



उत्पाद मानक

ST48015

मुख पृष्ठ

PREFACE SHEET

PRODUCT STANDARD

केवल आंतरिक प्रयोग हेतु
प्रदायक को देने से पूर्व इस मुखपृष्ठ को निकाल दें ।

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REMOVE THIS PREFACE BEFORE ISSUE TO SUPPLIERS.

Title :- Technical requirements for Local Instrument Racks (IR)

समतुल्य मानक/सूची आदि

COMPARABLE STANDARDS / CATALOGUES ETC.

NO.

सुझाए/सम्भावित प्रदायक एवं श्रेणी

SUGGESTED / PROBABLE SUPPLIERS AND GRADES.

1) Instrumentation Ltd.-----Kota

कोई अन्य जानकारी

ANY OTHER INFORMATIONS

NONE

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स्वत्वाधिकार एवं गोपनीय

इस प्रलेख में कोई भी सूचना भारत भारती इलेक्ट्रिकल्स की सम्पत्ति है इसका प्रयोग एवं अपर्याप्त रूप से किसी भी तरह प्रयोग, जो कि कंपनी के हित में हानिकारक ही न किया जाए ।

दिनांक एवं हस्ताक्षर
SIGN & DATE

14/7/10

सामग्री सूची संख्या
INVENTORY NO

P-6398

रवीकृति
APPROVED

K.B. Batra
HOD-CIE

क्र.सं.
8.10

REV.NO.

01

निर्माण
PREPARED

CIE

जारी
ISSUED

TSX

दिनांक
DATE

01.07.10

Dt.

29.10.2014

सामग्री सूची संख्या को अधिकृत करता है
 SUPERSEDES INVENTORY NO.

(Based on BHEL-EDN-Tech. spec. no. CE/415/LIE-LIR/TR)

TECHNICAL REQUIREMENT FOR LOCAL INSTRUMENT RACKS (IR)

I. OPEN TYPE INSTRUMENT RACKS:

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.

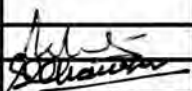

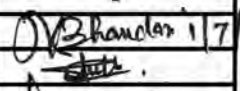
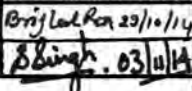
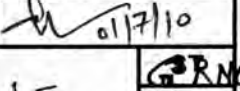
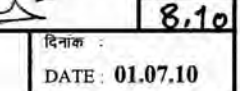
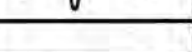
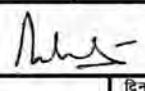

7. Equipment Installation

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

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सामग्री सूची संख्या
 INVENTORY NO. P-6398

MEMBER-PSC	K.B. BATRA		अनुवादक TRANSLATED BY	-	नाम NAME	दिनांक एवं हस्ताक्षर SIGNATURE & DATE	-
QAX	S.K. Chauhan		निर्माणाकर्ता WORKED BY	J.S. BHANDARI			 17/10
TSX	Jaljit Kumar		जांचकर्ता CHECKED BY	G. GUPTA			
सहमत विभाग AGREED DEPTT	नाम NAME	दिनांक एवं हस्ताक्षर DATE & SIGNATURE	पर्यवेक्षणकर्ता SUPERVISED BY	VINOD KUMAR			 17/10
ALTERED BY	BRIJ LAL	 23/10/14	स्वीकृति APPROVED :	K.B. BATRA, SDGM (CIE)			 8.10
CHECKED BY	SHEETAL	 03/10/14	निर्माण PREPARED :	CIE	जारी ISSUED :	CIE	दिनांक DATE : 01.07.10

दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद मानक PRODUCT STANDARD	ST 48015
			पृष्ठ 13 का 2 Page 2 of 13

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SUPERSEDES INVENTORY NO.

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दिनांक
SIGN & DATE
5/11/17
4/17/10








8. Impulse Piping / Tubing




- 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.
- 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.
- 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.
- 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.
- 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.



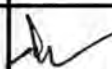

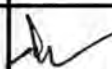

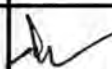
9. Wiring of the Racks




- 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.
- 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.
- Vendor shall furnish general arrangement and wiring diagrams for each Instrument rack for approval.
- 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

सामग्री सूची संख्या INVENTORY NO. P-6398	REV. 01	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								
सामग्री सूची संख्या को अतिरिक्तित्त करता है	SUPERSEDES INVENTORY NO.	II. General Requirement applicable to Transmitter Racks :										
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		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. <p>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.</p>										
		स्वत्वाधिकार एवं गोपनीय इस प्रलेख में दी गई सूचना भारत की इलेक्ट्रिकल्स की सम्पत्ति है इस्का प्रकस एवं आरक्षण रूप से किसी भी तरह प्रयोग, जो कि कंपनी के हित में हानिकारक हो न किया जाए ।										
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सामग्री सूची संख्या INVENTORY NO. P-6398												

दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद मानक PRODUCT STANDARD	ST 48015 पृष्ठ 13 का 4 Page 4 of 13	
सामग्री सूची संख्या को अतिरिक्तित्व क्रमांक है SUPERSEDES INVENTORY NO.	<p>4. <u>Wiring Details</u></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>			
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>5. <u>Fuse Blocks</u></p> <p>a) Fuse blocks shall be modular type with Bakelite frame and reinforced retaining clips.</p> <p>6. <u>Terminal Blocks</u></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 4(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>			
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सामग्री सूची संख्या INVENTORY NO. P-6398	REV. 01	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								
सामग्री सूची संख्या को अधीनस्थित करता है SUPERSEDES INVENTORY NO.	<p>d) Terminal blocks shall be provided with white marking strips/self adhesive marker cards.</p> <p>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.</p> <p>f) Terminal blocks for termination of electrical power supply shall be type WAGO / PHOENIX make of suitable size with marking strips.</p> <p>g) The last terminal in a rail-mounted assembly shall be closed with an end plate and end bracket.</p> <p>III. Documents to be Submitted by Vendor for Approval :</p> <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) <p>IV. Specific requirements</p> <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. <p>V. Testing requirements</p> <p>Testing shall be carried out as per check list for Instrument valve, Impulse & tubes, Socket weld fittings and SS compression fittings.</p>										
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सामग्री सूची संख्या को अधिकृत करता है	SUPERSIDES INVENTORY NO.	<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>				
<p style="text-align: center;">COPYRIGHT AND CONFIDENTIAL</p> <p style="text-align: center;">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>						
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P-6398	14.7.10		जांचकर्ता CHECKED BY	V. KUMAR		01/07/10

सामग्री सूची संख्या को अधिकारित 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		✓	
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		


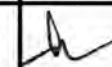
LEGEND :
 * D: RECORDS, IDENTIFIED WITH ' right mark ' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION.
 ** M: MANUFACTURER/SUB CONTRACTOR, C:CONTRACTOR/NOMINATED INSP.AGENCY
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NOTE :

1) QUANTUM OF CHECK SHALL BE AS BELOW :

100%	- BY MANUFACTURER
10%	- BY CONTRACTOR
NIL	- BY M/S CUSTOMER

2) MANUFACTURER TO MAINTAIN CALIBRATED INSTRUMENT HAVING BETTER ACCURACY THAN THE ITEM UNDER TEST. INSPECTING ENGINEER SHALL CHECK THE SAME.
 3) UT REQUIRED IF RAW MATERIAL/ FORGING SECTION IS 50mm AND ABOVE
 4) FORGINGS SHALL BE NORMALISED BEFORE MACHINING

सामग्री सूची संख्या INVENTORY NO.	P-6398	REV. 01		निर्माणकर्ता WORKED BY	G.GUPTA		01/07/10
हस्ताक्षर एवं दिनांक SIGN & DATE	5/1/14 14.7.10			जांचकर्ता CHECKED BY	V. KUMAR		01/07/10

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ST 48015

पृष्ठ 13 का 8

PRODUCT STANDARD

Page 8 of 13

CHECK LIST FOR IMPULSE PIPES AND TUBES

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	✓	<p style="text-align: center;">↑</p> <p>MANUFACTURER TO PROVIDE TEST CERT. AS PER RELEVANT ASTM STDS. MENTIONED IN SPECS</p> <p style="text-align: center;">↓</p>
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 :

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N: END USER "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 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

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सामग्री सूची संख्या
INVENTORY NO

P-6398

REV. 01

निर्माणकर्ता WORKED BY	G.GUPTA		01/07/10
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सामग्री सूची संख्या
INVENTORY NO.
 P-6398

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 IDENTICATION 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 CARRD ON UNDRILLED BRANCH-TEE
 3) HYDRAULIC PRESSURE TEST ON FITTINGS | QUANTUM CHECK | TWO NOS OF EACH TYPE ON | BY CONTRACTOR | 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

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उत्पाद मानक

ST 48015

पृष्ठ 13 का 10

Page 10 of 13

PRODUCT STANDARD

SUPERSEDES
INVENTORY NO.

सामग्री सूची संख्या को
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CHECK LIST FOR STAINLESS STEEL COMPRESSION FITTINGS

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/	↓	P	V	V		
2.1	CHEMICAL	HEAT /		P	V	V	✓	
2.2	PHYSICAL, HARDWARE	LOT						
3	PROOF PRESSURE TEST	5 RDM. SAMPLE	↑	P	V	V	✓	
4	DISMANTLING	3 RDM. SAMPLE		P	V	V		
	RE-ASSEMBLY TEST	SAMPLE	↓					
5	HYDRAULIC IMPULES & VIBRATION TEST ✓	5 RDM. SAMPLE		P	V	V	✓	

LEGEND :

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** 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.

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INVENTORY NO
P-6398

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ST 48015

पृष्ठ 13 का 12

PRODUCT STANDARD

Page 12 of 13

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सामग्री सूची संख्या
INVENTORY NO.

P-6398

REV. 01

IN-TYPE	CHANGING ELEMENTS		
	WIDTH	DEPTH	HEIGHT
TYPE-A	1600	650	2200
TYPE-B	1000	650	2200

NOTES:-
1. PAINT -- EXTENSION & INTENSION -- HAL 9002 (EPOXY BASED) SEMI-GLOSSY FINISH, AIR DRYING TYPE & THICKNESS MORE THAN 100 MICRONS.
2. ANCHOR BOLT SIZE 110mm DIA FOR IN TYPE-A AND 80mm DIA FOR IN TYPE-B

20	CABLE TRAY	8
21	MOUNTING ANGLE 40x40x40mm	8
22	1/2" STEEL NUTS, LENGTH, DIA, 800	4/8
23	BRACKET FOR PANEL MATE	1
24	SOLE BRAD PLATE 8mm THICK	2
25	GRATING PLATE 8 THICK	8
26	STIFFER PAD 40x40mm	4/8
27	CHANNEL	1
28	CLEAR AT REAR OF THE CHANNEL	1
29	COVER PLATE (MADE FROM BRASS)	8
30	CH. BRAD NUTS 1/2" DIA 1/4" HTY	4/8
31	BRUSH FOR PANEL MATE	8
32	1/2" DIA BRASS NUTS FOR PANEL MATE	4/8
33	1/2" DIA BRASS NUTS FOR PANEL MATE	4/8
34	CLEAR AT REAR OF THE CHANNEL	1
35	CLEAR AT FRONT (MADE FROM BRASS)	8
36	CORNER BRACKET MADE FROM BRASS 1 INCH	1
37	CLEAR AT REAR (MADE FROM BRASS)	4
38	PLATE FROM BRASS 40x40x10mm THICK	8
39	ANCHOR BOLT 8mm THICK 200mm DIA	1
40	CORNER FOR TRANSMITTER BACK, BRASS THICK 1	1
41	CHANNEL 100x100mm, L=2000mm	8
42	CHANNEL 100x100mm, L=2000mm	8

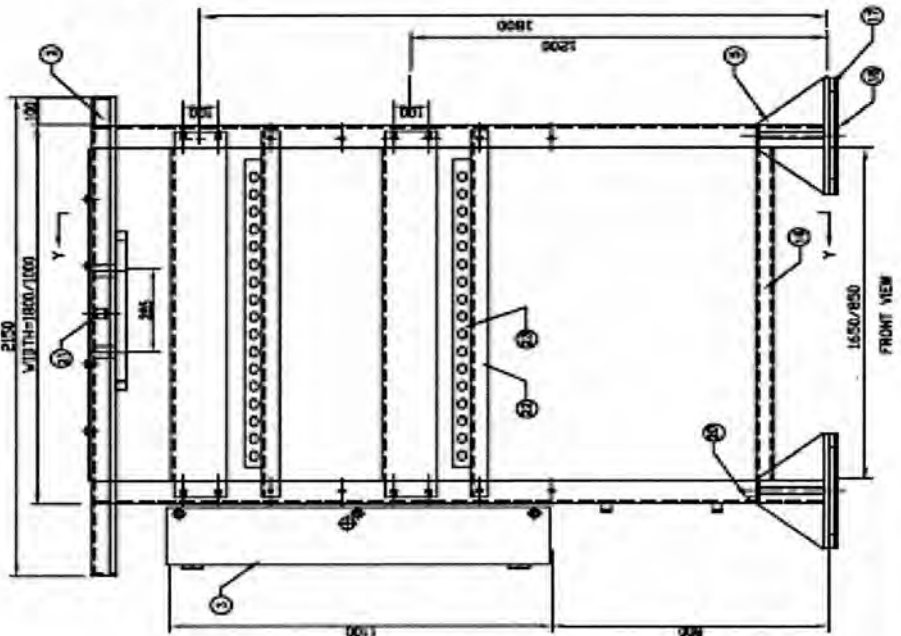
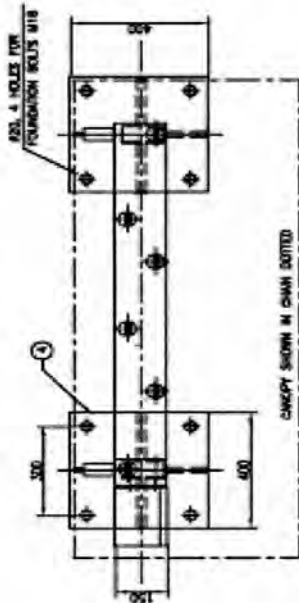


Fig.-2- Typical Fabrication drg for Instrument Rack (Type A& B)

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- NOTES:-
1. CONTINUOUS WELDING REQD. ALL WHERE 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. WITH IN TOLERANCE OF ±10% OF INDICATED DIMENSIONS.
 5. FOR TYPE A JB HEIGHT 1100 & TYPE B JB HEIGHT 800mm.
 6. PAINT:- EXT & INT.- EPOXY BASED RAL 9002
 7. JB'S DOOR (OUT SIDE) PAINT SHALL BE EPOXY BASED RAL-5012 AIR DRYING.
 8. JUNCTION BOX SHALL BE MADE OF 2mm CRCA SHEET.

S.NO.	DESCRIPTION	QTY	REMARKS
21	BUSH	3	
20	RUBBER GASKET	A/R	
19	CLS.SCR. M4x12 WITH NUT & WASHER	4	
18	CLS.SCR. M4x16 (PS:47)	80	
17	RUBBER GASKET 3x16	A/R	
16	STRIP FOR CABLE ROUTING 80x8	2	TYPE-A=700 TYPE-B=400
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	KNURLED SCREW	5	
7	BUSH FOR TERMINAL	4	
6	BUSH 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	

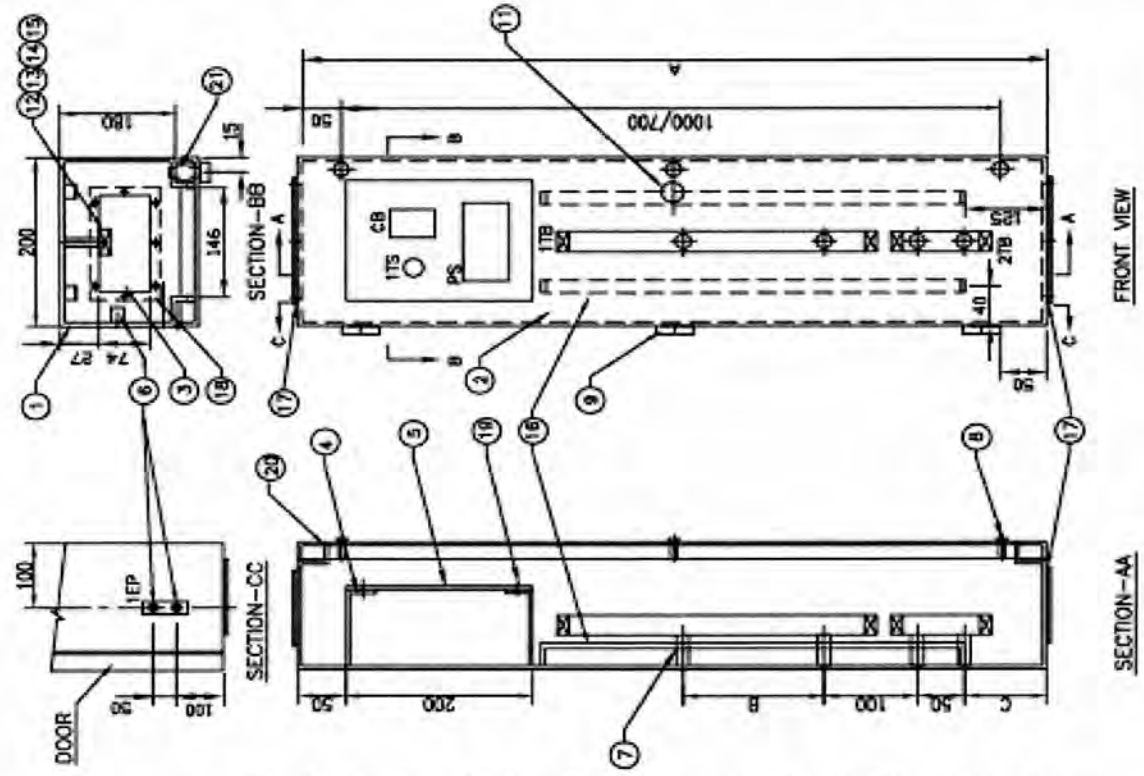


Fig.-3- Typical JB drg. for Instrument Rack (Type A & B)

VARIANTS	CHANGING ELEMENT			REMARKS
	A	B	C	
FOR TYPE-A	1100	300	175	
FOR TYPE-B	800	200	125	

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INSTRUMENT SCHEDULE

IR-1

S.NO.	KKS	DESCRIPTION	IR	MEDIUM	INSTRUMENT TYPE	DESIGN PRESSURE	OPERATING PRESSURE	UNIT	OPERATING TEMPERATURE
1	LBA10CP001	MAIN STM.PRESS BEFORE ESV-1	IR1	STEAM	PT	250	166	KG/CM2	537
2	LBC10CP001	EXHAUST CASING HPT	IR1	STEAM	PT	60	45	KG/CM2	337
3	MAA50CP001	STEAM PRESSURE BEFORE DRUMSTAGE 1.CASING	IR1	STEAM	PT	200	154	KG/CM2	531
4	MAA50CP006	STEAM PRESSURE BEFORE DRUMSTAGE 1.CASING	IR1	STEAM	PT	200	154	KG/CM2	531
5	MAB50CP001	STEAM PRESSURE BEFORE IPTBLADING	IR1	STEAM	PT	60	40	KG/CM2	564
6	MAA50CP101	MAIN STEAM FLOW	IR1	STEAM	PT	200	154	KG/CM2	531
7	MAA50CP102	MAIN STEAM FLOW	IR1	STEAM	PT	200	154	KG/CM2	531
8	MAA50CP103	MAIN STEAM FLOW	IR1	STEAM	PT	200	154	KG/CM2	531

IR-2

S.NO.	KKS	DESCRIPTION	IR	MEDIUM	INSTRUMENT TYPE	DESIGN PRESSURE	OPERATING PRESSURE	UNIT	OPERATING TEMPERATURE
1	MAG10CP002	VACUUM CONDENSER	IR2	VACUUM	PT	1	0.11	KG/CM2(ABS)	45
2	MAG10CP003	VACUUM CONDENSER	IR2	VACUUM	PT	1	0.11	KG/CM2(ABS)	45
3	MAG10CP004	VACUUM CONDENSER	IR2	VACUUM	PT	1	0.11	KG/CM2(ABS)	45
4	MAG10CP502	VACUUM CONDENSER	IR2	VACUUM	PG	+1.5	0.11	KG/CM2	45
5	MAC11CP001	LP INLET STEAM PRESSURE	IR2	STEAM	PT	9	7	KG/CM2	292
6	MAC11CP002	LP INLET STEAM PRESSURE	IR2	STEAM	PT	9	7	KG/CM2	292
7	MAC11CP003	LP INLET STEAM PRESSURE	IR2	STEAM	PT	9	7	KG/CM2	292

IR-3

S.NO.	KKS	DESCRIPTION	IR	MEDIUM	INSTRUMENT TYPE	DESIGN PRESSURE	OPERATING PRESSURE	UNIT	OPERATING TEMPERATURE
1	LBQ50CP001	STEAM PRESSURE IN EXTR. LINE-5	IR3	STEAM	PT	25	17	KG/CM2	412
2	LBS21CP001	STEAM PRESSURE IN EXTR. LINE-2	IR3	STEAM	PT	3	1.5	KG/CM2	131
3	LBS31CP001	STEAM PRESSURE IN EXTR. LINE-3	IR3	STEAM	PT	3	2.8	KG/CM2	190
4	LBS40CP001	STEAM PRESSURE IN EXTR. LINE-4	IR3	STEAM	PT	9	7	KG/CM2	290

INSTRUMENT SCHEDULE

IR-4

S.NO.	KKS	DESCRIPTION	IR	MEDIUM	INSTRUMENT TYPE	DESIGN PRESSURE	OPERATING PRESSURE	UNIT	OPERATING TEMPERATURE
1	LBS11CP001	STEAM PRESSURE IN EXTR. LINE-1	IR4	STEAM	PT	3	0.36	KG/CM2	74
2	MAW20CP001	SHAFT SEAL STEAM HEADERPRESS.,REAR	IR4	STEAM	PT	900	1.04	MMWC	<150
3	MAW20CP011	SHAFT SEAL STEAM HEADERPRESS.,REAR	IR4	STEAM	PT	900	1.048	MMWC	< 150

IR-5

S.NO.	KKS	DESCRIPTION	IR	MEDIUM	INSTRUMENT TYPE	DESIGN PRESSURE	OPERATING PRESSURE	UNIT	OPERATING TEMPERATURE
1	LBA01CP002	MAIN STEAM PRESS BEF HP BYPASSCOMMON PIPE	IR5	STEAM	PT	250	166	KG/CM2	537
2	LBA01CP011	MAIN STEAM BEF.HP-BYP. COMMON OPERATING PRESSURE PIPE	IR5	STEAM	PT	250	166	KG/CM2	537
3	LBB01CP002	REHEAT STEAM PRESS -LP-BYPASS COMMON PIPE	IR5	STEAM	PT	60	40	KG/CM2	537
4	LBB01CP011	HRH STEAM PRESSBRANCH LP-BYP COMMON PIPE	IR5	STEAM	PT	60	40	KG/CM2	537
5	LBB01CP012	HRH STEAM PRESS BEF BRANCH LP-BYP COMMON PIPE	IR5	STEAM	PT	60	40	KG/CM2	537
6	LBB10CP001	HRH STEAM PRES-SURE BEFORE IV 1	IR5	STEAM	PT	60	40	KG/CM2	537

IR-6

S.NO.	KKS	DESCRIPTION	IR	MEDIUM	INSTRUMENT TYPE	DESIGN PRESSURE	OPERATING PRESSURE	UNIT	OPERATING TEMPERATURE
1	MAX46CP001	SECONDARY AUX FLUID PRESSURE	IR6	CONTROL FLUID	PT	6		KG/CM2	50
2	MAX47CP001	START UP FLUID PRESSURE	IR6	CONTROL FLUID	PT	16	8	KG/CM2	50
3	MAX48CP251	AUX START UP FLUID PRESSURE	IR6	CONTROL FLUID	PT	16	8	KG/CM2	50
4	MAX48CP252	AUX START UP FLUID PRESSURE	IR6	CONTROL FLUID	PT	16	8	KG/CM2	50
5	MAX62CP251	TEST OVERSPEED GOVERNOR MIN	IR6	CONTROL FLUID	PT	16		KG/CM2	50

INSTRUMENT SCHEDULE

IR-7

S.NO.	KKS	DESCRIPTION	IR	MEDIUM	INSTRUMENT TYPE	DESIGN PRESSURE	OPERATING PRESSURE	UNIT	OPERATING TEMPERATURE
1	MAX51CP255	BETWEEN SV EMER-GENCY STOP AND TEST DEVICE	IR7	CONTROL FLUID	PT	16	8	KG/CM2	50
2	MAX51CP257	BETWEEN SOL. VAL. TRIP 'G UNIT, CO-NT. SLIDE VALV	IR7	CONTROL FLUID	PT	16	8	KG/CM2	50
3	MAX51CP259	CONTROL SLIDE VALVE	IR7	CONTROL FLUID	PT	16	8	KG/CM2	50

IR-8

S.NO.	KKS	DESCRIPTION	IR	MEDIUM	INSTRUMENT TYPE	DESIGN PRESSURE	OPERATING PRESSURE	UNIT	OPERATING TEMPERATURE
1	MAX44CP001	PRIMARY OIL PRESSURE	IR8	CONTROL FLUID	PT	4	2.5	KG/CM2	50
2	MAX45CP001	SECONDARY FLUID PRESSURE TO HP	IR8	CONTROL FLUID	PT	10	8	KG/CM2	50
3	MAX45CP002	SECONDARY FLUID PRESSURE TO IP	IR8	CONTROL FLUID	PT	10	8	KG/CM2	50
4	MAX51CP001	TRIP FLUID PRESSURE	IR8	CONTROL FLUID	PT	10	8	KG/CM2	50
5	MAX51CP002	TRIP FLUID PRESSURE	IR8	CONTROL FLUID	PT	10	8	KG/CM2	50
6	MAX51CP003	TRIP FLUID PRESSURE	IR8	CONTROL FLUID	PT	10	8	KG/CM2	50
7	MAX52CP251	AUXILIARY TRIP FLUID PRESSURE	IR8	CONTROL FLUID	PT	10	8	KG/CM2	50

IR-9

S.NO.	KKS	DESCRIPTION	IR	MEDIUM	INSTRUMENT TYPE	DESIGN PRESSURE	OPERATING PRESSURE	UNIT	OPERATING TEMPERATURE
1	MAV41CP501	LUBE OIL PRESS BEFORE OIL COOLERS	IR9	LUBE OIL	PG	10	5.2	KG/CM2	65
2	MAV41CP502	LUB OIL PRESS AFTER OIL COOLER	IR9	LUBE OIL	PG	10	8	KG/CM2	50
3	MAV42CP001	LUBE OIL PRESS AFTER OIL COOLERS	IR9	LUBE OIL	PT	4	1.5	KG/CM2	45

INSTRUMENT SCHEDULE

4	MAV42CP002	LUBE OIL PRESS AFTER OIL COOLERS	IR9	LUBE OIL	PT	4	1.5	KG/CM2	45
5	MAV42CP003	LUBE OIL PRESS AFTER OIL COOLERS	IR9	LUBE OIL	PT	4	1.5	KG/CM2	45
6	MAV51CP501	TURNING GEAR OIL PRESSURE	IR9	LUBE OIL	PG	10	8	KG/CM2	50

IR-10

S.NO	KKS	DESCRIPTION	IR	MEDIUM	INSTRUMENT TYPE	DESIGN PRESSURE	OPERATING PRESSURE	UNIT	OPERATING TEMPERATURE
1	MAV21CP511	MAIN OIL PUMP SUCTION PRESS.BEFORE INJTN.1	IR10	LUBE OIL	PG	16	6.0	KG/CM2	<60
2	MAV21CP512	MAIN OIL PUMP SUCTION PRESSURE BEFORE INJTN.2	IR10	LUBE OIL	PG	16	6.0	KG/CM2	<60
3	MAV21CP521	MAIN OIL PUMP SUCTION PRESS.AFTER INJECTOR1	IR10	LUBE OIL	PG	15	0.5	KG/CM2	<60
4	MAV21CP522	MAIN OIL PUMP SUCTION PRESS.AFTER INJECTOR 2	IR10	LUBE OIL	PG	15	0.2	KG/CM2	<60
5	MAV31CP501	JACK OIL BEH PUMP 1	IR10	LUBE OIL	PG	250	2.3	KG/CM2	<60
6	MAV33CP501	JACK OIL BEH PUMP 2	IR10	LUBE OIL	PG	250		KG/CM2	
7	MAV35CP001	JACKING OIL PUMP DISCHARGEHEADER PRESSURE	IR10	LUBE OIL	PT	250	180	KG/CM2	<60
8	MAV35CP002	JACKING OIL PUMP DISCHARGEHEADER PRESSURE	IR10	LUBE OIL	PT	250	180	KG/CM2	<60

IR-11

S.NO	KKS	DESCRIPTION	IR	MEDIUM	INSTRUMENT TYPE	DESIGN PRESSURE	OPERATING PRESSURE	UNIT	OPERATING TEMPERATURE
1	MAV21CP001	OIL PUMPS DIS- CHARGE HEADERPRESSURE	IR11	LUBE OIL	PT	10	8.4	KG/CM2	<60
2	MAV21CP002	OIL PUMPS DIS- CHARGE HEADERPRESSURE	IR11	LUBE OIL	PT	10	8.4	KG/CM2	<60
3	MAV22CP001	DIS.PRESS. OF AUX OIL PUMP-1	IR11	LUBE OIL	PT	10	7.0	KG/CM2	<60

INSTRUMENT SCHEDULE

4	MAV22CP501	DISCHARGE PRESSOF AUXILIARYOIL PUMP-1	IR11	LUBE OIL	PG	10	7.0	KG/CM2	<60
5	MAV23CP001	DIS.PRESS. OF AUXI. OIL PUMP-2	IR11	LUBE OIL	PT	10	7.0	KG/CM2	<60
6	MAV23CP501	DISCHARGE PRESSOF AUXILIARYOIL PUMP-2	IR11	LUBE OIL	PG	10	7.0	KG/CM2	<60
7	MAV24CP001	DIS.PRESS. OF EMER. OIL PUMP	IR11	LUBE OIL	PT	10	2.3	KG/CM2	<60
8	MAV24CP501	DISCHARGE PRESSOF LUBE OILPUMP	IR11	LUBE OIL	PG	6	2.3	KG/CM2	<60
9	MAV42CP012	LUBE OIL PRESS AFTER OILCOOLERS	IR11	LUBE OIL	PS	2.5	1.5	KG/CM2	45


IR-12

S.NO.	KKS	DESCRIPTION	IR	MEDIUM	INSTRUMENT TYPE	DESIGN PRESSURE	OPERATING PRESSURE	UNIT	OPERATING TEMPERATURE
1	MAX16CP001	HP-CONTR. FLUIDBEH. PUMP 1	IR12	CONTROL FLUID	PT	60	32	KG/CM2	50
2	MAX16CP002	HP-CONTR. FLUIDBEH. PUMP 2	IR12	CONTROL FLUID	PT	60	32	KG/CM2	50
3	MAX16CP501	HP-CONTR. FLUIDBEH. PUMP 1	IR12	CONTROL FLUID	PG	60	32	KG/CM2	50
4	MAX16CP502	HP-CONTR. FLUIDBEH. PUMP 2	IR12	CONTROL FLUID	PG	60	32	KG/CM2	50
5	MAX18CP501	LP-CONTR. FLUIDBEH. PUMP 1	IR12	CONTROL FLUID	PG	16	8	KG/CM2	50
6	MAX18CP502	LP-CONTR. FLUIDBEH. PUMP 2	IR12	CONTROL FLUID	PG	16	8	KG/CM2	50
7	MAX31CP001	HP-CONTROL FLUID	IR12	CONTROL FLUID	PT	60	32	KG/CM2	50
8	MAX41CP001	LP-CONTROL FLUID	IR12	CONTROL FLUID	PT	16	8	KG/CM2	50
9	MAX41CP511	LP CONTROL FLUID	IR12	CONTROL FLUID	PG	16	8	KG/CM2	50

IR-13

S.NO.	KKS	DESCRIPTION	IR	MEDIUM	INSTRUMENT TYPE	DESIGN PRESSURE	OPERATING PRESSURE	UNIT	OPERATING TEMPERATURE
1	MAN42CP001	STEAM PRESS. AFTER LPBP-V1	IR13	STEAM	PT	60		KG/CM2	
2	MAN42CP002	STEAM PRESS. AFTER LPBP-V1	IR13	STEAM	PT	60		KG/CM2	
1	MAN52CP001	STEAM PRESS. AFTER LPBP-V2	IR13	STEAM	PT	60		KG/CM2	
2	MAN52CP002	STEAM PRESS. AFTER LPBP-V2	IR13	STEAM	PT	60		KG/CM2	
3	MAN43CF001	DIFF PRESS. ACROSS WATERINJECTION NOZZLE 1	IR13	STEAM	DPT	1800	22	mBar	35
4	MAN43CF002	DIFF PRESS. ACROSS WATERINJECTION NOZZLE 1	IR13	STEAM	DPT	1800	22	mBar	35
5	MAN53CF001	DIFF PRESS. ACROSS WATERINJECTION NOZZLE 2	IR13	STEAM	DPT	1800	22	mBar	35
5	MAN53CF002	DIFF PRESS. ACROSS WATERINJECTION NOZZLE 2	IR13	STEAM	DPT	1800	22	mBar	35

Purchase Specification For Local Instrument Racks (IR)

TYPE OF PRODUCT : TG-C&I							
NAME OF CUSTOMER / PROJECT: FERAZ GANDHI UNCHA HAR TPP (1X500MW)							
BHARAT HEAVY ELECTRICALS LTD.  HEEP-Haridwar				NAME	SIGN	DATE	NO.OF VAR.
		DRN.		SHEETAL SINGH	Sd/-	16.10.14	
		CHD.		V.KUMAR	Sd/-	16.10.14	
		APPD.		B.S.RANA	Sd/-	16.10.14	
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-D2		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	4-180-00D2-006
03	VENDOR LIST FOR COMPONENTS	Page nos.: 5 to 6
04	DRAWINGS FOR IR	IR nos.- 1 TO 13
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	VAR No.	IR no.	IR Type	Qty	Material code
1	RACK FOR FR FLUID INSTRUMENTS	11335253010	00	IR12	A	1	W90318130017
2	RACK FOR M.S. PRESS. INSTRUMENTS	11335365010	00	IR01	A	1	W90318130327
3	RACK FOR CONDENSER PRESS. INSTRUMENTS	11335465010	00	IR02	A	1	W90318130335
4	RACK FOR EXTN. LINES & G.S. INSTRUMENTS	11335553010	00	IR03	B	1	W90318130041
5	RACK FOR EXTN. LINES & G.S. INSTRUMENTS	11335553010	01	IR04	B	1	W90318130050
6	RACK FOR HRH / M.S. PRESS. INSTRUMENTS	11335653010	00	IR05	A	1	W90318130068
7	RACK FOR CONTROL OIL PRESS. INSTRUMENTS	11335765010	00	IR06	A	1	W90318130343
8	RACK FOR CONTROL OIL PRESS. INSTRUMENTS	11335765010	01	IR07	A	1	W90318130351
9	RACK FOR CONTROL OIL PRESS. INSTRUMENTS	11335765010	02	IR08	A	1	W90318130360
10	RACK FOR LUBE OIL PRESS. INSTRUMENTS	11335965010	00	IR09	A	1	W90318130394
11	RACK FOR LUBE OIL PRESS. INSTRUMENTS	11335965010	01	IR10	A	1	W90318130408
12	RACK FOR LUBE OIL PRESS. INSTRUMENTS	11335965010	02	IR11	A	1	W90318130378
13	RACK FOR WATER INJECTION INSTRUMENTS	21336065010	00	IR13	A	1	W90318130386
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 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

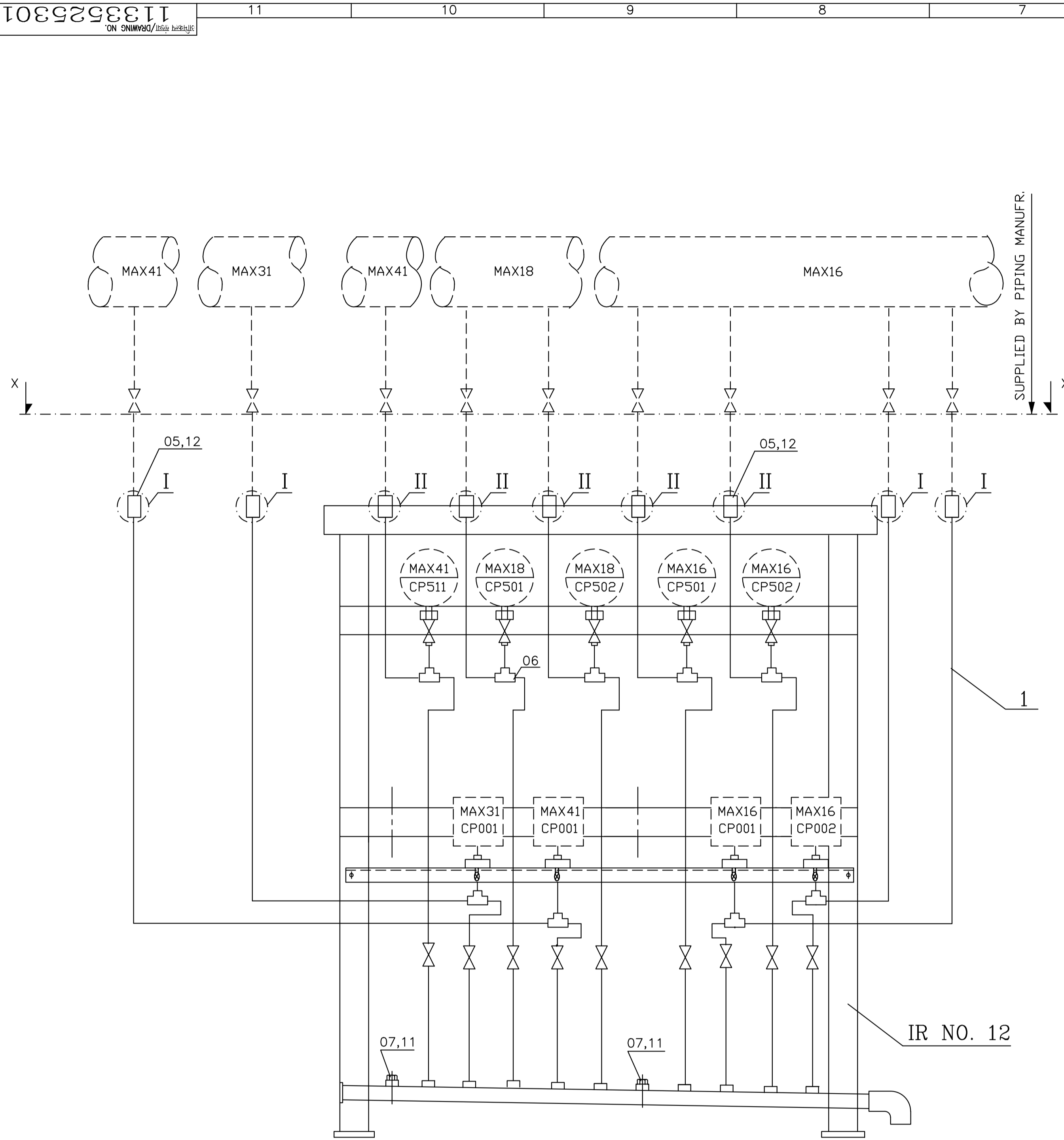
NOTE: *VENDOR LIST OF JUNCTION BOX (JB) APPLICABLE ONLY IF JB IS A BOUGHT OUT ITEM.

11335253010
ON 09/11/2010

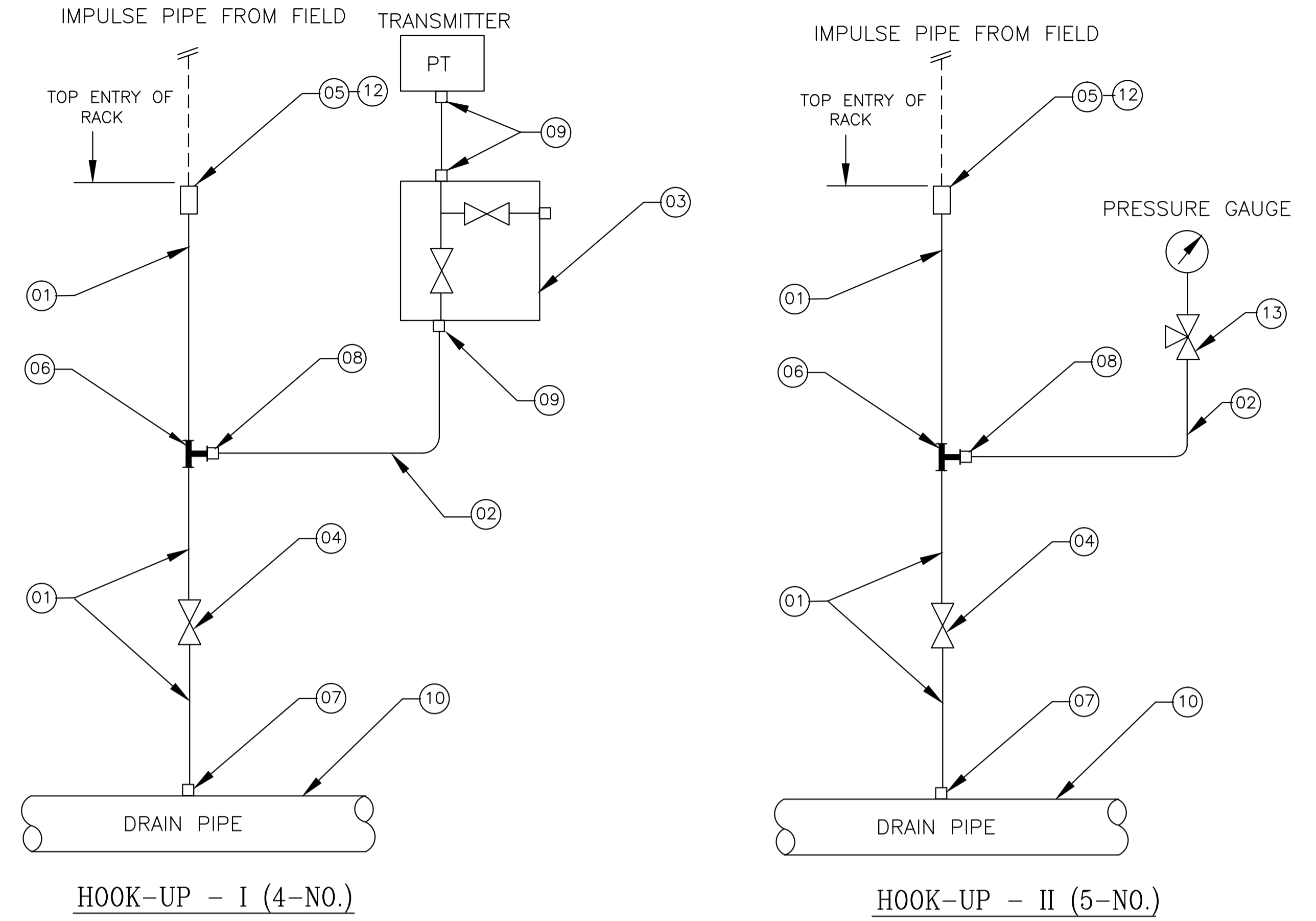
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प्रमाणित न हो, यह दस्तावेज़ केवल एक संदर्भ दस्तावेज़ है।
 संपूर्ण रूप से सही और उपयोगी नहीं है।

आभार/शुक्रिया/INVENTORY NO. 11335253010



INSTRUMENT RACK NO. 12.(VAR-00)
(TYPE-A)



HOOK-UP - I (4-NO.)

HOOK-UP - II (5-NO.)

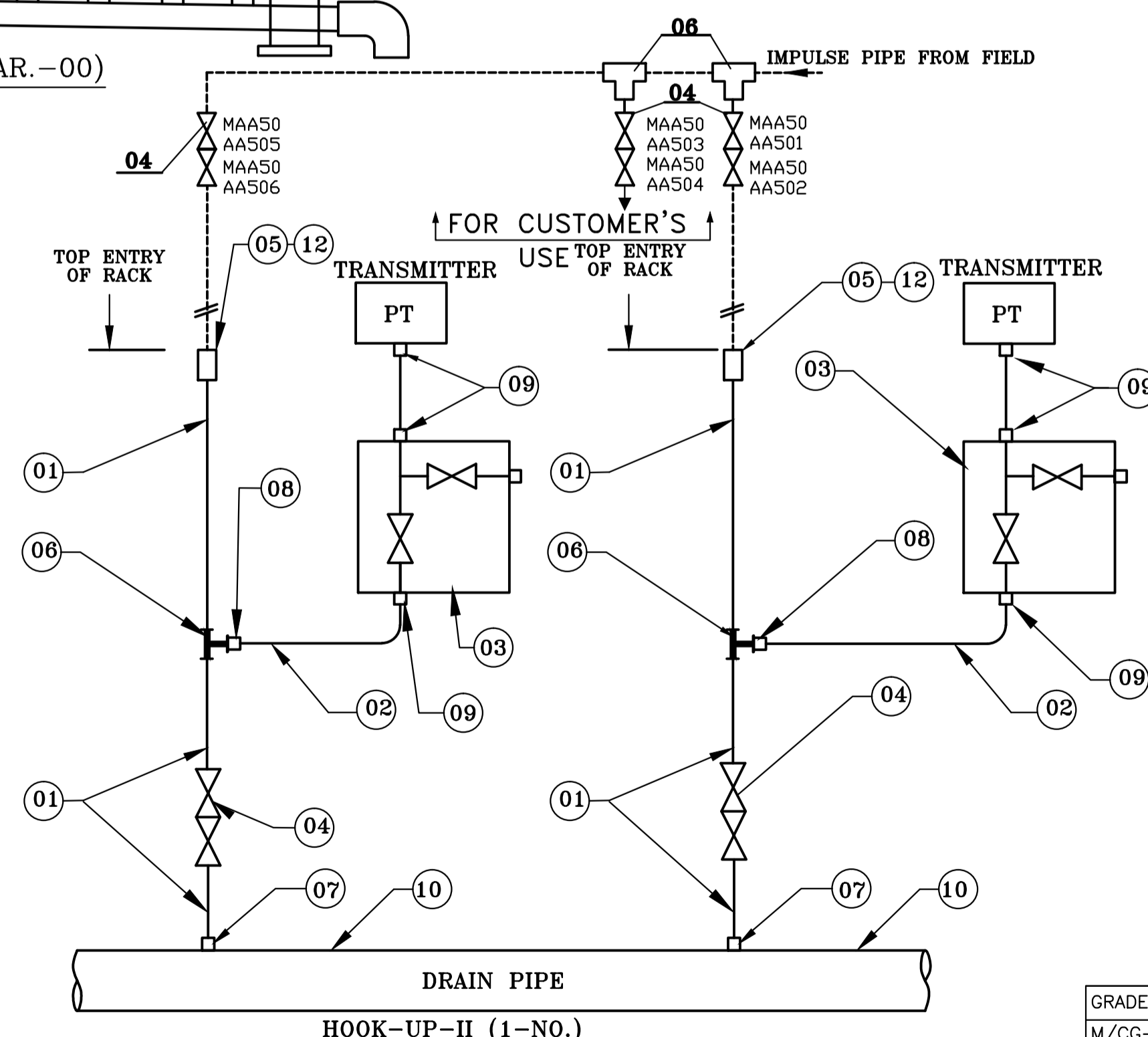
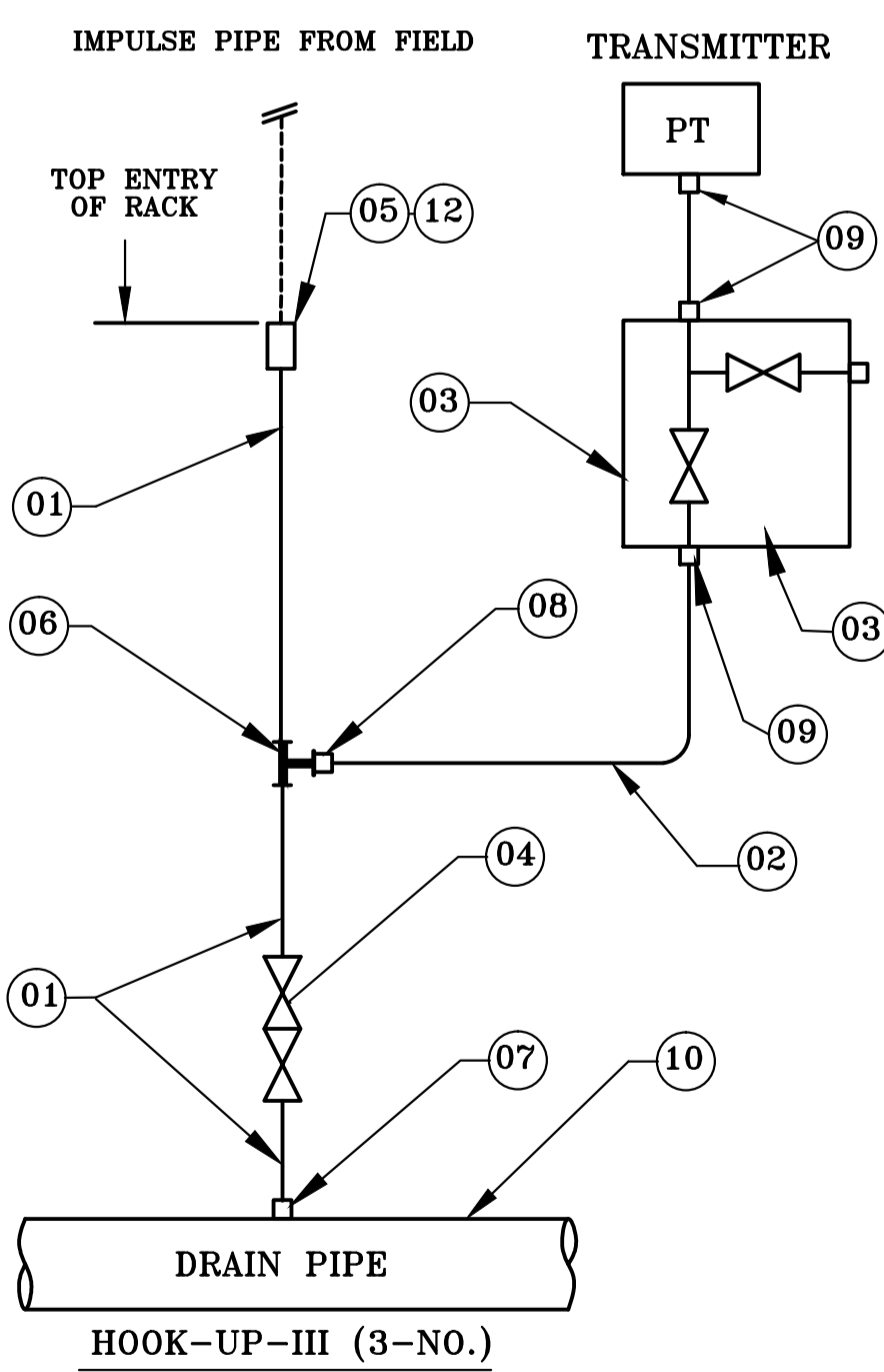
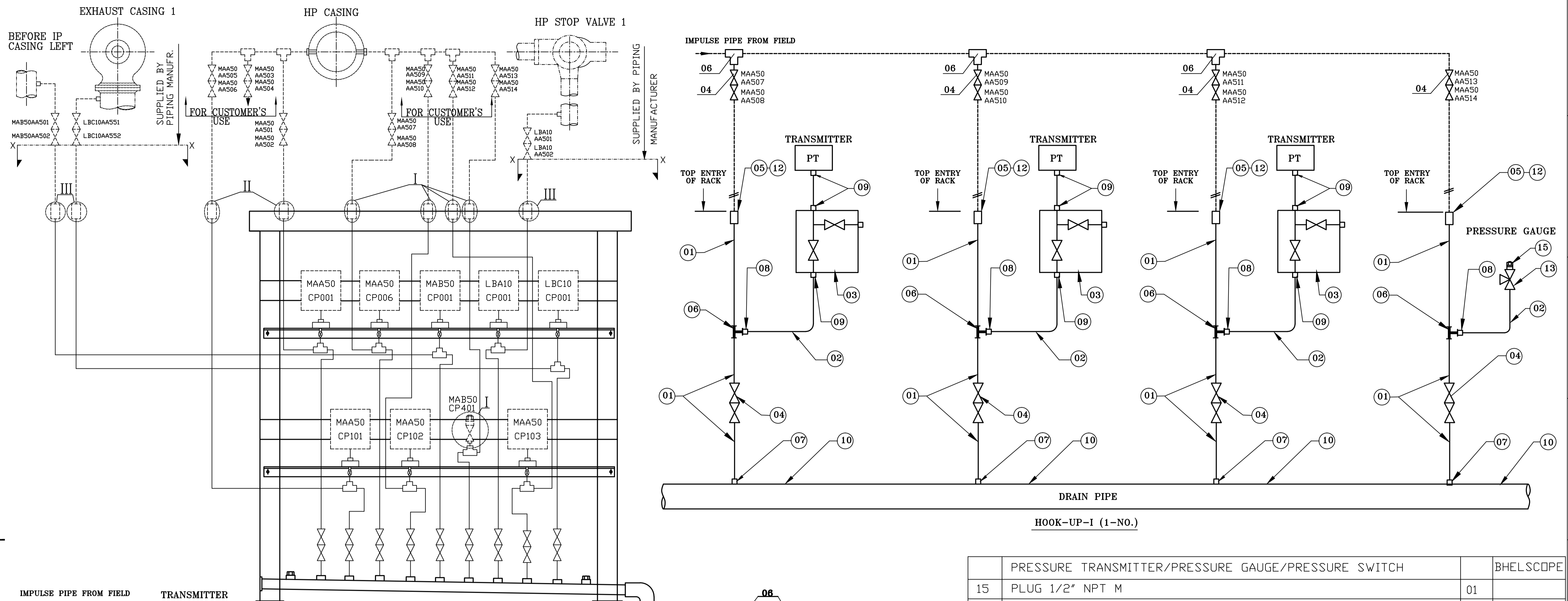
ITEM	DESCRIPTION	QTY	REMARKS
	PRESSURE TRANSMITTER/PRESSURE GAUGE/PRESSURE SWITCH		BHEL SCOPE
13	THREE WAY GAUGE COCK/ SS316/ SIZE 1/2" NPTF x 1/2" OD SS TUBE	05	
12	CAP NUT FOR BULK HEAD ASTM A105	09	
11	CAP NUT FOR HALF COUPLING ASTM A105	02	
10	DRAIN PIPE/ ASTM A182 Gr-F316 / SIZE 2" NB/ SCH-40	01	
09	TUBE FITTING DOUBLE FERRULE DOUBLE COMPRESSION/ MAT. SS316/ SIZE 1/2" NPTM x TO SUIT 1/2" OD SS TUBE	12	
08	TEE TUBE UNION/ SS316 / SIZE OD OF 1/2" NB SW x TO SUIT 1/2" OD SS TUBE	09	
07	HALF COUPLING/ASTM A182 Gr-F316/SIZE 1/2" NB SW/CL 3000lbs	11	
06	FORGED TEE/ASTM A182 Gr-F316/SIZE 1/2" NB SW/ CL 3000lbs	09	
05	BULK HEAD UNION/ASTM A182 Gr-F316/1/2" NB SW/CL 3000lbs	09	
04	FORGED GLOBE VALVE/ BODY ASTM A182 Gr-F316/ STEM ASTM A182 Gr-F6A / SIZE 1/2" NB SW/ CL 800	09	
03	TWO VALVE MANIFOLD, 1/2" NPTF/BODY/TRIM SS316/PR TESTING 3000PSI	04	
02	SEAMLESS SS TUBE, ASTM A213 TP 316L/SIZE 1/2" OD, THICK 2.1mm	A/R	
01	IMPULSE PIPE/ ASTM A213 Gr-TP316/ SIZE 1/2" NB / SCH-40	A/R	

00	W90318130017	असम्य विमाओं का वर्ग GRADE OF UNTOLERANCED DIMENSION	मौलिक/आवृत्ति MACHINING - AA0230208 m	समतल/समतल WELDING-CLASS 'B' OF AA0621104	समतल/समतल GAS CUTTING-TABLE 3 OF AA0621101	समतल/समतल STEAM TURBINE	उत्पाद का प्रकार या ग्राहक/परियोजना का नाम TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT	भारत हेवी इलेक्ट्रिकल्स लिमिटेड, रानीपुर, हरिद्वार BHARAT HEAVY ELECTRICALS LIMITED, RANIPUR, HARDWAR	नाम/नाम SSTEJSB SSTEJSB	हस्ताक्षर/हस्ताक्षर SSTEJK SSTEJK	दिनांक/दिनांक 09/11/2010 10/11/2010	संख्या/संख्या 118/11/2010	
REV.	DATE	ALTERED BY	REASON	REV.	DATE	ALTERED BY	REASON	DEPT.	SCALE	WEIGHT (KG)	REFER TO ASSLY. DRG.	ITEM NO.	NO. OF ITEMS
								STE	N.T.S.	225		11335253010	23 24

ASSEMBLED RACK FOR
FRF INSTRUMENTS.

अभिकल्प संख्या/DRAWING NO.
11335253010

11335365011
DRAWING NO.



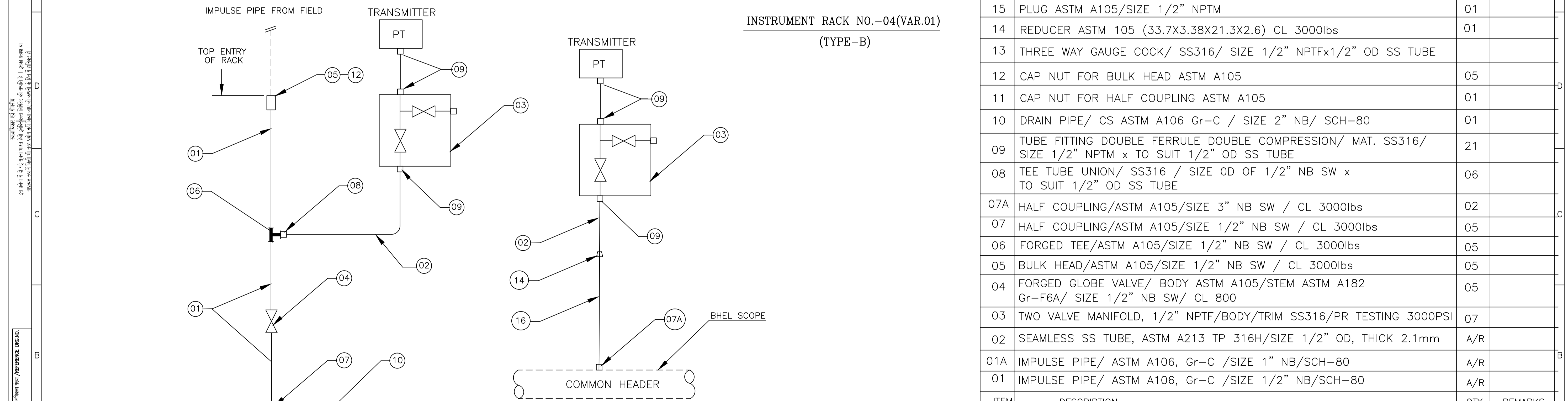
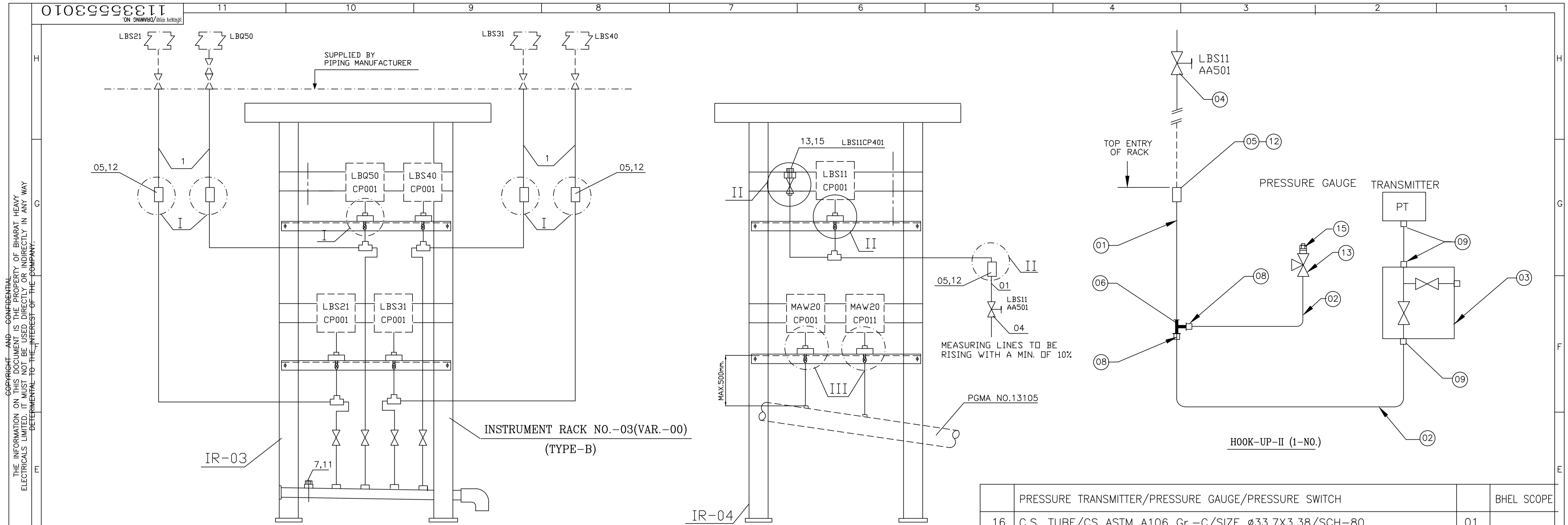
ITEM	DESCRIPTION	QTY	REMARKS
	PRESSURE TRANSMITTER/PRESSURE GAUGE/PRESSURE SWITCH		BHELSCOPE
15	PLUG 1/2" NPT M	01	
13	THREE WAY GAUGE COCK/ SS316/ SIZE 1/2" NPTF x 1/2" OD SS TUBE	01	
12	CAP NUT FOR BULK HEAD ASTM A105	09	
11	CAP NUT FOR HALF COUPLING ASTM A105	02	
10	DRAIN PIPE/ CS ASTM A106 Gr-C / SIZE 2" NB/ SCH-80	01	
09	TUBE FITTING DOUBLE FERRULE DOUBLE COMPRESSION/ MAT. SS316/ SIZE 1/2" NPTM x TO SUIT 1/2" OD SS TUBE	24	
08	TEE TUBE UNION/ SS316 / SIZE OD OF 1/2" NB SW x TO SUIT 1/2" OD SS TUBE	09	
07	HALF COUPLING/ASTM A182 GR-F22/SIZE 1/2" NB SW/CL 9000lbs	02	
06	FORGED TEE/ASTM A182 GR-F22/SIZE 1/2" NB SW / CL 9000lbs	10	
05	BULK HEAD/ASTM A182 GR-F22/SIZE 1/2" NB SW / CL 9000lbs	09	
04	FORGED GLOBE VALVE/ BODY ASTM A182 F22/STEM ASTM A182 Gr-F6A/ SIZE 1/2" NB SW/ CL 3000 SPL	32	
03	TWO VALVE MANIFOLD, 1/2" NPTF/BODY/TRIM SS316/PR TESTING 9000PSI.	08	
02	SEAMLESS S.S. TUBE, ASTM A213 TP 316H/SIZE 1/2" OD, THICK 2.1mm	A/R	
01	IMPULSE PIPE/ ASTM A335, Gr-P22/ SIZE 1/2" NB / SCH-XXS	A/R	

NOTE:- ITEM NO. 04 & 06 INDICATED BEYOND BULK HEAD, SHALL BE SUPPLIED AS LOOSE WITH THE ASSEMBLED RACK.

00 W90318130327
VAR.NO. MATERIAL CODE

CBOM NO. 21335365000		STATUS OF DRG.		TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT		STEAM TURBINE	
AGREED	NAME	SIGN	DATE				
GRADE OF UNTOL. DIM.:- M/CG- V/C/M/F AA 0230208				DEPT. STE			
WELDING-A/B/C/D-AA621104				SCALE N.T.S.			
GAS CUTTING-T3'AA0621101				WEIGHT(Kg.) 200			
REV.	DATE	ALTERED CHECKED	REV.	DATE	ALTERED CHECKED	REF. TO ASSY. DRG.	
Bharat Heavy Electricals Ltd. HARDWAR				ITEM NO. OF SHEETS 15			
TITLE ASSEMBLED RACK FOR MS PR. INST				DRAWING NO. 11335365010			
				SHEET NO. 1 NO. OF SHEETS 1			

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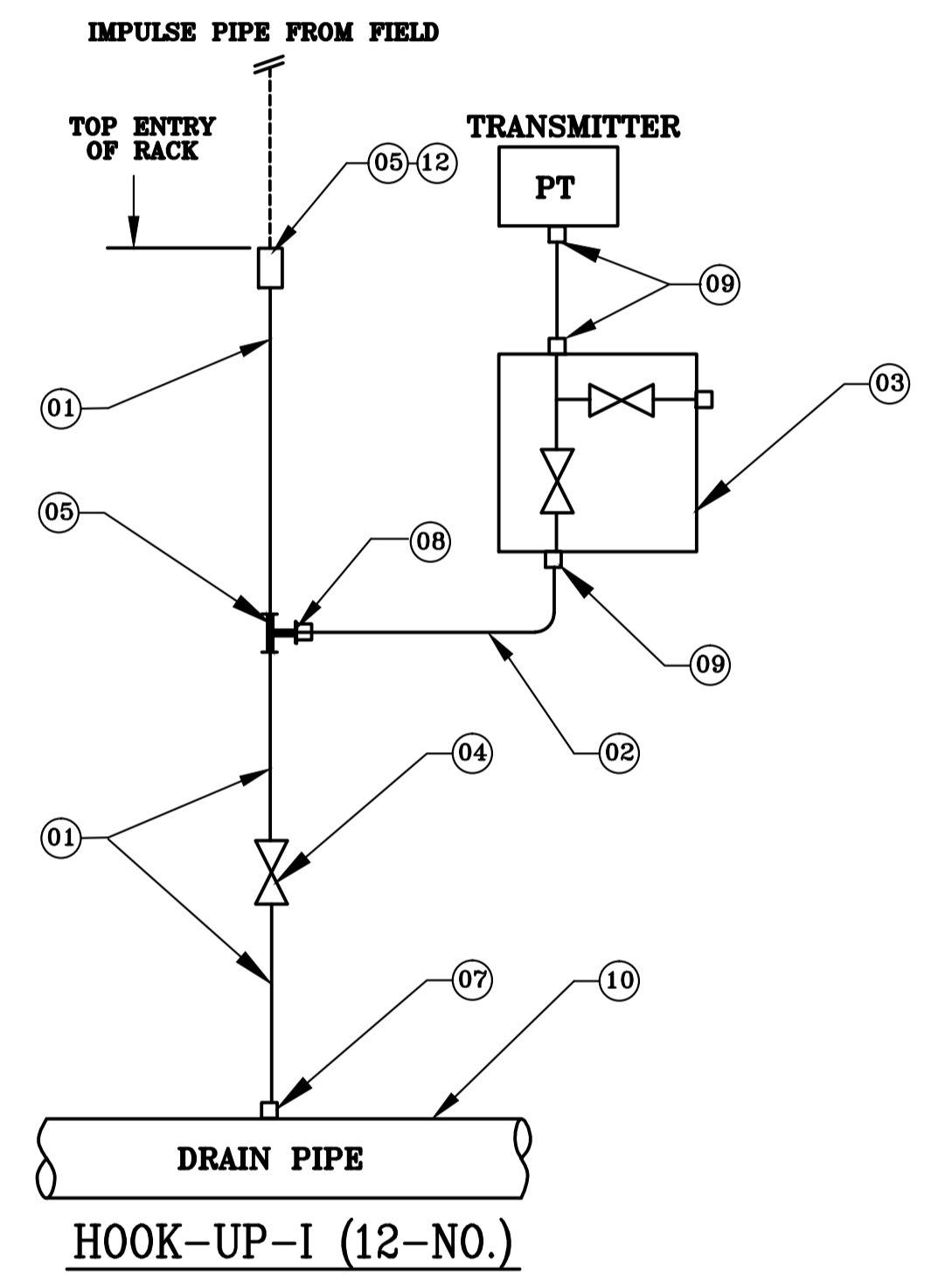
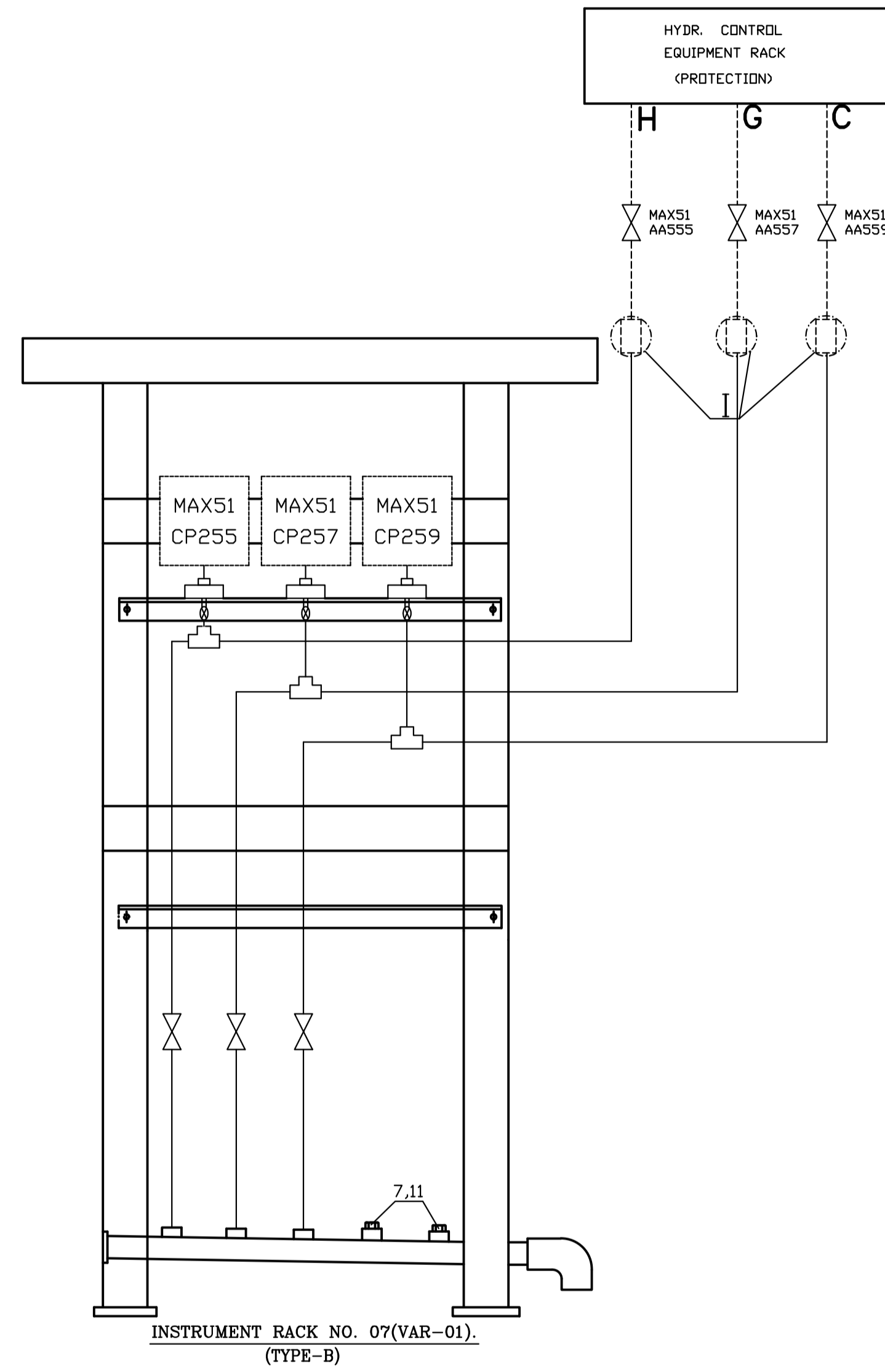
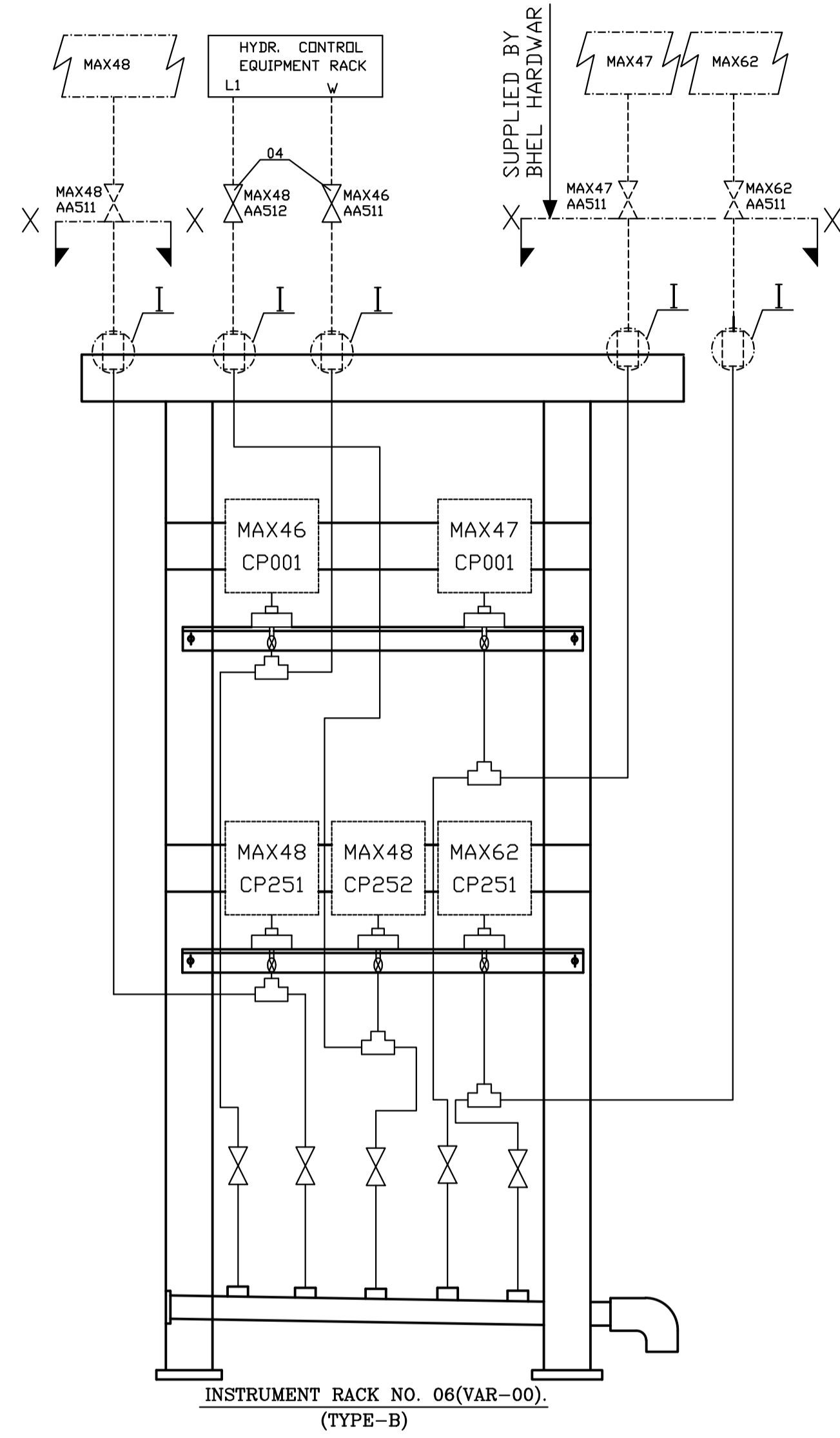
ITEM	DESCRIPTION	QTY	REMARKS
	PRESSURE TRANSMITTER/PRESSURE GAUGE/PRESSURE SWITCH		BHEL SCOPE
16	C.S. TUBE/CS ASTM A106 Gr.-C/SIZE $\phi 33.7 \times 3.38$ /SCH-80	01	
15	PLUG ASTM A105/SIZE 1/2" NPTM	01	
14	REDUCER ASTM 105 (33.7X3.38X21.3X2.6) CL 3000lbs	01	
13	THREE WAY GAUGE COCK/ SS316/ SIZE 1/2" NPTFx1/2" OD SS TUBE		
12	CAP NUT FOR BULK HEAD ASTM A105	05	
11	CAP NUT FOR HALF COUPLING ASTM A105	01	
10	DRAIN PIPE/ CS ASTM A106 Gr.-C / SIZE 2" NB/ SCH-80	01	
09	TUBE FITTING DOUBLE FERRULE DOUBLE COMPRESSION/ MAT. SS316/ SIZE 1/2" NPTM x TO SUIT 1/2" OD SS TUBE	21	
08	TEE TUBE UNION/ SS316 / SIZE OD OF 1/2" NB SW x TO SUIT 1/2" OD SS TUBE	06	
07A	HALF COUPLING/ASTM A105/SIZE 3" NB SW / CL 3000lbs	02	
07	HALF COUPLING/ASTM A105/SIZE 1/2" NB SW / CL 3000lbs	05	
06	FORGED TEE/ASTM A105/SIZE 1/2" NB SW / CL 3000lbs	05	
05	BULK HEAD/ASTM A105/SIZE 1/2" NB SW / CL 3000lbs	05	
04	FORGED GLOBE VALVE/ BODY ASTM A105/STEM ASTM A182 Gr-F6A/ SIZE 1/2" NB SW/ CL 800	05	
03	TWO VALVE MANIFOLD, 1/2" NPTF/BODY/TRIM SS316/PR TESTING 3000PSI	07	
02	SEAMLESS SS TUBE, ASTM A213 TP 316H/SIZE 1/2" OD, THICK 2.1mm	A/R	
01A	IMPULSE PIPE/ ASTM A106, Gr.-C /SIZE 1" NB/SCH-80	A/R	
01	IMPULSE PIPE/ ASTM A106, Gr.-C /SIZE 1/2" NB/SCH-80	A/R	

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01 W90318130050 00 W90318130041 VAR.NO. MATERIAL CODE	अमृत्यु विमाओं का वर्ग GRADE OF UNTOLERANCED DIMENSION 21335553000 MACHINING - AA0230208 m वेल्डिंग - एए0021104 को अंगों में WELDING-CLASS 'B' OF AA021104 गैस काटिंग - एए0021101 को सारांग 3 GAS CUTTING-TABLE 3 OF AA021101	सी.बी.ओ.ए./C.B.O.M. नाम/NAME दिनांक/DATE	जयपुर का प्रकार या ग्राहक/परियोजना का नाम TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT STEAM TURBINE
संशोधन/REV. तिथि/DATE अमृत्यु/ALTERED BY कारण/REASON	संशोधन/REV. तिथि/DATE अमृत्यु/ALTERED BY कारण/REASON	संशोधन/REV. तिथि/DATE अमृत्यु/ALTERED BY कारण/REASON	नाम/NAME हस्ताक्षर/SIGN तिथि/DATE संशोधन/REV.
भाग/SCALE N.T.S.		भार/WEIGHT (KG) 155	आसन्न/REFER TO ASSLY. DRG.
आसन्न/REFER TO ASSLY. DRG.			आसन्न/REFER TO ASSLY. DRG.
आसन्न/REFER TO ASSLY. DRG.			आसन्न/REFER TO ASSLY. DRG.

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11335765010
DRAWING NO.



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SIGN. & DATE

INVENTORY NO.

02	W90318130360	GRADE OF UNTOL. DIM.:-
01	W90318130351	M/CG- V/C/M/F AA 0230208
00	W90318130343	WELDING-A/B/C/D-AA621104
VAR.NO.	MATERIAL CODE	GAS CUTTING-T3'AA0621101

REV.	DATE	ALTERED CHECKED

CBOM NO.		STATUS OF DRG.	
21335765000			
AGREED	NAME	SIGN	DATE

TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT		STEAM TURBINE	
DEPT. STE		SCALE	WEIGHT(Kg.)
CODE 4011		N.T.S.	150
TITLE		REF. TO ASSY. DRG.	
ASSY.RACK FOR CON.OIL PR.INST.			
DRAWING NO.		NO.OF SHEETS	
11335765010		2	

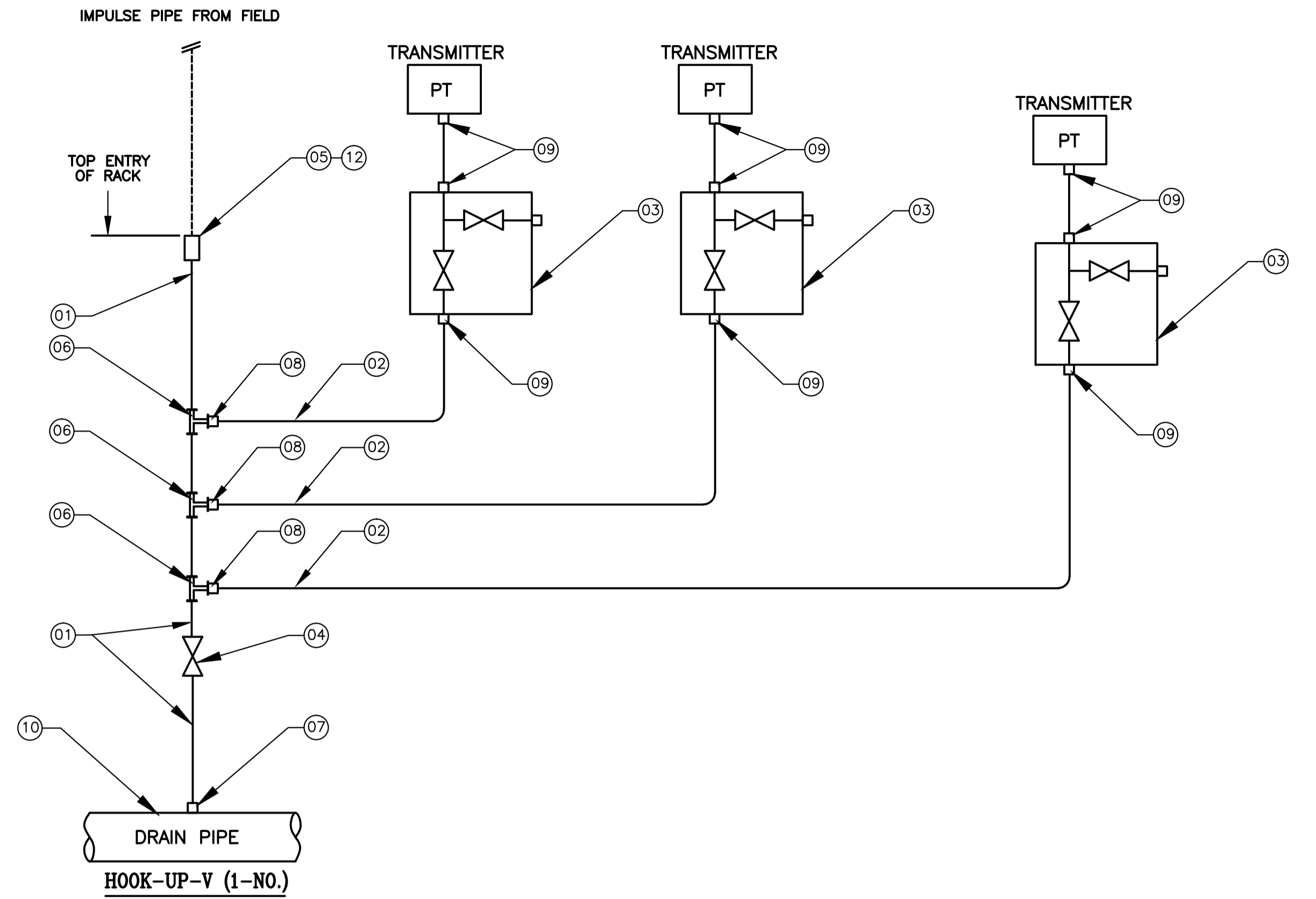
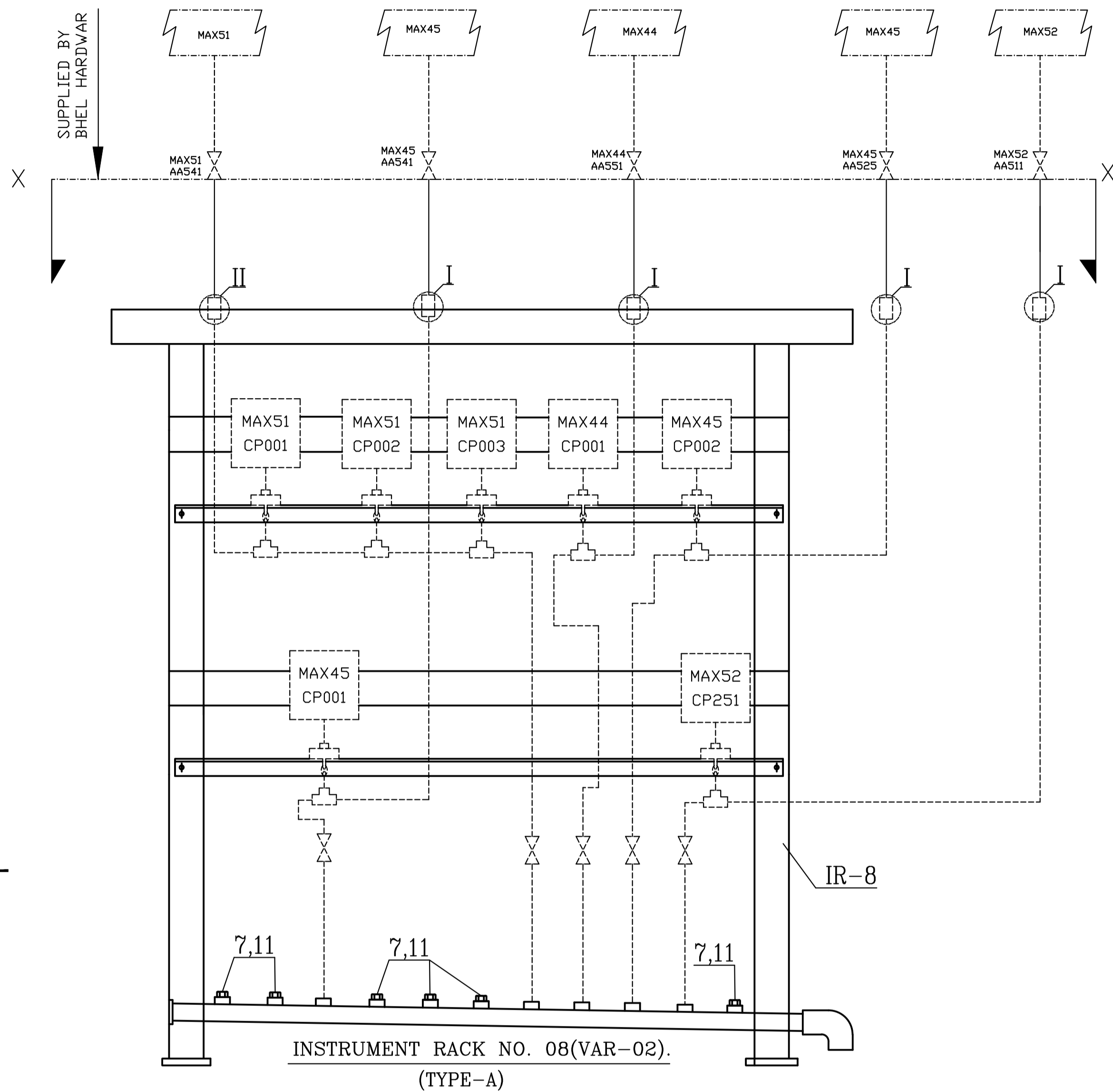
DRN	NAME	SIGN	DATE	NO.OF VAR.
CHD				
APD				

DEPT. STE	SCALE	WEIGHT(Kg.)	REF. TO ASSY. DRG.	ITEM NO.	NO.OF ITEMS
CODE 4011	N.T.S.	150			

DRAWING NO. 11335765010 SHEET NO. 1 NO.OF SHEETS 2

SIZE A1

11335765010
DRAWING NO.



ITEM	DESCRIPTION	QTY	REMARKS
	PRESSURE TRANSMITTER/PRESSURE GAUGE/PRESSURE SWITCH		BHEL SCOPE
12	CAP NUT FOR BULK HEAD ASTM A105	13	
11	CAP NUT FOR HALF COUPLING ASTM A105	20	
10	DRAIN PIPE/ ASTM A182 Gr-F316 / SIZE 2" NB/ SCH-40	03	
09	TUBE FITTING DOUBLE FERRULE DOUBLE COMPRESSION/ MAT. SS316/ SIZE 1/2" NPTM x TO SUIT 1/2" OD SS TUBE	66	
08	TEE TUBE UNION/ SS316 / SIZE OD OF 1/2" NB SW x TO SUIT 1/2" OD SS TUBE	22	
07	HALF COUPLING/ASTM A182 Gr-F316/SIZE 1/2" NB SW/CL 3000lbs	21	
06	FORGED TEE/ASTM A182 Gr-F316/SIZE 1/2" NB SW/ CL 3000lbs	22	
05	BULK HEAD UNION/ASTM A182 Gr-F316/1/2" NB SW/CL 3000lbs	13	
04	FORGED GLOBE VALVE/ BODY ASTM A182 Gr-F316/ STEM ASTM A182 Gr-F6A / SIZE 1/2" NB SW/ CL 800	18	
03	TWO VALVE MANIFOLD, 1/2" NPTF/BODY/TRIM SS316/PR TESTING 3000PSI	22	
02	SEAMLESS SS TUBE, ASTM A213 TP 316L/SIZE 1/2" OD, THICK 2.1mm	A/R	
01	IMPULSE PIPE/ ASTM A213 Gr-TP316/ SIZE 1/2" NB / SCH-40	A/R	

NOTE:- ITEM NO. 04 INDICATED BEYOND BULK HEAD, SHALL BE SUPPLIED AS LOOSE WITH THE ASSEMBLED RACK.

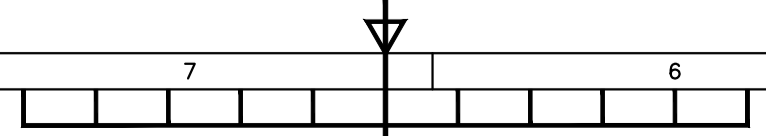
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SIGN & DATE

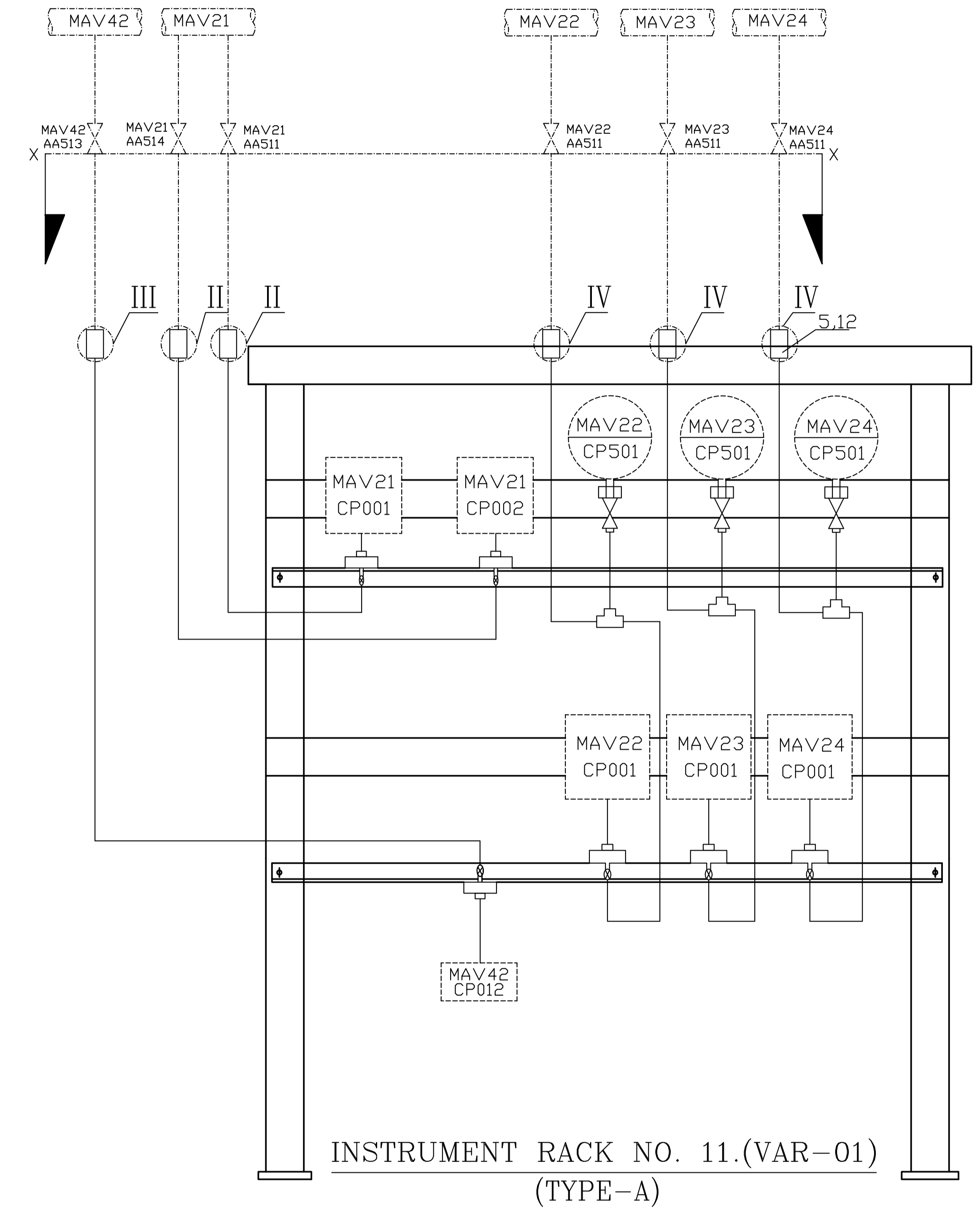
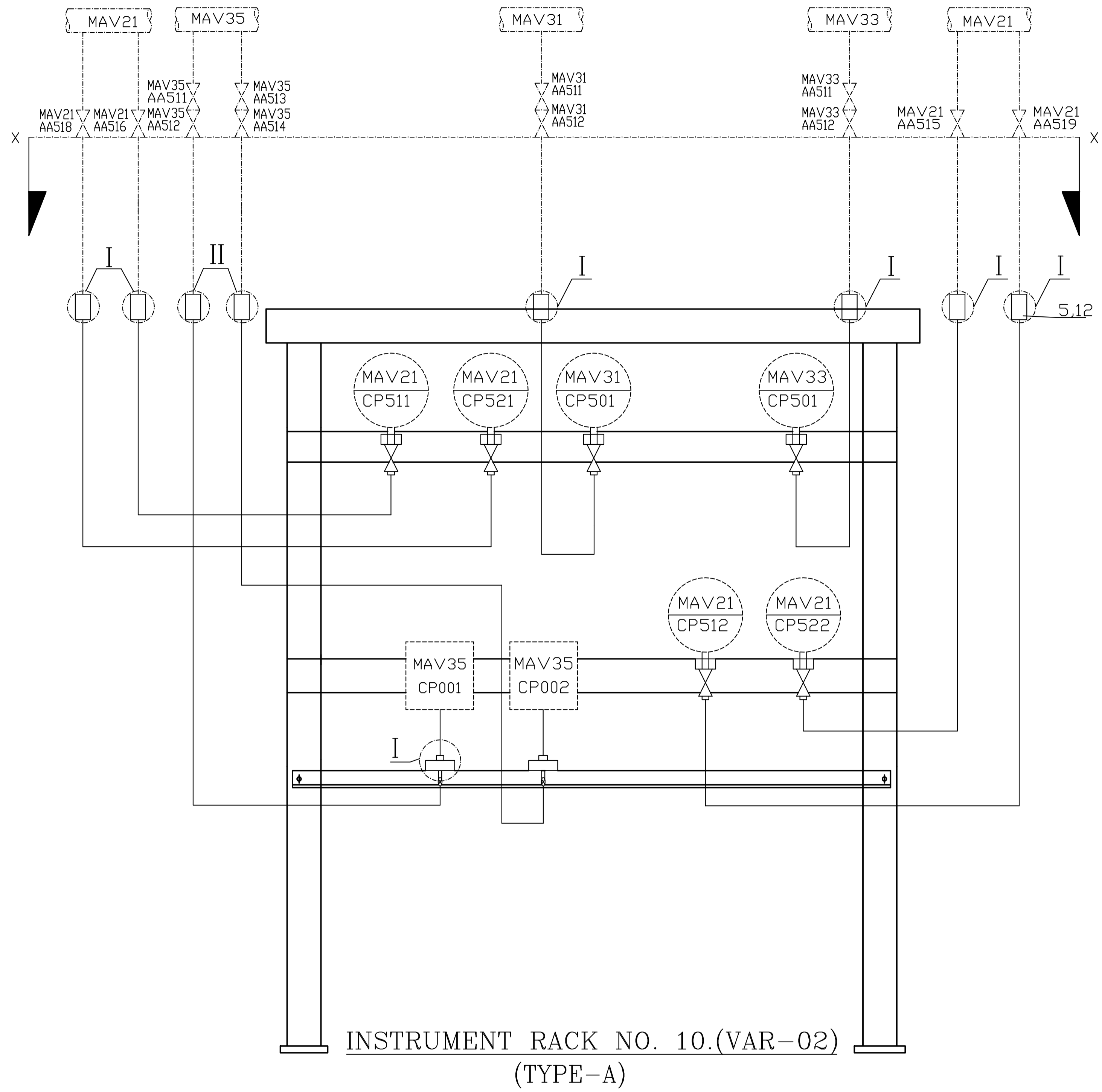
INVENTORY NO.

02	W90318130360	GRADE OF UNTOL. DIM.:-	CBOM NO. 21335765000	STATUS OF DRG.	TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT STEAM TURBINE
01	W90318130351	M/CG- V/C/M/F AA 0230208	AGREED DEPT.	NAME SIGN DATE	
00	W90318130343	WELDING-A/B/C/D-AA621104			
VAR.NO.	MATERIAL CODE	GAS CUTTING-T3'AA0621101	REV. DATE	ALTERED CHECKED	DEPT. STE CODE 4011
			REV. DATE	ALTERED CHECKED	SCALE N.T.S.
					WEIGHT(Kg.) 150
					REF. TO ASSY. DRG.
					ITEM NO. OF SHEETS 2
					DRAWING NO. 11335765010
					SHEET NO. 2

ASSY.RACK FOR CON.OIL PR.INST.
DRAWING NO. 11335765010
SHEET NO. 2



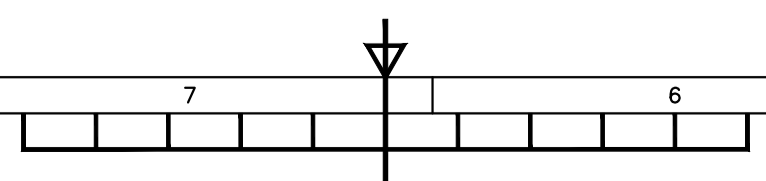
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DRAWING NO.



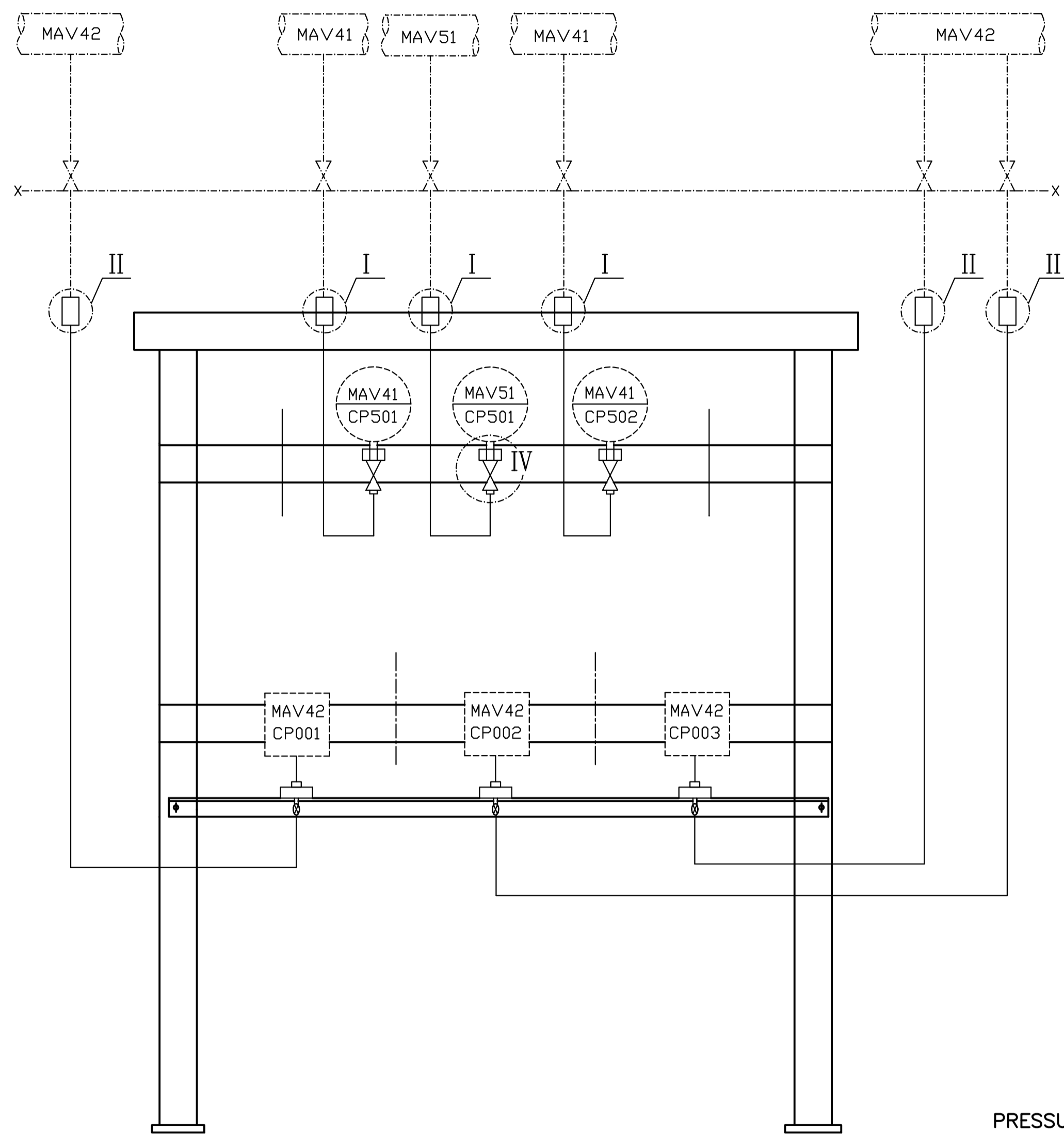
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INVENTORY NO. SIGN & DATE REF. DRG NO.

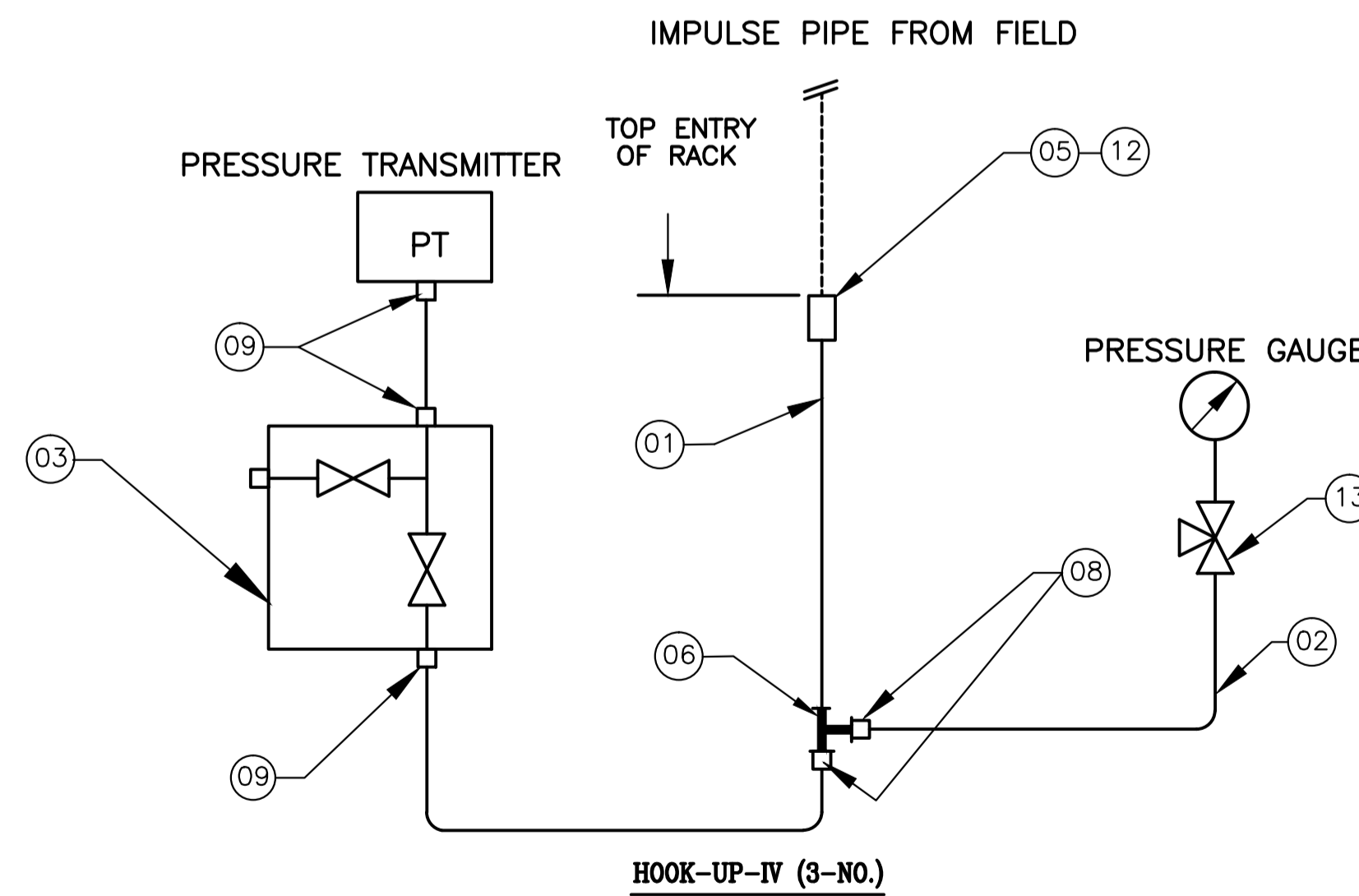
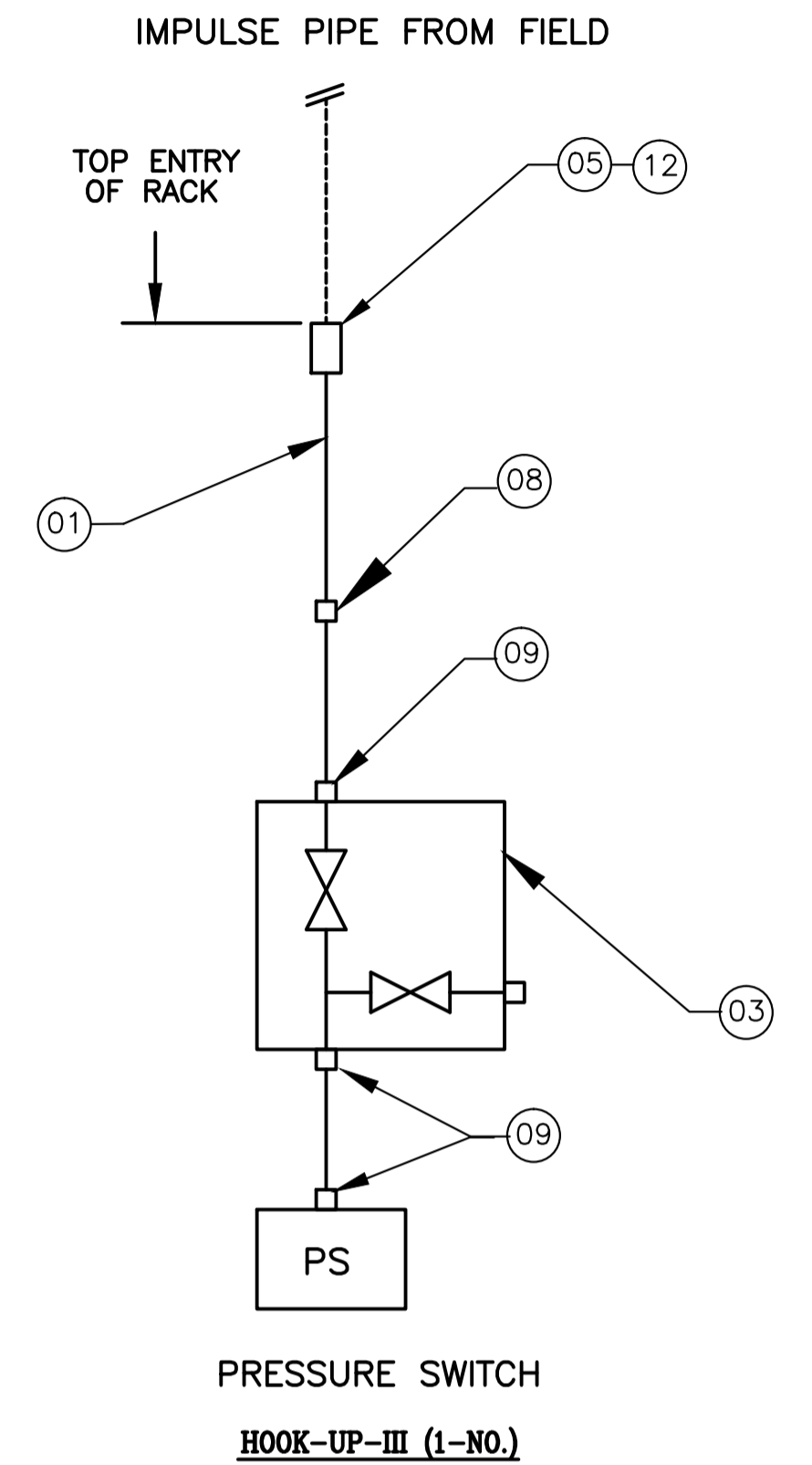
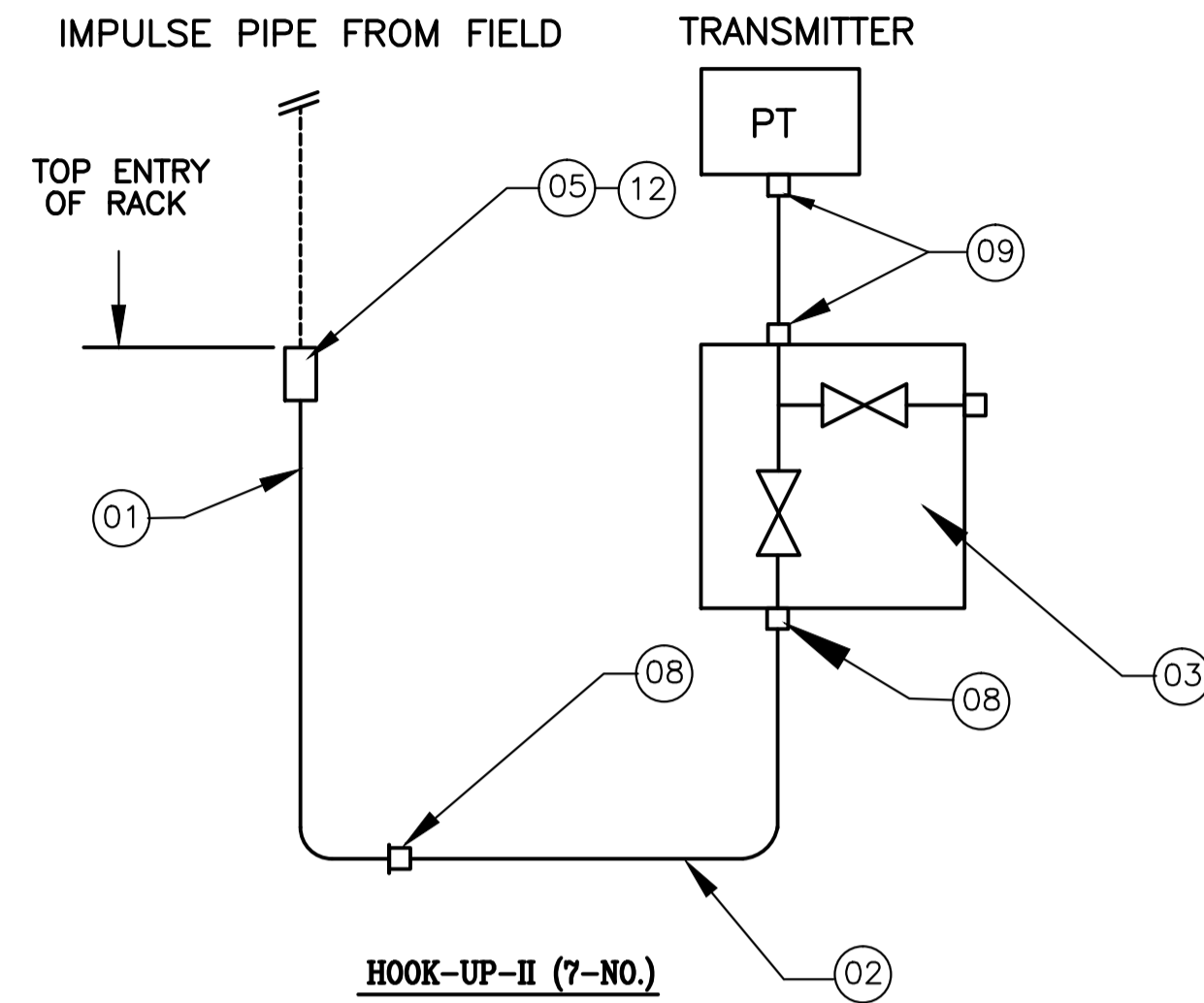
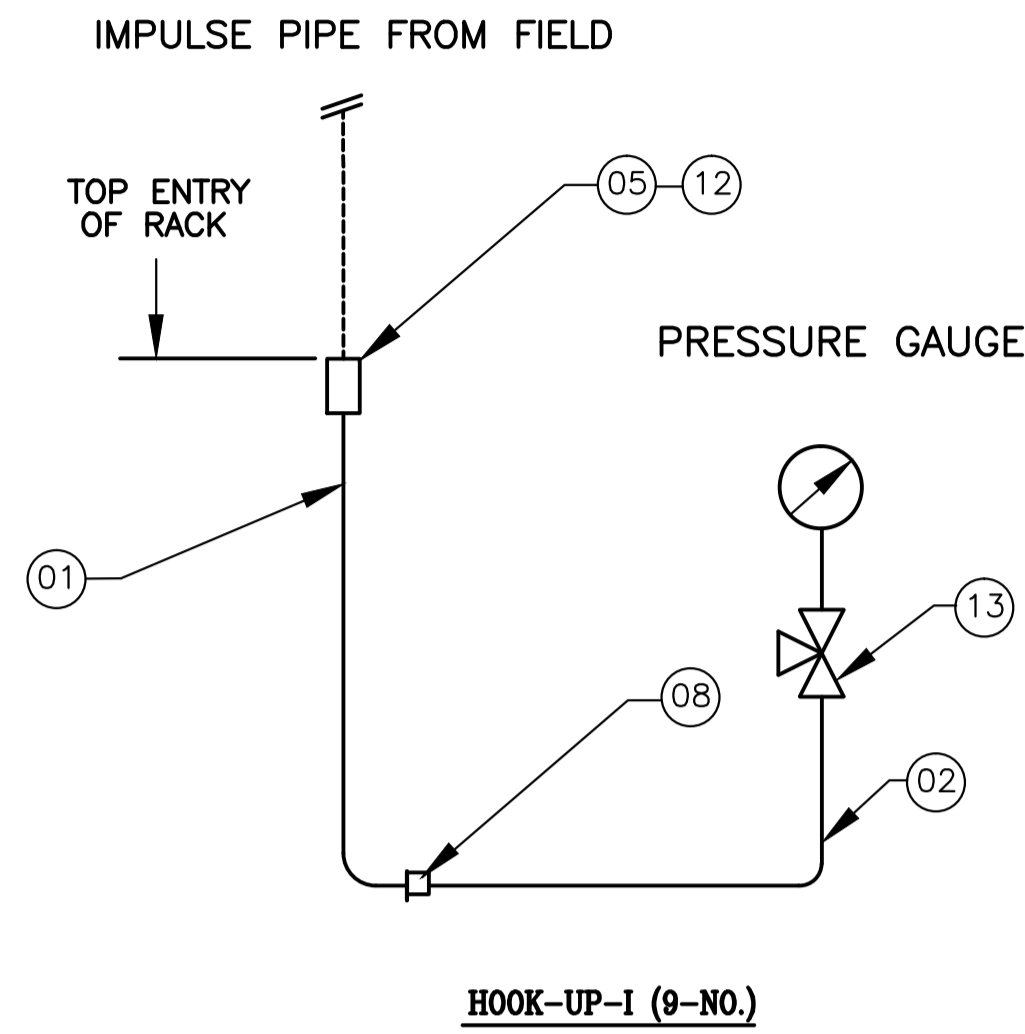
CBOM NO. 21335965000		STATUS OF DRG.		TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT				STEAM TURBINE					
AGREED	DEPT.	NAME	SIGN	DATE									
02	W90318130378	GRADE OF UNTOL. DIM.:-											
01	W90318130408	M/CG- V/C/M/F AA 0230208											
00	W90318130394	WELDING-A/B/C/D-AA621104											
VAR.NO.	MATERIAL CODE	GAS CUTTING-T3'AA0621101											
REV.	DATE	ALTERED	CHECKED	REV.	DATE	ALTERED	CHECKED	DEPT. STE	SCALE	WEIGHT(Kg.)	REF. TO ASSY. DRG.	ITEM NO.	NO.OF ITEMS
								CODE 4011	N.T.S.	150		73, 74	75, 77
TITLE								DRAWING NO.					
ASSY. RACK FOR LUB OIL PR.INST								11335965010					
								SHEET NO. 1 NO.OF SHEETS 1					



11335965010
DRAWING NO.



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



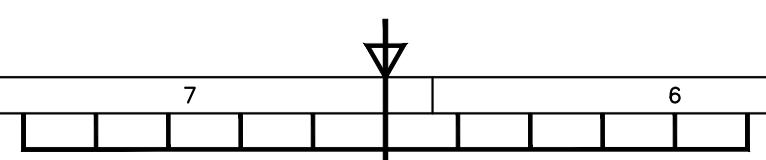
ITEM	DESCRIPTION	QTY	REMARKS
	PRESSURE TRANSMITTER/PRESSURE GAUGE/PRESSURE SWITCH		BHEL SCOPE
13	THREE WAY GAUGE COCK/ SS316/ SIZE 1/2" NPTFx1/2" OD SS TUBE	12	
12	CAP NUT FOR BULK HEAD ASTM A105	20	
09	TUBE FITTING DOUBLE FERRULE DOUBLE COMPRESSION/ MAT. SS316/ SIZE 1/2" NPTM x TO SUIT 1/2" OD SS TUBE	33	
08	TEE TUBE UNION/ SS316 / SIZE OD OF 1/2" NB SW x TO SUIT 1/2" OD SS TUBE	20	
06	FORGED TEE/ASTM A105/SIZE 1/2" NB SW / CL 6000lbs	03	
05	BULK HEAD/ASTM A105/SIZE 1/2" NB SW / CL 3000lbs	20	
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	

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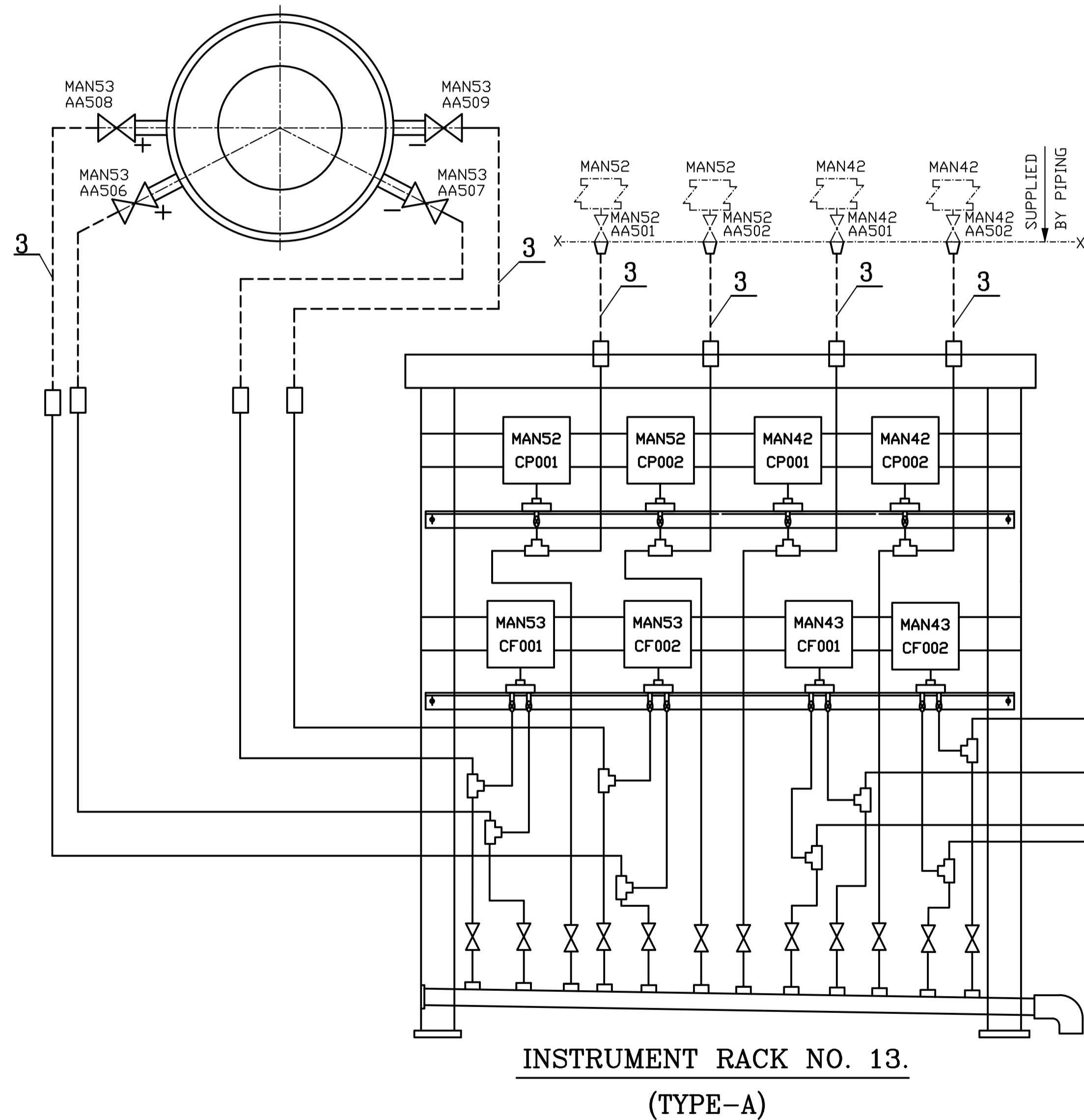
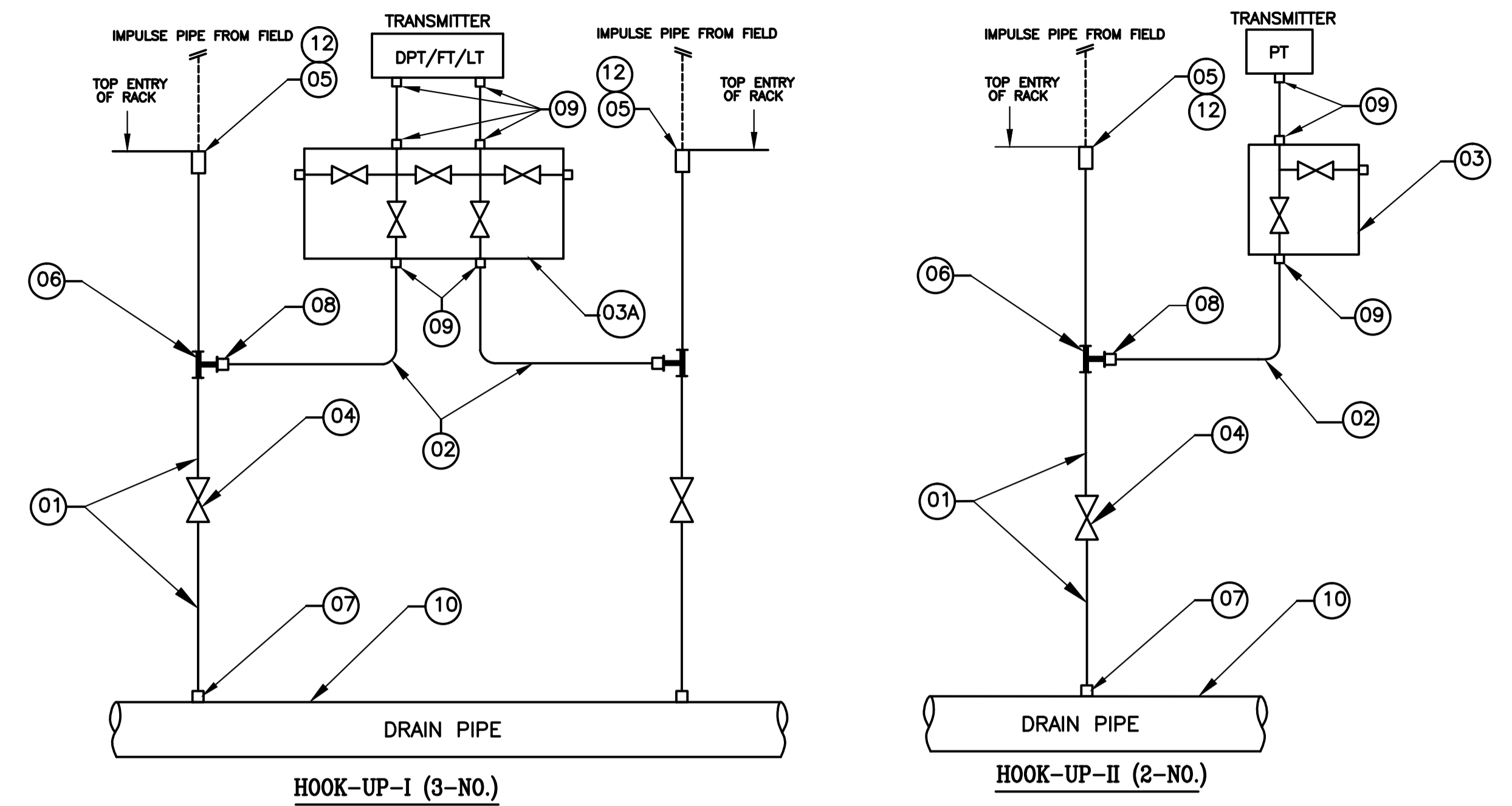
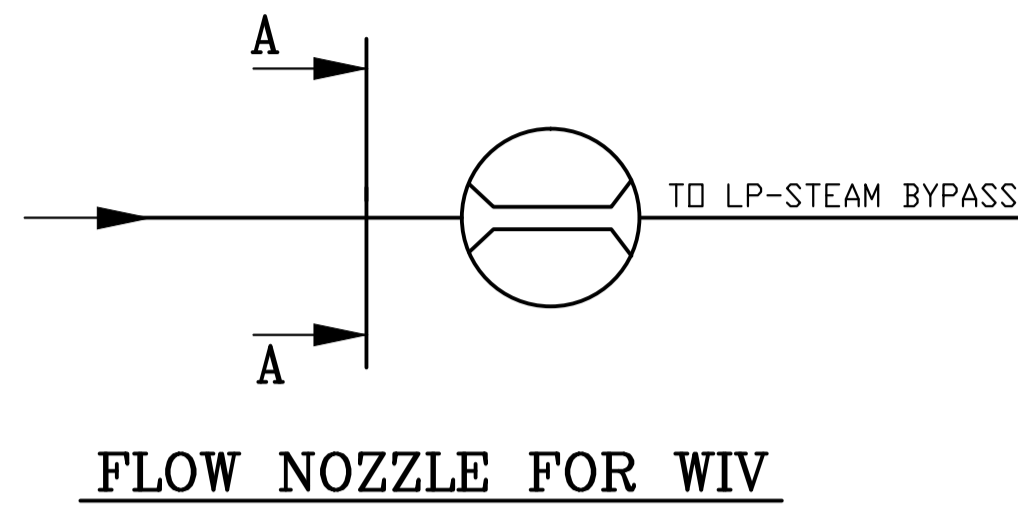
INVENTORY NO. SIGN & DATE REF. DRG NO.

REV.	DATE	ALTERED CHECKED	REV.	DATE	ALTERED CHECKED
02					
01					
00					
VAR.NO.					

CBOM NO. 21335965000		STATUS OF DRG.		TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT			
AGREED	NAME	SIGN	DATE	STEAM TURBINE			
BHARAT HEAVY ELECTRICALS LTD. HARDWAR				DRN	SSTEBLR	SSTEBLR	DATE
				CHD	SSTEGG	SSTEGG	07/11/2014
				APD			05/11/2014
DEPT. STE	SCALE	WEIGHT(Kg.)	REF. TO ASSY. DRG.	NO. OF VARS.			
CODE 4011	N.T.S.	150		73, 74			
TITLE				ITEM NO. OF ITEMS			
ASSY. RACK FOR LUB OIL PR.INST				75, 77			
DRAWING NO. 11335965010				NO. OF SHEETS 2			



11336064510
DRAWING NO.



ITEM	DESCRIPTION	QTY	REMARKS
	PRESSURE TRANSMITTER/PRESSURE GAUGE/PRESSURE SWITCH		BHEL SCOPE
14	REDUCER/ASTM A105 / SIZE 1" NB SW x 1/2" NB SW/CL 3000lbs	04	
12	CAP NUT FOR BULK HEAD ASTM A105	12	
10	DRAIN PIPE/ CS ASTM A106 Gr-C / SIZE 2" NB/ SCH-80	01	
09	TUBE FITTING DOUBLE FERRULE DOUBLE COMPRESSION/ MAT. SS316/ SIZE 1/2" NPTM x TO SUIT 1/2" OD SS TUBE	36	
08	TEE TUBE UNION/ SS316 / SIZE OD OF 1/2" NB SW x TO SUIT 1/2" OD SS TUBE	12	
06	FORGED TEE/ASTM A105/SIZE 1/2" NB SW / CL 3000lbs	12	
05	BULK HEAD/ASTM A105/SIZE 1/2" NB SW / CL 3000lbs	12	
04	FORGED GLOBE VALVE/ BODY ASTM A105/STEM ASTM A182 Gr-F6A/ SIZE 1/2" NB SW/ CL 800	20	
03A	FIVE VALVE MANIFOLD, 1/2" NPTF/BODY/TRIM SS316/PR TESTING 3000PSI	04	
03	TWO VALVE MANIFOLD, 1/2" NPTF/BODY/TRIM SS316/PR TESTING 3000PSI	04	
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	

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00	W90318130386
VAR.NO.	MATERIAL CODE

CBOM NO. 21336064500	STATUS OF DRG.	TYPE OF PRODUCT OR NAME OF CUSTOMER/ PROJECT
AGREED DEPT.	NAME SIGN DATE	
GRADE OF UNTOL. DIM.:- M/CG- V/C/M/F AA 0230208 WELDING-A/B/C/D-AA621104 GAS CUTTING-T3'AA0621101	REV. DATE ALTERED CHECKED	REV. DATE ALTERED CHECKED
DEPT. STE CODE 4011	SCALE N.T.S.	WEIGHT(Kg.) 0
BHARAT HEAVY ELECTRICALS LTD. HARDWAR		NAME SIGN DATE NO. OF VAR. DRN SSTEBLR SSTEBLR 16/10/2014 CHD APD
REF. TO ASSY. DRG. 21336064500		ITEM NO. NO. OF ITEMS 02 14 23, 24
TITLE ASSY RACK FOR WATER INJT.INST.		DRAWING NO. 11336064510
SHEET NO. 1		NO. OF SHEETS 1

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