCO, Vidyut Soudha,
Khairatabad, Hyderabad - 82.

ANNEXURE – K

(CHECK LIST)

ANNEXURE - K

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: PY51868, 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 / sensors / detectors 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	Conventional hooter cum strobe or conventional hooter and conventional strobe with addressable module is not acceptable. Bidder to consider addressable loop powered hooter cum strobe or addressable loop powered hooter and addressable loop powered strobe only.	

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

ANNEXURE – L

(NO-DEVIATION FORMAT)

ANNEXURE - L

LIST OF DEVIATIONS

Project: Framework for Fire Detection & Alarm System

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_____

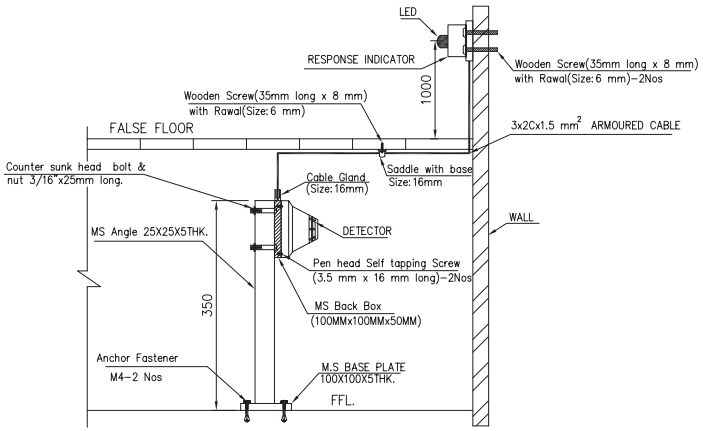
NAME_____

DESIGNATION_____

COMPANY SEAL DATE_____

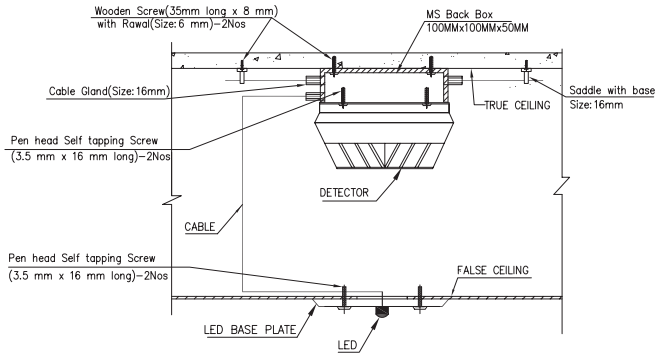
ANNEXURE – M

(TYPICAL INSTALLATION DETAILS OF FDA COMPONENTS)



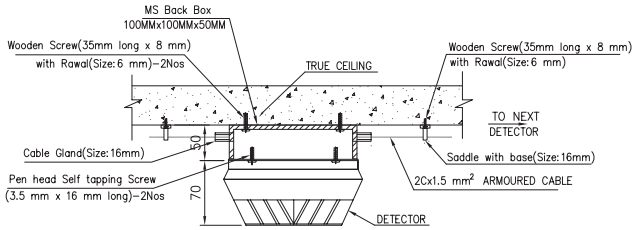
INSTALLATION DETAIL FOR DETECTORS BELOW FALSE FLOOR

DETECTOR WITH RESPONSE INDICATOR BELOW FALSE FLOOR			
Sr.No	ITEM DESCRIPTION	UNIT	QTY/ITEM
1	MS ANGLE(SIZE:25 X 25 X 5 MM,350 LONG)	Nos	1
2	MS Back Box(Size:100 x 100 x 50 mm)	Nos	1
3	MS Base Plate(Size:100 x 100 x 5 mm)	Nos	1
4	Anchor Fastener (Size: M-4)	Nos	2
5	Saddle with base(Size:16mm)	Nos	9
6	Counter sunk head bolt & nut 3/16"x25mm long.	Nos	2
7	Wooden Screw(35mm long x 8 mm) with Rawal(Size:6 mm)	Nos	2
8	Cable Gland(Size:16mm)	Nos	3
9	Cable Lug(Size:1.5Sqmm)	Nos	6
10	Pen head Self tapping Screw(3.5 mm x 16 mm long)	Nos	2



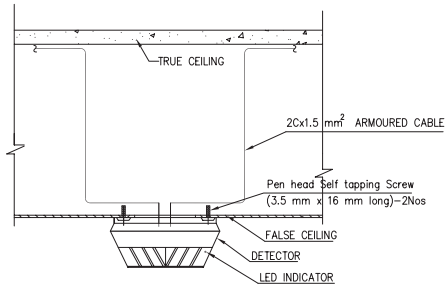
MOUNTING ARRANGEMENT OF RESPONSE INDICATOR ON FALSE CEILING

DETECTOR ABOVE FALSE CEILING WITH RESPONSE INDICATOR ON FALSE CEILING			
Sr.No	ITEM DESCRIPTION	UNIT	QTY/ITEM
1	MS Back Box-(100 x 100 x 50 mm)	Nos	1
2	Saddle with base(Size:16mm)	Nos	2
3	Pen head Self tapping Screw(3.5 mm x 16 mm long)	Nos	4
4	Cable Gland(Size:16mm)	Nos	3
5	Cable Lug(Size:1.5Sqmm)	Nos	6
6	Wooden Screw(35mm long x 8 mm) with Rawal(Size:6 mm)	Nos	4



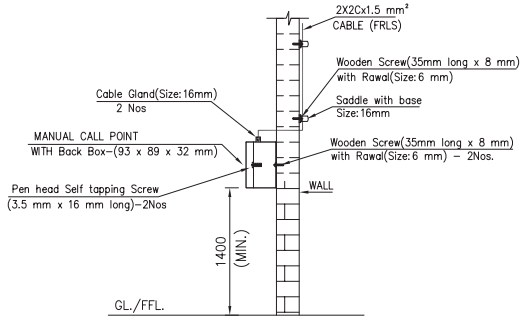
MOUNTING ARRANGEMENT OF DETRCTOR ON TRUE CEILING

DETECTOR ON TRUE CEILING			
Sr.No	ITEM DESCRIPTION	UNIT	QTY/ITEM
1	MS Back Box-(100 x 100 x 50 mm)	Nos	1
2	Wooden Screw(35 mm x 8 mm) with Rawal(Size:6 mm)	Nos	2
3	Cable Gland(Size:16mm)	Nos	2
4	Cable Lug(Size:1.5Sqmm)	Nos	4
5	Saddle with base(Size:16mm)	Nos	2
6	Pen head Self tapping Screw(3.5 mm x 16 mm long)	Nos	2



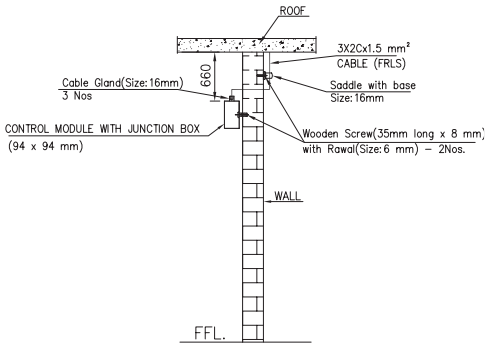
MOUNTING ARRANGEMENT OF DETECTOR ON FALSE CEILING

DETECTOR ON FALSE CEILING			
Sr.No	ITEM DESCRIPTION	UNIT	QTY/ITEM
1	Pen head Self tapping Screw(3.5 mm x 16 mm long)	Nos	2
2	Cable Lug(Size:1.5Sqmm)	Nos	4
2	Cable Gland(Size:16mm)	Nos	2



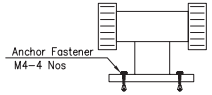
TYPICAL MOUNTING ARRANGEMENT OF MANUAL CALL POINT

MANUAL CALL POINT			
Sr.No	ITEM DESCRIPTION	UNIT	QTY/ITEM
1	MANUAL CALL POINT -(93 x 89 x 32 mm)	Nos	1
2	Wooden Screw(35 mm x 8 mm) with Rawal(Size:6 mm)	Nos	4
3	Cable Gland(Size:16mm)	Nos	2
4	Cable Lug(Size:1.5Sqmm)	Nos	4
5	Saddle with base(Size:16mm)	Nos	2
6	Pen head Self tapping Screw(3.5 mm x 16 mm long)	Nos	2

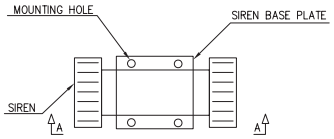


TYPICAL MOUNTING ARRANGEMENT OF CONTROL MODULES

MANUAL CALL POINT			
Sr.No	ITEM DESCRIPTION	UNIT	QTY/ITEM
1	CONTROL MODULE WITH JUNCTION BOX (94 x 94 mm)	Nos	1
2	Wooden Screw(35 mm x 8 mm) with Rawal(Size:6 mm)	Nos	3
3	Cable Gland(Size:16mm)	Nos	3
4	Cable Lug(Size:1.5Sqmm)	Nos	6
5	Saddle with base(Size:16mm)	Nos	1

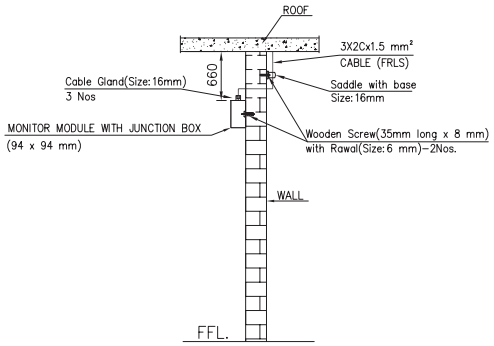


VIEW A-A



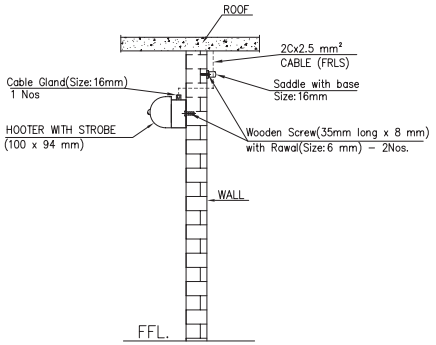
TYPICAL MOUNTING ARRANGEMENT OF SIREN

SIREN			
Sr.No	ITEM DESCRIPTION	UNIT	QTY/ITEM
1	Anchor Fastener (Size: 6ø)	Nos	4
2	Cable Gland(Size:16mm)	No	1
3	Cable Lug(Size:2.5Sqmm)	Nos	3



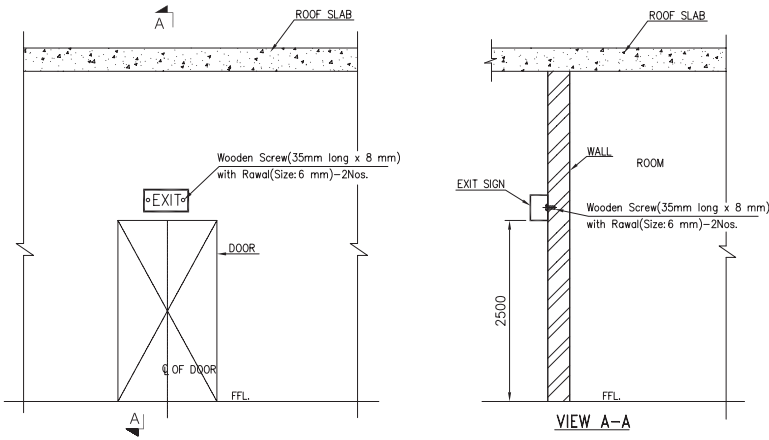
TYPICAL MOUNTING ARRANGEMENT OF MONITOR MODULES

MANUAL CALL POINT			
Sr.No	ITEM DESCRIPTION	UNIT	QTY/ITEM
1	MONITOR MODULE WITH JUNCTION BOX (94 x 94 mm)	Nos	1
2	Wooden Screw(35 mm x 8 mm) with Rawal(Size:6 mm)	Nos	3
3	Cable Gland(Size:16mm)	Nos	3
4	Cable Lug(Size:1.5Sqmm)	Nos	6
5	Saddle with base(Size:16mm)	Nos	1



TYPICAL MOUNTING ARRANGEMENT OF HOOTER WITH STROBE

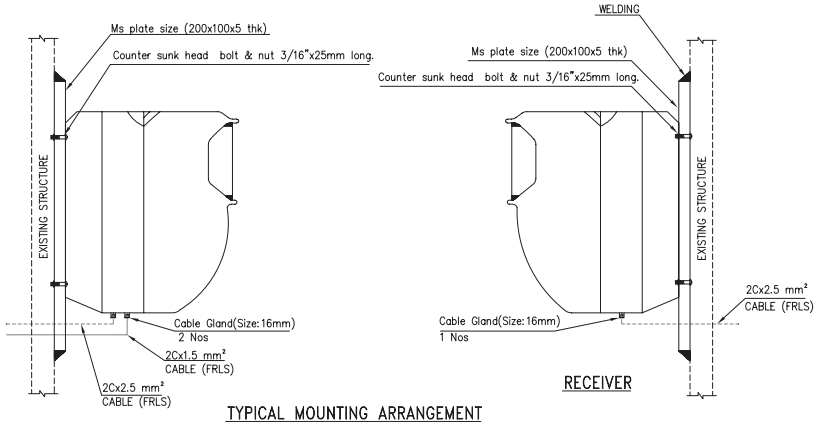
HOOTER WITH STROBE			
Sr.No	ITEM DESCRIPTION	UNIT	QTY/ITEM
1	HOOTER WITH STROBE (100 x 94 mm)	Nos	1
2	Wooden Screw(35 mm x 8 mm) with Rawal(Size:6 mm)	Nos	3
3	Cable Gland(Size:16mm)	Nos	1
4	Cable Lug(Size:2.5Sqmm)	Nos	2
5	Saddle with base(Size:16mm)	Nos	1



VIEW A-A

TYPICAL MOUNTING ARRANGEMENT
WALL MOUNTED TYPE EXIT SIGN

WALL MOUNTED TYPE EXIT SIGN			
Sr.No	ITEM DESCRIPTION	UNIT	QTY/ITEM
1	EXIT SIGN (200X200)	Nos	1
2	Wooden Screw(35 mm x 8 mm) with Rawal(Size:6 mm)	Nos	2

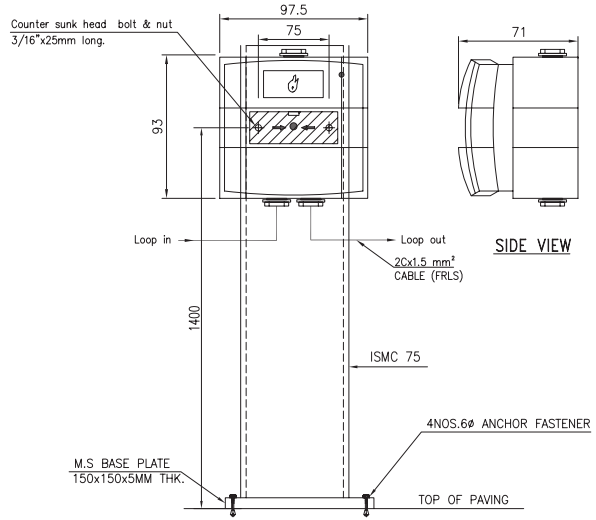


EMITTER

RECEIVER

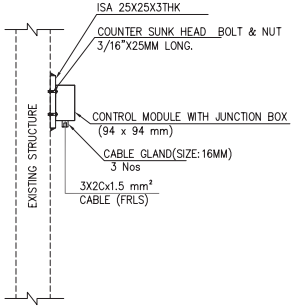
TYPICAL MOUNTING ARRANGEMENT
BEAM DETECTOR

BEAM DETECTOR			
Sr.No	ITEM DESCRIPTION	UNIT	QTY/ITEM
1	Counter sunk head bolt & nut 3/16"x25mm long.	Nos	4
2	MS PLATE SIZE (200X100X5 THK)	Nos	2
3	Cable Gland(Size:16mm)	Nos	3
4	Cable Lug(Size:1.5Sqmm)	Nos	2
5	Cable Lug(Size:2.5Sqmm)	Nos	4



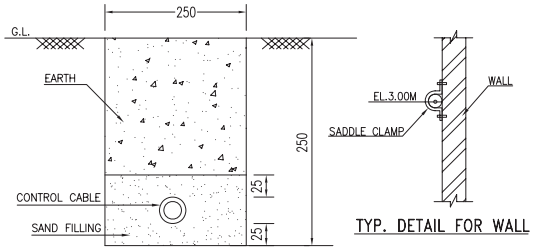
MOUNTING ARRANGEMENT OF OUTDOOR
MANUAL CALL POINT

OUTDOOR MANUAL CALL POINT			
Sr.No	ITEM DESCRIPTION	UNIT	QTY/ITEM
1	MS Base Plate(Size:150 x 150 x 5 mm)	Nos	1
2	Anchor Fastener (Size: 6ø)	Nos	4
3	Counter sunk head bolt & nut 3/16"x25mm long.	Nos	2
4	Cable Gland(Size:16mm)	Nos	2
5	Cable Lug(Size:1.5Sqmm)	Nos	4
5	Ismc 75 (Length 1500mm)	Nos	1



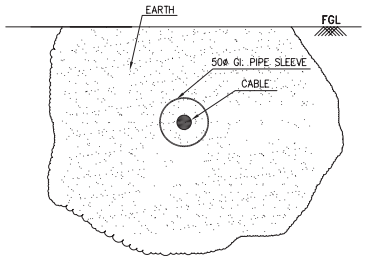
TYPICAL MOUNTING ARRANGEMENT OF
INPUT OUTPUT MODULE FOR COAL CONVEYOR

INPUT OUTPUT MODULE FOR COAL CONVEYOR			
Sr.No	ITEM DESCRIPTION	UNIT	QTY/ITEM
1	Control module with junction box (94 x 94 mm)	Nos	1
2	Counter sunk head bolt & nut 3/16"x25mm long.	Nos	2
3	Cable Gland(Size:16mm)	Nos	3
4	Cable Lug(Size:1.5Sqmm)	Nos	6
5	MS ANGLE(SIZE:25 X 25 X 5 MM,100MM LONG)	Nos	1

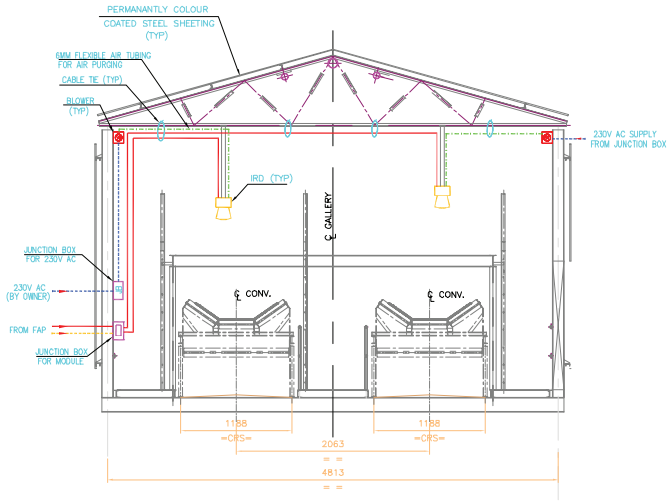


TYP. DETAIL FOR WALL

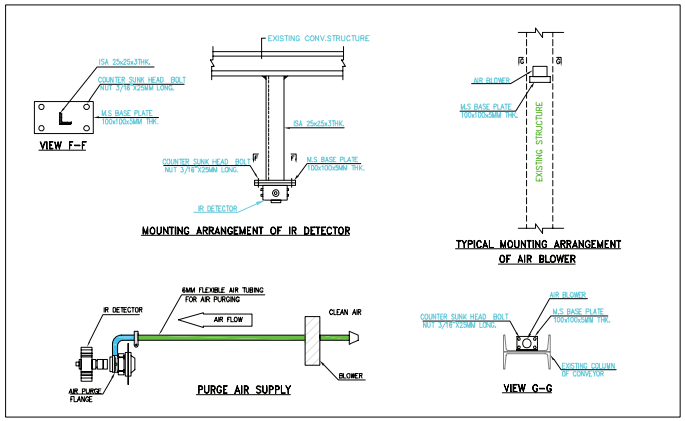
TYP. DETAIL FOR LAYING
OF BURIED CABLE



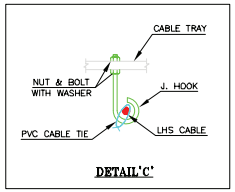
TYP. DETAIL FOR ROAD CROSSING
CABLE LAYING DETAIL



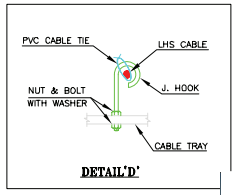
TYPICAL MOUNTING ARRANGEMENT FOR IRD FOR COAL CONVEYOR



INFRA RED DETECTOR & BLOWER			
Sr.No	ITEM DESCRIPTION	UNIT	QTY/ITEM
1	MS Base Plate(Size:100 x 100 x 5 mm)	Nos	4
2	Counter sunk head bolt & nut 3/16"x25mm long.	Nos	8
3	MS ANGLE(SIZE:25 X 25 X 5 MM,500MM LONG)	Nos	2
4	JUNCTION BOX FOR 230V AC SUPPLY	No.	1

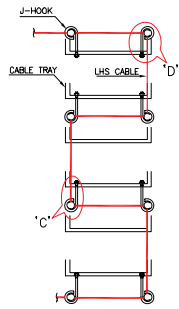


DETAIL'C'

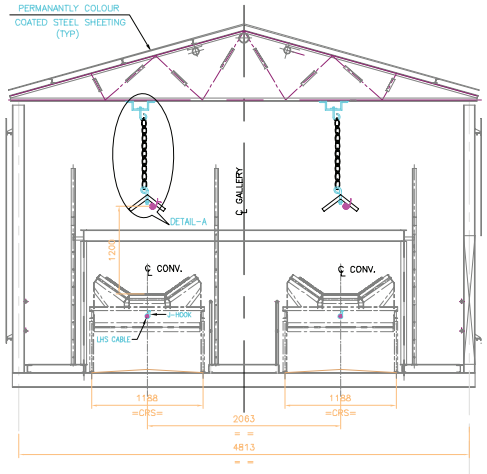


DETAIL'D'

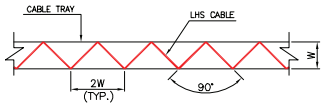
200mm long J- Hook for every 1 metre



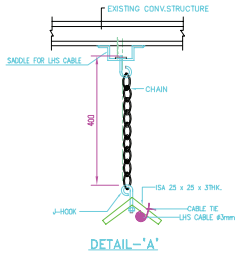
LHS MOUNTING DETAIL FOR CABLE TRAY



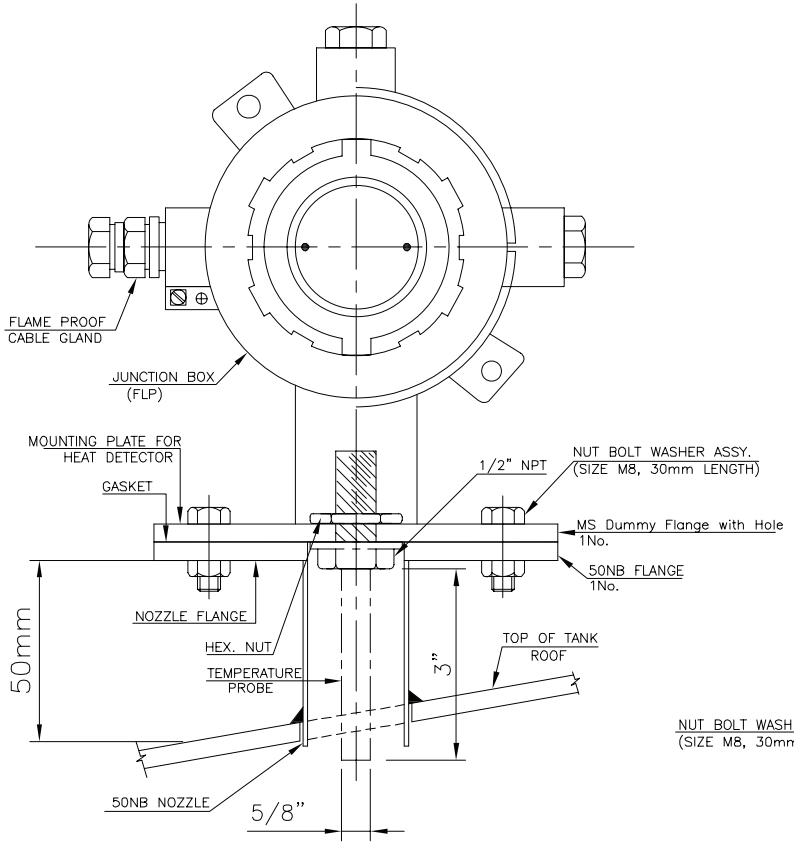
TYPICAL MOUNTING ARRANGEMENT FOR LHS CABLE FOR COAL CONVEYOR



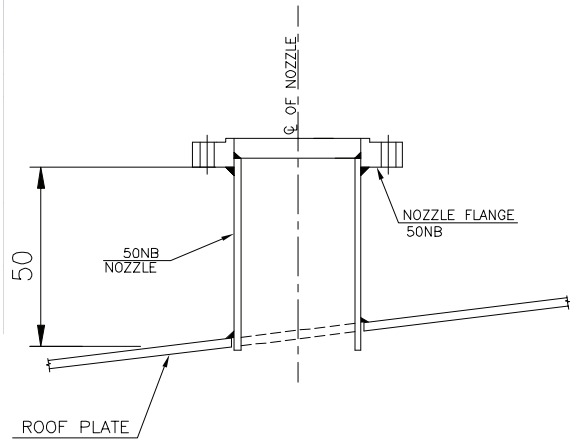
TYPICAL LHS ZIG-ZAG ARRANGEMENT (FOR CABLE GALLERY)



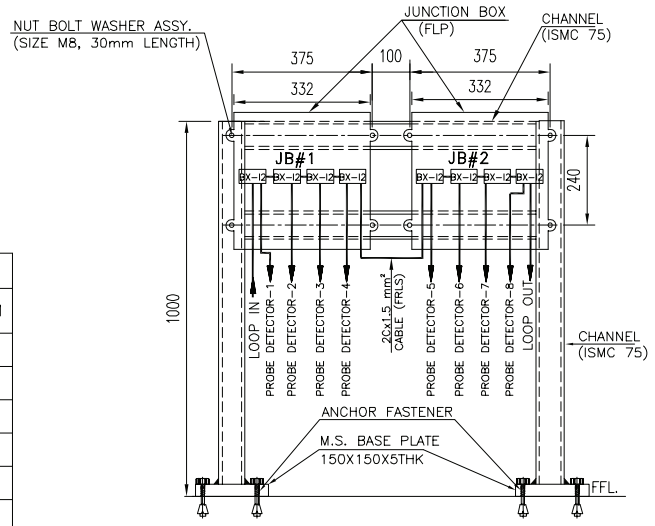
DETAIL-'A'



TYPICAL MOUNTING ARRANGEMENT
OF PROBE TYPE DETECTOR



NOZZLE ARRANGEMENT
TANK ROOF FOR PROBE TYPE DETECTOR



TYPICAL MOUNTING DETAIL
OF JUNCTION BOX

PROBE DETECTOR & JUNCTION BOXES			
Sr.No	ITEM DESCRIPTION	UNIT	QTY/ITEM
1	MS BASE PLATE(SIZE:150 X 150 X 5 MM)	Nos	2
2	ANCHOR FASTENER (SIZE: 6ø)	Nos	8
3	NUT BOLT WASHER ASSY. (SIZE M8, 30MM LENGTH)	Nos	12
4	CABLE GLAND(SIZE:16MM)	Nos	20
5	CABLE LUG(SIZE:1.5SQMM)	Nos	40
6	ISMC 75 (LENGTH 1000MM)	Nos	2
7	ISMC 75 (LENGTH 850MM)	Nos	2
8	MS DUMMY FLANGE WITH HOLE	Nos	8
9	JUNCTION BOX FOR PROBE DETECTOR	Nos	8
10	JUNCTION BOX FOR MODULES	Nos	2

ANNEXURE – N

(DETAILS OF 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

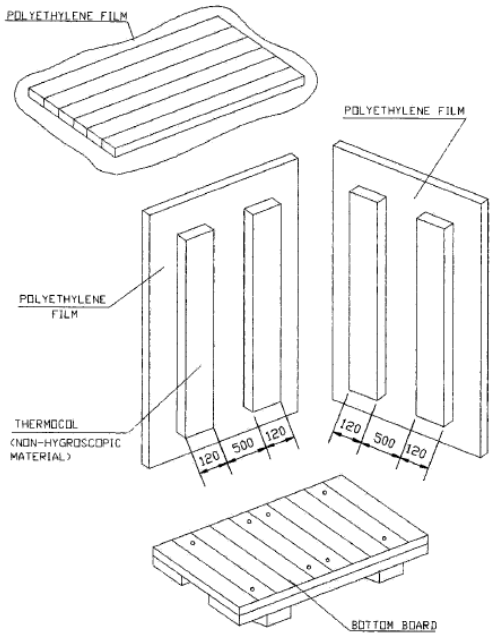


Figure 1

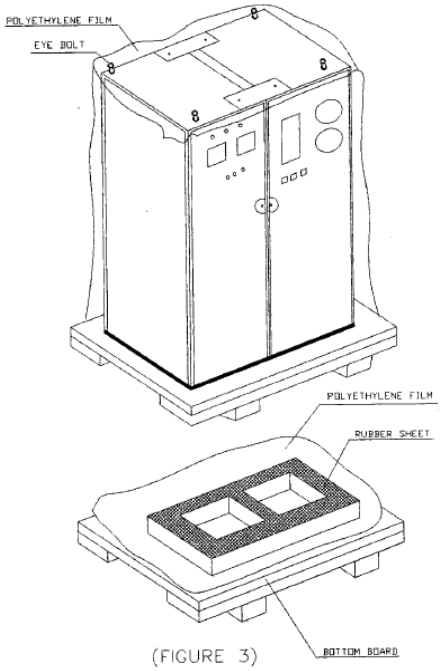


Figure 2

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: -

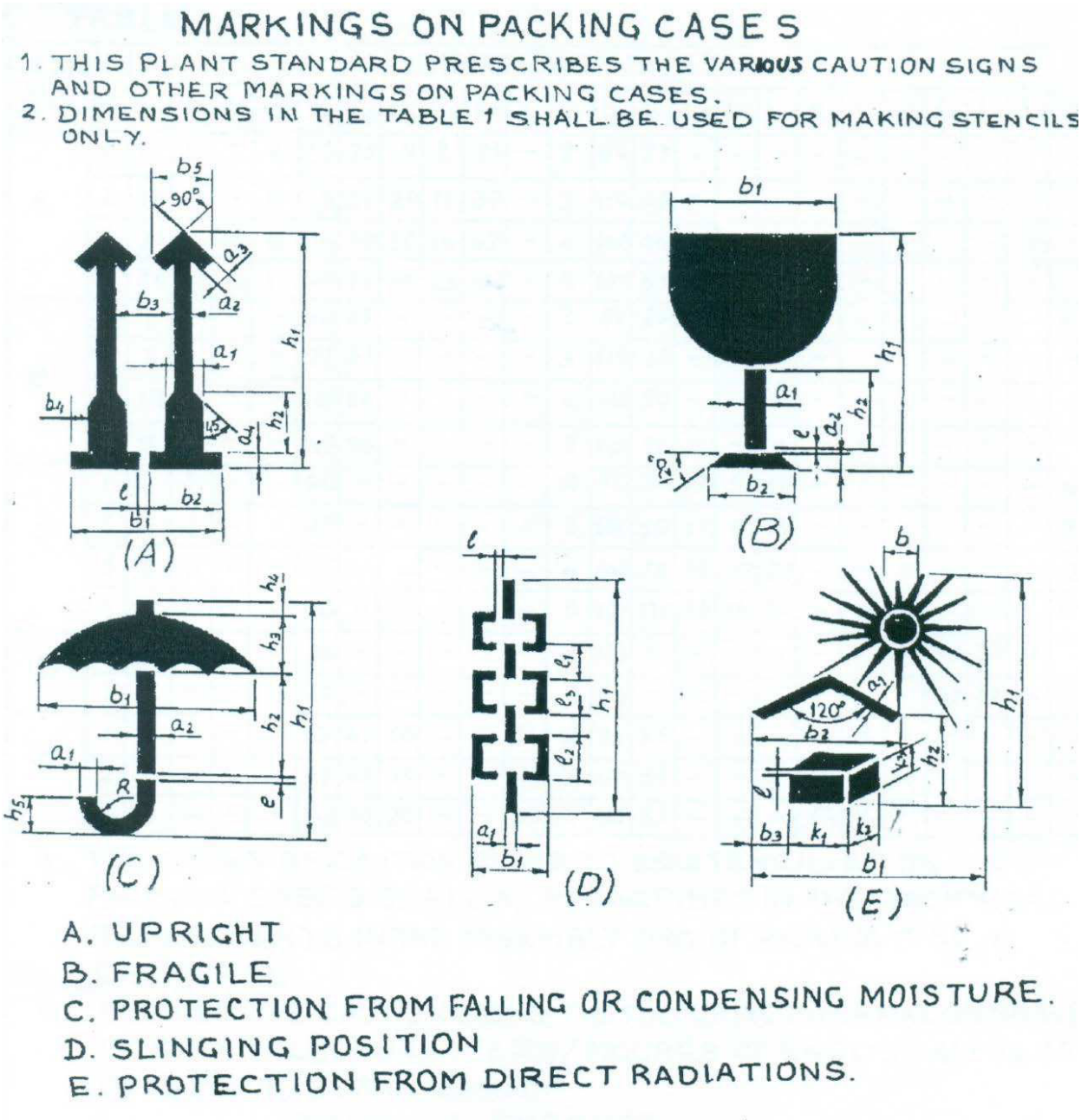
b) Put the machine in the steel container properly,

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.

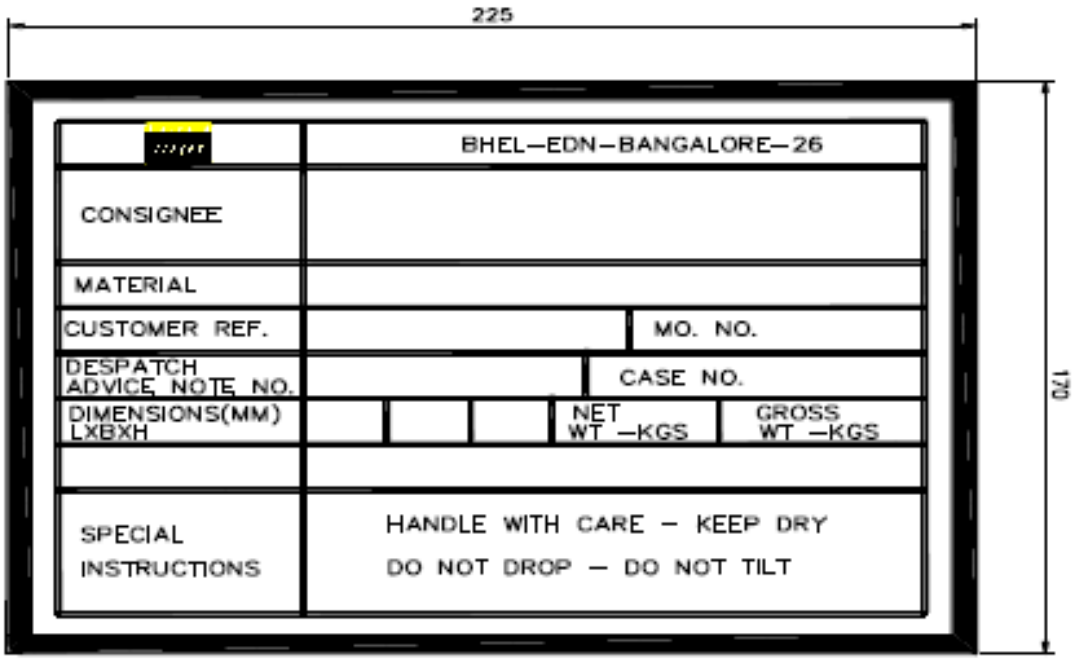


Figure 4 – TYPICAL MARKING PLATE

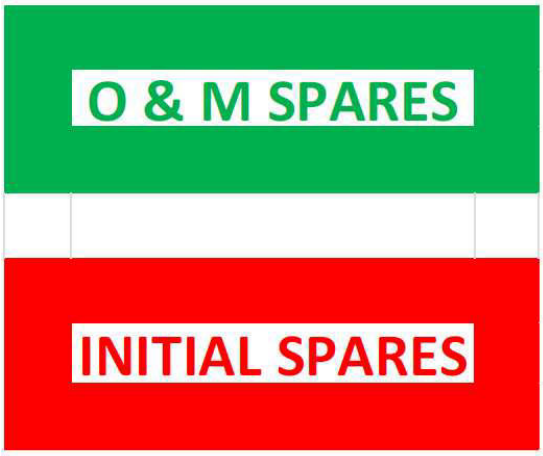


Figure 5

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