
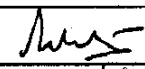













शिवाहर एवं दिनांक SIGN & DATE		उत्पाद मानक PRODUCT STANDARD	ST48015 मुख पृष्ठ PREFACE SHEET
शिवाहर एवं दिनांक SIGN & DATE	SUPERSEDES INVENTORY NO	केवल आंतरिक प्रयोग हेतु प्रदायक को देने से पूर्व इस मुखपृष्ठ को निकाल दें । FOR INTERNAL USE ONLY REMOVE THIS PREFACE BEFORE ISSUE TO SUPPLIERS. Title :- Technical requirements for Local Instrument Racks (IR)	
COPYRIGHT AND CONFIDENTIAL. The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.	समतुल्य मानक/सूची आदि COMPARABLE STANDARDS / CATALOGUES ETC.	} : NO.	
स्वत्वाधिकार एवं गोपनीय इस दस्तावेज में दी गई सूचना भारत भारी इलेक्ट्रिकल लिमिटेड की संपत्ति है। इसका प्रयोग केवल आंतरिक प्रयोग हेतु ही किया जा सकता है। इसका प्रयोग अन्य किसी भी उद्देश्य के लिए नहीं किया जा सकता है।	सुझाए/सम्भावित प्रदायक एवं श्रेणी SUGGESTED / PROBABLE SUPPLIERS AND GRADES. 1) Instrumentation Ltd.-----Kota	} : NONE	
शिवाहर एवं दिनांक SIGN & DATE	INVENTORY NO P-6398	कोई अन्य जानकारी ANY OTHER INFORMATIONS	} : NONE
शिवाहर एवं दिनांक SIGN & DATE	INVENTORY NO P-6398	REV. NO. 00 DI. 01.07.10	रवीकृति APPROVED  K.B. Batra HOD-CIE SR No 8.10 निम्न PREPARED: CIE जारी ISSUED: TSX दिनांक DATE 01.07.10




दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद मानक PRODUCT STANDARD	ST 48015 पृष्ठ 13 का 1 Page 1 of 13																														
सामग्री सूची संख्या और अधिकारिणी करना है SUPERSEDES INVENTORY NO.	(Based on BHEL-EDN-Tech. spec. no. CE/415/LIE-LIR/TR)																																
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.	TECHNICAL REQUIREMENT FOR LOCAL INSTRUMENT RACKS (IR) I. OPEN TYPE INSTRUMENT RACKS:																																
स्वत्साधिकार एवं गोपनीय इस प्रलेख में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की संपत्ति है इसका इस्तेमाल एवं आरक्षण का स अधिकारी को करार प्रयोग, जो कि कंपनी के हित में होना चाहिए ही न होना चाहिए।	1. Instrument racks is provided for mounting pressure transmitters, switches & gauges and other accessories, in buildings and closed areas like the power house building / turbine hall at various locations. 2. The Instrument Racks shall be of following sizes (in millimeters). Type A- 1800(W) x 650(D) x 2200(H) (For Transmitters / Switches / Gauges) Type B- 1000(W) x 650(D) x 2200(H) (For Transmitters Switches / Gauges) 3. Racks shall be constructed on structural members of adequate strength and rigidity to ensure proper support to the mounted instruments and equipment. Racks shall be of welded construction. Each rack shall be provided with a canopy to protect the instrument from dripping water or falling objects. 4. All Valves & Manifolds shall be securely mounted and the structural design shall be such that no item shall interfere with maintenance and removal of instrument, equipment and their accessories. 5. Construction of same shall be typically as per Fig. nos.-1,2 &3. 6. Service Power and Lighting a. Each rack shall be provided with one receptacle, one light fixture with wire guard and one lighting switch. Light fixtures shall be installed on the canopy of the rack. b. Power supplies for miscellaneous devices shall be provided with fuses located within the rack JB. Fuses shall be mounted in fuse blocks. Fuse ratings shall be suitable upto 15Amps Power supply shall be 240 V AC. 7. Equipment Installation Vendor shall prepare rack fabrication and piping drawings indicating the layout of each Rack. Instruments shall be installed using custom fabricated supports which are attached to the vertical members provided for this purpose. Drawings shall indicate the arrangement of all equipment, piping, valves and fittings within the rack and shall be subject to approval																																
दिनांक एवं हस्ताक्षर SIGN & DATE 14.7.10	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:15%;"></td> <td style="width:15%;"></td> <td style="width:15%;"></td> <td style="width:15%;"></td> <td style="width:15%; text-align: center;">नाम NAME</td> <td style="width:20%; text-align: center;">दिनांक एवं हस्ताक्षर SIGNATURE & DATE</td> </tr> <tr> <td>MEMBER-PSC</td> <td>K.B. BAKRA</td> <td></td> <td>अनुवादक TRANSLATED BY</td> <td></td> <td></td> </tr> <tr> <td>QAX</td> <td>S.K.Chauhan</td> <td></td> <td>निर्माणकर्ता WORKED BY</td> <td>J.S.BHANDARI</td> <td>J.S.Bhandari 17/10</td> </tr> <tr> <td>TSX</td> <td>Lalit Kumar</td> <td></td> <td>जांचकर्ता CHECKED BY</td> <td>G.GUPTA</td> <td>G.Gupta</td> </tr> <tr> <td>सहमत विभाग AGREED DEPTT.</td> <td>नाम NAME</td> <td>दिनांक एवं हस्ताक्षर DATE & SIGNATURE</td> <td>पर्यवेक्षणकर्ता SUPERVISED BY</td> <td>VINOD KUMAR</td> <td>Vinod Kumar 01/7/10</td> </tr> </table>							नाम NAME	दिनांक एवं हस्ताक्षर SIGNATURE & DATE	MEMBER-PSC	K.B. BAKRA		अनुवादक TRANSLATED BY			QAX	S.K.Chauhan		निर्माणकर्ता WORKED BY	J.S.BHANDARI	J.S.Bhandari 17/10	TSX	Lalit Kumar		जांचकर्ता CHECKED BY	G.GUPTA	G.Gupta	सहमत विभाग AGREED DEPTT.	नाम NAME	दिनांक एवं हस्ताक्षर DATE & SIGNATURE	पर्यवेक्षणकर्ता SUPERVISED BY	VINOD KUMAR	Vinod Kumar 01/7/10
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सामग्री सूची संख्या INVENTORY NO. P-6398	स्वीकृति APPROVED : K.B.BATRA , SDGM (CIE)			दिनांक DATE 01.07.10																													
दिनांक एवं हस्ताक्षर SIGN & DATE	दिनांक एवं हस्ताक्षर SIGN & DATE 01.07.2010	निर्माण PREPARED : CIE	जारी ISSUED : CIE	दिनांक DATE : 01.07.10																													

निम्नक एवं दिनांक SIGN & DATE			उत्पाद मानक PRODUCT STANDARD	ST 48015 पृष्ठ 13 का 2 Page 2 of 13
सामग्री सूची संख्या को अधिकृतित करता है SUPERSEDES INVENTORY NO.	COPYRIGHT AND CONFIDENTIAL The information on this documents is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.	<p>8. <u>Impulse Piping / Tubing</u></p> <p>a. Instrument racks shall be complete with impulse tubing piping, valves from enclosure bulkhead connection to all instruments and necessary drain / blow down connections. The type, sizes, material and pressure class of pipes/tubes, fittings, valves etc. shall be suitable for the intended applications as per the Schemes / Tagging list of Instrument, provided by BHEL.</p> <p>b. Bulkhead connection shall be used when instrument piping/ tubing enters the enclosure through Bulkhead plate. Typically through Bulk heads, Impulse pipe entry shall be through top side of the rack for Steam and Liquid services.</p> <p>c. All Instrument Blow down lines, except those measuring vacuum shall be connected to a two-inch header, which is extended through one end of the rack and turned downward for directing the blow down into drain.</p> <p>d. In the drain /common header, provision of spare drain connections shall be made for adding additional instruments in future as shown in the rack drgs. These connections shall be plugged suitably to avoid any flash over near by the racks.</p> <p>e. Instrument piping and tubing shall be hydrostatically tested at one and one-half times the maximum system pressure for that instrument except for low pressure and vacuum measurement the test pressure will be 8 Kg / Cm².</p> <p>9. <u>Wiring of the Racks</u></p> <p>a. A fully enclosed IP 55 (as per IS:2147) type junction box shall be provided in each rack for housing the terminal blocks, power supply fuses and other electrical accessories, as required.</p> <p>b. All electrical connections between instrument and the Terminals in Junction box shall be made. In addition all utility wiring for lighting and service power shall be installed.</p> <p>c. Vendor shall furnish general arrangement and wiring diagrams for each Instrument rack for approval.</p> <p>d. Junction boxes for the racks shall be mounted on one end of each assembly to accept field wiring through the top or bottom of the junction box. The junction box shall be 150 millimeters minimum depth. A removable bolted door shall give access to the interior of the junction box. All junction boxes shall accept same key. JB to be of Metallic type with IP 55 protection class and fitted with 24 way Terminal Block.. Door handle shall be of SS. Self locking type with common key. Door gasket shall be of synthetic rubber. Two nos. cable glands shall be provided in the JB suitable for outgoing group cable (individual & overall shielded) of size: 1x8Px0.5mm²</p>		
स्वसाधिकार एवं गोपनीय इस दस्तावेज में दी गई सूचना भारत भारती इंजीनियरिंग लिमिटेड की संपत्ति है इतना मात्र सूचित किया जा रहा है कि इस सूचना को किसी भी तरह प्रयोग, जो कि कंपनी के हित में साबितकारक हो न किया जाए।	निम्नक एवं दिनांक SIGN & DATE 24/7/10			
सामग्री सूची संख्या INVENTORY NO. P-6398	REV.00		निर्माणकर्ता WORKED BY G.GUPTA	01/07/10
			जांचकर्ता CHECKED BY V. KUMAR	01/07/10

दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद मानक PRODUCT STANDARD	ST 48015 पृष्ठ 13 का 3 Page 3 of 13			
सारणी सूची संख्या को अधिस्तम्भित करना है	II. General Requirement applicable to Transmitter Racks :					
SUPERSEDES INVENTORY NO. COPYRIGHT AND CONFIDENTIAL The information on this document is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.	<ol style="list-style-type: none"> 1. Surface preparation And Painting <ol style="list-style-type: none"> a. All sheet metal / exterior steel surfaces shall rust free and scale free and all other residue during fabrication operation such as Oil, grease and salts etc. shall be removed by one or more solvent cleaning methods. Epoxy primer surface shall be applied to all exterior and interior surfaces. Epoxy paint shall be applied to all surfaces and the paint thickness shall be 100 to 150 microns. The finish colours for exterior and interior surfaces shall conform to the shades mentioned in scope of supply. b. All impulse lines starting from bulk head upto drain header including drain valves shall be finished with one coat of epoxy primer. 2. Grounding <ol style="list-style-type: none"> a. Racks shall be provided with ground points which shall have two (2) welded GI bolts and nuts at each end of frame. 3. Name plate / Label. Service details and Tag no. shall be engraved on a nameplate or label for each of the instrument. These Nameplates or Labels shall be of white non-hygroscopic material with engraved black lettering. This shall be fixed on to the Impulse Pipe closer to the instrument inside the Rack. 					
स्वत्वाधिकार एवं गोपनीय इस प्रलेख में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की संपत्ति है इका प्रत्येक एवं अपरिच्छेद रूप से किसी भी तरह प्रयोग, जो कि कंपनी के हित में खनिजायुक्त हो न किया जाए।						
दिनांक एवं दिनांक SIGN & DATE 14/7/10						
सारणी सूची संख्या INVENTORY NO. P-6398	REV.00		निर्माणकर्ता WORKED BY	G.GUPTA		01/07/10
			जांचकर्ता CHECKED BY	V. KUMAR		01/07/10

दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद मानक PRODUCT STANDARD	ST 48015	
सामग्री सूची संख्या को अधिकाधिक करें। SUPERSEDES INVENTORY NO.	पृष्ठ 13 का 4 Page 4 of 3			
COPYRIGHT AND CONFIDENTIAL The information on this documents is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.	<p>4. Wiring Details</p> <p>a. Interconnecting wiring shall be provided between all electrical devices mounted in the panels and between the devices and terminal blocks if the devices are to be connected to equipment outside the panels by cabling. All interior wiring shall be installed neatly and carefully and shall be terminated at suitable terminal blocks in the Junction box. Sufficient clearance shall be provided for all control and instrumentation leads.</p> <p>b. Each wire shall be identified at both ends with wire designations as per approved wiring diagram. Interlocking type ferrules shall be used for identification</p> <p>c. All wire termination shall be made with insulated sleeve and cage clamp type terminals.</p> <p>d. All signal wiring shall be done with 2 or 4 pair, 0.5 sq. mm annealed copper, pair twisted overall & shielded, voltage grade 650 V, unarmored FRLS PVC sheathed cable and 4 pair, 0.5 sq. mm for PS/DPS. For power supply application, 1100V cable shall be used.</p> <p>e. Wires shall be dressed and run in trays or troughs with clamp-on type covers. Wiring may be neatly bunched in-groups by non-metallic cleats or bands. Shield wires shall be terminated on separate terminal blocks.</p> <p>f. Internal wiring shall follow distinct color coding to segregate different voltage levels viz. 24V DC & 230V AC</p> <p>g. For DPT/ Pressure Transmitter, two wires and for Pressure Switch six wires shall be terminated in the Junction Boxes (JB) of each Rack.</p>			
	स्वासाधिकार एवं गोपनीय इस प्रलेख में दी गई सूचना भारत के ही इलेक्ट्रिकल्स की सम्पत्ति है इसका प्रयोग एवं आरम्भक रूप से किया भी तरह प्रयोग, जो कि कंपनी के हित में सांख्यिकीय हो न किया जाय।	<p>5. Fuse Blocks</p> <p>a) Fuse blocks shall be modular type with Bakelite frame and reinforced retaining clips.</p> <p>6. Terminal Blocks</p> <p>(a) Terminal blocks shall be DIN rail mounted and shall have Cage clamp type connection which shall be maintained for all panels uniformly.</p> <p>b) The terminal blocks shall be suitable for connecting 0.5mm²/2.5 mm² conductor of suitable voltage grade as specified in clause 3(d).</p> <p>c) Terminal blocks shall be mounted vertically with adequate spacing between rows for routing the cable and to allow adequate free workspace for termination and removal of wires.</p>		
दिनांक एवं हस्ताक्षर SIGN & DATE 14.7.10				
सामग्री सूची संख्या INVENTORY NO. P-6398	REV.00		निर्माणकर्ता WORKED BY G.GUPTA	 01/07/10
			जांचकर्ता CHECKED BY V. KUMAR	 01/07/10

दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद मानक PRODUCT STANDARD	ST 48015 पृष्ठ 13 का 5 Page 5 of 13		
वापसी सूची संख्या को अंकित करने के लिए	SUPER SERIES INVENTORY NO.	d) Terminal blocks shall be provided with white marking strips/self adhesive marker cards. e) 10 nos. of spare unused terminals shall be provided on each terminal blocks for circuit modifications and for termination of all conductors in a multi conductor control cables. f) Terminal blocks for termination of electrical power supply shall be type WAGO / PHOENIX make of suitable size with marking strips. g) The last terminal in a rail-mounted assembly shall be closed with an end plate and end bracket.			
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.		III. Documents to be Submitted by Vendor for Approval : <ol style="list-style-type: none"> 1. OGA for Instrument Racks. 2. Layout of Components in each of Instrument Rack. 3. Electrical diagrams for each Instrument Rack. 4. Component datasheets 5. Quality plan including Welding Procedure specification and Welder Procedure qualification Record. 6. The quality plan shall include Visual inspection, GA BOM/Layout features verification, Dimensions, Paint shade, thickness measurement, Alignment of sections, component ratings, Wiring, IR, HV, review of TC for instruments / Devices, Accessibility of TBs / Devices, Illumination, Tubing and Degree of protection (Review of type test certificate) 			
		स्वत्वधिकार एवं गोपनीय इस प्रलेख में दी गई सूचना भारत भारती इलेक्ट्रिकल्स की संपत्ति है। इसका प्रयोग केवल निर्धारित उद्देश्यों के लिए ही किया जाना चाहिए। अन्यथा इसका प्रयोग करने से कानून की दृष्टि से हानि हो सकती है।		IV. Specific requirements <ol style="list-style-type: none"> 1. Where grouping is not provided for instruments, same shall be indicated during detailed engineering. 2. Two nos. of drain valves shall be provided where operating pressure is more than 40Kg/cm². 3. Spare drain connections at drain / common header as per clause I:8(d), shall be plugged with removable metallic caps. This should be ensured before dispatch of Racks. 4. Drain/common header and other open ended points of valves/pipes etc. shall be plugged with removable rubber/plastic caps. This should be ensured before dispatch of Racks. 	
दिनांक एवं हस्ताक्षर SIGN & DATE 14.7.10		V. Testing requirements Testing shall be carried out as per check list for Instrument valve, Impulse & tubes, Socket weld fittings and SS compression fittings.			
वापसी सूची संख्या INVENTORY NO. P-6398	REV.00		निर्माणकर्ता WORKED BY G.GUPTA		01/07/10
			जांचकर्ता CHECKED BY V. KUMAR		01/07/10

दिनांक एवं हस्ताक्षर SIGN & DATE		<p style="text-align: center;">उत्पाद मानक</p> <p style="text-align: center;">PRODUCT STANDARD</p>		<p style="text-align: center;">ST 48015</p> <p style="text-align: center;">पृष्ठ 13 का 6</p> <p style="text-align: center;">Page 6 of 13</p>	
सुपरसेड्स INVENTORY NO. सामग्री सूची संख्या को अधिकारित करना है	<p>VI. <u>Packing and conservation:</u></p> <p>All the items shall be conserved and packed to avoid damage during shipment and handling.</p> <p>VII. <u>Compliance with National/International Standard :</u></p> <p>No Indian standard exists, assistance taken from BHEL-EDN-Bangalore technical specification.</p> <p>VIII. <u>Cross-referred Standards:</u></p> <p>ASTM: A3328, IS:2147 & ANSI: B16.11.</p>				
COPYRIGHT AND CONFIDENTIAL The information on this documents is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.	<p style="text-align: center; opacity: 0.5; font-size: 2em;">OldRevision</p>				
स्वत्वाधिकार एवं गोपनीय इस प्रलेख में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की संपत्ति है इन्हें प्रत्यक्ष एवं अप्रत्यक्ष रूप से किसी भी तरह प्रयोग, जो कि कंपनी के हित में बाधिकात्मक हो न किया जाए।					
दिनांक एवं हस्ताक्षर SIGN & DATE 14.7.10					
सामग्री सूची संख्या INVENTORY NO. P-6398	REV.00		निर्माणकर्ता WORKED BY	G.GUPTA	 01/07/10
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दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद मानक PRODUCT STANDARD	ST 48015 पृष्ठ 13 का 7 Page 7 of 13
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दिनांक एवं हस्ताक्षर SIGN & DATE	सापेक्ष सूची संख्या को अतिरिक्त करता है SUPERSEDES INVENTORY NO.	CHECK LIST FOR INSTRUMENT VALVES
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SL NO.	TESTS/CHECKS	Q/TUM OF CHECK	REFERENCE DOC. ACCEPTANCE NORMS.	AGENCY**				REMARKS
				M	C	N	D*	
1	DIMENSIONS, TYPE	REFER NOTE-1 BELOW	APPROVED SPEC/ DATA SHEETS/DRG.	P	W	V		
2	MATERIAL FOR BODY AND STEM	ONE SAMPLE/	AS PER ASTM STD.* (FOR FORGING)/DRG.	P	V	V		* FOR BARSTOCK ITEMS LABR. TC TO BE FURNISHED
2.1	CHEMICAL	HEAT/						
2.2	PHYSICAL	LOT				V		
3	STELITING OF SEAT	↑	MANUFACTURE'S STD.	P	V	V		✓ NO LEAKAGE TO BE OBSERVED FOR 4 & 5
4	HYDRAULIC TESTING BODY AND SEAT	REFER NOTE-1 BELOW	1.5 TIMES RATED PRESSURE	P	W	V		
5	AIR LEAKAGE TEST	↓	AT 7 Kg/cm ²	P	W	V		
6	IDENTIFICATION & RATINGS TO BE PUNCHED MARKED	REFER NOTE-1 BELOW	APPROVED SPEC/ DATA SHEETS/DRG.	P	W	V		

LEGEND :
 * D: RECORDS, IDENTIFIED WITH 'right mark' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION.
 ** M: MANUFACTURER/SUB CONTRACTOR, C:CONTRACTOR/NOMINATED INSP.AGENCY
 N: END USER "P" PERFORM "W" WITNESS "V" VERIFICATION


NOTE :

- QUANTUM OF CHECK SHALL BE AS BELOW :

100%	- BY MANUFACTURER
10%	- BY CONTRACTOR
NIL	- BY M/S CUSTOMER
- MANUFACTURER TO MAINTAIN CALIBRATED INSTRUMENT HAVING BETTER ACCURACY THAN THE ITEM UNDER TEST. INSPECTING ENGINEER SHALL CHECK THE SAME.
- UT REQUIRED IF RAW MATERIAL/ FORGING SECTION IS 50mm AND ABOVE
- FORGINGS SHALL BE NORMALISED BEFORE MACHINING

दिनांक एवं हस्ताक्षर SIGN & DATE	सापेक्ष सूची संख्या INVENTORY NO. P-6398	REV.00		निर्माणकर्ता WORKED BY G.GUPTA	जांचकर्ता CHECKED BY V. KUMAR	01/07/10 01/07/10
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स्वसाक्षिकार एवं गोपनीय
 इस प्रलेख में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की संपत्ति है इसका प्रस्ताव एवं अप्रस्ताव को इस कानूनी रूप से सुरक्षित है, जो कि कानूनी के हित में साक्षिकार को न देना चाहिए।

दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद मानक PRODUCT STANDARD	ST 48015 पृष्ठ 13 का 8 Page 8 of 13
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सामग्री सूची संख्या को INVENTORY NO.	SUPERSEDES INVENTORY NO.	CHECK LIST FOR IMPULSE PIPES AND TUBES
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SL NO	TESTS/CHECKS	QUANTUM OF CHECK	REFERENCE DOC. ACCEPTANCE NORMS.	AGENCY**				REMARKS
				M	C	N	D*	
1	CHECK FOR DIMENSION, GRADE, SURFACE-DEFECTS	SEE NOTE: BELOW	APPROVED DATA SHEET AND CORRESPONDING ASTM STDS FOR GRADE OF MATERIAL	P	V	V	✓	↑ MANUFACTURER TO PROVIDE TEST CERT. AS PER RELEVANT ASTM STDS. MENTIONED IN SPECS ↓
2	CHEMICAL PROPERTIES AND PHY. PROPERTIES AS PER RELEVANT ASTM. (GRADE SHALL BE AS PER APPROVED DATA SHEET)	FOR LOT	↑	P	V	V	✓	
3	FLATTENING TEST.			P	V	V	✓	
4	FLARING TEST	##	-DO-	P	V	V	✓	
5	BENDING TEST.	**	↓	P	V	V	✓	
6	HYDRAULIC TEST OR EDDY CURRENT TEST			P	V	V	✓	
7	HARDNESS CHECK	##		P	V	V	✓	

LEGEND :
 * D: RECORDS, IDENTIFIED WITH 'right mark' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION.
 ** M: MANUFACTURER/SUB CONTRACTOR, C:CONTRACTOR/NOMINATED INSP.AGENCY
 N: END USER "P" PERFORM "W" WITNESS "V" VERIFICATION

स्वायत्तिकार एवं गोपनीय
 इस प्रारंभ में ही यह सूचना जारी है कि स्वयत्तिकार एवं गोपनीयता का अर्थ है कि इस दस्तावेज़ को समझने के लिए आवश्यक रूप से किसी भी तरह प्रमाण, जो कि कंपनी के हित में स्वयत्तिकार हो न शिका जाए।

NOTE :
 1) QUANTUM OF CHECK SHALL BE AS BELOW:
 100% - BY MANUFACTURER
 NIL - BY M/S BHEL
 NIL - BY M/S END USER
 2) MANUFACTURER TO MAINTAIN CALIBRATED INSTRUMENT HAVING BETTER ACCURACY THAN THE UNDER TEST, INSPECTING ENGINEER SHALL CHECK THE SAME.
 3) ## APPLICABLE FOR TUBES ONLY
 4) ** APPLICABLE FOR CS PIPES ONLY
 5) WHEN, MATERIAL CORRELATION IS NOT POSSIBLE. MATERIAL SAMPLES ARE TO BE TESTED AT THIRD PARTY LAB & TEST CERTIFICATES ARE TO BE SUBMITTED FOR BHEL REVIEW CHP

दिनांक SIGN & DATE	14.7.10
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P-6398			जांचकर्ता CHECKED BY	V. KUMAR		01/07/10

दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद मानक PRODUCT STANDARD	ST 48015 पृष्ठ 13 का 9 Page 9 of 13
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CHECK LIST FOR SOCKET WELD FITTING



SL NO.	TESTS/CHECKS	QUATUM OF CHECK	REFERENCE DOC. ACCEPTANCE NORMS	AGENCY**				REMARKS
				M	C	N	D*	
1	RAW MATERIAL IDENTIFICATION CHEMICAL COMPOSITION	ONE PER SECTION	APPROVED SPEC DATA SHEETS	P	V	V	✓	LABORATORY TEST REPORT FOR 10
2	FORGING		AS PER ASTM STD	P	V	V	✓	
2.1	CHEMICAL TEST	SEE COI						ONE PER CAST
2.2	MECHANICAL TEST	REMARKS						PER HEAT FOR
2.3	DIMENSINOL CHECK	100 °						2.1&2.2
2.4	NDT(BY U T)	FOR CL 9000 ONLY	AS PER ASTM A338					NO DEFECT TO BE OBSERVED IN 2.4
3	MACHINING	100°		P	V	V	✓	
4	HYDRAULIC PRESSURE TESTING OF FITTING (ALSO SEE NOTE-2 BELOW)	5°	AS PER RATINGS	P	V	V	✓	
5	FINAL MACHINING OF TEEs	10°	AS PER ANSI B16.11	P	V	V		
6	DIMENSIONAL CHEK OF ALL FITTINGS	10°	AS PER ANSI B16.11	P	V	V		

LEGEND:
 *D: RECORDS IDENTIFIED WITH 'right marked 'SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION
 **M: MANUFACTURER / SUB CONTRACTOR . C: CONTRACTOR NOMINATED INSP AGENCY
 N : END USER "P" PERFORM "W" WITNESS "V" VERIFICATION

- NOTE :**
- 1) MANUFACTURER TO MAINTAIN CALIBRATED INSTRUMENT HAVING BETTER ACCURACY THAN THE ITEM UNDER TEST. INPECTING ENGINEER SHALL CHECK THE SAME.
 - 2) HYDRAULIC PRESSURE TEST SHALL BE CARRED ON UNDRILLED BRANCH-TEE
 - 3) HYDRAULIC PRESSURE TEST ON FITTINGS | QUANTUM CHECK BY CONTRACTOR | TWO NOS OF EACH TYPE ON NO LEAKAGE TO BE OBSERVED
 - 4) MARKING OF RATING ON FITTING BY PUNCHING SHALL BE CARRIED OUT BY MANUFACTURER
 - 5) FORGINGS SHALL BE NORMALISED BEFORE MACHINING RECORDS TO BE MAINTAINED

SUPERSEDES INVENTORY NO. _____
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दिनांक
SIGN & DATE
 14/7/10

सामग्री सूची संख्या INVENTORY NO. P-6398	REV.00		निर्माणकर्ता WORKED BY G.GUPTA		01/07/10
			जांचकर्ता CHECKED BY V. KUMAR		01/07/10

निर्माक एवं हस्ताक्षर SIGN & DATE		उत्पाद मानक PRODUCT STANDARD	ST 48015 पृष्ठ 13 का 10 Page 10 of 13
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सामग्री सूची संख्या को SUPERSEDES INVENTORY NO. अधिकृतित करता है	CHECK LIST FOR STAINLESS STEEL COMPRESSION FITTINGS
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SL NO.	TESTS/CHECKS	QUANTUM OF CHECK	REFERENCE DOC. ACCEPTANCE NORMS.	AGENCY**				REMARKS
				M	C	N	D*	
1	DIMENSIONS	REFER		P	V	V		
		NOTE : 1	↑					
2	MATERIAL	SAMPLE/	APPROVED SPECS./	P	V	V		
2.1	CHEMICAL	HEAT /	DATA SHEETS	P	V	V	✓	
2.2	PHYSICAL, HARDWARE	LOT	↓					
			↑					
3	PROOF PRESSURE TEST	5 RDM.		P	V	V	✓	
		SAMPLE						
4	DISMANTLING	3 RDM.	MANUFACTURER'S	P	V	V		
	RE-ASSEMBLY TEST	SAMPLE						
			STANDARD					
5	HYDRAULIC IMPULES &	5 RDM.		P	V	V	✓	
	VIBRATION TEST	SAMPLE	↓					

LEGEND :
 * D: RECORDS, IDENTIFIED WITH 'right marked ' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION
 ** M: MANUFACTURER/SUB CONTRACTOR, C:CONTRACTOR/NOMINATED INSP.AGENCY
 N:CUSTOMER "P" PERFORM "W" WITNESS "V" VERIFICATION

NOTE :
 1) QUANTUM OF CHECK SHALL BE AS BELOW :
 100% - BY MANUFACTURER
 NIL -BY M/S BHEL
 NIL -BY CUSTOMER
 2) MANUFACTURER TO MAINTAIN CALIBRATED INSTRUMENT HAVING BETTER ACCURACY THAN THE ITEM UNDER TEST. INSPECTING ENGINEER SHALL CHECK THE SAME.

हस्ताक्षर एवं तिनांक SIGN & DATE	14/7/10	
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सामग्री सूची संख्या INVENTORY NO. P-6398	REV.00		निर्माणकर्ता WORKED BY G.GUPTA	01/07/10
			जांचकर्ता CHECKED BY V. KUMAR	01/07/10

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रामजी सूची संख्या को
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इस प्रलेख में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की सम्पत्ति है इसका प्रकाश एवं
अन्यथा रूप से किसी भी तरह प्रयोग, जो कि कंपनी के हित में हानिकारक हो न किया जाए।

रिजिस्ट्रार एवं दिनांक
SIGN & DATE
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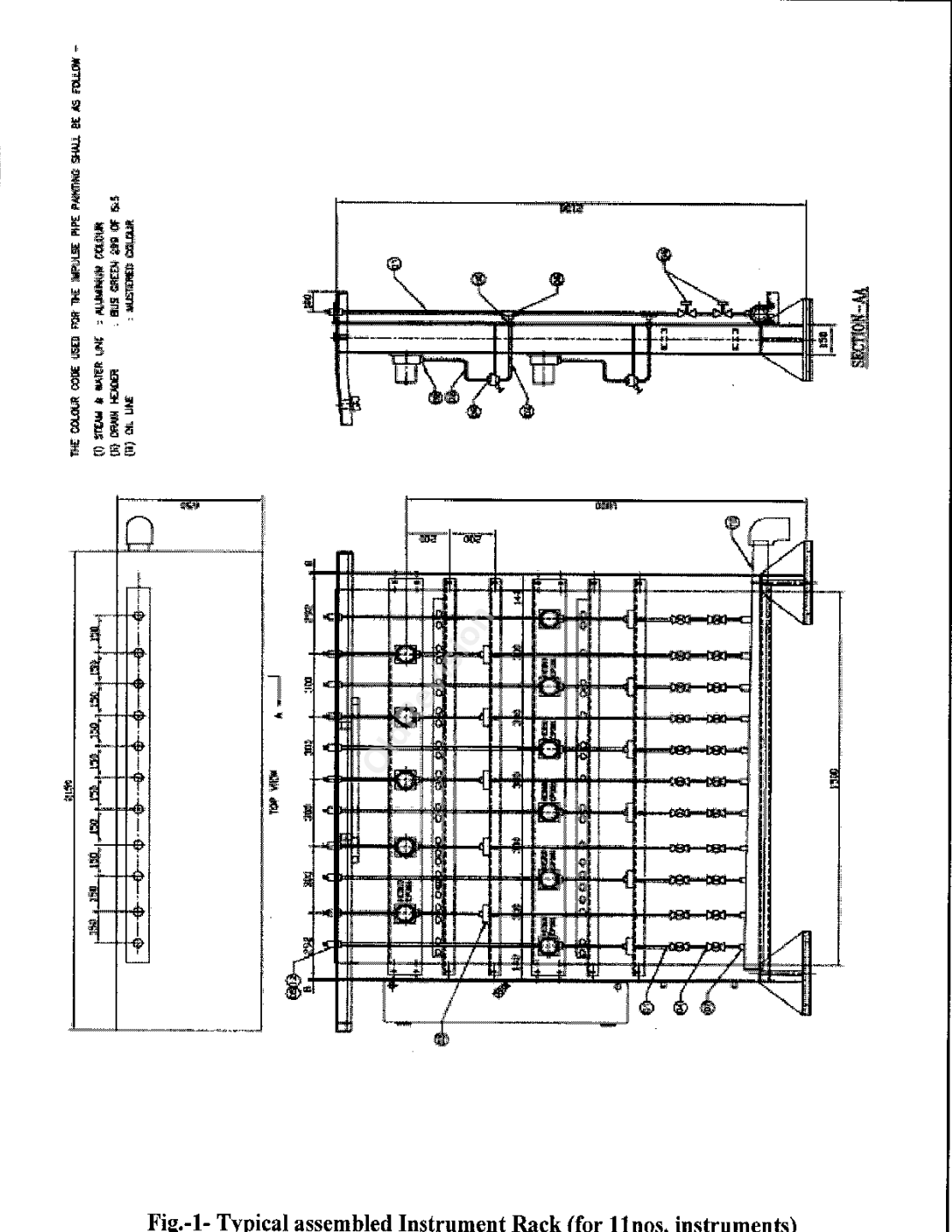




Fig.-1- Typical assembled Instrument Rack (for 11nos. instruments)

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		जांचकर्ता CHECKED BY	V. KUMAR		01/07/10

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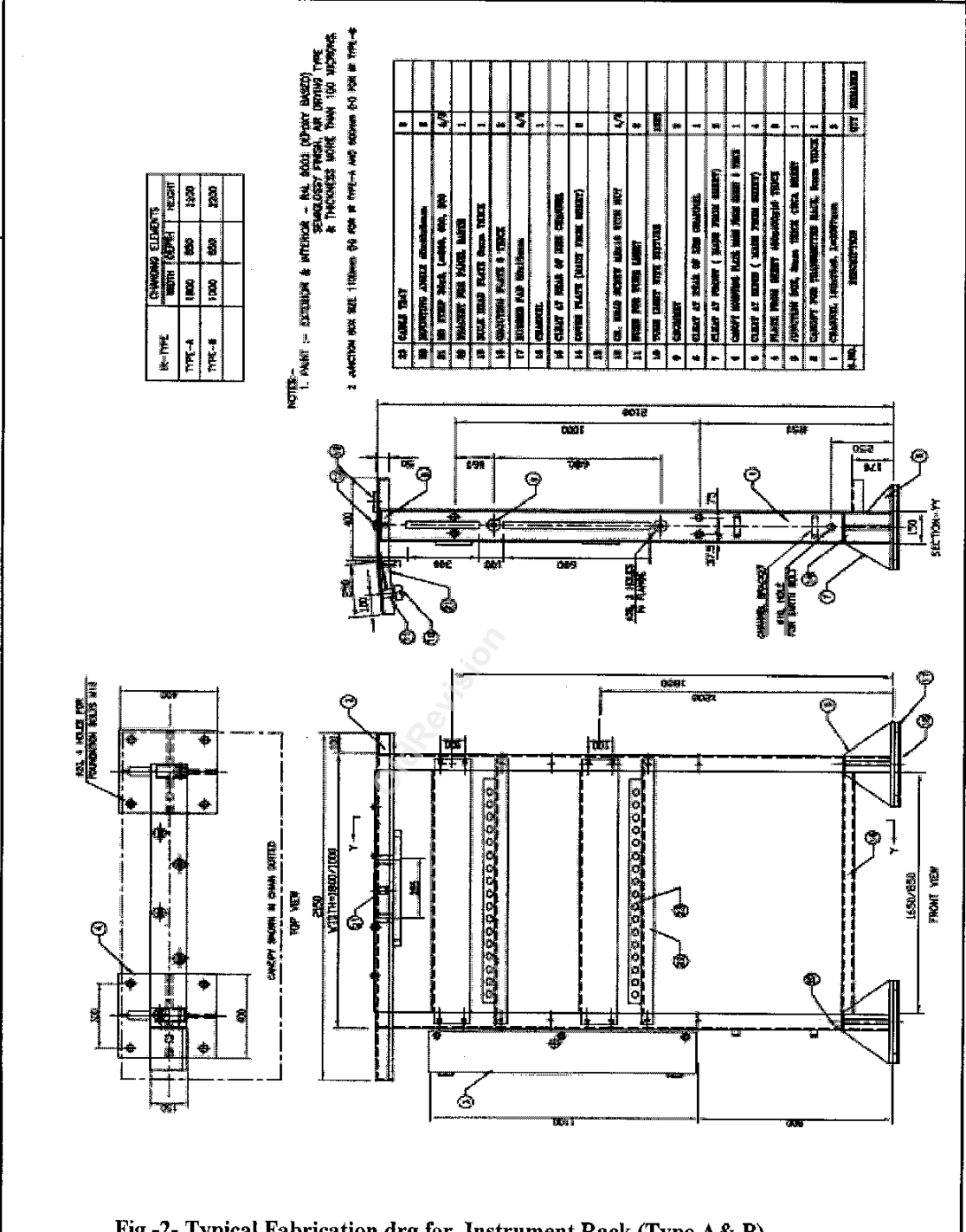
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हस्ताक्षर एवं दिनांक
SIGN & DATE

14.7.10

सापेक्षी सूची संख्या
INVENTORY NO.

P-6398



REV.00		निर्माणांक WORKED BY	G.GUPTA	01/07/10
		जांचकर्ता CHECKED BY	V. KUMAR	01/07/10

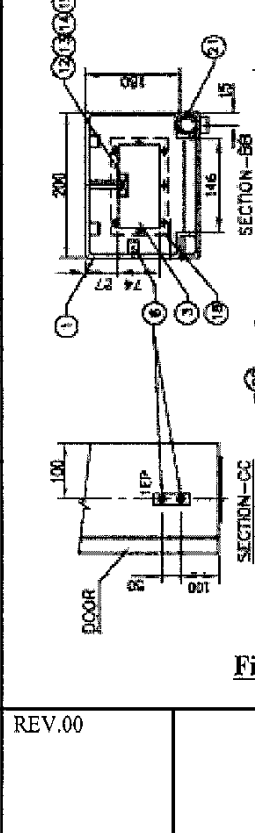
रिजिस्ट्रेशन नं. SIGN & DATE		उत्पाद मानक		ST 48015
		PRODUCT STANDARD		पृष्ठ 13 का 13
SUPERSEDES INVENTORY NO. आगामी सूची संख्या को अधिकारित करता है				Page 13 of 13

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रिजिस्ट्रेशन नं.
SIGN & DATE
14.7.10

NOTES:-
 1. CONTINUOUS WELDING REQD. ALL WELDING IS APPLICABLE.
 2. BOX TO BE MANUFACTURED AS PER IP-55 DEGREE OF PROTECTION IS:2147.
 3. CABLE ENTRY FROM TOP AND BOTTOM.
 4. STRIPPING IN JUNCTION BOX SHALL BE DONE BY SHOWN IN THE DRG.
 5. WITH IN TOLERANCE OF ±10% OF INDICATED DIMENSIONS.
 6. FOR TYPE A JB HEIGHT 1150 & TYPE B JB HEIGHT 800mm.
 7. PAINT:- EXT & INT. EPOXY BASED RAL 9002 SEMI-GLOSSY FINISH, AIR DRYING TYPE.
 8. JB'S DOOR (OUT SIDE) PAINT SHALL BE EPOXY BASED RAL-5012 AIR DRYING.
 9. TOGGLE SWITCH PROVIDED FOR JB.
 10. JUNCTION BOX SHALL BE MADE OF 2mm CRCA SHEET.



S.NO.	DESCRIPTION	QTY	REMARKS
21	BOSS	3	
20	RUBBER GASKET	A/R	
19	CH.NUT. M4x16 WITH NUT & WASHER	4	
18	CH.NUT. M4x16 (IP-147)	80	
17	RUBBER GASKET 3x16	A/R	
16	STRIP FOR CABLE BOLTING 80x3	2	TYPE-A & B
15	END PLATE FOR TERMINAL BLOCK	2	
14	TERMINAL BLOCK	A/R	
13	SIDE CLAMP	2	
12	MOUNTING CHANNEL	1	
11	KNOB	1	
10		2	
9	HINGE ASSEMBLY	3	
8	ENHANCED SCREW	3	
7	DISS FOR TERMINAL	4	
6	DISS FOR BARTING	2	
5	POWER RECP. PLATE FOR JB	1	
4	BRACKET FOR MOUNTING PLATE	4	
3	TOP & BOTTOM PLATE	1	
2	DOOR LEAF	1	
1	CASE FOR JUNCTION BOX	1	

निर्माणकर्ता WORKED BY	G.GUPTA	01/07/10
जांचकर्ता CHECKED BY	V. KUMAR	01/07/10

Fig-3- Typical JB drg. for Instrument Rack (Type A & B)

REV.00

आगामी सूची संख्या
INVENTORY NO.
P-6398

INSTRUMENT SCHEDULE

IR-1

S.NO.	KKS	DESCRIPTION	IR	MEDIUM	INSTRUMENT TYPE	RANGE	DESIGN PRESSURE	OPERATING PRESSURE	UNIT	OPERATING TEMPERATURE
1	MAA50CP001	HPT BLD U/STR P	IR1	STEAM	PT	(-1) - 299 BAR	291	242	bar	565
2	MAA50CP002	HPT BLD U/STR P	IR1	STEAM	PT	(-1) - 299 BAR	291	242	bar	565
3	MAA50CP003	HPT BLD U/STR P	IR1	STEAM	PT	(-1) - 299 BAR	291	242	bar	565
4	MAA12CP021	MS C-V 1 D/STR P	IR1	STEAM	PT	0 - 300 BAR	300	245	bar	565
5	MAA14CP021	MS O/L-V D/STR P	IR1	STEAM	PT	0 - 200 BAR	200	160	bar	565

IR-2

S.NO.	KKS	DESCRIPTION	IR	MEDIUM	INSTRUMENT TYPE	RANGE	DESIGN PRESSURE	OPERATING PRESSURE	UNIT	OPERATING TEMPERATURE
1	MAA50CP011	HPT BLD DIFF P	IR2	STEAM	PT	(-5) - 25 BAR	25	20	bar	565
2	MAA50CP012	HPT BLD DIFF P	IR2	STEAM	PT	(-5) - 25 BAR	25	20	bar	565
3	MAA50CP013	HPT BLD DIFF P	IR2	STEAM	PT	(-5) - 25 BAR	25	20	bar	565
4	LBA11CP004	MS ESV 1 U/STR P	IR2	STEAM	PT	0-300BAR	291	242	bar	565
5	LBA11CP005	MS ESV 2 U/STR P	IR2	STEAM	PT	0-300BAR	291	242	bar	565
6	LBA12CP004	MS ESV 1 U/STR P	IR2	STEAM	PT	0-300BAR	291	242	bar	565
7	LBA12CP005	MS ESV 2 U/STR P	IR2	STEAM	PT	0-300BAR	291	242	bar	565
8	LBC10CP001	CRH NRF U/STR P	IR2	STEAM	PT	(-1) - 79 BAR	73	55	bar	340
9	LBC10CP002	CRH NRF U/STR P	IR2	STEAM	PT	(-1) - 79 BAR	73	55	bar	340
10	LBC10CP003	CRH NRF U/STR P	IR2	STEAM	PT	(-1) - 79 BAR	73	55	bar	340

IR-3

S.NO.	KKS	DESCRIPTION	IR	MEDIUM	INSTRUMENT TYPE		DESIGN PRESSURE	OPERATING PRESSURE	UNIT	OPERATING TEMPERATURE
1	MAG10CP002	CONDR 1 P	IR2	VACUUM	PT	0 - 1.3 BARABS	1	0.11	ABS	46
2	MAG10CP003	CONDR 1 P	IR2	VACUUM	PT	0 - 1.3 BARABS	1	0.11	ABS	46
3	MAG10CP004	CONDR 1 P	IR2	VACUUM	PT	0 - 1.3 BARABS	1	0.11	ABS	46
4	MAC11CP001	LPT 1 U/STR P	IR2	STEAM	PT	0 - 10 BARABS	7.5	6	ABS	282
5	MAC11CP002	LPT 1 U/STR P	IR2	STEAM	PT	0 - 10 BARABS	7.5	6	ABS	282
6	MAC11CP003	LPT 1 U/STR P	IR2	STEAM	PT	0 - 10 BARABS	7.5	6	ABS	282

IR-4

S.NO.	KKS	DESCRIPTION	IR	MEDIUM	INSTRUMENT TYPE	RANGE	DESIGN PRESSURE	OPERATING PRESSURE	UNIT	OPERATING TEMPERATURE
1	MAG10CP012	CONDR 1 P	IR4	VACUUM	PT	0 - 1.3 BARABS	1	0.11	ABS	46
2	MAG10CP013	CONDR 1 P	IR4	VACUUM	PT	0 - 1.3 BARABS	1	0.11	ABS	46
3	MAG10CP014	CONDR 1 P	IR4	VACUUM	PT	0 - 1.3 BARABS	1	0.11	ABS	46
4	MAG10CP511	CONDR 1 PIP 1 WTR INJ P	IR5	WATER	PI	0 - 16 BAR	1	0.103	bar	46

INSTRUMENT SCHEDULE

5	MAG10CP512	CONDR 1 PIP 2 WTR INJ P	IR6	WATER	PI	0 - 16 BAR	1	0.103	bar	46
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IR-5

S.NO.	KKS	DESCRIPTION	IR	MEDIUM	INSTRUMENT TYPE		DESIGN PRESSURE	OPERATING PRESSURE	UNIT	OPERATING TEMPERATURE
1	LBQ60CP001	EXTN 6 P	IR5	STEAM	PT	0 - 40 BAR	29.7	24.7	bar	481
2	LBQ80CP001	EXTN 8 P	IR5	STEAM	PT	0 - 100 BAR	87	79.1	bar	387
3	LBS31CP001	EXTN 3.1 P	IR5	STEAM	PT	0 - 4 BAR	3.7	2.2	bar	173
4	LBS40CP001	EXTN 4 P	IR5	STEAM	PT	0 - 10 BAR	7.2	6.2	bar	387
5	LBS50CP001	EXTN 5 P	IR5	STEAM	PT	0 - 20 BAR	16	13.2	bar	387

IR-6

S.NO.	KKS	DESCRIPTION	Mounting	MEDIUM	INSTRUMENT TYPE		DESIGN PRESSURE	OPERATING PRESSURE	UNIT	OPERATING TEMPERATURE
1	LBG30CP011	SS SUP-V U/STR P	IR6	STEAM	PT	0 - 16 BAR	14	12	bar	295
2	LBG30CP012	SS SUP-V U/STR P	IR6	STEAM	PT	0 - 16 BAR	14	12	bar	295
3	LBS20CP001	EXTN 2 P	IR6	STEAM	PT	0 - 10 BAR	1.25	1.02	bar	103
4	MAW20CP001	SS MFLD P	IR6	STEAM	PT	(-10) - 90 Mbar	900	1.013	mmwc	540
5	MAW20CP002	SS MFLD P	IR6	STEAM	PT	(-10) - 90 Mbar	900	1.013	mmwc	540

IR-7

S.NO.	KKS	DESCRIPTION	IR	MEDIUM	INSTRUMENT TYPE		DESIGN PRESSURE	OPERATING PRESSURE	UNIT	OPERATING TEMPERATURE
1	LBB21CP001	IPS B/P-V 1 U/STR P	IR7	STEAM	PT	0 - 80 BAR	72	50	bar	593
2	LBB21CP002	IPS B/P-V 1 U/STR P	IR7	STEAM	PT	0 - 80 BAR	72	50	bar	593
3	LBB22CP001	IPS B/P-V 2 U/STR P	IR7	STEAM	PT	0 - 80 BAR	72	50	bar	593
4	LBB22CP002	IPS B/P-V 2 U/STR P	IR7	STEAM	PT	0 - 80 BAR	72	50	bar	593
5	MAB50CP001	IPT BLD U/STR P	IR7	STEAM	PT	(-1) - 59 BAR	72	50	bar	593

IR-8

S.NO.	KKS	DESCRIPTION	IR	MEDIUM	INSTRUMENT TYPE		DESIGN PRESSURE	OPERATING PRESSURE	UNIT	OPERATING TEMPERATURE
1	LBB11CP004	INTCPT ESV 1 U/STR P	IR8	STEAM	PT	0 - 80 BAR	72	50	bar	593
2	LBB11CP005	INTCPT ESV 1 U/STR P	IR8	STEAM	PT	0 - 80 BAR	72	50	bar	593
3	LBB12CP004	INTCPT ESV 2 U/STR P	IR8	STEAM	PT	0 - 80 BAR	72	50	bar	593
4	LBB12CP005	INTCPT ESV 2 U/STR P	IR8	STEAM	PT	0 - 80 BAR	72	50	bar	593

IR-9

S.NO.	KKS	DESCRIPTION	IR	MEDIUM	INSTRUMENT TYPE		DESIGN PRESSURE	OPERATING PRESSURE	UNIT	OPERATING TEMPERATURE
-------	-----	-------------	----	--------	-----------------	--	-----------------	--------------------	------	-----------------------


INSTRUMENT SCHEDULE

1	MAN52CP011	LPBP-V D/STR P	IR9	STEAM	PT	(-1) - 44 BAR	44		bar	150
2	MAN55CP011	LPBP-V 2 D/STR P	IR9	STEAM	PT	(-1) - 44 BAR	44		bar	150
3	MAN53CF001	LPBP INJ WTR F	IR9	WATER	DPT	0 - 1800 mBAR	180	22	mbar	35
4	MAN53CF002	LPBP INJ WTR F	IR9	WATER	DPT	0 - 1800 mBAR	180	22	mbar	35
5	MAN53CF003	LPBP INJ WTR F	IR9	WATER	DPT	0 - 1800 mBAR	180	22	mbar	35

IR-10

S.NO.	KKS	DESCRIPTION	IR	MEDIUM	INSTRUMENT TYPE		DESIGN PRESSURE	OPERATING PRESSURE	UNIT	OPERATING TEMPERATURE
1	MAN56CF001	LPBP INJ WTR F	IR10	WATER	DPT	0 - 1800 mBAR	1800	22	mbar	35
2	MAN56CF002	LPBP INJ WTR F	IR10	WATER	DPT	0 - 1800 mBAR	1800	22	mbar	35
3	MAN56CF003	LPBP INJ WTR F	IR10	WATER	DPT	0 - 1800 mBAR	1800	22	mbar	35
4	QFB01CP001	C-AIR MFLD P	IR10	AIR	PT	0 - 10 BAR	10	8	bar	45

Purchase Specification For Local Instrument Racks (IR)

TYPE OF PRODUCT : TG-C&I							
NAME OF CUSTOMER / PROJECT: SURATGARH (2X660MW)							
BHARAT HEAVY ELECTRICALS LTD.  HEEP-Haridwar				NAME	SIGN	DATE	NO.OF VAR.
		DRN.		SHEETAL SINGH	Sd/-	27.08.14	
		CHD.		VINOD KUMAR	Sd/-	27.08.14	
		APPD.		B.S.RANA	Sd/-	27.08.14	
DEPT.	CIE		SCALE	WEIGHT(KG)	REF.TO ASSY.DRG.	ITEM NO.	NO. OF ITEMS
CODE.	4180						
TITLE: Purchase Specification for Local Instrument Racks (IRs)				CARD CODE	DOC. No. CIE-IR-C8		REV. 00
					SHT.NO 01	NO. OF SHT. 06	

CONTENTS

SL. NO.	DESCRIPTION	REFERENCE NO /SHEET NO.
01	SCOPE OF SUPPLY	Page nos.: 3 to 4
02	INSTRUMENT SCHEDULE	4-180-00C8-006
03	VENDOR LIST FOR COMPONENTS	Page nos.: 5 to 6
04	DRAWINGS FOR IR	IR nos.- 1 TO 10
05	TECHNICAL REQUIREMENTS	ST48015

Scope of supply

The Scope of supply is as per Technical requirements attached with this specification. Vendor shall quote for each line item of the Table A&B. The unit rate shall be valid until the completion of the contracts. For this purpose vendors shall maintain MS Excel file indicating total Bill of materials and calculation of commissioning spares.

TABLE: A

Sl. No.	Description	Ref.Drg/ Doc	VA R No.	IR no.	IR Type	Qty	Material code
1	RACK FOR M.S. PRESS. INSTRUMENTS	11335363010	00	IR01	A	1	W90318130300
2	RACK FOR M.S. PRESS. INSTRUMENTS	11335363010	01	IR02	A	1	W90318130319
3	RACK FOR CONDENSER PRESS. INSTRUMENTS	21335460010	00	IR03	A	1	W90318130165
4	RACK FOR CONDENSER PRESS. INSTRUMENTS	21335460010	01	IR04	A	1	W90318130173
5	RACK FOR EXTN. & G.S. INSTRUMENTS	21335560010	00	IR05	B	1	W90318130181
6	RACK FOR EXTN. & G.S. INSTRUMENTS	21335560010	01	IR06	B	1	W90318130190
7	RACK FOR HRH/MS PRESS. INSTRUMENTS	21335660010	00	IR07	A	1	W90318130203
8	RACK FOR HRH/MS PRESS. INSTRUMENTS	21335660010	01	IR08	B	1	W90318130211
9	RACK FOR WATER INJECTION INSTRUMENTS	21336060510	00	IR09	A	1	W90318130220
10	RACK FOR WATER INJECTION INSTRUMENTS	21336060510	01	IR10	A	1	W90318130238
14	Commissioning spares for IR	TABLE-B	-	-	-	1	
15	Mandatory Spare	TABLE-C	-	-	-	NA	-

Note:

1. The finish colours for exterior and interior surfaces of shall conform to the following shades:
INTERIOR,EXTERNAL(FRONT , REAR & TOP)-RAL9002
Final colour will be decided during detailed engineering.
2. Quantity mentioned above is for per unit.
3. Type test to be conducted for IR & JB of IR of each type & test report to be submitted for approval.
4. Instrument grouping will be as per Instrument Rack drawings above (Table-A).

Commissioning Spare

TABLE: B

SL. NO	DESCRIPTION	QTY	UNIT
1	VALVE MANIFOLD OF EACH TYPE & RATING	2	NOS.
2	GLOVE VALVE OF EACH TYPE AND RATING	2	NOS.
3	MALE CONNECTOR , ½"NPTM X TO SUIT ½" OD SS TUBE	20	NOS.
4	TUBE: ½"SS 316 2.1 THK	15	MTR.

Mandatory Spare

TABLE: C

NOT APPLICABLE.

Unit rate of each item for commissioning & Mandatory spare to be provided in the offer.

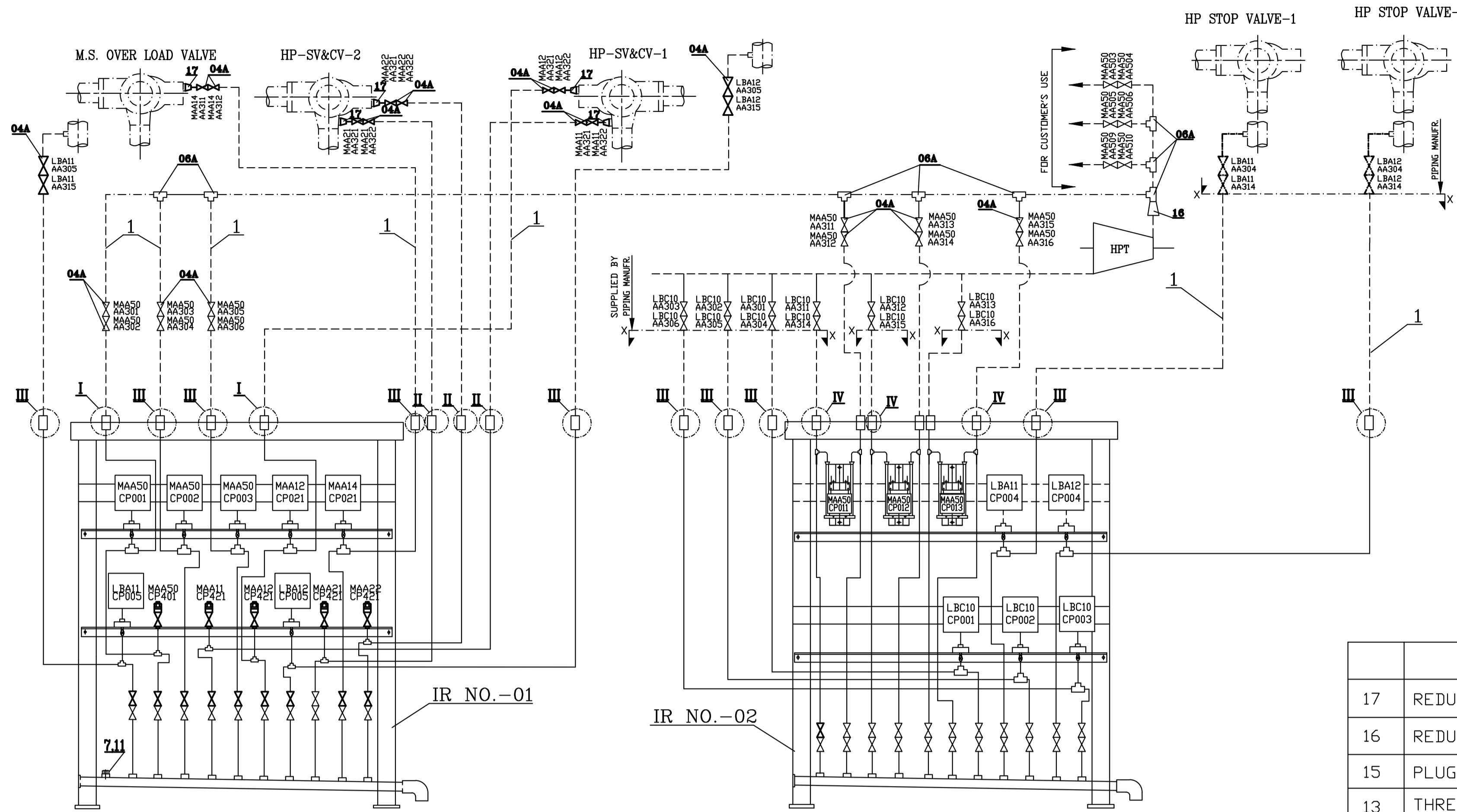
COMPONENT VENDOR LIST

SL NO.	ITEM DESCRIPTION	RECOMMENDED VENDORS
1	Socket Weld Fitting	AURA INC, NEW DELHI
		BALDOTA VALVE AND FITTING CO PVT LT, MUMBAI
		EXCEL HYDRO-PNEUMATICS PVT LTD,MUMBAI
		METPRESS ENGINEERING WORKS, KOLKATA
		PRECISION ENGG INDUSTRIES, MUMBAI
		FLOWTECH, KOLKATA
		V.K.INDUSTRIES,BANGALORE
		VIKAS INDUSTRIAL PRODUCTS, NEW DELHI
		HP VALVES AND FITTINGS, CHENNAI
		PANAM ENGINEERS MUMBAI
2	Compression Fitting	AURA INC, NEW DELHI
		EXCEL HYDRO-PNEUMATICS PVT LTD,MUMBAI
		METPRESS ENGINEERING WORKS, KOLKATA
		PARKER HANNIFIN, USA
		PRECISION ENGG INDUSTRIES, MUMBAI
		HP VALVES AND FITTINGS, CHENNAI
		SWAGELOCK, USA
		ASTEC VALVES & FITTINGS PVT LTD, THANE
		FLUIDCONTROLS,MUMBAI
		PANAM ENGINEERS, MUMBAI
3	Instrument Valves	AURA INC, NEW DELHI
		BALDOTA VALVE AND FITTING CO PVT LT, MUMBAI
		BHARAT HEAVY ELECTRICALS LTD, TRICHY
		EXCEL HYDRO-PNEUMATICS PVT LTD,MUMBAI
		INSTRUMENTATION LIMITED, PALGHAT
		METPRESS ENGINEERING WORKS, KOLKATA
		PRECISION ENGG INDUSTRIES, MUMBAI
		SHALIMAR VALVES, MUMBAI
		HYDAIR ENGG WORKS, LONAVAL
4	Valve Manifolds	AURA INC, NEW DELHI
		BALDOTA VALVE AND FITTING CO PVT LT, MUMBAI
		EXCEL HYDRO-PNEUMATICS PVT LTD, MUMBAI
		METPRESS ENGINEERING WORKS, KOLKATA
		PRECISION ENGG INDUSTRIES, MUMBAI
		FLOWTECH, KOLKATA
		HP VALVES AND FITTINGS, CHENNAI
		ASTEC VALVES & FITTINGS PVT LTD,THANE
HYDAIR ENGG WORKS, LONAVAL		

SI No	Item Description	RECOMMENDED VENDORS
5	SEAMLESS TUBE / PIPES	CHOKSI TUBE COMPANY Ltd
		RATNAMANI METALS & TUBES LTD, AHMADABAD
		TROUVAY AND CAUVIN, GULF
		BHEL TRICHY
		TPS TECHNITUBE , GERMANY
		MAHALAKSHMI SEAMLESS, MAHARASHTRA
		MANNESMAN AG GERMANY
		HEAVY METAL TUBES AHMADABAD
		JINDAL SAW PIPES
		SUMITOMO CORPORATION JAPAN
6	INSTRUMENTATION CABLES	DELTON CABLES
		RELIANCE CABLES
		CORDS CABLE
		UNIVERAL CABLES , SATNA
		DELTON CABLES , FARIDABAD
		PARAMOUNT CABLES , ALWAR
		UNIVERAL CABLES , SATNA
		RELIANCE ENGRS. ,BANGALORE
		CORDS CABLES , RAJASTHAN
		NICCO CABLE , KOLKATA
7*	JUNCTION BOX (MILD STEEL)	K.S. INSTRUMENTS , BANGALORE
		BALIGA LIGHTNING , CHENNAI
		KHODAY CONTROL SYSTEMS , BANGALORE
		MANISHA ENTERPRISES , PUNE
		ELECTRO MECHANICAL (INDIA) , KOLKATA

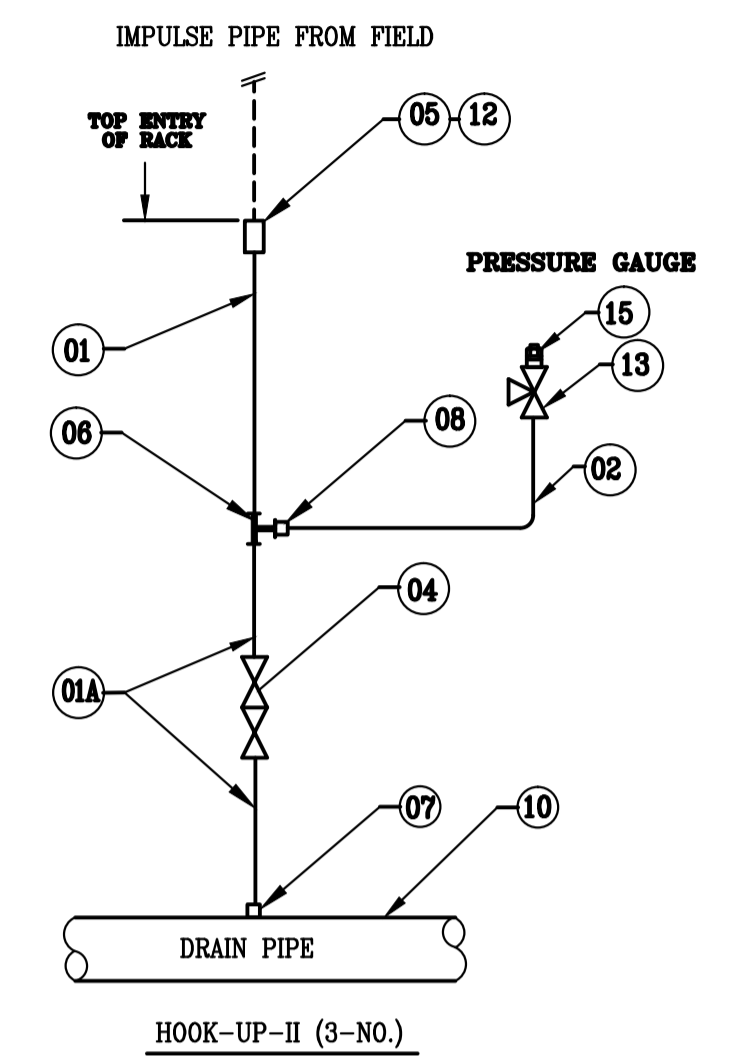
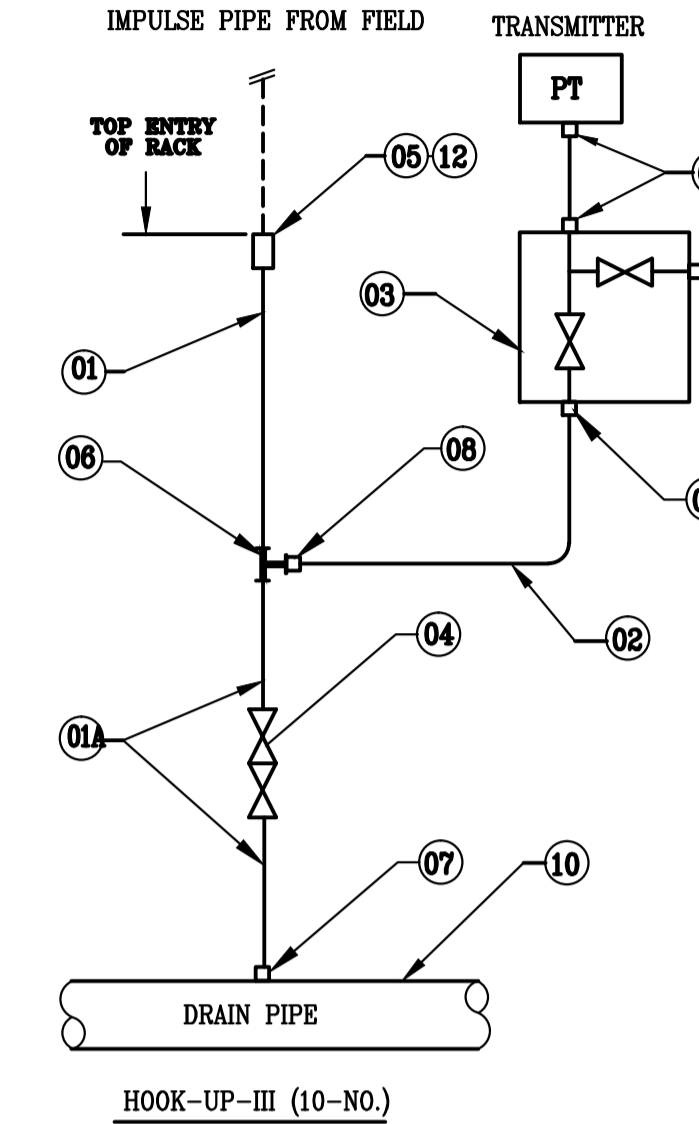
NOTE: *VENDOR LIST OF JUNCTION BOX (JB) APPLICABLE ONLY IF JB IS A BOUGHT OUT ITEM.

11335363010
DRAWING NO.



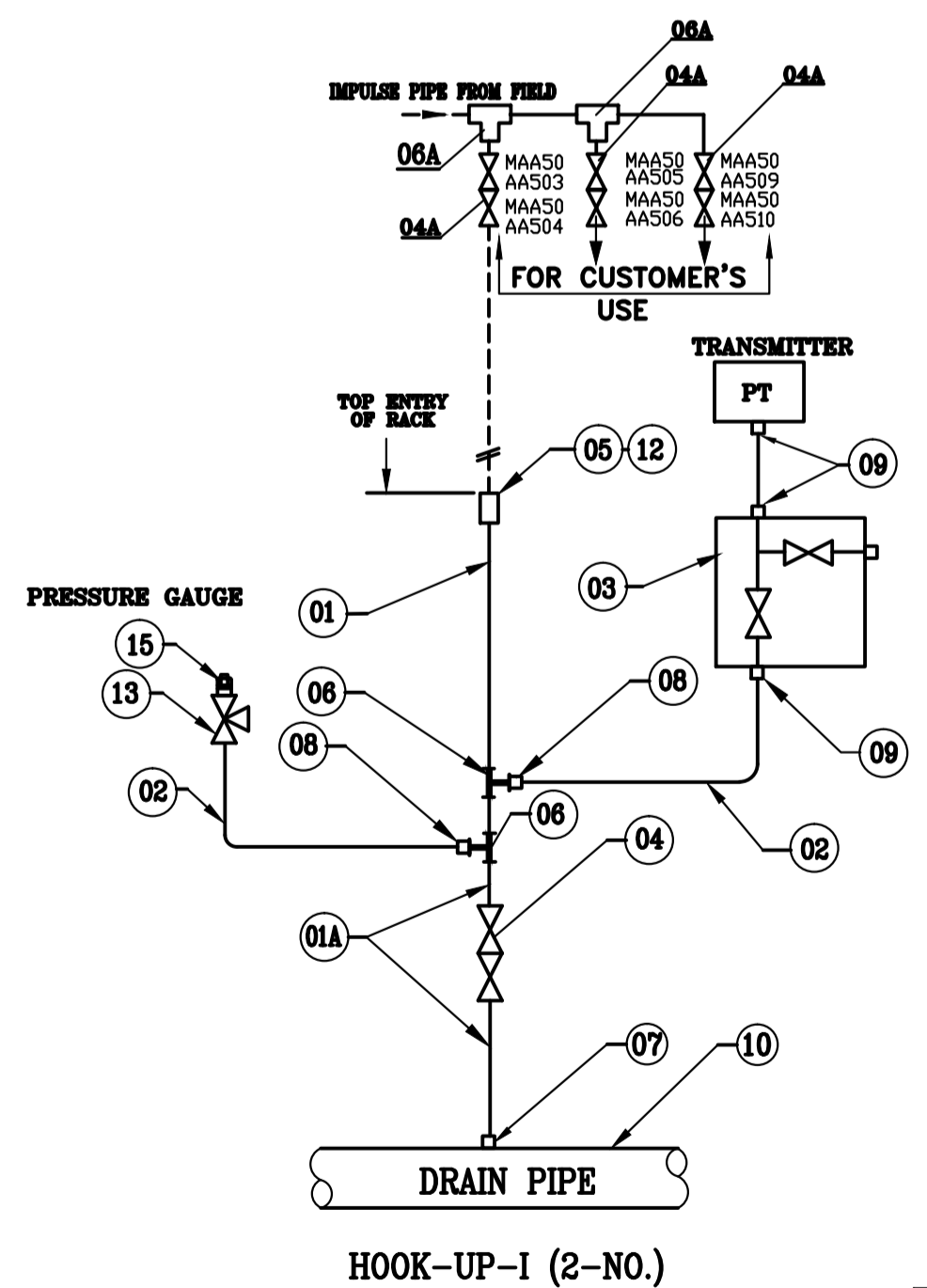
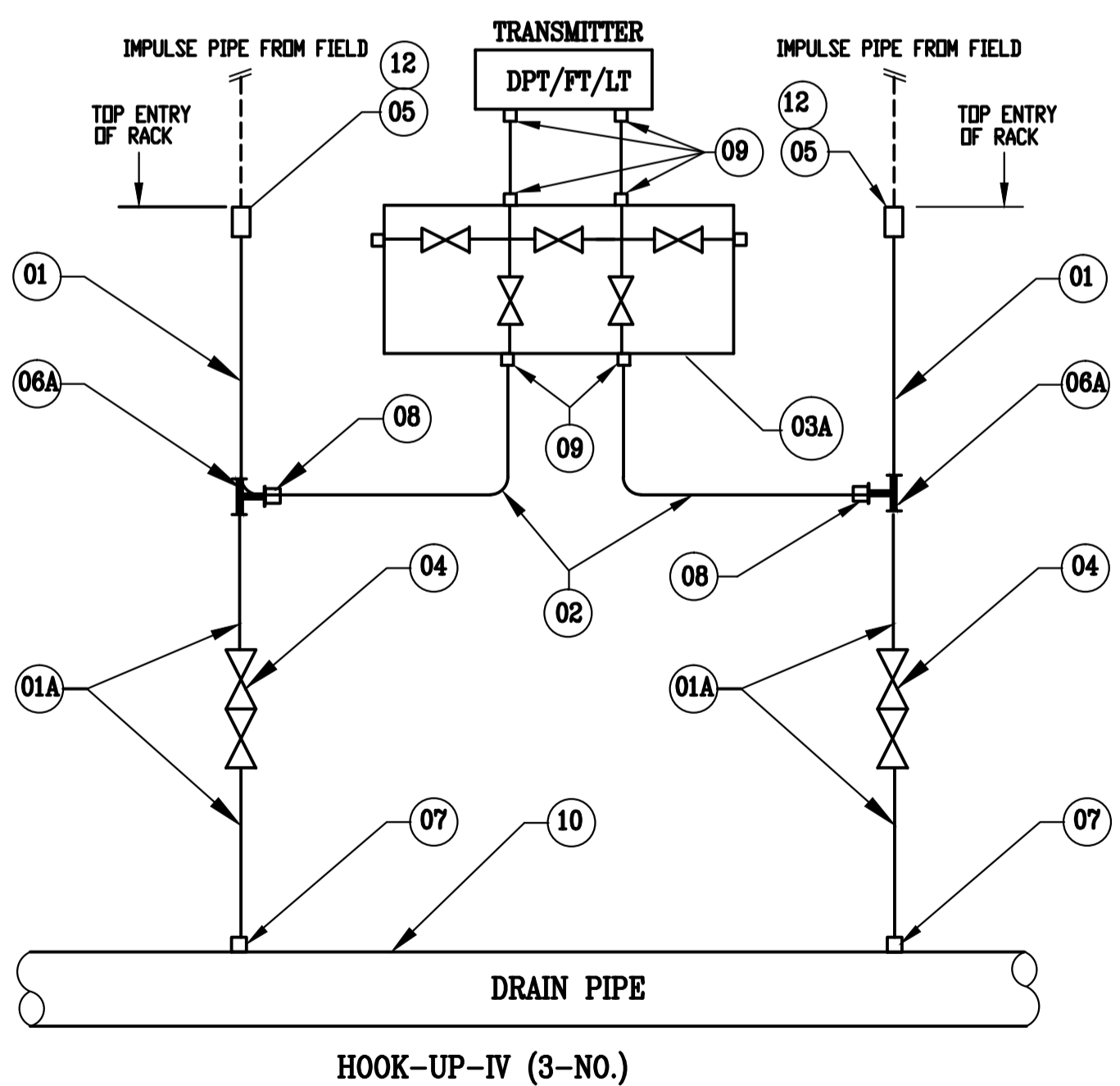
NOTE:-

- 1-ITEM NO. 04A,6A,16&17 INDICATED BEYOND BULK HEAD, SHALL BE SUPPLIED AS LOOSE WITH THE ASSEMBLED RACK.
- 2-ALL THE BULK HEAD & ITEM NO. 5, INDECATED IN SHALL BE ACCOMADETED & INSTALLED IN RESPECTIVE RACKS.



INSTRUMENT RACK NO.-01(VAR.01)
(TYPE-A)

INSTRUMENT RACK NO.-02(VAR.01)
(TYPE-A)



ITEM	DESCRIPTION	QTY	REMARKS
17	REDUCER <33.4X9.1>X<21.3X7.47> Gr.-F91	05	LOOSE
16	REDUCER 50X11X21.3X7.47 Gr.-F91	01	
15	PLUG 1/2" NPT "M".	05	
13	THREE WAY GAUGE COCK/SS316/SIZE 1/2" NPTF x 1/2" DD S.S. TUBE.	05	
12	CAP NUT FOR BULK HEAD ASTM A105.	21	
11	CAP NUT FOR HALF COUPLING ASTM A105.	01	
10	DRAIN PIPE/ CS ASTM A106 Gr-C / SIZE 2" NB/ SCH-80.	02	
09	TUBE FITTING DOUBLE FERRULE DOUBLE COMPRESSION/ MAT. SS316/ SIZE 1/2" NPTM x TO SUIT 1/2" DD S.S. TUBE.	54	
08	TEE TUBE UNION/ SS316 / SIZE 0D OF 1/2" NB SW x TO SUIT 1/2" DD S.S. TUBE.	23	
07	HALF COUPLING/ASTM A105/SIZE 1/2" NB SW / CL 9000 lbs.	22	
06A	FORGED TEE / SIZE 1/2" NB/SW/F91 CAS: X10 CrMOVNB91 DR EQUIVALENT SIZE 1/2" (SW-DN-15) 21.3X7.47, CLASS 4500. TEE EQUAL 21.3X21.3X7.47	14	
06	FORGED TEE/ASTM A105/SIZE 1/2" NB SW / CL 9000 lbs. TEE UNEQUAL<21.3X7.47X13.5X2.6>	17	
05	BULK HEAD/ASME SA213, Gr.-T-91 SIZE 1/2" NB (21.3X7.47) SW / CL 9000 lbs.	21	
04A	FORGED GLOBE VALVE/ BODY ASTM A336 Gr. F91 CAS: X10 CrMOVNB9-1 DR EQUIVALENT.	32	
04	FORGED GLOBE VALVE/ BODY ASTM A182 F22/ASTM ASTM A182 Gr-F6A/ SIZE 1/2" NB SW/ CL 3000 SPL.	42	
03A	FIVE VALVE MANIFOLD, 1/2" NPTF/BODY/TRIM SS316/PR. TESTING 3000 PSI.	03	
03	TWO VALVE MANIFOLD, 1/2" NPTF/BODY/TRIM S.S. 316 / PR. TESTING 3000 PSI.	12	
02	SEAMLESS S.S. TUBE ASTM A213 TP 316H/SIZE 1/2" DD, THICK 2.1mm.	A/R	
01A	IMPULSE PIPE/ ASTM A335, Gr-P-22 /SIZE 1/2" NB/SCH-XXS. <21.3X2.77>	A/R	
01	IMPULSE PIPE/ ASME SA213, Gr-T-91 /SIZE 1/2" NB/SCH-XXS. <21.3X7.47>	A/R	

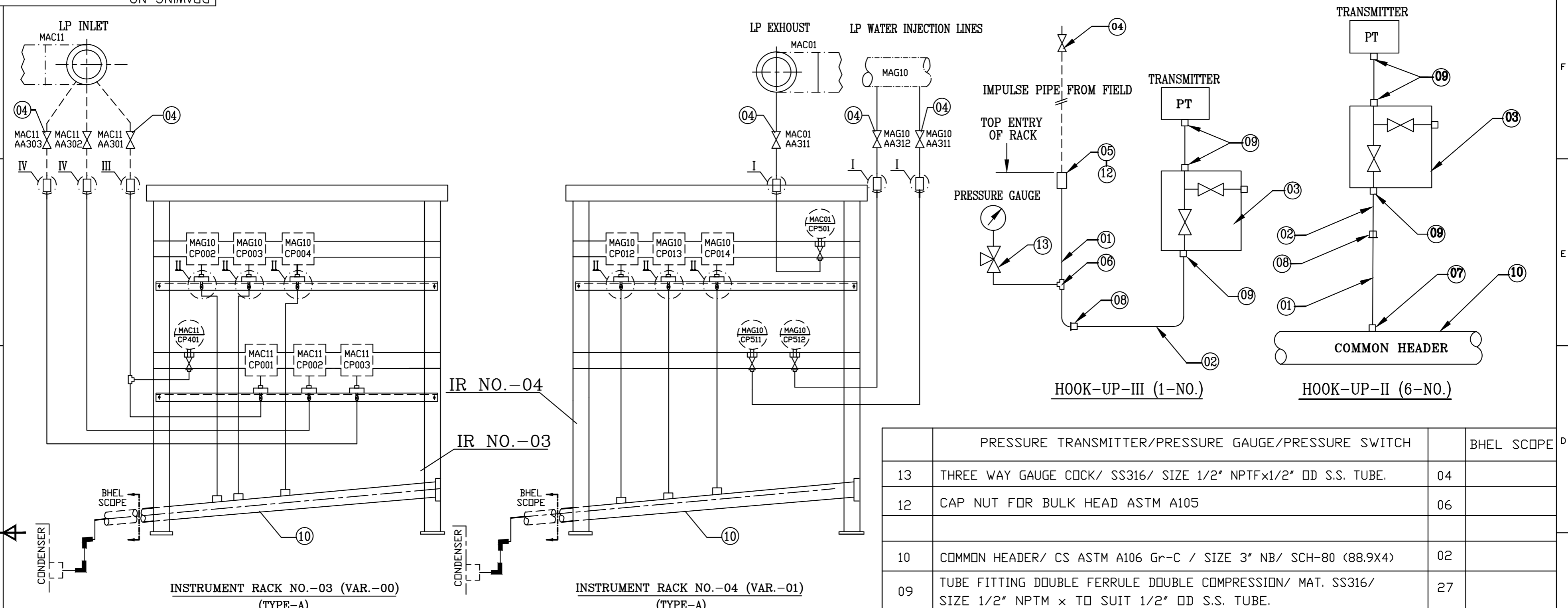
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REF. DRG. NO. SIGN & DATE INVENTORY NO.

01	W90318130319	GRADE OF UNTOL. DIM.-:-	CBOM NO.	STATUS OF DRG.	TYPE OF PRODUCT
00	W90318130300	M/CG- V/C/M/F AA 0230208	21335363000	AGREED	OR
VAR.NO.	MATERIAL CODE	WELDING-A/B/C/D-AA621104	NAME	SIGN	DATE
		GAS CUTTING-T3'AA0621101	NAME	SIGN	DATE
REV.	DATE	ALTERED CHECKED	REV.	DATE	ALTERED CHECKED
DEPT. STE CODE 4011			NAME OF CUSTOMER/ PROJECT STEAM TURBINE		
TITLE ASSY.RACK FOR MS PRESS INSTRU.			NAME BHARAT HEAVY ELECTRICALS LTD. HARDWAR		
SCALE N.T.S.			WEIGHT(Kg.) 200		
REF. TO ASSY. DRG.			NO. OF SHEETS 1		
DRAWING NO. 11335363010			SHEET NO. 1 NO. OF SHEETS 1		

21335460010
DRAWING NO.

INVENTORY NO. SIGN & DATE REF. DRG NO. B
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NOTE:-
 ITEM NO. 04 INDICATED BEYOND BULK HEAD, SHALL BE SUPPLIED, AS LOOSE WITH THE ASSEMBLED RACK.

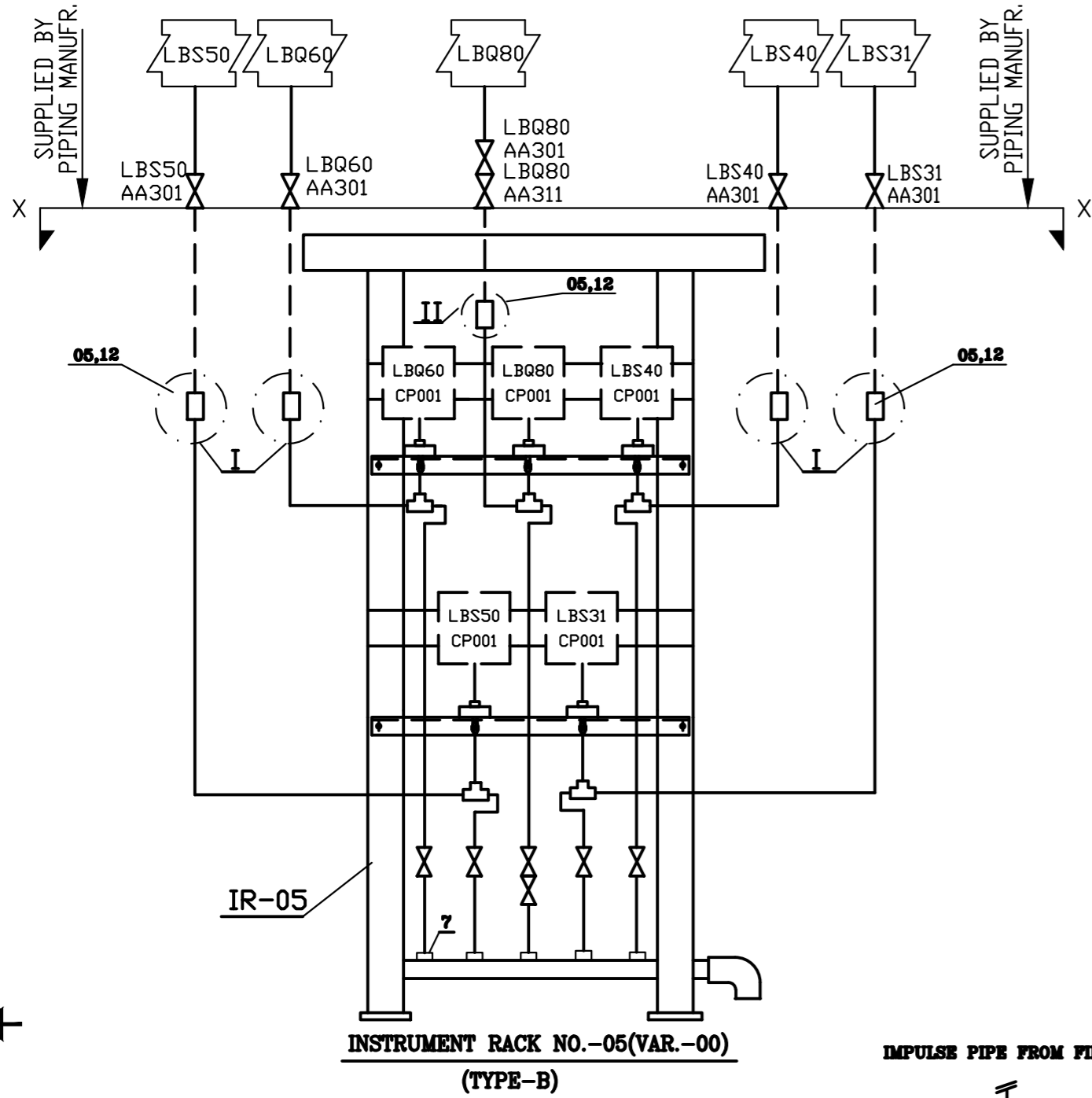
ITEM	DESCRIPTION	QTY.	REMARKS
13	THREE WAY GAUGE COCK/ SS316/ SIZE 1/2" NPTFx1/2" OD S.S. TUBE.	04	
12	CAP NUT FOR BULK HEAD ASTM A105	06	
10	COMMON HEADER/ CS ASTM A106 Gr-C / SIZE 3" NB/ SCH-80 (88.9X4)	02	
09	TUBE FITTING DOUBLE FERRULE DOUBLE COMPRESSION/ MAT. SS316/ SIZE 1/2" NPTM x TO SUIT 1/2" OD S.S. TUBE.	27	
08	TEE TUBE UNION/ SS316 / SIZE OD OF 1/2" NB SW x TO SUIT 1/2" OD S.S. TUBE.	12	
07	HALF COUPLING/ASTM A105/SIZE 1/2" NB SW / CL 3000 lbs.	06	
06	FORGED TEE/ASTM A 182 GR.-F11/SIZE 1/2" NB/SW 3000 PSI.	01	
05	BULK HEAD/ASTM A105/SIZE 1/2" NB SW / CL 3000 lbs.	06	
04	FORGED GLOBE VALVE/ BODY ASTM A105/STEM ASTM A182 Gr-F6A/ SIZE 1/2" NB SW/ CL 800.	06	
03	TWO VALVE MANIFOLD, 1/2" NPTF/BODY/TRIM SS316/PR TESTING 3000 PSI.	09	
02	SEAMLESS S.S. TUBE, ASTM A213 TP 316H/SIZE 1/2" OD, THICK 2.1mm.	A/R	
01	IMPULSE PIPE/ ASTM A106, Gr-C /SIZE 1/2" NB/SCH-80.	A/R	

VAR.NO.	MATERIAL CODE	ITEM	DESCRIPTION	QTY.	REMARKS
01	W90318130173	02	SEAMLESS S.S. TUBE, ASTM A213 TP 316H/SIZE 1/2" OD, THICK 2.1mm.	A/R	
00	W90318130165	01	IMPULSE PIPE/ ASTM A106, Gr-C /SIZE 1/2" NB/SCH-80.	A/R	

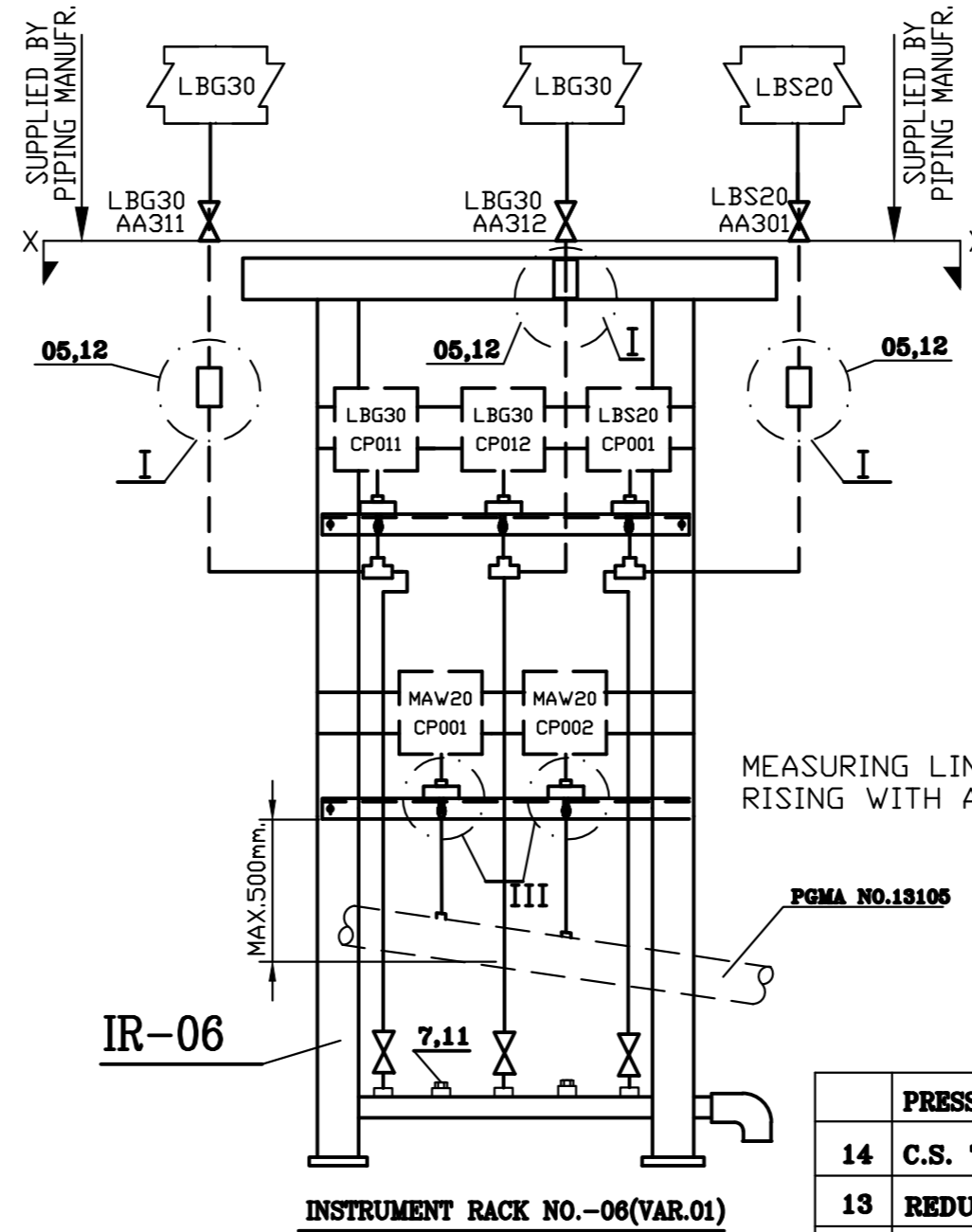
CBOM NO. 21335460000		STATUS OF DRG.		TYPE OF PRODUCT STEAM TURBINE			
AGREED DEPT.		NAME SIGN DATE		OR NAME OF CUSTOMER/ PROJECT			
GRADE OF UNTOL. DIM.:- M/CG- V/C/M/F AA 0230208				BHARAT HEAVY ELECTRICALS LTD. HARDWAR		NAME SIGN DATE NO. OF VAR.	
WELDING-A/B/C/D-AA621104				DEPT. STE CODE 4011		DRN SSTEJSB SSTEJSB 10/04/2015 12000 01	
GAS CUTTING-T3'AA0621101				SCALE 200		CHD SSTEVK SSTEVK 11/04/2015 12000 01	
REV. DATE ALTERED CHECKED		REV. DATE ALTERED CHECKED		WEIGHT(Kg.) 200		APD ASTEVK ASTEVK 16/04/2015 12000 01	
TITLE ASSY.RACK COND. PRESS.INSTRUMENTS.				REF. TO ASSY. DRG.		ITEM NO. NO. OF ITEMS	
				DRAWING NO. 21335460010		73, 74	
				SHEET NO. 1		NO. OF SHEETS 1	



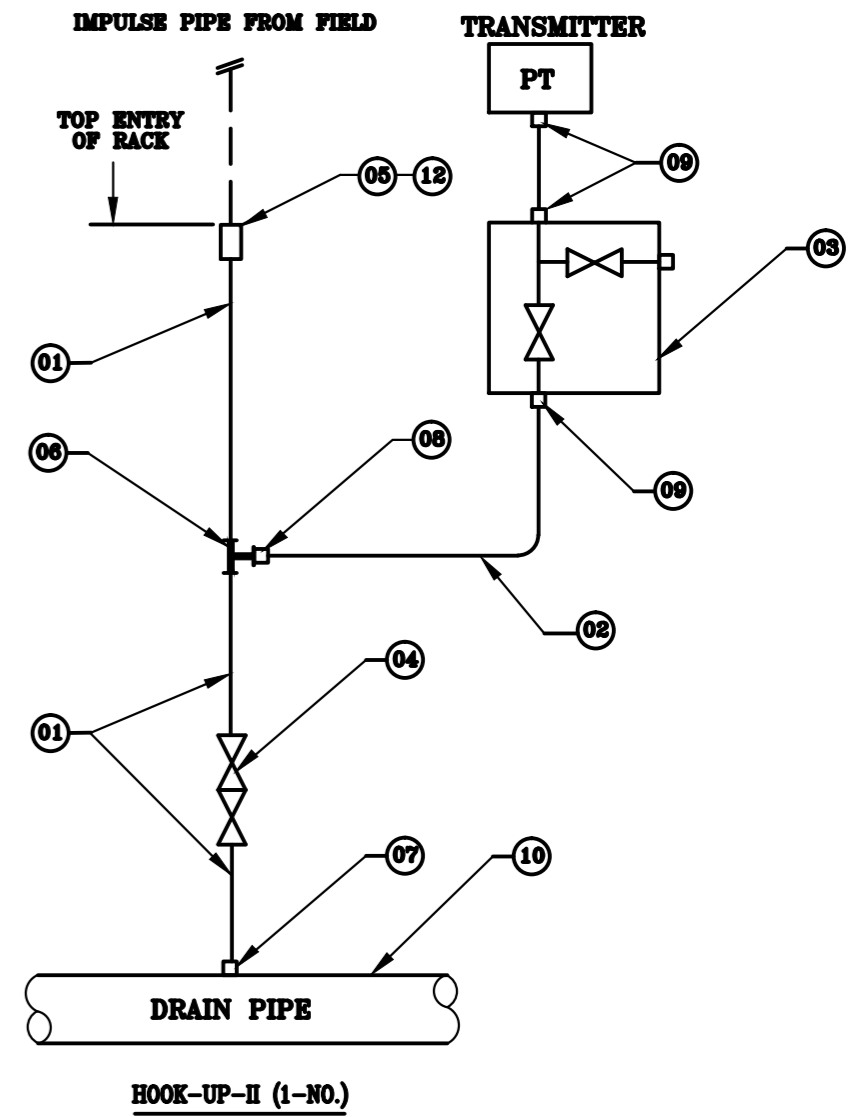
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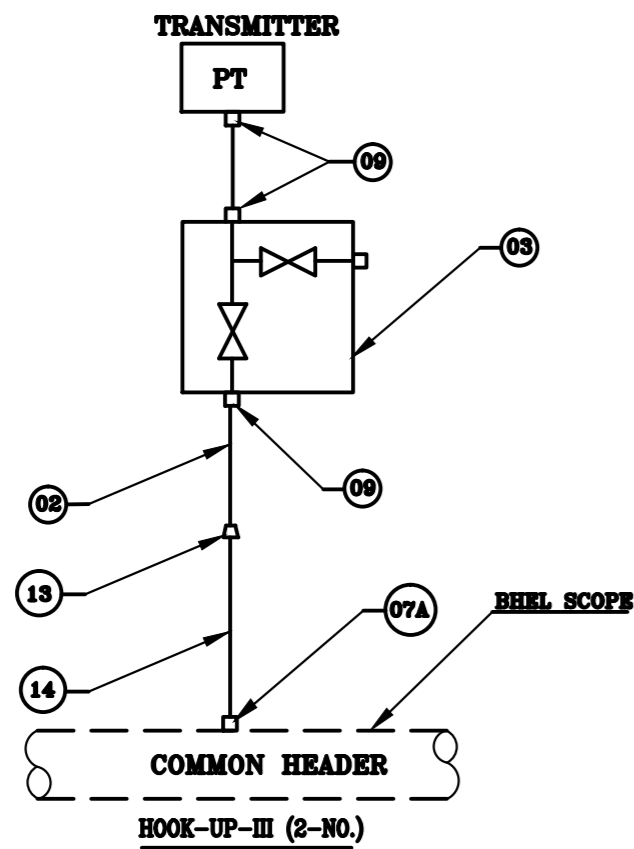
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(TYPE-B)



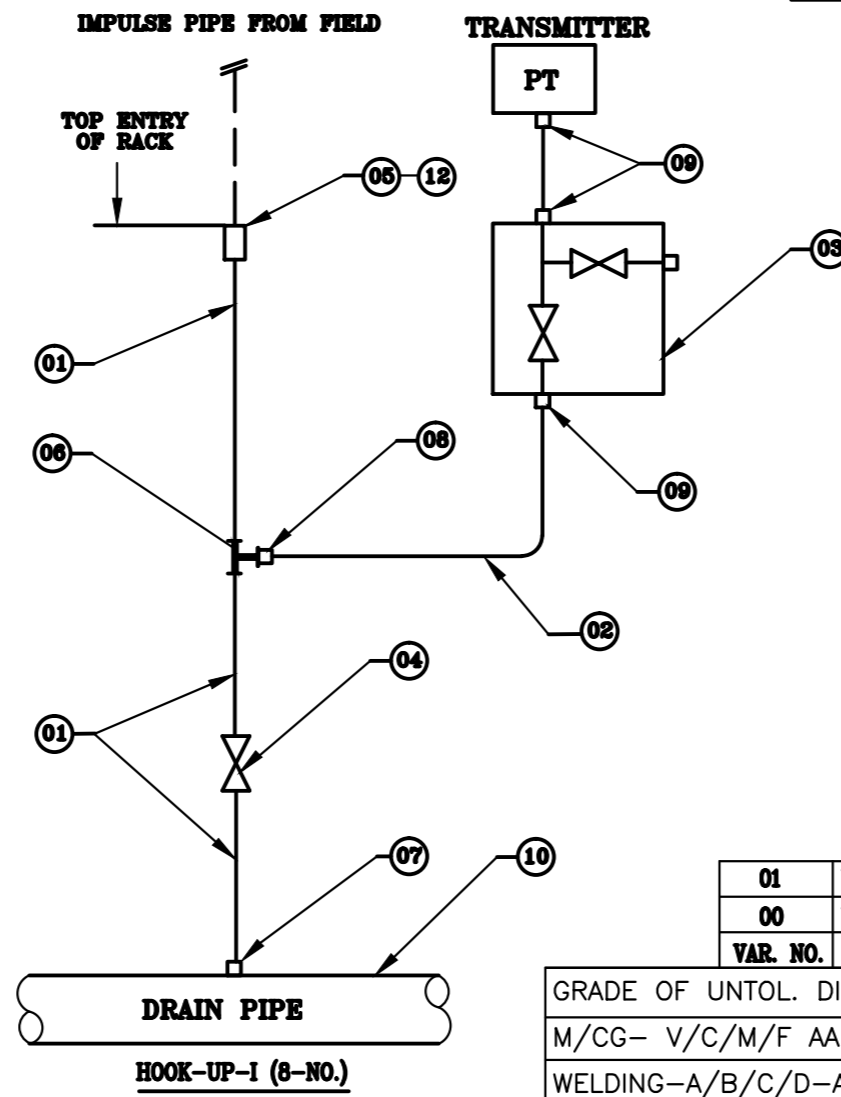
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(TYPE-B)



HOOK-UP-II (1-NO.)



HOOK-UP-III (2-NO.)



HOOK-UP-I (8-NO.)

MEASURING LINES TO BE RISING WITH A MIN. OF 10%

ITEM	DESCRIPTION	QTY	REMARKS
14	C.S. TUBE/CS ASTM A106 Gr.-C/SIZE ϕ 33.7X3.38/SCH-80	AR	
13	REDUCER ASTM 105 (33.7X3.38X21.3X2.6) CL 3000lbs	02	
12	CAP NUT FOR BULK HEAD ASTM A105	09	
11	CAP NUT FOR HALF COUPLING ASTM A105	02	
10	DRAIN PIPE/ CS ASTM A106 Gr-C / SIZE 2" NB/ SCH-80	02	
09	TUBE FITTING DOUBLE FERRULE DOUBLE COMPRESSION/ MAT. SS316/ SIZE 1/2" NPTM x TO SUIT 1/2" OD SS TUBE	33	
08	TEE TUBE UNION/ SS316 / SIZE OD OF 1/2" NB SW x TO SUIT 1/2" OD SS TUBE	09	
07A	HALF COUPLING/ASTM A105/SIZE 3" NB SW / CL 3000lbs	02	LOOSE
07	HALF COUPLING/ASTM A105/SIZE 1/2" NB SW / CL 3000lbs	11	
06	FORGED TEE/ASTM A105/SIZE 1/2" NB SW / CL 3000lbs	09	
05	BULK HEAD/ASTM A105/SIZE 1/2" NB SW / CL 3000lbs	09	
04	FORGED GLOBE VALVE/ BODY ASTM A105/STEM ASTM A182 Gr-F6A/ SIZE 1/2" NB SW/ CL 800	10	
03	TWO VALVE MANIFOLD, 1/2" NPTF/BODY/TRIM SS316/PR TESTING 3000PSI	11	
02	SEAMLESS SS TUBE, ASTM A213 TP 316H/SIZE 1/2" OD, THICK 2.1mm	A/R	
01	IMPULSE PIPE/ ASTM A106, Gr-C /SIZE 1/2" NB/SCH-80	A/R	

01	W90318130190	CBOM NO.	21335560000	STATUS OF DRG.	
00	W90318130181	AGREED DEPT.		NAME	SIGN
VAR. NO.	MATERIAL CODE	NAME	SIGN	DATE	

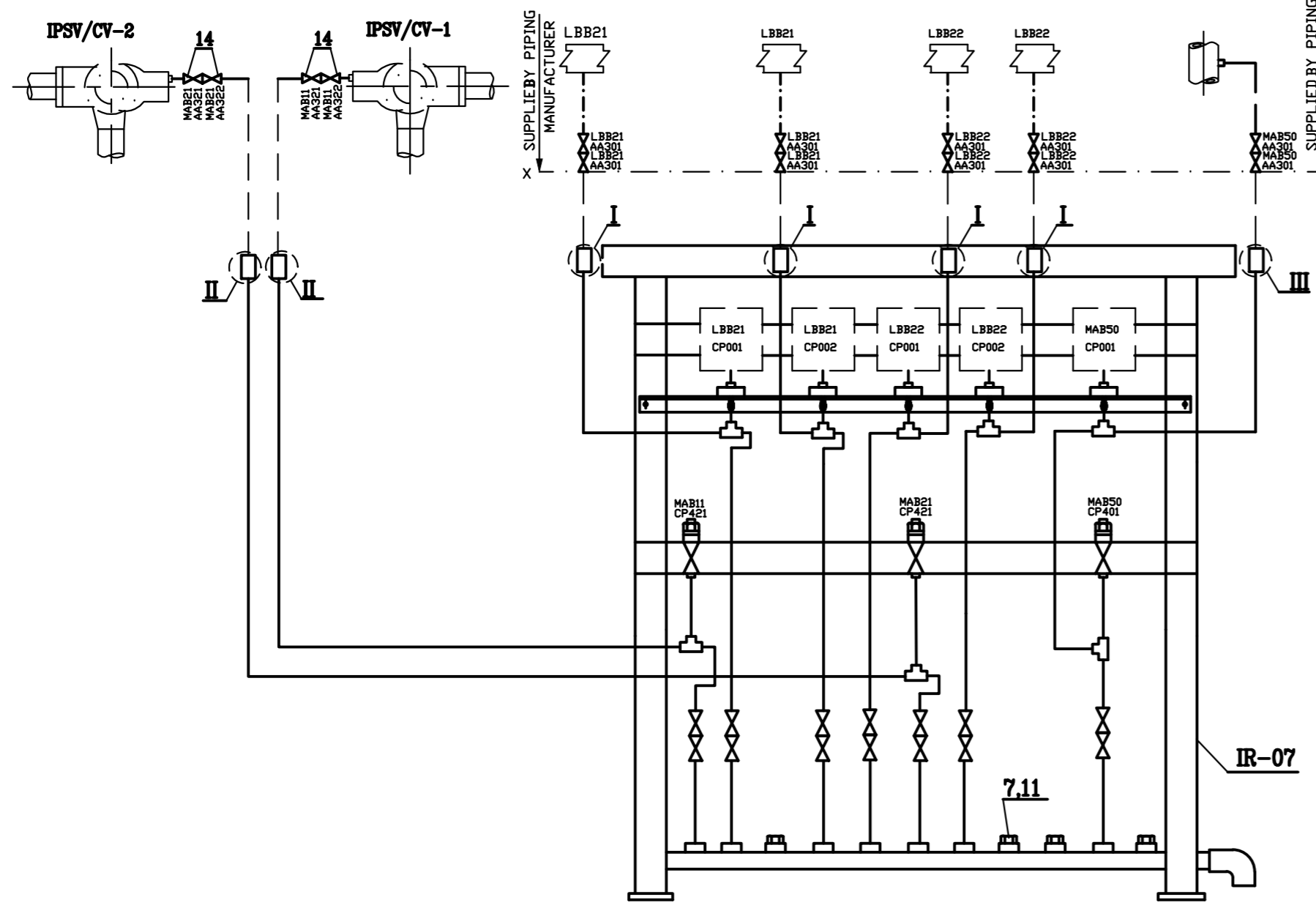
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M/CG- V/C/M/F AA 0230208					
WELDING-A/B/C/D-AA621104					
GAS CUTTING-T3'AA0621101					
REV.	DATE	ALTERED	REV.	DATE	ALTERED
		CHECKED			CHECKED

TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT		STEAM TURBINE			
BHARAT HEAVY ELECTRICALS LTD. HARDWAR		NAME	SIGN	DATE	NO. OF VAR.
DEPT. STE CODE 4011		DRN	SSTEBLR	SSTEBLR	73, 74
SCALE N.T.S		CHD	SSTEGG	SSTEGG	22, 23, 24
WEIGHT(Kg.) 155		APD	ASTEVK	ASTEVK	75, 77
TITLE ASSY.RACK FOR EX.& GLAND SEAL INST.		REF. TO ASSY. DRG.		ITEM NO.	
DRAWING NO. 21335560010		SHEET NO. 1		NO. OF SHEETS 1	

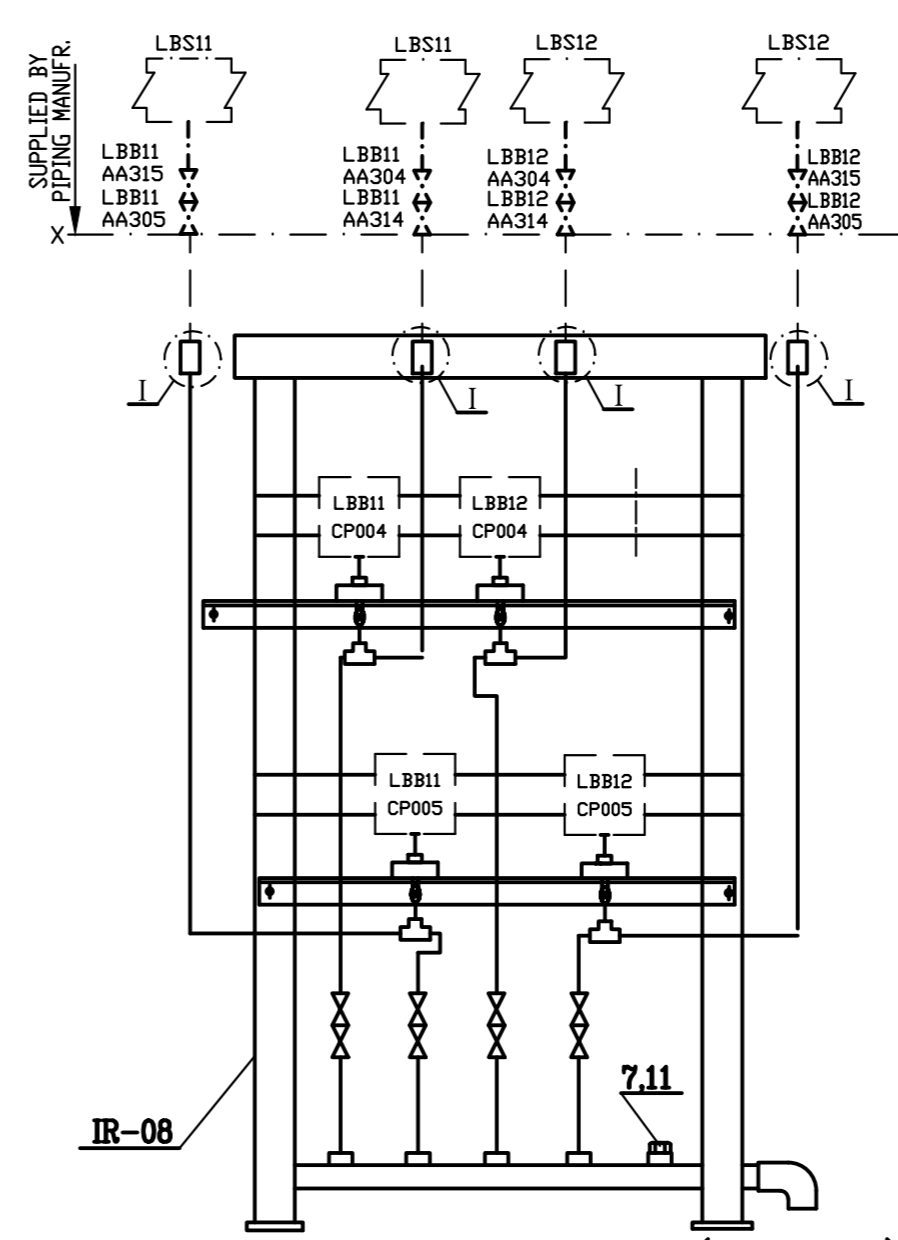
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INVENTORY NO.
SIGN & DATE
REF. DRG NO.

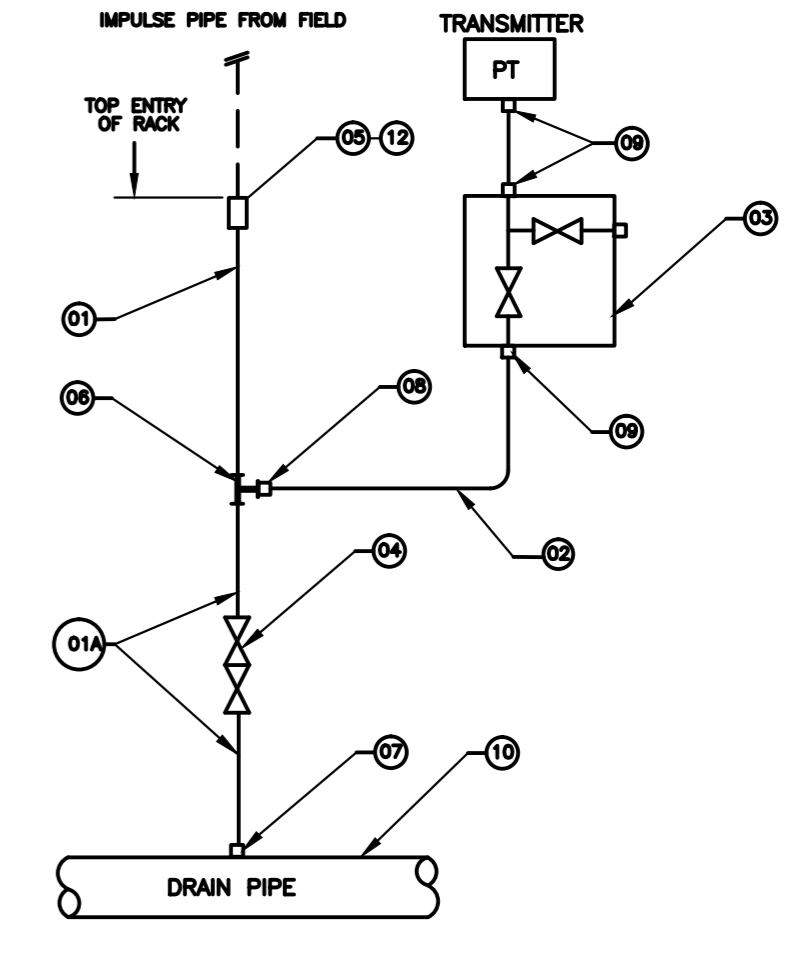
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INSTRUMENT RACK NO. 07.(VAR-00)
(TYPE-A)



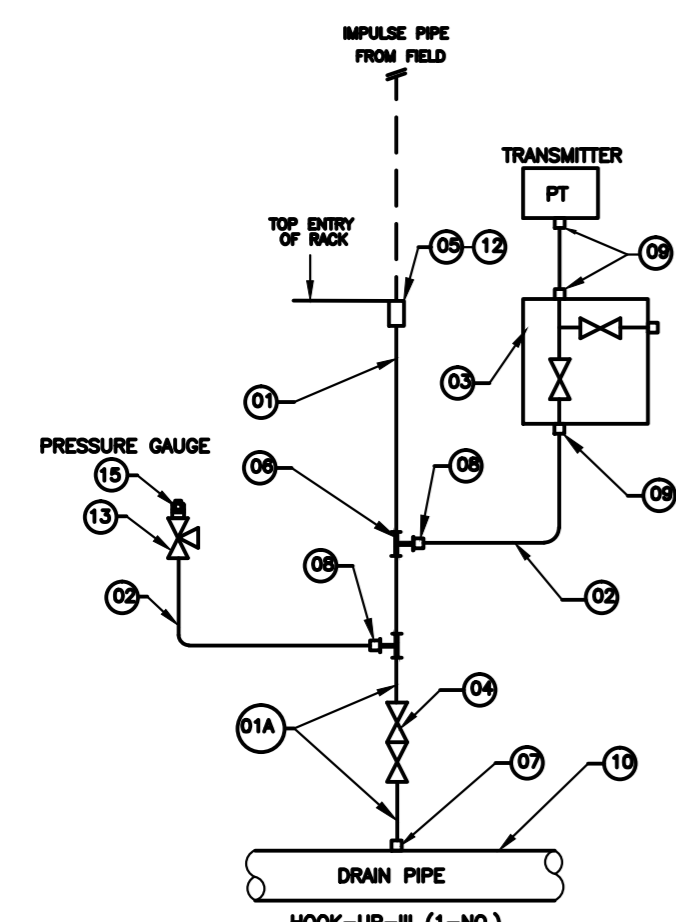
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(TYPE-B)



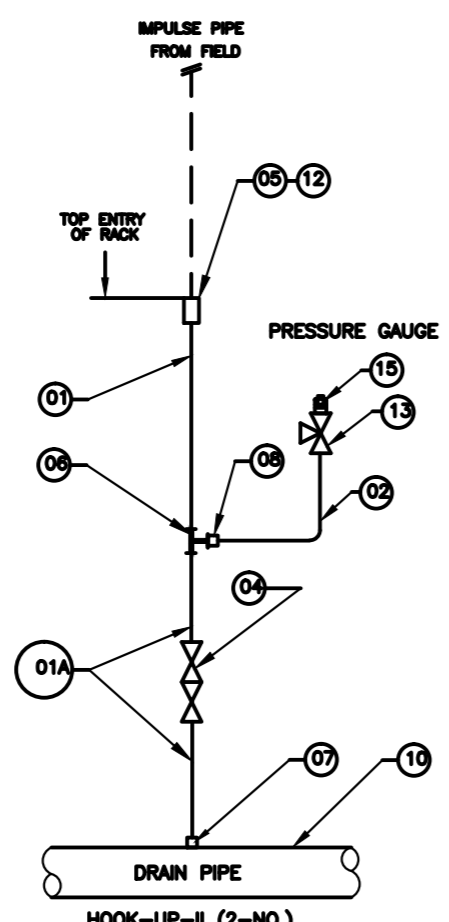
HOOK-UP-I (8-NO.)

NOTE:- ITEM NO.-14, INDICATED BEYOND BULK HEAD, SHALL BE SUPPLIED AS LOOSE WITH THE ASSEMBLED RACK

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HOOK-UP-III (1-NO.)

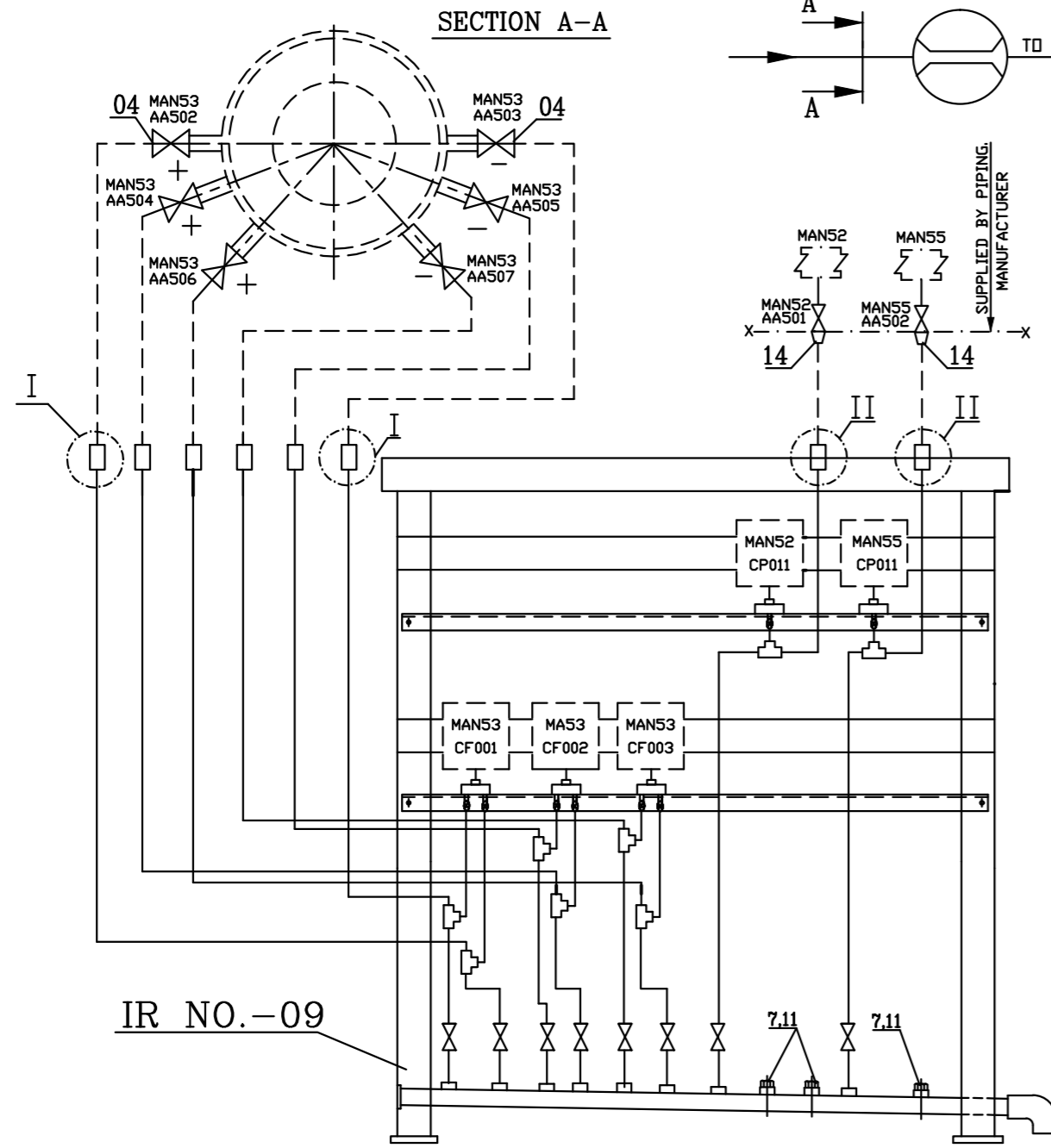


HOOK-UP-II (2-NO.)

ITEM	DESCRIPTION	BHEL/SAR SCOPE	QTY	REMARKS
15	PLUG 1/2" NPTM	3		
14	FORGED GLOBE VALVE ASTM,336, Gr. A91 (AS: X10CrMoVNb 9-1 Or EQUIVALENT	4		
13	THREE WAY GAUGE COCK/ S316/ SIZE 1/2" NPTFx1/2" OD SS TUBE	3		
12	CAP NUT FOR BULK HEAD ASTM A105	11		
11	CAP NUT FOR HALF COUPLING ASTM A105	5		
10	DRAIN PIPE/ CS ASTM A106 Gr-C / SIZE 2" NB/ SCH-80	2		
09	TUBE FITTING DOUBLE FERRULE DOUBLE COMPRESSION/ MAT. SS316/ SIZE 1/2" NPTM x TO SUIT 1/2" OD SS TUBE	27		
08	TEE TUBE UNION/ SS316 / SIZE OD OF 1/2" NB SW x TO SUIT 1/2" OD SS TUBE	12		
07	HALF COUPLING/ASTM A182 GR-F22/SIZE 1/2" NB SW/CL 9000lbs	16		
06	FORGED TEE/ASME SA213 Gr. T91/SIZE 1/2" NB SW / CL 9000lbs	12		
05	BULK HEAD/ASME SA213 Gr. T91/SIZE 1/2" NB SW / CL 9000lbs	11		
04	FORGED GLOBE VALVE/ BODY ASTM A182 F22/STEM ASTM A182 Gr-F8A/ SIZE 1/2" NB SW/ CL 3000 SPL	22		
03	TWO VALVE MANIFOLD, 1/2" NPTF/BODY/TRIM SS316/PR TESTING 9000PSI	9		
02	SEAMLESS SS TUBE, ASME SA213 Gr. T91 316H/SIZE 1/2" OD, THICK 2.1mm	A/R		
01A	IMPULSE PIPE/ ASTM A335, Gr.P22/ SIZE 1/2" NB/ SCH-XXS	A/R		
01	IMPULSE PIPE/ ASME A335, Gr-T91/ SIZE 1/2" NB/ SCH-XXS	A/R		

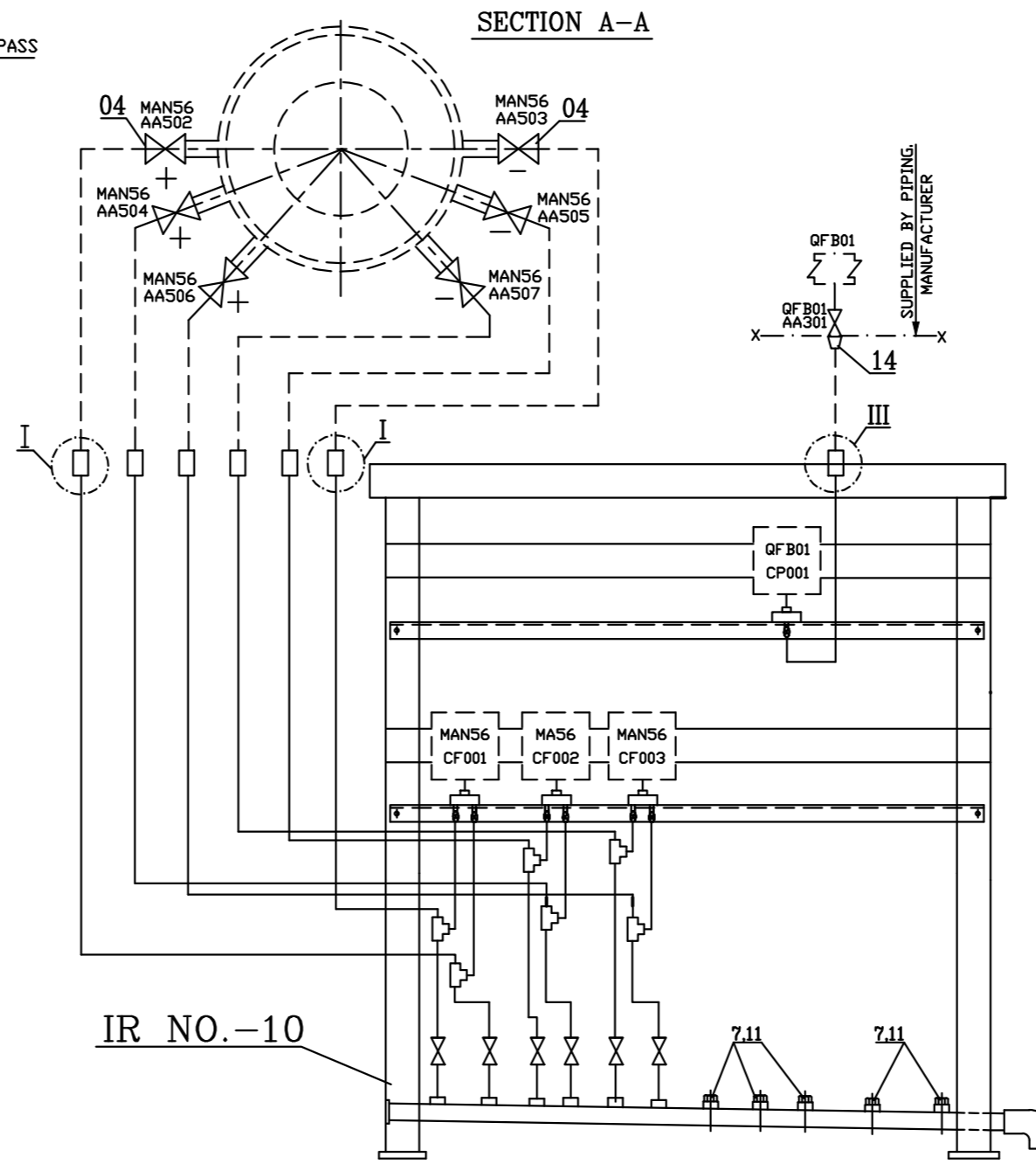
01	W90318130211	CBOM NO.	STATUS OF DRG.	TYPE OF PRODUCT				STEAM TURBINE			
00	W90318130203	21335660000		OR							
VAR. NO. MATERIAL CODE		AGREED DEPT.	NAME	SIGN	DATE	NAME OF CUSTOMER/ PROJECT					
GRADE OF UNTOL. DIM.:-						DRN		SSTEBLR	SSTEBLR	DATE	NO.OF VAR.
M/CG- V/C/M/F AA 0230208						CHD		SSTEGG	SSTEGG	DATE	
WELDING-A/B/C/D-AA621104						APD		ASTEVK	ASTEVK	DATE	73, 74
GAS CUTTING-T3'AA0621101						DEPT. STE		SCALE	WEIGHT(Kg.)	REF. TO ASSY. DRG.	ITEM NO.
REV. DATE ALTERED CHECKED		REV. DATE ALTERED CHECKED				CODE 4011		N.T.S.	210		NO.OF ITEMS
						TITLE		ASSY.RACK FOR HRH/MS PRESSURE INSTRUMENTS			
						DRAWING NO.		21335660010			
						SHEET NO. 1		NO.OF SHEETS 1			

21336060510
DRAWING NO.



INSTRUMENT RACK NO.-09 (VAR.-00)
(TYPE-A)

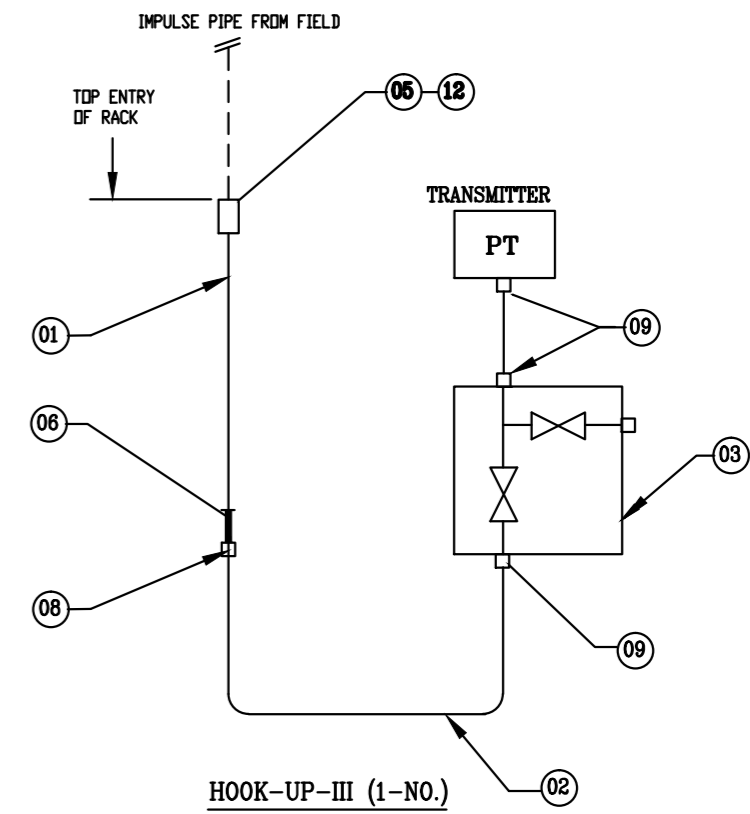
IR NO.-09



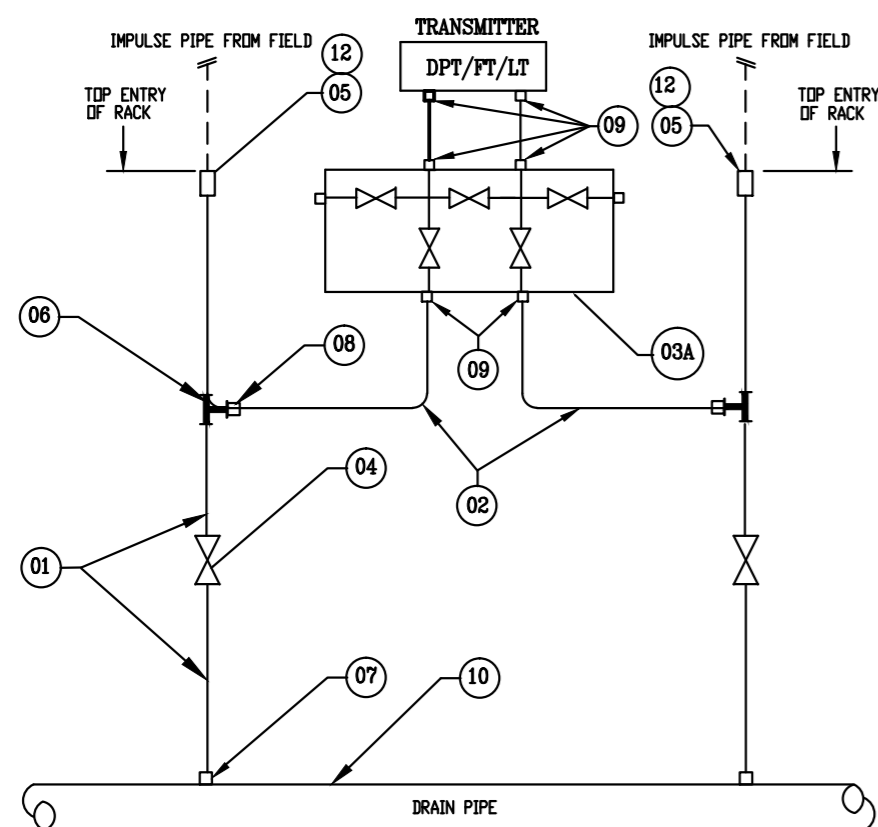
INSTRUMENT RACK NO.-10 (VAR.-01)
(TYPE-A)

IR NO.-10

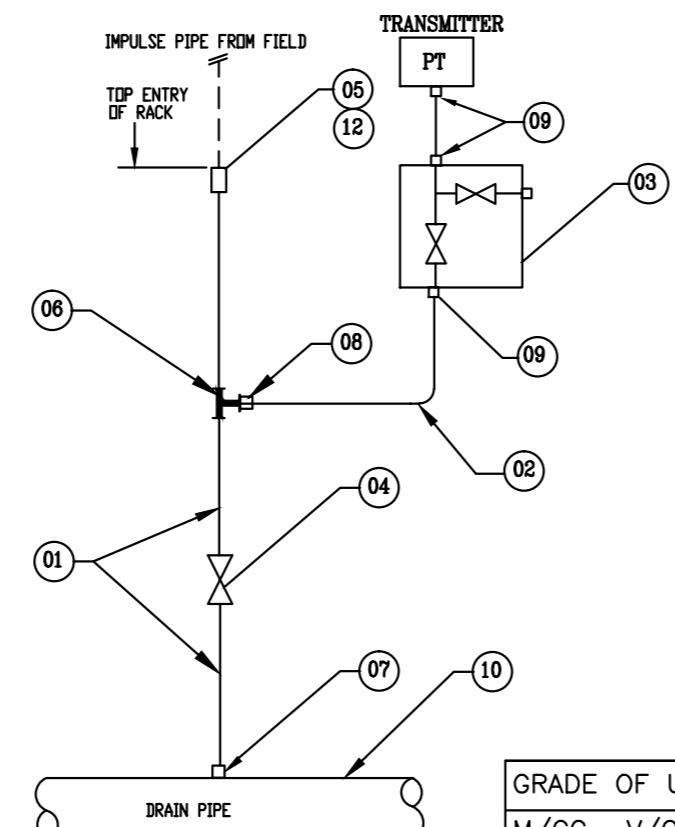
NOTE:- 01: ITEM NO. 04,14 INDICATED BEYOND BULK HEAD, SHALL BE SUPPLIED AS LOOSE WITH THE ASSEMBLED RACK.
02: ALL THE BULK HEADS & ITEM NO. 5, INDICATED IN SHALL BE ACCOMMODATED & INSTALLED IN RESPECTIVE RACKS.



HOOK-UP-III (1-NO.)



HOOK-UP-I (6-NO.)



HOOK-UP-II (2-NO.)

ITEM	DESCRIPTION	QTY	REMARKS
14	REDUCER/ASTM A105 / SIZE 1' NB SW x 1/2' NB SW/CL 3000lbs	03	
12	CAP NUT FOR BULK HEAD ASTM A105	15	
11	CAP NUT FOR HALF COUPLING ASTM A105	08	
10	DRAIN PIPE/ CS ASTM A106 Gr-C / SIZE 2' NB/ SCH-80	02	
09	TUBE FITTING DOUBLE FERRULE DOUBLE COMPRESSION/ MAT. SS316/ SIZE 1/2" NPTM x TO SUIT 1/2" OD SS TUBE	45	
08	TEE TUBE UNION/ SS316 / SIZE OD OF 1/2" NB SW x TO SUIT 1/2" OD SS TUBE	15	
07	HALF COUPLING/ASTM A105/SIZE 1/2" NB SW / CL 3000lbs	22	
06	FORGED TEE/ASTM A105/SIZE 1/2" NB SW / CL 3000lbs	15	
05	BULK HEAD/ASTM A105/SIZE 1/2" NB SW / CL 3000lbs	15	
04	FORGED GLOBE VALVE/ BODY ASTM A105/STEM ASTM A182 Gr-F6A/ SIZE 1/2" NB SW/ CL 800	26	
03A	FIVE VALVE MANIFOLD, 1/2" NPTF/BODY/TRIM SS316/PR TESTING 3000PSI	06	
03	TWO VALVE MANIFOLD, 1/2" NPTF/BODY/TRIM SS316/PR TESTING 3000PSI	03	
01	W90318130238	02	SEAMLESS SS TUBE, ASTM A213 TP 316H/SIZE 1/2" DD, THICK 2.1mm
00	W90318130220	01	IMPULSE PIPE/ ASTM A106, Gr-C /SIZE 1/2" NB/SCH-80

VAR.NO.	MATERIAL CODE
01	W90318130238
00	W90318130220

REV.	DATE	ALTERED	CHECKED	BRIJ LAL SHEETAL
01	19.08.14	CHECKED		

GRADE OF UNTOL. DIM:-
M/CG- V/C/M/F AA 0230208
WELDING-A/B/C/D-AA621104
GAS CUTTING-T3'AA0621101

NOTE 2 ADDED AS PER
C/A NO- STE-14-F0254

TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT
STEAM TURBINE

DRN	NAME	SIGN	DATE	NO.OF VAR.
SSSTEJSB	SSSTEJSB	SSSTEJSB	19/04/2013	
CHD	SSTEVK	SSTEVK	20/04/2013	
APD	ASTEVK	ASTEVK	24/04/2013	73, 74

DEPT. STE CODE 4011
SCALE WEIGHT(Kg.) 200
REF. TO ASSY. DRG. 21336060500

TITLE
ASSY.RACK FOR WATER INJECTION INSTRUMENTS.
DRAWING NO. **21336060510**

SHEET NO. 1 NO.OF SHEETS 1

SIZE A2

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