

15558/2020/PE-SD-450_PE

Form No:	 PE&SD	BHARAT HEAVY ELECTRICALS LIMITED PROJECT ENGINEERING & SYSTEMS DIVISION	PY 52036
		PURCHASE SPECIFICATION	Rev. No. 02
		PRE-FORMED CALCIUM SILICATE THERMAL INSULATION	Page 1 of 3

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PRE-FORMED CALCIUM SILICATE THERMAL INSULATION

1.0 GENERAL

This specification covers design and material requirements for supply of above ground, external calcium silicate insulation of piping and equipment operating upto 650 degC for the purpose of heat conservation, process stabilization, temperature maintenance, personnel and fire protection.

This specification is suitable for use in normal process plant atmospheres.

All the codes/standards mentioned in this specification shall be of latest issue.

2.0 CODES AND STANDARDS:

Following codes and standards to be followed for supply of Calcium silicate preformed blocks, slabs and pipe sections:

IS 8154 : Preformed Calcium Silicate Insulation (For temperatures up to 650 deg C)

3.0 MATERIAL REQUIREMENTS:

Manufacturing, Physical & Chemical properties, Inspection and Testing of Calcium silicate preformed blocks, slabs and pipe sections to be supplied under this specification shall conform to the latest edition of the **IS 8154** at an application density specifically as per Job Specification for any project.

4.0 SCOPE OF SUPPLY:

4.1 Pre-formed Calcium Silicate blocks shall be supplied as per the detailed BOQ specified in the Job Specification.

4.2 In addition, the following materials also shall be supplied:

- Calcium Silicate Powder (for filling the joints and gaps), measured in Kgs, quantity of which shall be **at least 5% of the total weight of the Blocks**. Vendor shall provide the calculation.
- Sodium Silicate Powder (Adhesive bond), measured in Kgs, quantity of which shall be **at least 1.5 Kg per Sq.m calculated on the Total Surface Area of the Insulation Block Layers**. Vendor shall provide the calculation.

5.0 TESTING

All testing and quality requirements shall be as per IS 8154.

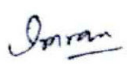
6.0 PACKING

Calcium silicate pipe sections to be packed in polythene sheets and further kept in corrugated boxes. Suitable arrangement may be made inside boxes for tight packing and to prevent damage from jerk/vibration caused during transportation & handling. Bidder to ensure proper safety of items up to their receipt at site. Each packing case must contain 2 copies of the shipping list giving details of all the contents of the case.

7.0 MARKING ON PACKING CASE

The following marking shall be done on each packing case minimum on two sides and also at the top:

- BHEL Purchase Order Number
- Complete address of the consignee and destination as per BHEL Purchase Order.
- Name of the material
- Indication of the source of manufacture

Refer Doc	LAYOUTS & PIPING ENGINEERING	PREPARED	CHECKED	APPROVED	DATE
		 IMRAN	 UDAY G	 G SRIKANTH	13.06.19

15558/2020/PE-SD-450_PE



PE&SD

Form No:

**BHARAT HEAVY ELECTRICALS LIMITED
PROJECT ENGINEERING & SYSTEMS DIVISION**
PY 52036**PURCHASE SPECIFICATION**

Rev. No. 02

**PRE FORMED CALCIUM SILICATE THERMAL
INSULATION**

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- e) Shape and size
- f) Quantity of material
- g) Maximum service temperature.

8.0 GUARANTEE

Vendor shall guarantee all insulation material against the defects due to manufacturing affecting performance for a period of twenty four months from the date of supply and shall repair/replace promptly, without cost, any part or parts of the material that fails within said period. All the test certificates required as per this document shall also be furnished along with the supply of materials.

9.0 DOCUMENTATION**Along with offer:**

One copy each of the following documents shall be submitted along with offer, without which offers will not be scrutinised:

- a) Bill of materials with material specification details, tests, weight etc.
- b) Any deviation to this standard, separately under a heading of Technical Deviations

After placement of order:

Four **copies** each of the following documents **for approval**:

- a) Bill of materials with material specification details. Quality plan adopted by the supplier during manufacture and inspection / testing
- b) Application Guidelines

Five copies of the following test certificates shall be furnished to BHEL **along with each consignment** attested by authorized inspector:

- a) Chemical and Mechanical Test Certificates
- b) Test Certificates

Bidder shall confirm in their bid for compliance in all respect for the submission of documents as follows:

S. No	Description	Along with offer	After placement of Order (Note-2)	After Supply completion
1	Bill of materials with material specification details	I (1)		
2	Quality Assurance Plan (QAP)	I (1)	A (4)	
3	Any deviations to this standard	A (1)		
4	Test Certificate		I (5)	
5	Guarantee Certificate		I (2)	

Notes:

- 1) I: For Information, A: For Approval
F: All above documents shall be made as 'FINAL' and submitted both in hard copies and soft copies
- 2) After placement of PO, all documentations required as applicable in above table shall be submitted within 7 days of PO placement.
- 3) BHEL will furnish their approvals / comments within 15 days after submission of drgs/ doc

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**BHARAT HEAVY ELECTRICALS LIMITED
PROJECT ENGINEERING & SYSTEMS DIVISION**
PY 52036**PURCHASE SPECIFICATION**

Rev. No. 02

**PRE FORMED CALCIUM SILICATE THERMAL
INSULATION**

Page 3 of 3

VARIANT TABLE:

Var No	Project	Scope of supply	Material Code
01	IOCL Baroda	PEMC-04389	PY9852036017
02	TCL Mithapur	PEMC-07415	PY9852036025

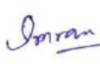
RECORD OF REVISIONS:

Rev No	Date	Revision Detail	Revised by	Approved by
00	19.02.14	FIRST ISSUE	VUK	DVS
01	13.06.19	NEW VARIANT ADDED AND GENERAL REVISION	IMRAN	GS
02	19.02.20	NEW VARIANT ADDED AND GENERAL REVISION	IMRAN	GS

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15558/2020/PE-SD-450 PE

Form No:	 PE&SD	BHARAT HEAVY ELECTRICALS LIMITED PROJECT ENGINEERING & SYSTEMS DIVISION		PEMC-07415									
		JOB SPECIFICATION		Rev. No. 02									
		PRE FORMED CALCIUM SILICATE THERMAL INSULATION		Page 1 of 4									
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.		JOB SPECIFICATION FOR PRE FORMED CALCIUM SILICATE THERMAL INSULATION TCL-MITHAPUR, GUJARAT											
						Refer Doc		LAYOUTS & PIPING ENGINEERING PROJECT ENGINEERING & SYSTEMS DIVISION		PREPARED	CHECKED	APPROVED	DATE
										 IMRAN	 G UDAY	 SRIKANTH G	13.06.19

15558/2020/PE-SD-450 PE

Form No:	 PE&SD	BHARAT HEAVY ELECTRICALS LIMITED PROJECT ENGINEERING & SYSTEMS DIVISION	PEMC-07415
		JOB SPECIFICATION	Rev. No. 02
		PRE FORMED CALCIUM SILICATE THERMAL INSULATION	Page 2 of 4

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1.0 GENERAL

- 1.1 This job specification document specifies the requirements of Pre formed Calcium Silicate thermal insulation applicable for TCL- Mithapur, Gujarat.
- 1.2 Bidder shall read this document in conjunction with "Technical Specification for Pre-formed calcium silicate thermal insulation (Doc.No.PY52036, Rev01), for the technical requirements, scope of supply & services, design criteria, requirements of quality, inspection & testing, documentation etc. Bidder shall also refer to all the enclosures listed at the end of this specification.
- 1.3 Bidder shall comply with all the requirements specified in the documents referred above.

2.0 LEGEND / GLOSSARY OF TERMS

Purchaser : BHEL
 Owner : BHEL's Customer
 Bidder : Eligible vendors from whom offers are received against the Enquiry
 Vendor : Successful Bidder of the Package on whom Order is placed

3.0 SCOPE OF SUPPLY

- 3.1 **Pre formed Calcium Silicate thermal insulation blocks and Pipe sections** shall be supplied for the piping as per the Bill of Material (as per Annexure-A) and the Isometrics (as per Annexure-B) of this Job specification.
- 3.2 In addition, the following materials also shall be supplied:
- Calcium Silicate Powder (for filling the joints and gaps)** measured in Kgs, quantities of which are given in Annexure-A (Bill of Material)
 - Sodium Silicate Powder (Adhesive bond)**, measured in Kgs, quantities of which are given in Annexure-A (Bill of Material)
- 3.3 The detailed scope of supply for Calcium silicate Insulation shall be as specified in "Technical Specification for Pre-formed calcium silicate thermal insulation" (Doc.No. PY52036, Rev.02).

4.0 PROJECT SPECIFIC DATA AND REQUIREMENTS

- 4.1 Manufacturing, Physical & Chemical properties, Inspection and Testing of Calcium silicate preformed blocks, slabs and pipe sections to be supplied under this specification shall conform to the latest edition of the IS 8154 **with average bulk density of 250 Kg/m3 (with tolerance of +/- 10%)**.
- 4.2 The shape of the pre-formed blocks shall be as per Manufacturer's standards as allowed by code.
- 4.3 The overall Insulation Thickness shall be as per the BOQ. However, the layer combination to achieve the required thickness shall be as per Manufacturer's standard.



5.0 CHECK LIST FORMAT

A check list format is attached with this job specification. Bidder shall submit, along with the technical offer, duly filled-in checklist as per this format only. **No other format is acceptable.** Offers submitted without the duly filled in checklist is liable for rejection.

6.0 LIST OF ENCLOSURES / ANNEXURES

Sl No	Doc Number	Description
1	PY52036, R01	Technical Specification for Pre-formed calcium silicate thermal insulation
2	Annexure-A	Piping Bill of Material along with Insulation thickness
3	Annexure-B	Engineering Isometrics
4	Annexure-C	Price Bid Format
5	Annexure-D	Checklist Format
6	Annexure-E	Format for Deviation Schedule
7	Annexure-F	Format for Pre-bid Queries

7.0 IMPORTANT INSTRUCTIONS TO BIDDER

Bidder shall mandatorily submit the following documents along-with Technical offer, failing which bidder's offer is liable for rejection.

- 7.1 Unpriced Price-bid Format
- 7.2 Filled-in Checklist.
- 7.3 Deviation Schedule ("NIL" to be mentioned, if no deviations)
- 7.4 Stamped & Signed copies of Technical Specification for Pre-formed calcium silicate thermal insulation (PY52036-R02) and job specification for Pre formed Calcium Silicate Thermal Insulation (PEMC-07415-R02).
- 7.5 Stamped & Signed copies of all attached Annexures.
- 7.6 Pre-bid queries, if any (within 4 days of receipt of enquiry from purchaser, failing which it is presumed that bidder does not have any pre-bid queries)
- 7.7 In case of ambiguity of any technical requirement among the above referred documents, a clarification/ query shall be raised by the bidder and get clarified from Purchaser during pre-bid stage itself.

8.0 RECORD OF REVISIONS

Rev No	Date	Revision Detail	Revised by	Approved by
00	13.06.2019	FIRST ISSUE	 IMRAN	 SRIKANTH G
01	11.01.2020	REVISED SCOPE OF SUPPLY	 IMRAN	 SRIKANTH G

15558/2020/PE-SD-450 PE

Form No:



PE&SD

BHARAT HEAVY ELECTRICALS LIMITED
PROJECT ENGINEERING & SYSTEMS DIVISION
PEMC-07415**JOB SPECIFICATION**

Rev. No. 02

PRE FORMED CALCIUM SILICATE THERMAL
INSULATION

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02	09.06.2020	REVISED SCOPE OF SUPPLY; REMOVED INSULATION ANCILLIARIES FROM SCOPE	 IMRAN	 SRIKANTH G
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ANNEXURE-A
BILL OF MATERIAL

Dt-09.06.2020

BOQ FOR CALCIUM SILICATE THERMAL INSULATION PACKAGE

A. BOQ for Calcium Silicate Preformed Pipe Sections															
SL NO	LINE NUMBER	OPER TEMP(DEG C)	SIZE 1	SIZE 2	INS THK	PIPE LEN(M)	ELBOW 90 DEG	ELBOW 45DEG	TEE	RDCR	CAP	FLANGE	OLET	VALVE	GAUGE 1/2"
1	12-MS-01-1101-55C-IH	510	12	10	200	115	25	2	1	1				2	10
2	12-MS-01-1101-55C-IH	510	12	8	200				1	1					
3	12-MS-01-1101-55C-IH	510	8	1.5	175	3					1	1			
4	12-MS-01-1101-55C-IH	510	10		200	6	1		1						
5	2-DR-01-1102-64C-IH	510	2		140	120	25							8	
6	1.5-DR-01-1103-64C-IH	510	1.5		25	50	15							2	
7	1-DR-11-1107-64C-IH/MISC	510	1		25	120	30							15	
8	2-MS-01-1104-64C-IH	510	2	1	140	15	7		1	1				2	
9	6-V-01-1105-14B-IS	-	6	3	25	28	6			1					
10	6-V-01-1105-14B-IS	-	3	2	25					1					
11	18-LS-01-1112-34C-IH	360	18	16	180	24	5			2					15
12	18-LS-01-1112-34C-IH	360	16	10	180					1				1	
13	18-LS-01-1112-34C-IH	360	10		180							1			
14	18-LS-01-1112-34C-IH	360	8		130	1					1		2		
15	18-LS-01-1116-24C-IH	360	18	16	180	50	6		1	1				1	
16	18-LS-01-1116-24C-IH	360	6		130	12	5							2	
17	18-LS-01-1116-24C-IH	360	8		130	1					1		2		
18	18-LS-01-1117-24C-IH	360	18		180	50	10		1					1	
19	18-LS-01-1117-24C-IH	360	18	14	180					2					
20	18-LS-01-1117-24C-IH	360	14		150	10									
21	18-LS-01-1117-24C-IH	360	8		130	2					1				
22	18-LS-01-1118-24C-IH	360	18	14	180	56	7	6		1				1	
23	18-LS-01-1118-24C-IH	360	8		130	2					1				
24	1.5-DR-11-6112-33C-IS	360	1.5		25	60	15							1	
25	1-DR-11-6110-33C-IS	360	1		25	150	40		10					15	
26	1-DR-11-1121,1124,1115-11B-IS	-	1		25	150	30								
27	4-LS-11-1108-34C-IH	442	4		125	8	5					1			2
28	4-LS-11-1108-34C-IH	442	1		80	50	10							1	
29	4-LS-01-1109-24C-IH	425	4	3	125	5		2		1					
30	4-LS-01-1109-24C-IH	425	3		125							1			
31	4-LS-01-1110-24C-IH	338	4	3	125	5	3			1					
32	4-LS-01-1110-24C-IH	338	3		125							1			
33	4-LS-01-1110-24C-IH	338	6	4	140	4	2		1	2					3
34	4-LS-01-1110-24C-IH	338	1		80	40	15		1					4	
35	6-LS-11-1111-21C-IH	375	6		140	36	8		2					2	5
36	6-LS-11-1111-21C-IH	375	1		80	50	10							4	
37	6-LS-11-1125-11C-IH	170	6		125	24	9		1				2		2
38	6-LS-01-1119/1122-33C-IH	360	6		140							2		2	
39	6-LS-01-1119/1122-33C-IH	360	8		25	1	2					2			
40	12-SV-01-1120/1123-11B-IS	-	12		25	60	10	4							
41	6-LS-01-1113-34C-IH	360	6		115	18	6					2		2	
42	12-V-01-1114-14B-IS	-	12	6	25	26	4			1					
43	4-GS-11-6101-13B-IH	430	4	3	125	6				1					3
44	4-GS-11-6101-13B-IH	430	6	4	125					1					

45	4-GS-11-6101-13B-IH	430	3		125							1			
46	4-GS-11-6102-13B-IH	400	4	3	125	6	3	1		1					
47	4-GS-11-6102-13B-IH	400	6	4	125					1					
48	4-GS-11-6102-13B-IH	400	3		125							1			
49	6-GS-11-6103-13B-IH	430	6		125	3			1						
50	6-GS-11-6104/6106-11B-IH	400	6		125	15	7		3						3
51	6-GS-11-6104/6106-11B-IH	400	1		75	60	20							1	
52	6-GS-11-6105-11B-IH	400	6		25	20	5							1	
53	N4 & N5 drains to flash tank	450	1		90	100	40							4	
54	GSC	400	20		160	6						6			5
55	2-DR-11-1213-11B-IS	98	2		25	20	5							1	
56	2-DR-11-1201/1202/1203-11B-IS	98	2		25	15	4		1					4	
57	1.5-CD-11-1204/1205/1206-11B-IS	98	1.5		25	50	4							5	
58	4-V-11-1212-11B	100	4		25	10	6		1					2	
59	4-V-11-1212-11B	100	6	4	25					2		2			
60	6-V-11-1210/1211-11B	100	6		25	48	7	2							
	Note :														
1.Size 1 refers to the main pipe size and Size 2 refers to branch pipe/reducer size															

B. BOQ for Calcium silicate and Sodium Silicate Powders			
S.No	ITEM DESCRIPTION	UOM	QTY
1	Calcium silicate powder	Kg	4000
2	Sodium silicate powder	Kg	750



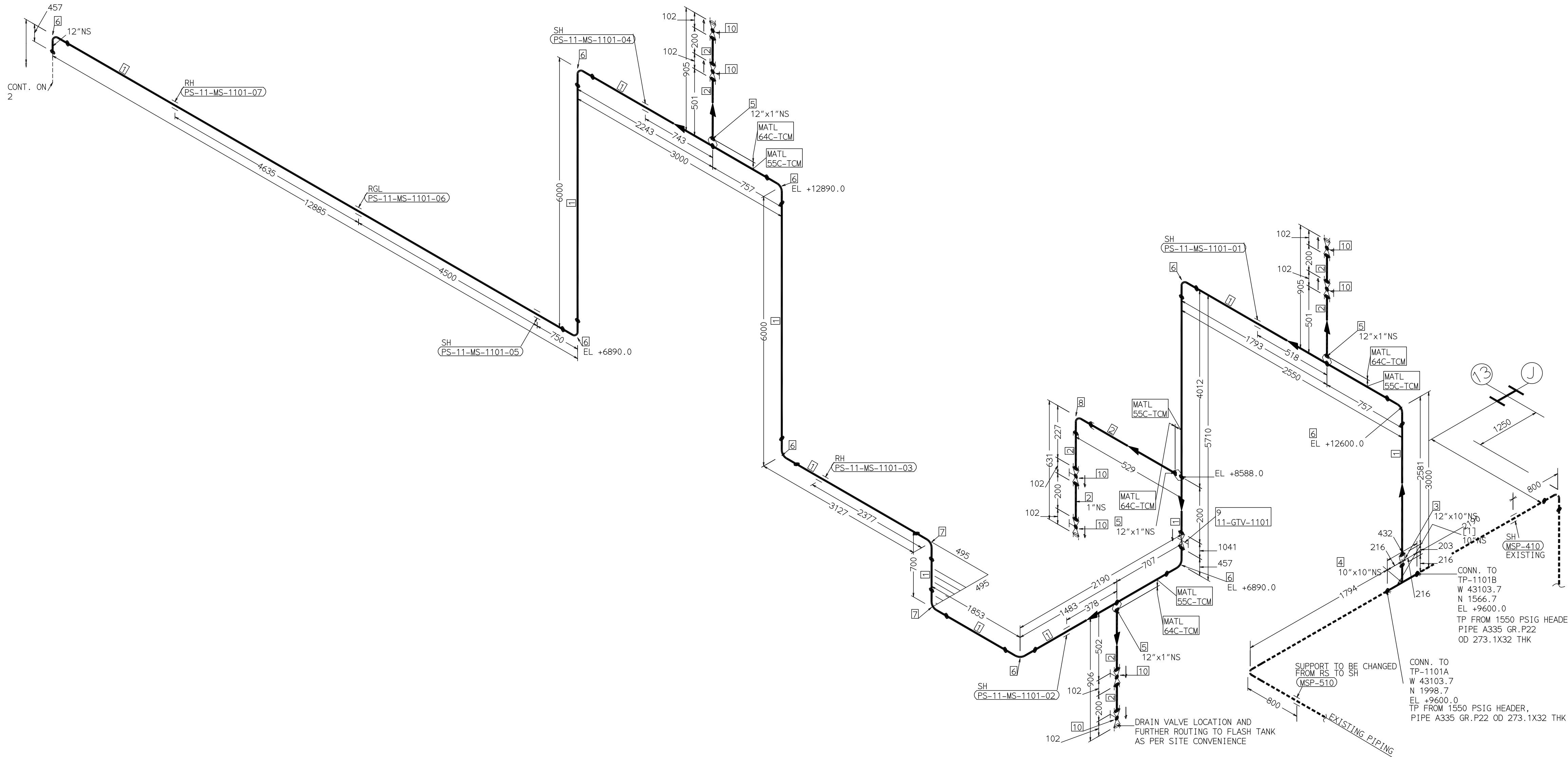
PIPING ISOMETRICS
CALCIUM SILICATE THERMAL INSULATION PACKAGE

ANNEXURE-B TO PEMC-07415

JOB SPECIFICATION FOR PRE FORMED CALCIUM SILICATE THERMAL INSULATION PACKAGE

TCL MITHAPUR

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PIPE: 12-MS-11-1101-55C-IH

REFERENCE DRAWINGS:-	
1) P&ID OF STEAM SYSTEM : PY-DP-1-M117-1001-01	

LINE PARAMETERS:-									
LINE NUMBER	W PR (Kg/cm2)	W TEMP (DegC)	D PR (Kg/cm2)	D TEMP (DegC)	HT PR (Kg/cm2)	INS THK (mm)	INS MAT	PSPEC	BORE
12-MS-11-1101-55C-IH	105	510	118	530	177	200	Ca. SLLT	55C-TCM	12"

LEGEND:-	
	SUPPORT LOCATION
	DIRECTION OF FLOW
	DIRECTION OF SLOPE
	WELD SYMBOL
A	ANCHOR
R	REST
RG	REST + GUIDE
RL	REST + LIMIT STOP
RGL	DIRECTION ANCHOR
RH	RIGID HANGER
SH	SPRING HANGER
BS	BOTTOM SPRING
VG	VERTICAL GUIDE

RECORD OF REVISIONS:-					
04	11.01.20	PS-11-MS-1101-14 & 15 SUPPORT TYPE CHANGED	IH	GUK	GS
03	04.12.19	GENERALLY REVISED	IH	GUK	GS
02	25.06.19	GENERALLY REVISED	IH	GUK	GS
01	10.06.19	GENERALLY REVISED	IH	GUK	GS
00	25-05-19	FIRST ISSUE	IH	GUK	GS
REV	ISSUE DATE	DESCRIPTION	DRN BY	CHKD BY	APPRD BY

BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING & SYSTEMS DIVISION R.C.PURAM, HYDERABAD-502032. PE&SD LAYOUTS & PIPING ENGINEERING		NAME	SIGN	DATE
DRN.	IH	-SD-		25-05-19
CHKD.	GUK	-SD-		25-05-19
APPRD.	GS	-SD-		25-05-19
SCALE: NTS				
TITLE: MAIN STEAM TO TURBINE INLET		DRAWING NO: PY-DX-1-M117-1001-01		REV 04
SHT. No. 1		NO. OF SHTS.		3

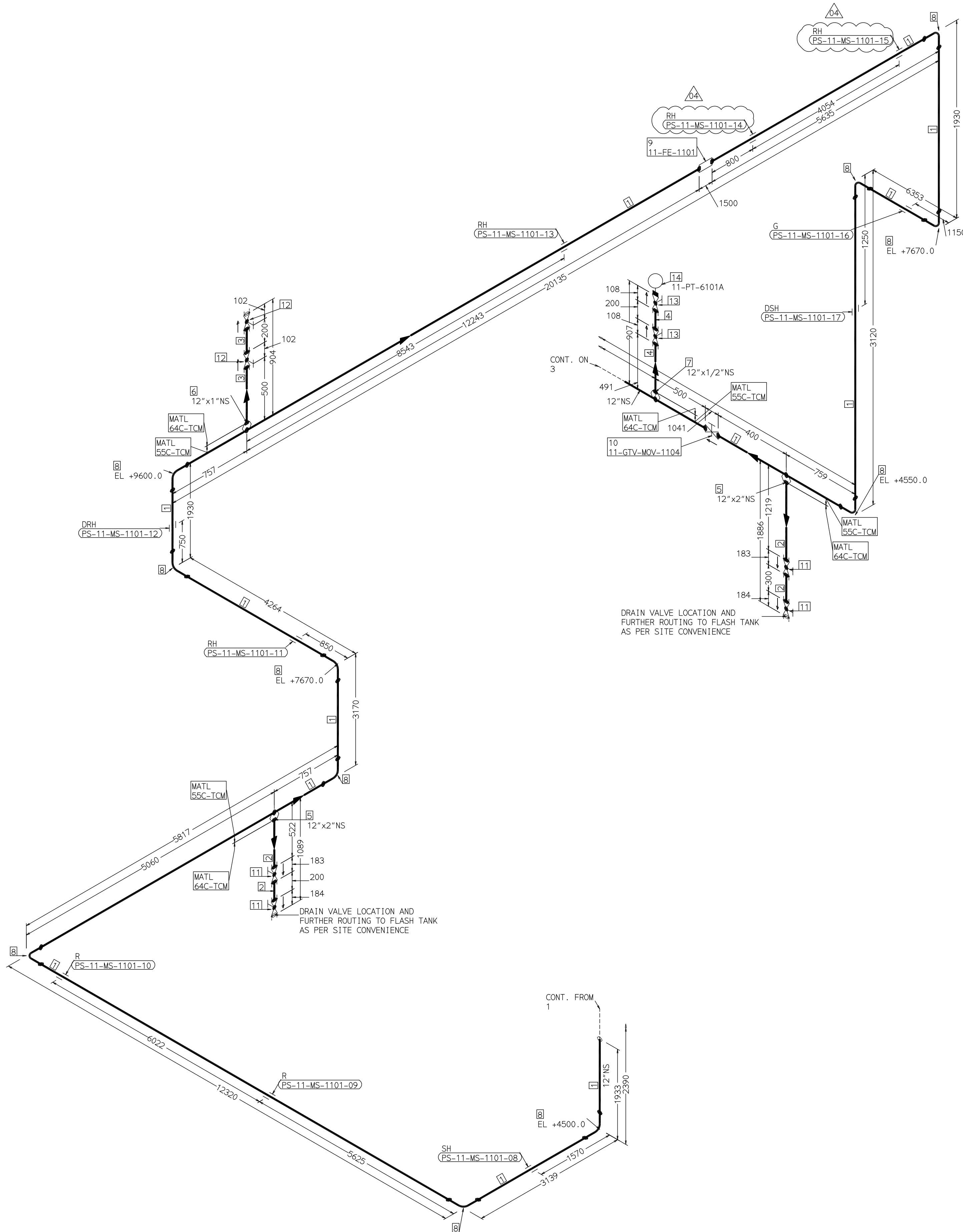
FABRICATION MATERIALS						
PT NO	COMPONENT DESCRIPTION	MATERIAL	BORE (In)	SCH	RATING	UNITWT (Kg)
1	PIPE SMLS ASME B36.10 PE	A335GRP91	12	T31		37.1M
2	PIPE SMLS ASME B36.10 PE	A335GRP22	1	S160		2.2M
3	RDCR CONC ASME B16.9 BW	A234GRWP91	12 x 10	S160X S160		1
4	TEE STRT ASME B16.9 BW	A234GRWP22	10 x 10	T32		1
5	WELDOLET REDUCING (MSS-SP-97) XXS BW	A182GRF91	12 x 1	XXS		4
6	ELBOW LR 90 DEG ASME B16.9 BW	A234GRWP91	12	T31		9
7	ELBOW LR 45 DEG ASME B16.9 BW	A234GRWP91	12	T31		2
8	ELBOW 90 DEG LR ASME B16.11 CL6000 SW	A182GRF22	1		CL6000	1
9	GATE VALVE GO CL2500 BW	A217GRWC9	12		CL2500	1
10	GLOBE VALVE HO CL2500 SW	A182GRF22	1		CL2500	8

[1]						
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GENERAL NOTES:-						
1. ALL DIMENSIONS, ELEVATIONS AND CO-ORDINATES ARE IN MM UNLESS OTHERWISE SPECIFIED.						
2. ELEVATIONS ARE CENTRE LINE ELEVATIONS UNLESS OTHERWISE SPECIFIED.						
3. PIPES CONNECTED TO EQUIPMENTS/VALVES SHOULD BE EDGE PREPARED TO MATCH THE CORRESPONDING NOZZLE OF EQUIPMENT/VALVE.						
4. DRAWING DOES NOT INCLUDE ANY FABRICATION/ERECTION ALLOWANCE UNLESS OTHERWISE SPECIFIED.						
5. REINFORCEMENT PAD TO BE CUT FROM RESPECTIVE RUN PIPE.						
ENGINEERING ISOMETRIC-IBR						

CLIENT:	TATA CHEMICALS LIMITED MITHAPUR - INDIA
PROJECT:	1 X 14.9 MW BACK PRESSURE STG SET TOPPER TURBINE (TT) - 1 MITHAPUR, GUJARAT
CONSULTANT:	TATA CONSULTING ENGINEERS (TCE)

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PIPE: 12-MS-11-1101-55C-IH

REFERENCE DRAWINGS:-									
1) P&ID OF STEAM SYSTEM : PY-DP-1-M117-1001-01									

LINE PARAMETERS:-									
LINE NUMBER	W PR (Kg/cm2)	W TEMP (DegC)	D PR (Kg/cm2)	D TEMP (DegC)	HT PR (Kg/cm2)	INS THK (mm)	INS MAT	PSPEC	BORE
12-MS-11-1101-55C-IH	105	510	118	530	177	200	Ca. SLLT	55C-TCM	12"

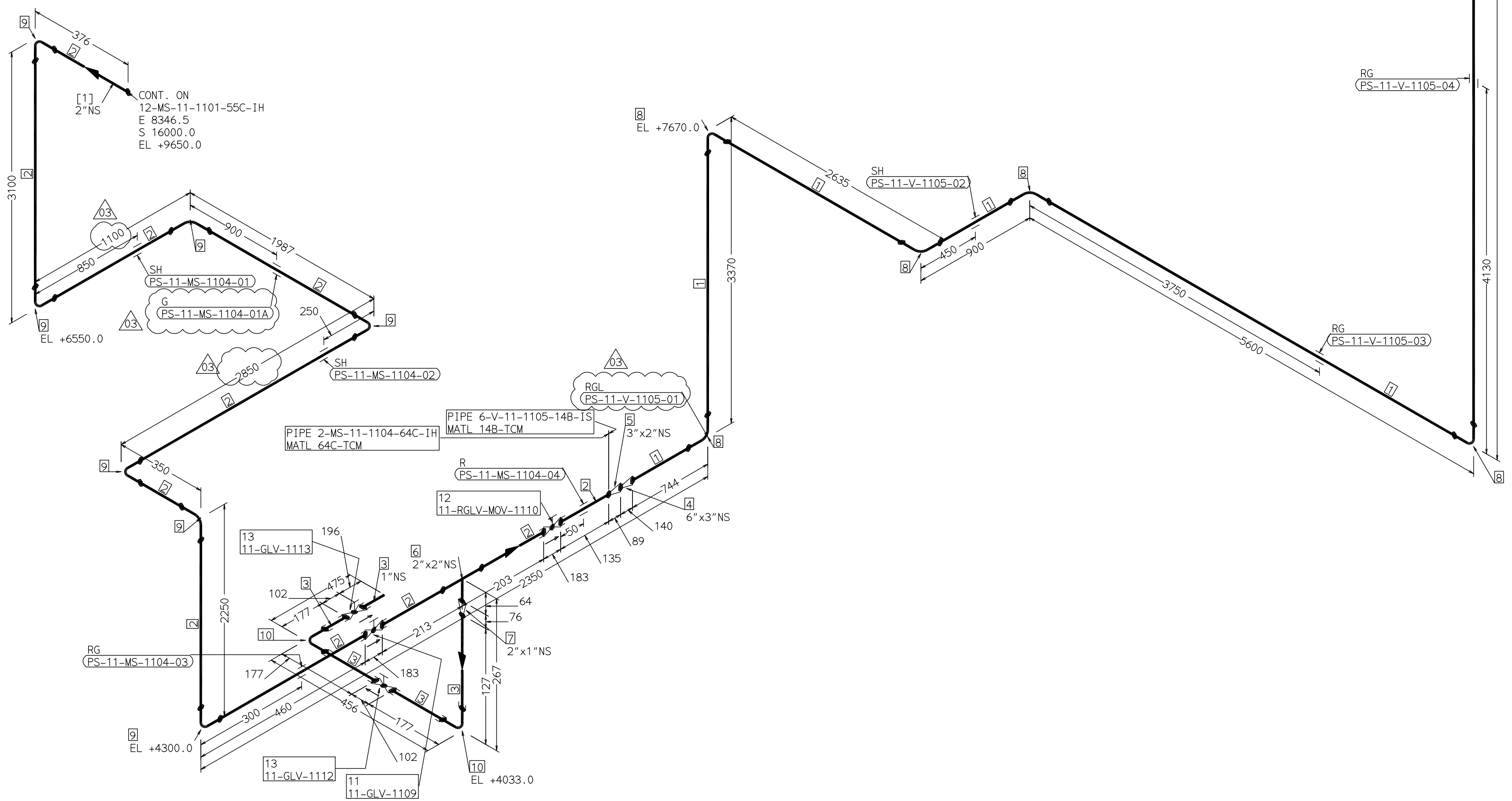
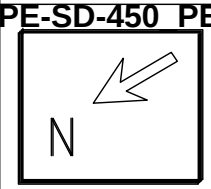
LEGEND:-									
— SUPPORT LOCATION									
— DIRECTION OF FLOW									
— DIRECTION OF SLOPE									
— WELD SYMBOL									
A - ANCHOR									
R - REST									
RG - REST + GUIDE									
RL - REST + LIMIT STOP									
RGL- DIRECTION ANCHOR									
RH - RIGID HANGER									
SH - SPRING HANGER									
BS - BOTTOM SPRING									
VG - VERTICAL GUIDE									

RECORD OF REVISIONS:-						
04	11.01.20	PS-11-MS-1101-14 & 15 SUPPORT TYPE CHANGED	IH	GUK	GS	
03	04.12.19	GENERALLY REVISED	IH	GUK	GS	
02	25.06.19	GENERALLY REVISED	IH	GUK	GS	
01	10.06.19	GENERALLY REVISED	IH	GUK	GS	
00	25-05-19	FIRST ISSUE	IH	GUK	GS	
REV	ISSUE DATE	DESCRIPTION	DRN BY	CHKD BY	APPRD BY	

BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING & SYSTEMS DIVISION R.C.PURAM, HYDERABAD-502032. PE&SD LAYOUTS & PIPING ENGINEERING		NAME	SIGN	DATE
DRN.	IH	-SD-		25-05-19
CHKD.	GUK	-SD-		25-05-19
APPRD.	GS	-SD-		25-05-19
SCALE: NTS				
TITLE: MAIN STEAM TO TURBINE INLET		DRAWING NO: PY-DX-1-M117-1001-01		REV 04
SHT. No. 2		NO. OF SHTS.		3

This Drawing is printed from Engineering Digital Archive System (EDAS).
Therefore signatures are not essentially required.

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FABRICATION MATERIALS							
PT NO	COMPONENT DESCRIPTION	MATERIAL	BORE (In)	SCH	RATING	QTY	UNITWT (Kg)
1	PIPE SMLS ASME B36.10 PE	A335GRF22	6	STD		25.3M	28.26
2	PIPE SMLS ASME B36.10 PE	A335GRF22	2	S160		11.9M	11.11
3	PIPE SMLS ASME B36.10 PE	A335GRF22	1	S160		0.8M	4.24
4	RDCR CONC ASME B16.9 BW	A234GRWP22	6 x 3	STDXS TD		1	3.9
5	RDCR CONC ASME B16.9 BW	A234GRWP22	3 x 2	STDXX S		1	1
6	TEE STRT ASME B16.9 BW	A234GRWP22	2 x 2	S160		1	2.25
7	RDCR CONC ASME B16.9 BW	A234GRWP22	2 x 1	S160X S160		1	0.84
8	ELBOW LR 90 DEG ASME B16.9 BW	A234GRWP22	6	STD		5	11.01
9	ELBOW LR 90 DEG ASME B16.9 BW	A234GRWP22	2	S160		7	1.48
10	ELBOW 90 DEG LR ASME B16.11 CL6000 SW	A182GRF22	1		CL6000	2	1.1
11	GLOBE VALVE HO CL2500 SW	A182GRF22	2		CL2500	1	0
12	REG GLOBE VALVE HO CL2500 SW	A182GRF22	2		CL2500	1	0
13	GLOBE VALVE HO CL2500 SW	A182GRF22	1		CL2500	2	0

[1]

GENERAL NOTES:-

- ALL DIMENSIONS, ELEVATIONS AND CO-ORDINATES ARE IN MM UNLESS OTHERWISE SPECIFIED.
- ELEVATIONS ARE CENTRE LINE ELEVATIONS UNLESS OTHERWISE SPECIFIED.
- PIPES CONNECTED TO EQUIPMENTS/VALVES SHOULD BE EDGE PREPARED TO MATCH THE CORRESPONDING NOZZLE OF EQUIPMENT/VALVE.
- DRAWING DOES NOT INCLUDE ANY FABRICATION/ERECTION ALLOWANCE UNLESS OTHERWISE SPECIFIED.
- REINFORCEMENT PAD TO BE CUT FROM RESPECTIVE RUN PIPE.

ENGINEERING ISOMETRIC-IBR

CLIENT:	TATA CHEMICALS LIMITED MITHAPUR - INDIA
PROJECT:	1 X 14.9 MW BACK PRESSURE STG SET TOPPER TURBINE (TT) - 1 MITHAPUR, GUJARAT
CONSULTANT:	TATA CONSULTING ENGINEERS (TCE)

REFERENCE DRAWINGS:-		LINE PARAMETERS:-									
1) P&ID OF STEAM SYSTEM : PY-DP-1-M117-1001-01		LINE NUMBER	W PR (Kg/cm2)	W TEMP (DegC)	D PR (Kg/cm2)	D TEMP (DegC)	HT PR (Kg/cm2)	INS THK (mm)	INS MAT	PSPEC	BORE
		2-MS-11-1104-64C-IH	102	508	118	530	177	140	Ca. SILL	64C-TCM	2"
		6-V-11-1105-14B-IS			5	466	NA	25	Ca. SILL	14B-TCM	6"

- LEGEND:-
- SUPPORT LOCATION
 - DIRECTION OF FLOW
 - DIRECTION OF SLOPE
 - WELD SYMBOL
 - A - ANCHOR
 - R - REST
 - RG - REST + GUIDE
 - RL - REST + LIMIT STOP
 - RGL - RIGID HANGER
 - SH - SPRING HANGER
 - BS - BOTTOM SPRING
 - VG - VERTICAL GUIDE

RECORD OF REVISIONS:-					
03	12-01-20	GENERALLY REVISED	IH	GUK	GS
02	08-11-19	REVISED DUE TO CHANGE IN VENT SILENCER HEIGHT	IH	GUK	GS
01	21-06-19	GENERALLY REVISED	IH	GUK	GS
00	25-05-19	FIRST ISSUE	IH	GUK	GS
REV	ISSUE DATE	DESCRIPTION	DRN BY	CHKD BY	APPRD BY

BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING & SYSTEMS DIVISION R.C.PURAM, HYDERABAD-502032. PE&SD LAYOUTS & PIPING ENGINEERING		NAME	SIGN	DATE
	DRN.	IH	-SD-	25-05-19
	CHKD.	GUK	-SD-	25-05-19
	APPRD.	GS	-SD-	25-05-19
		SCALE: NTS		
TITLE: MAIN STEAM-WARMUP-VENT-PIPING		DRAWING NO: PY-DX-1-M117-1001-02		REV 03
		SHT. No. 1	NO. OF SHTS.	1

[illegible]

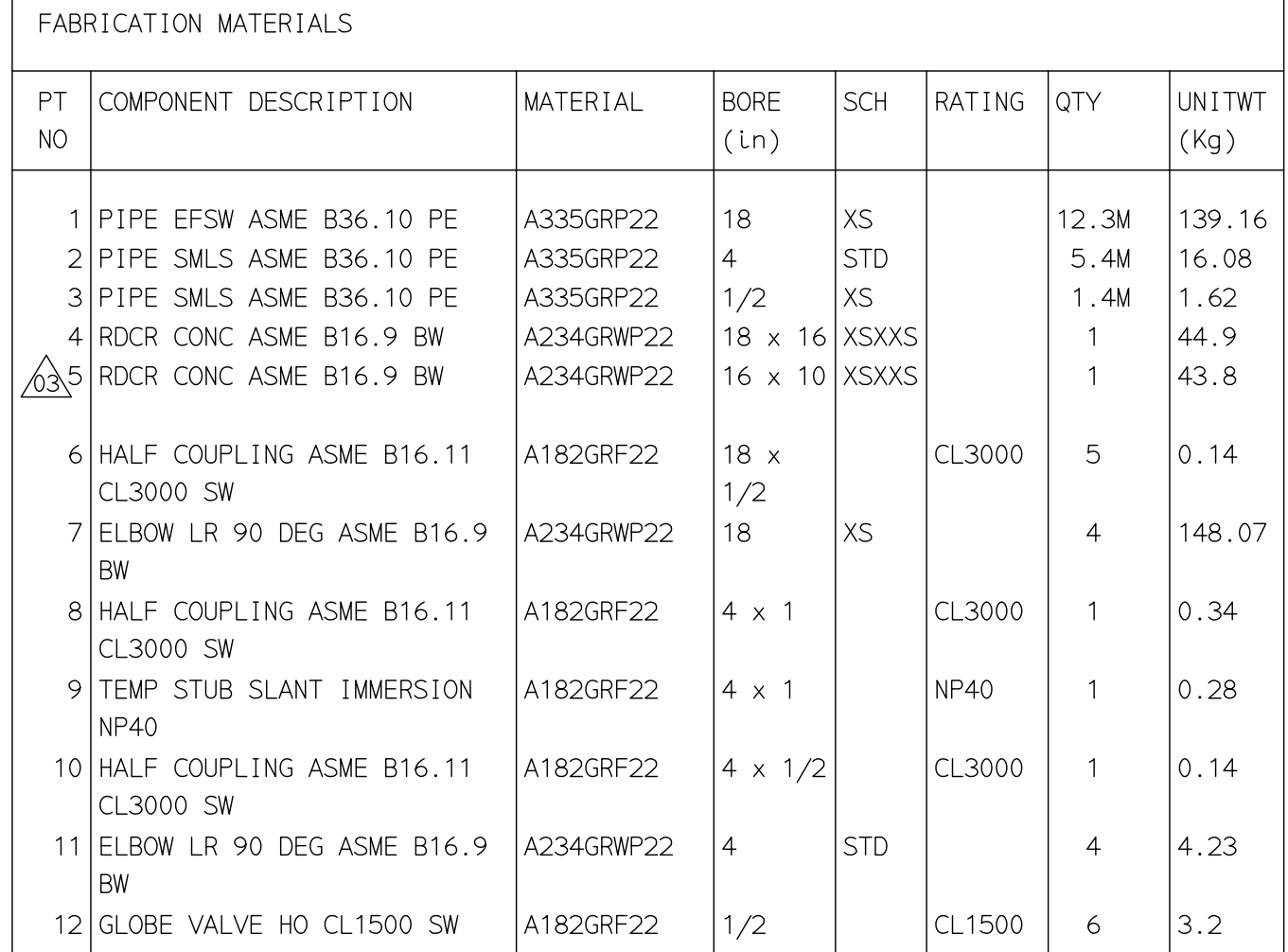
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COMPUTER FILE NAME: _____

EDS

BHEL-HYD



1. ALL DIMENSIONS, ELEVATIONS AND CO-ORDINATES ARE IN MM UNLESS OTHERWISE SPECIFIED.
2. ELEVATIONS ARE CENTRE LINE ELEVATIONS UNLESS OTHERWISE SPECIFIED.
3. PIPES CONNECTED TO EQUIPMENTS/VALVES SHOULD BE EDGE PREPARED TO MATCH THE CORRESPONDING NOZZLE OF EQUIPMENT/VALVE.
4. DRAWING DOES NOT INCLUDE ANY FABRICATION/ERECTION ALLOWANCE UNLESS OTHERWISE SPECIFIED.
5. REINFORCEMENT PAD TO BE CUT FROM RESPECTIVE RUN PIPE.

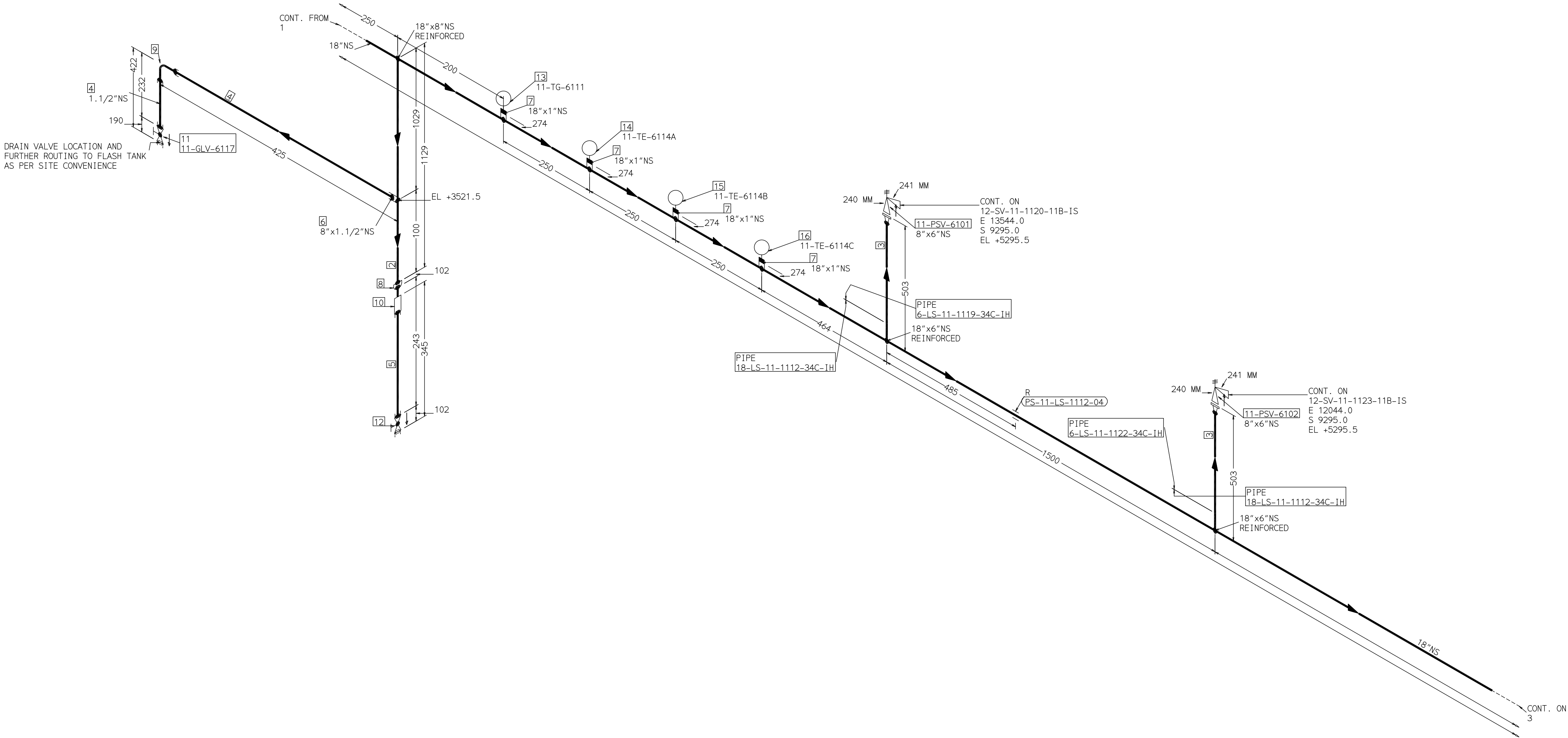
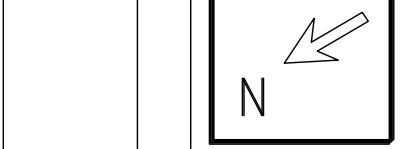
CLIENT:	TATA CHEMICALS LIMITED MITHAPUR - INDIA
PROJECT:	1 X 14.9 MW BACK PRESSURE STG SET TOPPER TURBINE (TT) - 1 MITHAPUR, GUJARAT
CONSULTANT:	TATA CONSULTING ENGINEERS (TCE)

LEGEND:

	SUPPORT LOCATION
	DIRECTION OF FLOW
	DIRECTION OF SLOPE
	WELD SYMBOL

A - ANCHOR
R - REST
RG - REST + GUIDE
RL - REST + LIMIT STOP
RGL - REST + GUIDE + ANCHOR
RH - RIGID HANGER
SH - SPRING HANGER
BS - BOTTOM SPRING
VG - VERTICAL GUIDE

 PE&SD	BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING & SYSTEMS DIVISION R.C.PURAM, HYDERABAD-502032. LAYOUTS & PIPING ENGINEERING		NAME	SIGN	DATE
		DRN.	IH	-SD-	25-05-19
		CHKD.	GUK	-SD-	25-05-19
		APPRD.	GS	-SD-	25-05-19
		SCALE: NTS			
TITLE: TURBINE EXHAUST-PIPING-COMMON HEADER		DRAWING NO: PY-DX-1-M117-1006-02			REV 03
This Drawing is printed from Engineering Digital Archive		SHT No. 1			No. OF SHTs 4



FABRICATION MATERIALS						
PT NO	COMPONENT DESCRIPTION	MATERIAL	BORE (Ln)	SCH	RATING	QTY
1	PIPE SMLS ASME B36.10 PE	A335GRF22	18	XS		4.3M
2	PIPE SMLS ASME B36.10 PE	A335GRF22	8	STD		1.0M
3	PIPE SMLS ASME B36.10 PE	A335GRF22	6	XS		0.4M
4	PIPE SMLS ASME B36.10 PE	A335GRF22	1.1/2	XS		0.5M
5	PIPE SMLS ASME B36.10 PE	A335GRF22	1	XS		0.3M
6	HALF COUPLING ASME B16.11 CL3000 SW	A182GRF22	8 x 1.1/2		CL3000	1
7	TEMP STUB STRT IMMERSION NP40	A182GRF22	18 x 1		NP40	4
8	CAP ASME B16.9 BW	A234GRWP22	8	STD		1
9	ELBOW 90 DEG LR ASME B16.11 CL3000 SW	A182GRF22	1.1/2		CL3000	1
10	HALF COUPLING ASME B16.11 CL3000 SW	A182GRF22	1		CL3000	1
11	GLOBE VALVE HO CL1500 SW	A182GRF22	1.1/2		CL1500	1
12	GLOBE VALVE HO CL1500 SW	A182GRF22	1		CL1500	1

ERECTION MATERIALS						
PT NO	COMPONENT DESCRIPTION	MATERIAL	BORE (Ln)	SCH	RATING	QTY
13	TEMP GAUGE SCRD (NP40) 11-TG-6111		1		NP40	1
14	TEMP TRANSMITTER SCRD (NP40) 11-TE-6114A		1		NP40	1
15	TEMP TRANSMITTER SCRD (NP40) 11-TE-6114B		1		NP40	1
16	TEMP TRANSMITTER SCRD (NP40) 11-TE-6114C		1		NP40	1

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 - REINFORCEMENT PAD TO BE CUT FROM RESPECTIVE RUN PIPE.

ENGINEERING ISOMETRIC-IBR

CLIENT:	TATA CHEMICALS LIMITED MITHAPUR - INDIA
PROJECT:	1 X 14.9 MW BACK PRESSURE STG SET TOPPER TURBINE (TT) - 1 MITHAPUR, GUJARAT
CONSULTANT:	TATA CONSULTING ENGINEERS (TCE)

 BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING & SYSTEMS DIVISION R.C.PURAM, HYDERABAD-502032. PE&SD LAYOUTS & PIPING ENGINEERING	NAME	SIGN	DATE
	DRN. IH	-SD-	25-05-19
	CHKD. GUK	-SD-	25-05-19
	APPRD. GS	-SD-	25-05-19
TITLE: TURBINE EXHAUST-PIPING-COMMON HEADER		DRAWING NO: PY-DX-1-M117-1006-02	REV 03
SHT. No. 2		NO. OF SHTS.	4

REFERENCE DRAWINGS:-

1) P&ID OF STEAM SYSTEM : PY-DP-1-M117-1001-01

LINE PARAMETERS:-

LINE NUMBER	W PR (Kg/cm2)	W TEMP (DegC)	D PR (Kg/cm2)	D TEMP (DegC)	HT PR (Kg/cm2)	INS THK (mm)	INS MAT	PSPEC	BORE
18-LS-11-1112-34C-IH	31	359.3	36.6	470	54.9	180	Ca. SLLL	33C-TCM	18"
4-LS-11-1108-34C-IH	31	441.6	36.6	470	54.9	125	Ca. SLLL	33C-TCM	4"
6-LS-11-1119-34C-IH	31	359.3	36.6	470	54.9	115	Ca. SLLL	34C-TCM	6"
6-LS-11-1122-34C-IH	31	359.3	36.6	470	54.9	115	Ca. SLLL	34C-TCM	6"
6-LS-11-1113-34C-IH	31	359.3	36.6	470	54.9	115	Ca. SLLL	34C-TCM	6"
12-V-11-1114-14B-IS			5	450	NA	25	Ca. SLLL	14B-TCM	12"
18-LS-11-1116-24C-IH	31	359	36.6	417	54.9	180	Ca. SLLL	24C-TCM	18"

LEGEND:-

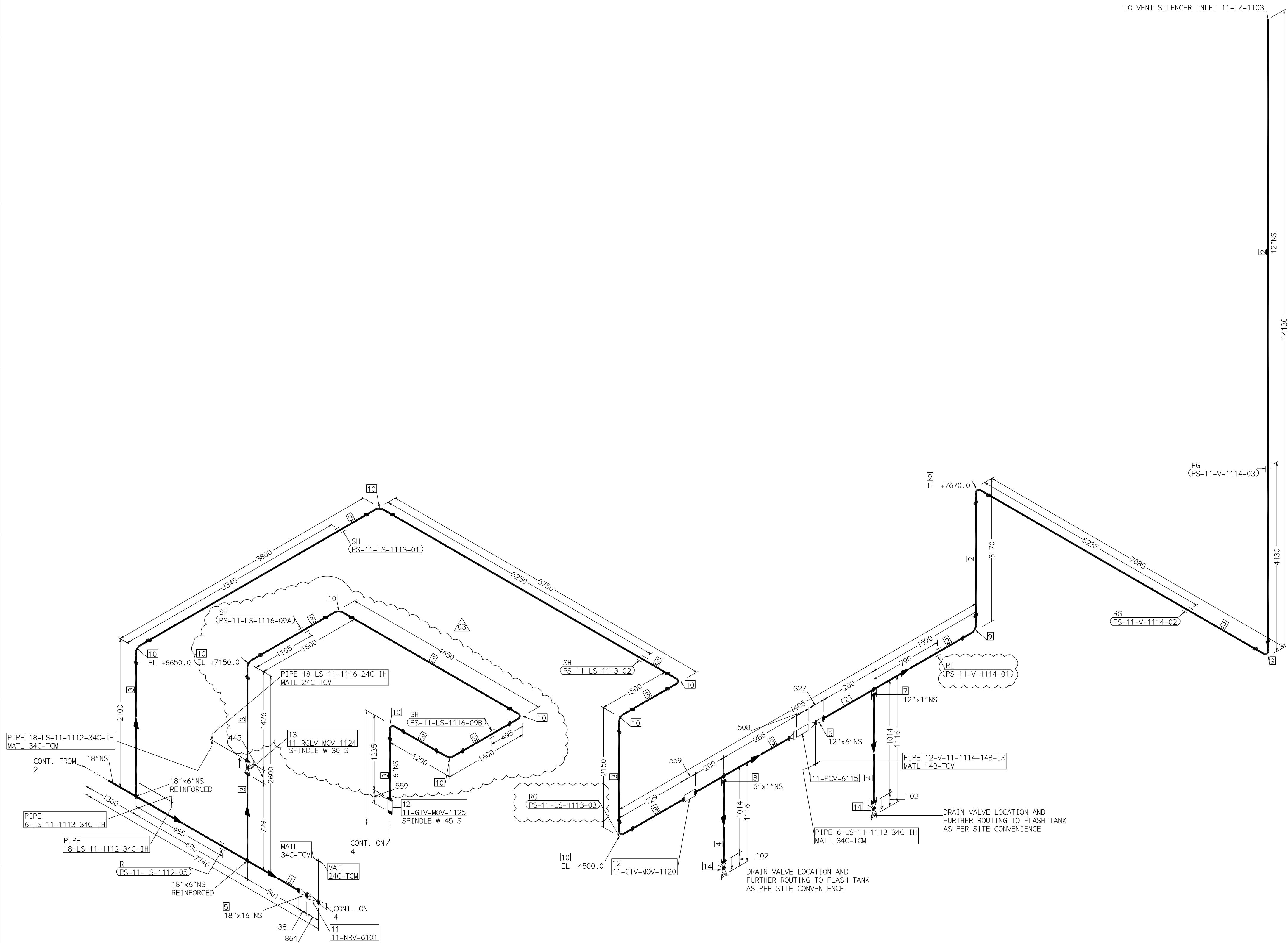
- SUPPORT LOCATION
- DIRECTION OF FLOW
- DIRECTION OF SLOPE
- WELD SYMBOL

- A - ANCHOR
- R - REST
- RG - REST + GUIDE
- RL - REST + LIMIT STOP
- RGL - DIRECTION ANCHOR
- RH - RIGID HANGER
- SH - SPRING HANGER
- BS - BOTTOM SPRING
- VG - VERTICAL GUIDE

RECORD OF REVISIONS:-

REV	ISSUE DATE	DESCRIPTION	DRN BY	CHKD BY	APPRD BY
03	12-01-20	REVISED BASED ON CUSTOMER COMMENTS	IH	GUK	GS
02	06-11-19	SUPPORT LOCATIONS & INS. THICK. CHANGED	IH	GUK	GS
01	25-06-19	GENERALLY REVISED	IH	GUK	GS
00	25-05-19	FIRST ISSUE	IH	GUK	GS

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FABRICATION MATERIALS						
PT NO	COMPONENT DESCRIPTION	MATERIAL	BORE (In)	SCH	RATING	QTY
1	PIPE SMLS ASME B36.10 PE	A335GRF22	18	XS		1.2M
2	PIPE SMLS ASME B36.10 PE	A335GRF22	12	STD		23.5M
3	PIPE SMLS ASME B36.10 PE	A335GRF22	6	XS		23.9M
4	PIPE SMLS ASME B36.10 PE	A335GRF22	1	XS		1.8M
5	RDCR CONC ASME B16.9 BW	A234GRWP22	18 x 16	XSXXS		1
6	RDCR CONC ASME B16.9 BW	A234GRWP22	12 x 6	STDXS TD		1
7	HALF COUPLING ASME B16.11 CL3000 SW	A182GRF22	12 x 1		CL3000	1
8	HALF COUPLING ASME B16.11 CL3000 SW	A182GRF22	6 x 1		CL3000	1
9	ELBOW LR 90 DEG ASME B16.9 BW	A234GRWP22	12	STD		3
10	ELBOW LR 90 DEG ASME B16.9 BW	A234GRWP22	6	XS		10
11	SWING CHECK VALVE ASME B16.10 CL300SPL BW	A217GRWC9	16		CL300SPL	1
12	GATE VALVE MO ASME B16.10 CL600 BW	A217GRWC9	6		CL600	2
13	REG GLOBE VALVE HO ASME B16.10 CL300SPL BW	A217GRWC9	6		CL300SPL	1
14	GLOBE VALVE HO CL1500 SW	A182GRF22	1		CL1500	2

[2]

GENERAL NOTES:-

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- REINFORCEMENT PAD TO BE CUT FROM RESPECTIVE RUN PIPE.

ENGINEERING ISOMETRIC-IBR

CLIENT:	TATA CHEMICALS LIMITED MITHAPUR - INDIA
PROJECT:	1 X 14.9 MW BACK PRESSURE STG SET TOPPER TURBINE (TT) - 1 MITHAPUR, GUJARAT
CONSULTANT:	TATA CONSULTING ENGINEERS (TCE)

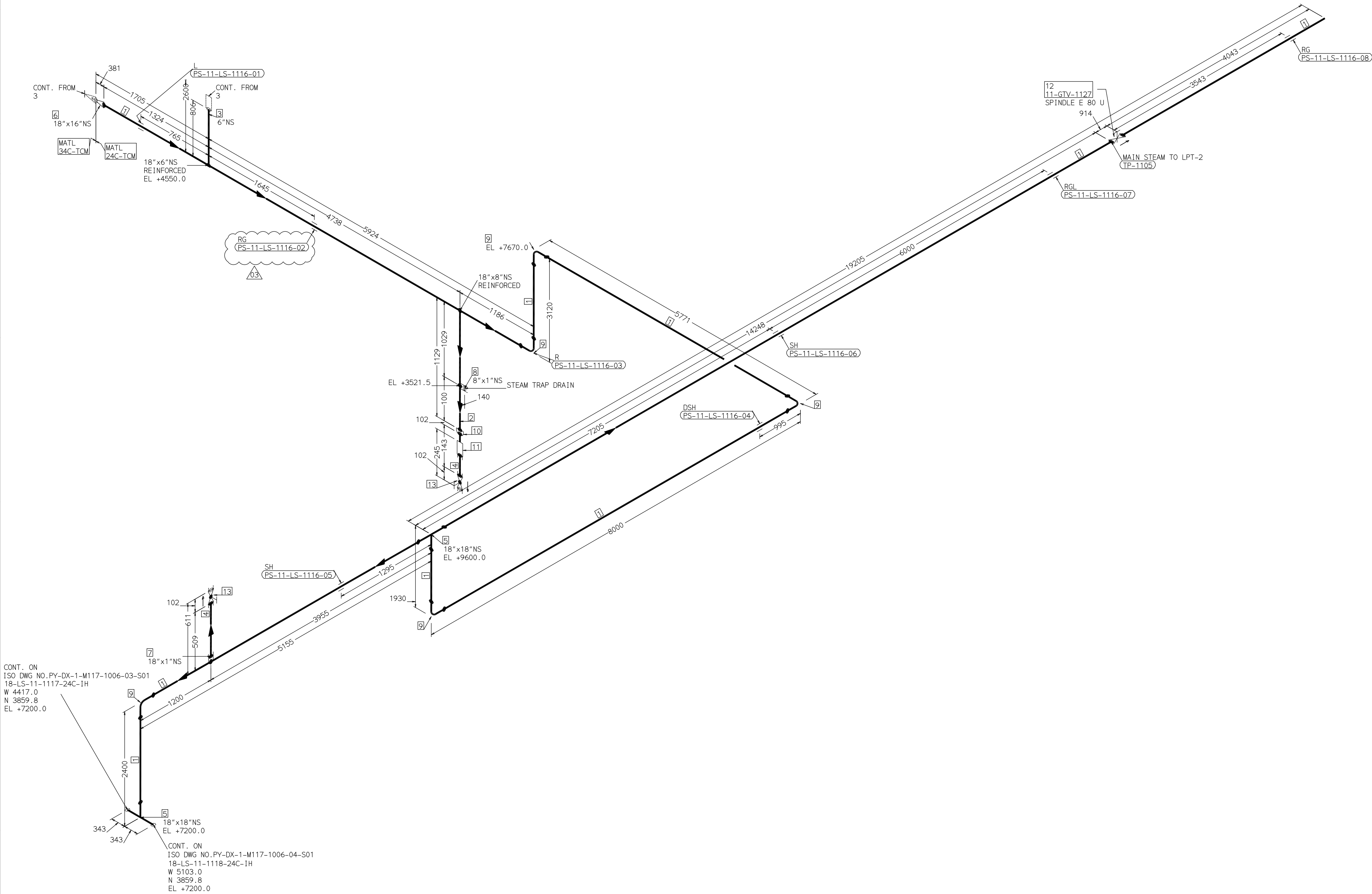
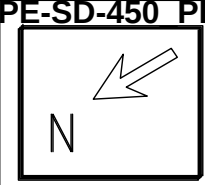
 BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING & SYSTEMS DIVISION R.C.PURAM, HYDERABAD-502032. PE&SD LAYOUTS & PIPING ENGINEERING		NAME	SIGN	DATE
		DRN.	IH	-SD-
		CHKD.	GUK	-SD-
		APPRD.	GS	-SD-
		SCALE: NTS		
TITLE: TURBINE EXHAUST-PIPING-COMMON HEADER		DRAWING NO: PY-DX-1-M117-1006-02		REV 03
		SHT. No. 3	NO. OF SHTS. 4	

REFERENCE DRAWINGS:-	LINE PARAMETERS:-
1) P&ID OF STEAM SYSTEM : PY-DP-1-M117-1001-01	LINE NUMBER
	W PR (Kg/cm2)
	W TEMP (DegC)
	D PR (Kg/cm2)
	D TEMP (DegC)
	HT PR (Kg/cm2)
	INS THK (mm)
	INS MAT
	PSPEC
	BORE
	18-LS-11-1112-34C-IH
	4-LS-11-1108-34C-IH
	6-LS-11-1119-34C-IH
	6-LS-11-1122-34C-IH
	6-LS-11-1123-34C-IH
	12-V-11-1114-14B-IS
	18-LS-11-1116-24C-IH

LEGEND:-
— SUPPORT LOCATION
— DIRECTION OF FLOW
— DIRECTION OF SLOPE
— WELD SYMBOL
A - ANCHOR
R - REST
RG - REST + GUIDE
RL - REST + LIMIT STOP
RGL- DIRECTION ANCHOR
RH - RIGID HANGER
SH - SPRING HANGER
BS - BOTTOM SPRING
VG - VERTICAL GUIDE

RECORD OF REVISIONS:-				
03	12-01-20	REVISED BASED ON CUSTOMER COMMENTS	IH	GUK
02	06-11-19	SUPPORT LOCATIONS & INS. THICK. CHANGED	IH	GUK
01	25-06-19	GENERALLY REVISED	IH	GUK
00	25-05-19	FIRST ISSUE	IH	GUK
REV	ISSUE DATE	DESCRIPTION	DRN BY	CHKD BY

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REFERENCE DRAWINGS:-

1) P&ID OF STEAM SYSTEM : PY-DP-1-M117-1001-01

LINE PARAMETERS:-

LINE NUMBER	W PR (Kg/cm2)	W TEMP (DegC)	D PR (Kg/cm2)	D TEMP (DegC)	HT PR (Kg/cm2)	INS THK (mm)	INS MAT	PSPEC	BORE
18-LS-11-1112-34C-IH	31	359.3	36.6	470	54.9	180	Ca. SLLL	33C-TCM	18"
4-LS-11-1108-34C-IH	31	441.6	36.6	470	54.9	125	Ca. SLLL	33C-TCM	4"
6-LS-11-1119-34C-IH	31	359.3	36.6	470	54.9	115	Ca. SLLL	34C-TCM	6"
6-LS-11-1122-34C-IH	31	359.3	36.6	470	54.9	115	Ca. SLLL	34C-TCM	6"
6-LS-11-1113-34C-IH	31	359.3	36.6	470	54.9	115	Ca. SLLL	34C-TCM	6"
12-V-11-1114-14B-IS			5	450	NA	25	Ca. SLLL	14B-TCM	12"
18-LS-11-1116-24C-IH	31	359	36.6	417	54.9	180	Ca. SLLL	24C-TCM	18"

LEGEND:-



A - ANCHOR
R - REST
RG - REST + GUIDE
RL - REST + LIMIT STOP
RGL - DIRECTION ANCHOR
RH - RIGID HANGER
SH - SPRING HANGER
BS - BOTTOM SPRING
VG - VERTICAL GUIDE

RECORD OF REVISIONS:-

REV	ISSUE DATE	DESCRIPTION	DRN BY	CHKD BY	APPRD BY
03	12-01-20	REVISED BASED ON CUSTOMER COMMENTS	IH	GUK	GS
02	06-11-19	SUPPORT LOCATIONS & INS. THICK. CHANGED	IH	GUK	GS
01	25-06-19	GENERALLY REVISED	IH	GUK	GS
00	25-05-19	FIRST ISSUE	IH	GUK	GS

FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	MATERIAL	BORE (In)	SCH	RATING	QTY	UNITWT (Kg)
1	PIPE SMLS ASME B36.10 PE	A335GRF22	18	XS		43.7M	139.16
2	PIPE SMLS ASME B36.10 PE	A335GRF22	8	STD		1.0M	42.55
3	PIPE SMLS ASME B36.10 PE	A335GRF22	6	XS		0.6M	42.56
4	PIPE SMLS ASME B36.10 PE	A335GRF22	1	XS		0.4M	3.24
5	TEE STRT ASME B16.9 BW	A234GRWP22	18 x 18	40		2	130
6	RDCR CONC ASME B16.9 BW	A234GRWP22	18 x 16	XSXS		1	44.9
7	HALF COUPLING ASME B16.11 CL3000 SW	A182GRF22	18 x 1		CL3000	1	0.34
8	HALF COUPLING ASME B16.11 CL3000 SW	A182GRF22	8 x 1		CL3000	1	0.34
9	ELBOW LR 90 DEG ASME B16.9 BW	A234GRWP22	18	XS		5	148.07
10	CAP ASME B16.9 BW	A234GRWP22	8	STD		1	5.5
11	HALF COUPLING ASME B16.11 CL3000 SW	A182GRF22	1		CL3000	1	0.34
12	GATE VALVE GO CL300SPL BW	A217GRWC9	18		CL300SPL	1	860
13	GLOBE VALVE HO CL1500 SW	A182GRF22	1		CL1500	2	5.6

GENERAL NOTES:-

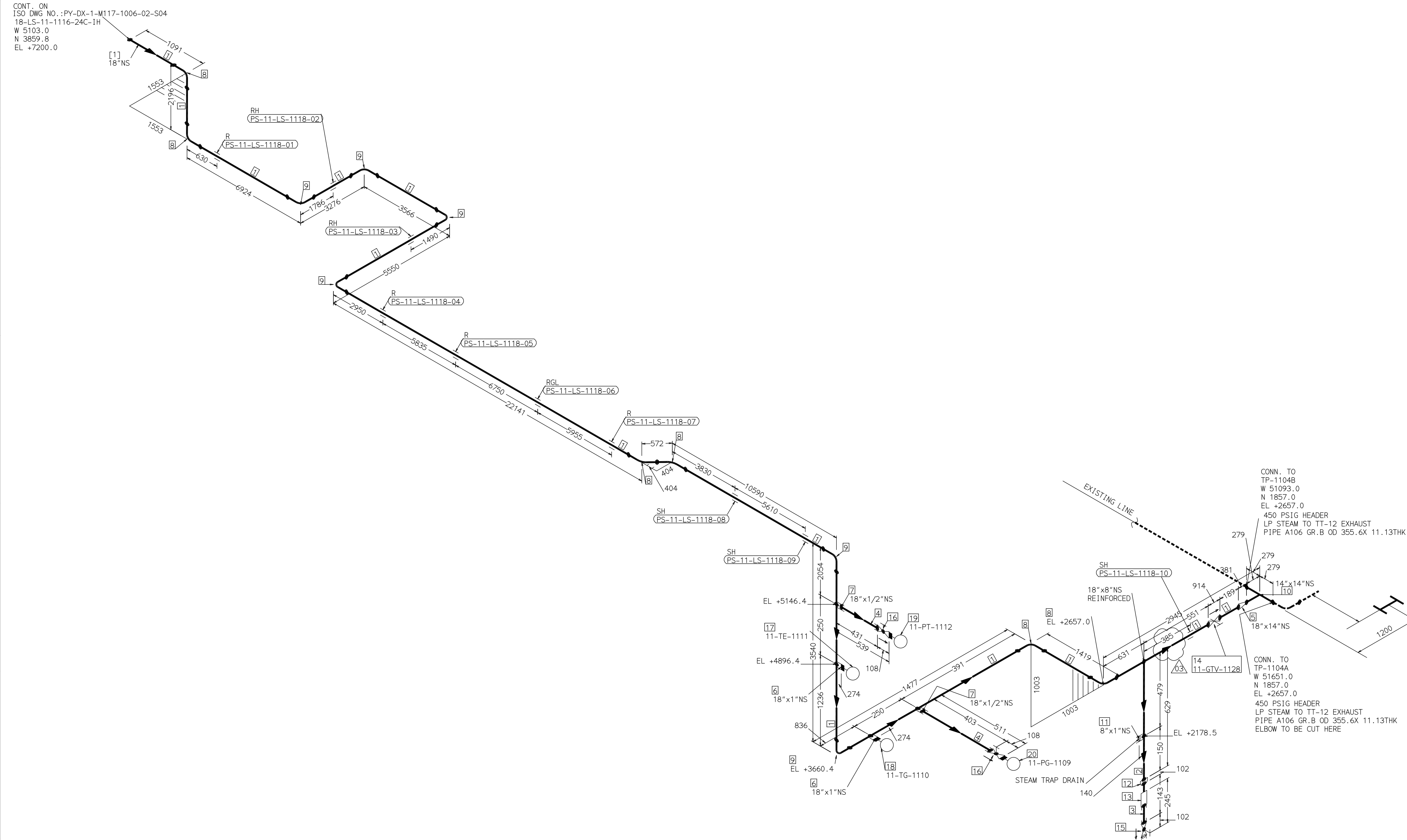
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- REINFORCEMENT PAD TO BE CUT FROM RESPECTIVE RUN PIPE.

ENGINEERING ISOMETRIC-IBR

CLIENT:	TATA CHEMICALS LIMITED MITHAPUR - INDIA
PROJECT:	1 X 14.9 MW BACK PRESSURE STG SET TOPPER TURBINE (TT) - 1 MITHAPUR, GUJARAT
CONSULTANT:	TATA CONSULTING ENGINEERS (TCE)

 BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING & SYSTEMS DIVISION R.C.PURAM, HYDERABAD-502032. PE&SD LAYOUTS & PIPING ENGINEERING	NAME	SIGN	DATE
	DRN. IH	-SD-	25-05-19
	CHKD. GUK	-SD-	25-05-19
	APPRD. GS	-SD-	25-05-19
SCALE: NTS			
TITLE: TURBINE EXHAUST-PIPING-COMMON HEADER		DRAWING NO: PY-DX-1-M117-1006-02 REV 03	
SHT. No. 4		NO. OF SHTS. 4	

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IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY DETRIMENTAL MANNER TO THE INTEREST OF THE COMPANY



FABRICATION MATERIALS						
PT NO	COMPONENT DESCRIPTION	MATERIAL	BORE (In)	SCH	RATING	QTY
1	PIPE EFSW ASME B36.10 PE	A691GR2.25CR	18	XS		52.1M
2	PIPE SMLS ASME B36.10 PE	A335GRP22	8	STD		0.5M
3	PIPE SMLS ASME B36.10 PE	A335GRP22	1	XS		0.2M
4	PIPE SMLS ASME B36.10 PE	A335GRP22	1/2	XS		0.4M
5	RDCR CONC ASME B16.9 BW	A234GRP22	18 x 14	XSX40		1
6	TEMP STUB STRT IMMERSION NP40	A182GRF22	18 x 1		NP40	2
7	HALF COUPLING ASME B16.11 CL3000 SW	A182GRF22	18 x 1/2		CL3000	2
8	ELBOW LR 45 DEG ASME B16.9 BW	A234GRP22	18	XS		6
9	ELBOW LR 90 DEG ASME B16.9 BW	A234GRP22	18	XS		6
10	TEE STRT ASME B16.9 BW	A234GRP22	14 x 14	40		1
11	HALF COUPLING ASME B16.11 CL3000 SW	A182GRF22	8 x 1		CL3000	1
12	CAP ASME B16.9 BW	A234GRP22	8	STD		1
13	HALF COUPLING ASME B16.11 CL3000 SW	A182GRF22	1		CL3000	1
14	GATE VALVE GO CL300 BW	A217GRWC9	18		CL300	1
15	GLOBE VALVE HO CL1500 SW	A182GRF22	1		CL1500	1
16	GLOBE VALVE HO CL1500 SW	A182GRF22	1/2		CL1500	2

ERECTION MATERIALS						
PT NO	COMPONENT DESCRIPTION	MATERIAL	BORE (In)	SCH	RATING	QTY
17	TEMP TRANSMITTER SCRD (NP40) 11-TE-1111		1		NP40	1
18	TEMP GAUGE SCRD (NP40) 11-TG-1110		1		NP40	1
19	PRESSURE TRANSMITTER SW 11-PT-1112		1/2			1
20	PRESSURE GAUGE SW 11-PG-1109		1/2			1

[1]

GENERAL NOTES:-

- ALL DIMENSIONS, ELEVATIONS AND CO-ORDINATES ARE IN MM UNLESS OTHERWISE SPECIFIED.
- ELEVATIONS ARE CENTRE LINE ELEVATIONS UNLESS OTHERWISE SPECIFIED.
- PIPES CONNECTED TO EQUIPMENTS/VALVES SHOULD BE EDGE PREPARED TO MATCH THE CORRESPONDING NOZZLE OF EQUIPMENT/VALVE.
- DRAWING DOES NOT INCLUDE ANY FABRICATION/ERECTION ALLOWANCE UNLESS OTHERWISE SPECIFIED.
- REINFORCEMENT PAD TO BE CUT FROM RESPECTIVE RUN PIPE.

ENGINEERING ISOMETRIC-IBR

CLIENT:	TATA CHEMICALS LIMITED MITHAPUR - INDIA
PROJECT:	1 X 14.9 MW BACK PRESSURE STG SET TOPPER TURBINE (TT) - 1 MITHAPUR, GUJARAT
CONSULTANT:	TATA CONSULTING ENGINEERS (TCE)

REFERENCE DRAWINGS:-	
1) P&ID OF STEAM SYSTEM : PY-DP-1-M117-1001-01	

LINE PARAMETERS:-									
LINE NUMBER	W PR (Kg/cm2)	W TEMP (DegC)	D PR (Kg/cm2)	D TEMP (DegC)	HT PR (Kg/cm2)	INS THK (mm)	INS MAT	PSPEC	BORE
18-LS-11-1118-24C-IH	30	356	36.6	417	54.9	180	Ca. SILL	24C-TCM	18"

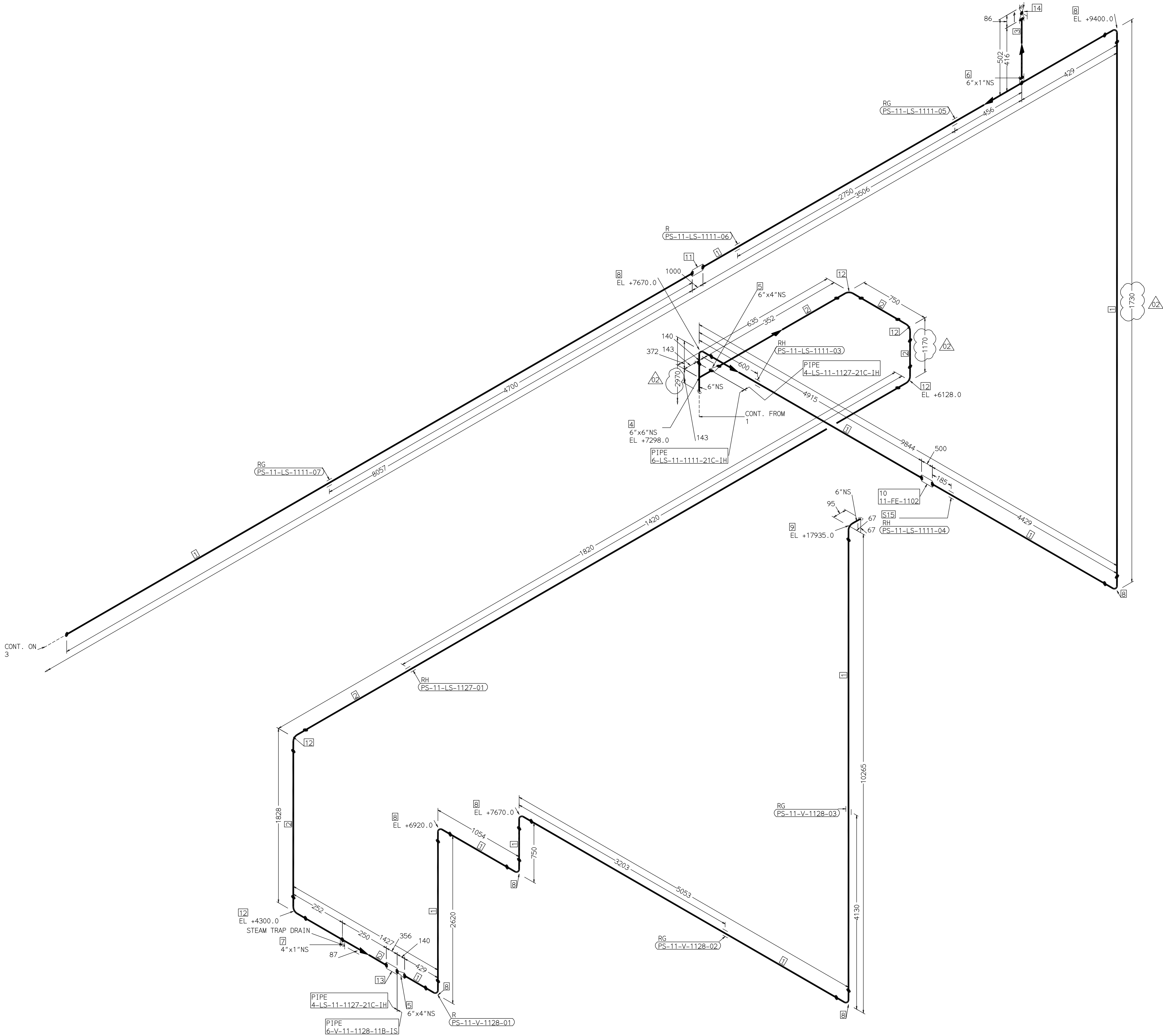
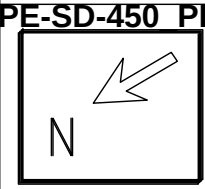
LEGEND:-	
	SUPPORT LOCATION
	DIRECTION OF FLOW
	DIRECTION OF SLOPE
	WELD SYMBOL
A	ANCHOR
R	REST
RG	REST + GUIDE
RL	REST + LIMIT STOP
RGL	DIRECTION ANCHOR
RH	RIGID HANGER
SH	SPRING HANGER
BS	BOTTOM SPRING
VG	VERTICAL GUIDE

RECORD OF REVISIONS:-				
03	12-01-20	GENERALLY REVISED	IH	GUK
02	10-08-19	GENERALLY REVISED	IH	GUK
01	21-06-19	GENERALLY REVISED	IH	GUK
00	25-05-19	FIRST ISSUE	IH	GUK
REV	ISSUE DATE	DESCRIPTION	DRN BY	APPRD BY

BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING & SYSTEMS DIVISION R.C.PURAM, HYDERABAD-502032. PE&SD LAYOUTS & PIPING ENGINEERING		NAME	SIGN	DATE
		DRN.	IH	-SD-
		CHKD.	GUK	-SD-
		APPRD.	GS	-SD-
		SCALE: NTS		
TITLE: TURBINE-EXHAUST-FROM-COMMON-HEADER TO TP-1104		DRAWING NO: PY-DX-1-M117-1006-04		REV 03
		SHT. No. 1	NO. OF SHTS.	1

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REFERENCE DRAWINGS:-	
1) P&ID OF STEAM SYSTEM : PY-DP-1-M117-1001-01	

LINE PARAMETERS:-									
LINE NUMBER	W PR (Kg/cm2)	W TEMP (DegC)	D PR (Kg/cm2)	D TEMP (DegC)	HT PR (Kg/cm2)	INS THK (mm)	INS MAT	PSPEC	BORE
4-LS-11-1110-24C-IH	4.5	337.9	7	435	10.5	125	Ca. SLLL	24C-TCM	4"
4-LS-11-1109-24C-IH	4.5	424.8	7	435	10.5	125	Ca. SLLL	24C-TCM	4"
6-LS-11-1111-21C-IH	4.5	375	7	420	10.5	140	Ca. SLLL	21C-TCM	6"
4-LS-11-1127-21C-IH	4	375	7	415	10.5	130	Ca. SLLL	21C-TCM	4"
6-V-11-1128-11B-IS			5	420	7.5	25	Ca. SLLL	11B-TCM	6"
6-LS-11-1125-11C-IH	4	170	7	180	10.5	125	Ca. SLLL	11C-TCM	6"

LEGEND:-	
	SUPPORT LOCATION
	DIRECTION OF FLOW
	DIRECTION OF SLOPE
	WELD SYMBOL
A	- ANCHOR
R	- REST
RG	- REST + GUIDE
RL	- REST + LIMIT STOP
RGL	- DIRECTION ANCHOR
RH	- RIGID HANGER
SH	- SPRING HANGER
BS	- BOTTOM SPRING
VG	- VERTICAL GUIDE

RECORD OF REVISIONS:-				
02	11-01-20	REVISED DUE TO CUSTOMER COMMENTS	IH	GUK GS
01	06-11-19	REVISED DUE TO ADDITION OF VENT LINE	IH	GUK GS
00	25-05-19	FIRST ISSUE	IH	GUK GS
REV	ISSUE DATE	DESCRIPTION	DRN BY	CHKD BY
				APPRD BY

FABRICATION MATERIALS						
PT NO	COMPONENT DESCRIPTION	MATERIAL	BORE (In)	SCH	RATING	QTY
1	PIPE SMLS ASME B36.10 PE	A106GRB	6	STD		39.8M
2	PIPE SMLS ASME B36.10 PE	A106GRB	4	STD		5.0M
3	PIPE SMLS ASME B36.10 PE	A106GRB	1	XS		0.4M
4	TEE STRT ASME B16.9 BW	A234GRWPB	6 x 6	STD		1
5	RDCR CONC ASME B16.9 BW	A234GRWPB	6 x 4	STDXS TD		2
6	HALF COUPLING ASME B16.11 CL3000 SW	A105	6 x 1		CL3000	1
7	HALF COUPLING ASME B16.11 CL3000 SW	A105	4 x 1		CL3000	1
8	ELBOW LR 90 DEG ASME B16.9 BW	A234GRWPB	6	STD		8
9	ELBOW LR 45 DEG ASME B16.9 BW	A234GRWPB	6	STD		1
10	PIPING COMPONENT (USER DEFINED) BW	A234GRWPB	6			1
11	DESUPERHEATER	A105	6		BWXCL300	1
12	ELBOW LR 90 DEG ASME B16.9 BW	A234GRWPB	4	STD		5
13	REG GLOBE VALVE M0 ASME B16.10 CL300 BW	A216GRWCB	4		CL300	1
14	GLOBE VALVE HO CL800 SW	A105	1		CL800	1

ERECTION MATERIALS						
PT NO	COMPONENT DESCRIPTION	MATERIAL	BORE (In)	SCH	RATING	QTY
15	RIGID HANGER		6			1

GENERAL NOTES:-

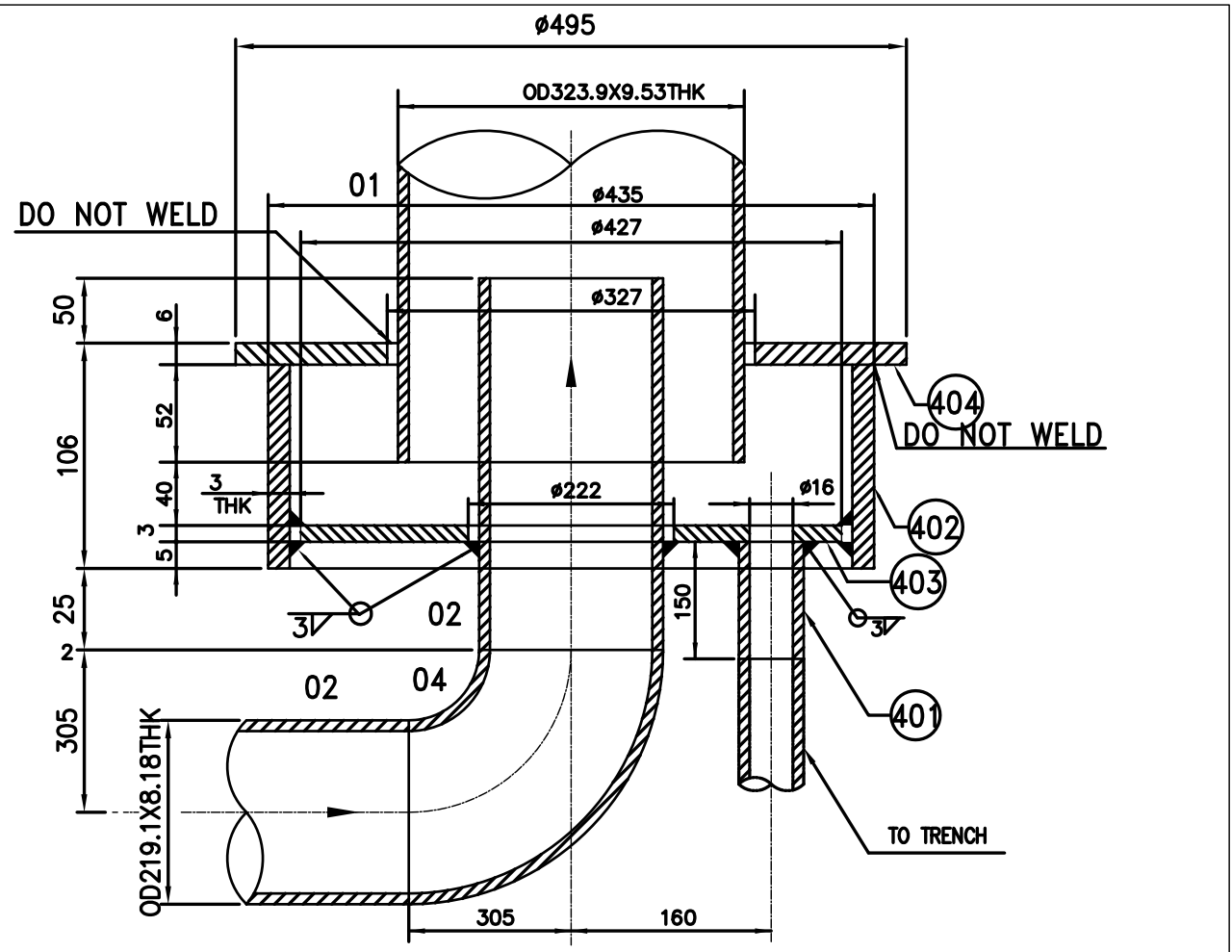
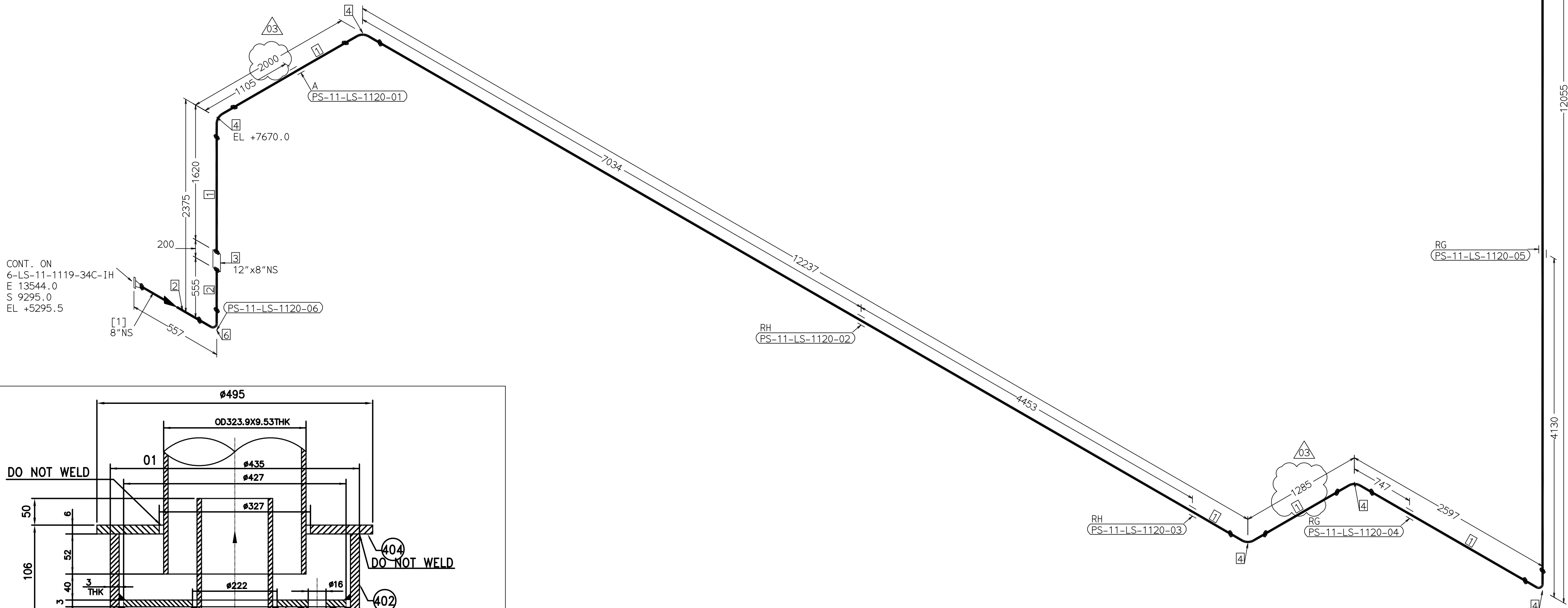
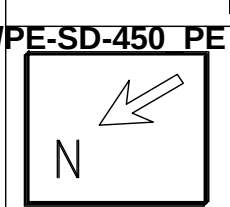
- ALL DIMENSIONS, ELEVATIONS AND CO-ORDINATES ARE IN MM UNLESS OTHERWISE SPECIFIED.
- ELEVATIONS ARE CENTRE LINE ELEVATIONS UNLESS OTHERWISE SPECIFIED.
- PIPES CONNECTED TO EQUIPMENTS/VALVES SHOULD BE EDGE PREPARED TO MATCH THE CORRESPONDING NOZZLE OF EQUIPMENT/VALVE.
- DRAWING DOES NOT INCLUDE ANY FABRICATION/ERECTION ALLOWANCE UNLESS OTHERWISE SPECIFIED.
- REINFORCEMENT PAD TO BE CUT FROM RESPECTIVE RUN PIPE.

ENGINEERING ISOMETRIC-IBR

CLIENT:	TATA CHEMICALS LIMITED MITHAPUR - INDIA
PROJECT:	1 X 14.9 MW BACK PRESSURE STG SET TOPPER TURBINE (TT) - 1 MITHAPUR, GUJARAT
CONSULTANT:	TATA CONSULTING ENGINEERS (TCE)

	BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING & SYSTEMS DIVISION R.C.PURAM, HYDERABAD-502032. PE&SD LAYOUTS & PIPING ENGINEERING		NAME	SIGN	DATE
		DRN.	IH	-SD-	25-05-19
		CHKD.	GUK	-SD-	25-05-19
		APPRD.	GS	-SD-	25-05-19
		SCALE: NTS			
TITLE: LEAK STEAM FROM FRONT & REAR GLAND TO 50 PSIG HEADER (TP-1102)		DRAWING NO: PY-DX-1-M117-1006-05			REV 02
		SHT. No. 2		NO. OF SHTS. 3	

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IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY DETRIMENTAL MANNER TO THE INTEREST OF THE COMPANY



BILL OF MATERIAL FOR DRIP PAN ARRANGEMENT						
PART NO.	COMPONENT DESCRIPTION	MATERIAL	BORE / SIZE	SCHEDULE	QTY	
401	PIPE SMLS ASME B36.10 PE	A106 GR B	12	S80	12 MTS	
402	PLATE 1366X100X3 THK	IS 2062	-	-	1	
403	PLATE 0142X1022X3 THK	IS 2062	-	-	1	
404	PLATE 01495X1032X6 THK	IS 2062	-	-	1	

REFERENCE DRAWINGS:-

1) P&ID OF STEAM SYSTEM : PY-DP-1-M117-1001-01

LINE PARAMETERS:-

LINE NUMBER	W PR (Kg/cm ²)	W TEMP (DegC)	D PR (Kg/cm ²)	D TEMP (DegC)	HT PR (Kg/cm ²)	INS THK (mm)	INS MAT	PSPEC	BORE
12-SV-11-1120-11B-IS	2	331.6	5	400	NA	25	Ca. SILL	11B-TCM	12"

LEGEND:-

- SUPPORT LOCATION
- DIRECTION OF FLOW
- DIRECTION OF SLOPE
- WELD SYMBOL

- A - ANCHOR
- R - REST
- RG - REST + GUIDE
- RL - REST + LIMIT STOP
- RGL - DIRECTION ANCHOR
- RH - RIGID HANGER
- SH - SPRING HANGER
- BS - BOTTOM SPRING
- VG - VERTICAL GUIDE

RECORD OF REVISIONS:-

REV	ISSUE DATE	DESCRIPTION	DRN BY	CHKD BY	APPRD BY
03	12-01-20	GENERALLY REVISED	AK	GUK	GS
02	08-11-19	REVISED DUE TO PIPING CLASH WITH STRUCTURAL	AK	GUK	GS
01	27-07-19	GENERALLY REVISED	AK	GUK	GS
00	25-05-19	FIRST ISSUE	IH	GUK	GS

FABRICATION MATERIALS

PT NO	COMPONENT DESCRIPTION	MATERIAL	BORE (In)	SCH	RATING	QTY	UNITWT (Kg)
1	PIPE SMLS ASME B36.10 PE	A106GRB	12	STD		28.4M	73.88
2	PIPE SMLS ASME B36.10 PE	A106GRB	8	STD		0.4M	42.55
3	DRIP PAN IN PSV OUTLET	A106GRB	12 x 8			1	0
4	ELBOW LR 90 DEG ASME B16.9 BW	A234GRWPB	12	STD		5	55.68
5	ELBOW LR 45 DEG ASME B16.9 BW	A234GRWPB	12	STD		2	27.84
6	ELBOW LR 90 DEG ASME B16.9 BW	A234GRWPB	8	STD		1	21.62

[1]

GENERAL NOTES:-

- ALL DIMENSIONS, ELEVATIONS AND CO-ORDINATES ARE IN MM UNLESS OTHERWISE SPECIFIED.
- ELEVATIONS ARE CENTRE LINE ELEVATIONS UNLESS OTHERWISE SPECIFIED.
- PIPES CONNECTED TO EQUIPMENTS/VALVES SHOULD BE EDGE PREPARED TO MATCH THE CORRESPONDING NOZZLE OF EQUIPMENT/VALVE.
- DRAWING DOES NOT INCLUDE ANY FABRICATION/ERECTION ALLOWANCE UNLESS OTHERWISE SPECIFIED.
- REINFORCEMENT PAD TO BE CUT FROM RESPECTIVE RUN PIPE.

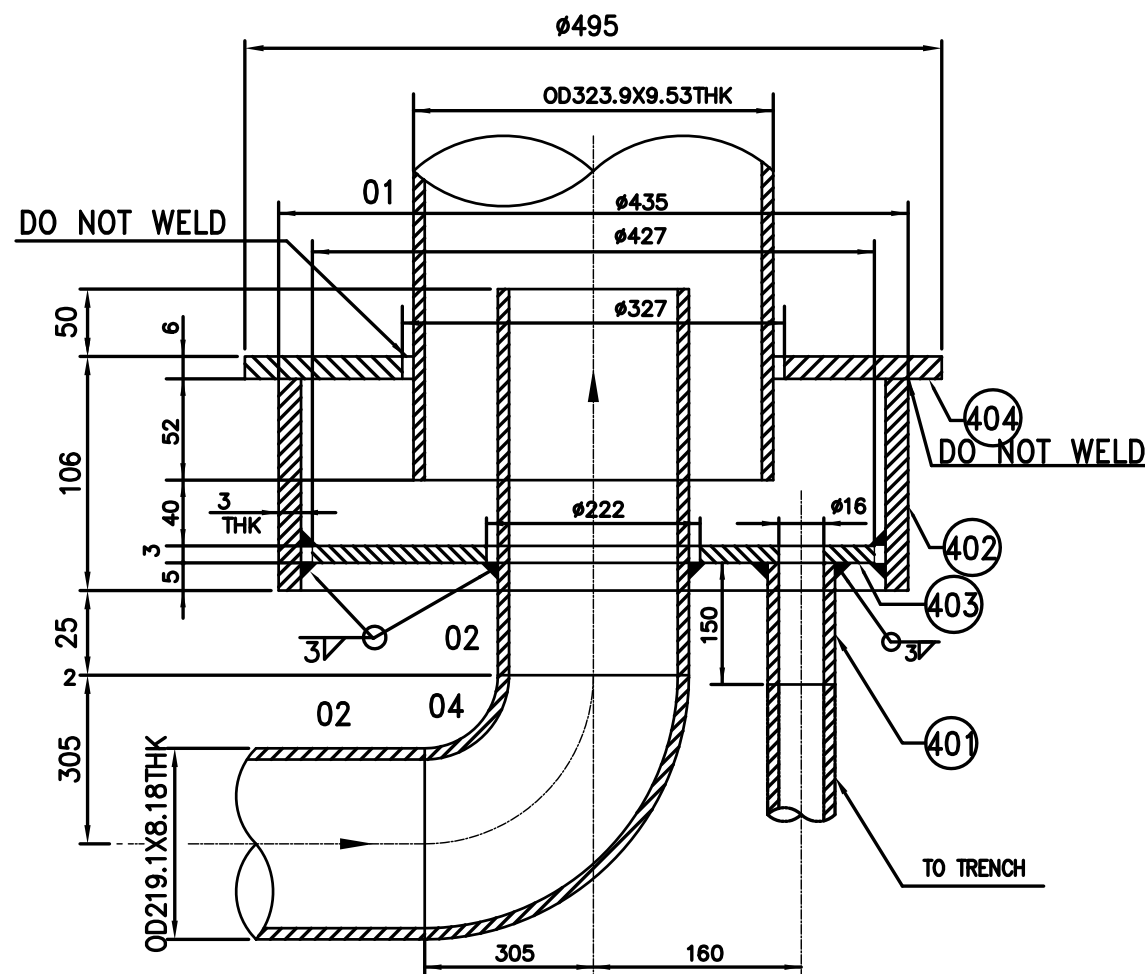
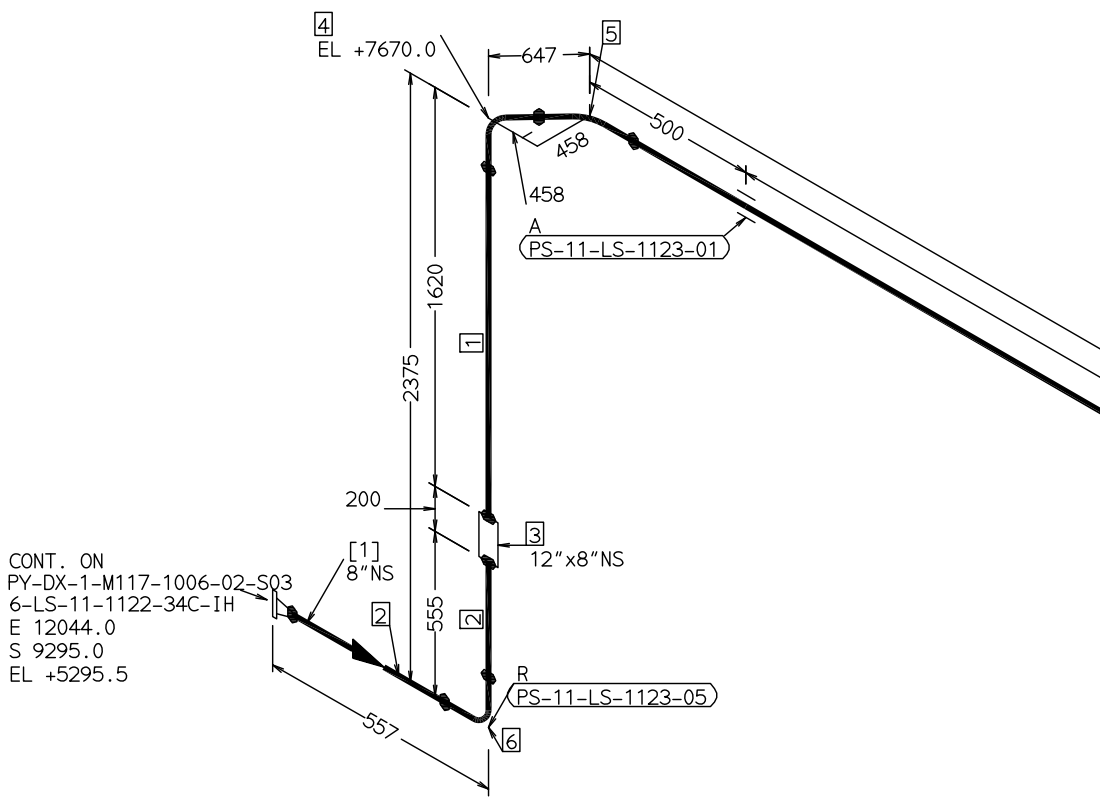
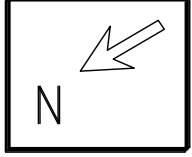
ENGINEERING ISOMETRIC-IBR

CLIENT:	TATA CHEMICALS LIMITED MITHAPUR - INDIA
PROJECT:	1 X 14.9 MW BACK PRESSURE STG SET TOPPER TURBINE (TT) - 1 MITHAPUR, GUJARAT
CONSULTANT:	TATA CONSULTING ENGINEERS (TCE)

BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING & SYSTEMS DIVISION R.C.PURAM, HYDERABAD-502032. PE&SD LAYOUTS & PIPING ENGINEERING				NAME	SIGN	DATE
	DRN.	IH	-SD-	25-05-19		
	CHKD.	GUK	-SD-	25-05-19		
	APPRD.	GS	-SD-	25-05-19		
				SCALE: NTS		
TITLE: 11-PSV-6101 SAFETY VALVE OUTLET LINE TO VENT SILENCER 11-LZ-1102				DRAWING NO: PY-DX-1-M117-1006-06		REV 03
				SHT. No. 1	NO. OF SHTS.	1

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TYP.DRIP PAN DETAIL

BILL OF MATERIAL FOR DRIP PAN ARRANGEMENT						
PART NO	COMPONENT DESCRIPTION	MATERIAL	BORE / SIZE	SCHEDULE	QTY	
401	PIPE SMLS ASME B36.10 PE	A106 GR B	12	S80	12 MTS	
402	PLATE 1366X100X3 THK	IS 2062	-	-	1	
403	PLATE 0142X100X25X3 THK	IS 2062	-	-	1	
404	PLATE 01495X100X7X6 THK	IS 2062	-	-	1	

REFERENCE DRAWINGS:-

1) P&ID OF STEAM SYSTEM : PY-DP-1-M117-1001-01

LINE PARAMETERS:-

LINE NUMBER	W PR (Kg/cm ²)	W TEMP (DegC)	D PR (Kg/cm ²)	D TEMP (DegC)	HT PR (Kg/cm ²)	INS THK S(mm)	INS MAT	PSPEC	BORE
12-SV-11-1123-11B-IS	2	331.6	5	400	NA	25	Ca. SLLL	11B-TCM	12"

LEGEND:-

— SUPPORT LOCATION
— DIRECTION OF FLOW
— DIRECTION OF SLOPE
— WELD SYMBOL

A - ANCHOR
R - REST
RG - REST + GUIDE
RL - REST + LIMIT STOP
RGL- DIRECTION ANCHOR
RH - RIGID HANGER
SH - SPRING HANGER
BS - BOTTOM SPRING
VG - VERTICAL GUIDE

RECORD OF REVISIONS:-

REV	ISSUE DATE	DESCRIPTION	DRN BY	CHKD BY	APPRD BY
02	08-11-19	REVISED DUE TO PIPING CLASH WITH STRUCTURAL	AK	GUK	GS
01	27-07-19	GENERALLY REVISED	AK	GUK	GS
00	25-05-19	FIRST ISSUE	IH	GUK	GS

FABRICATION MATERIALS									
PT NO	COMPONENT DESCRIPTION	MATERIAL	BORE (In)	SCHEDULE	RATING	QTY	UNITWT (Kg)	MATCODE	PART NO
1	PIPE SMLS ASME B36.10 PE	A106GRB	12	STD		25242MM	73.88	PY9752097138	
2	PIPE SMLS ASME B36.10 PE	A106GRB	8	STD		400MM	42.55	PY9752097111	
3	DRIP PAN IN PSV OUTLET	A106GRB	12 x 8			1	0		
4	ELBOW LR 90 DEG ASME B16.9 BW	A234GRWPB	12	STD		2	55.68	PY9752101135	
5	ELBOW LR 45 DEG ASME B16.9 BW	A234GRWPB	12	STD		5	27.84	PY9752112072	
6	ELBOW LR 90 DEG ASME B16.9 BW	A234GRWPB	8	STD		1	21.62	PY9752101119	

[1]

NOTES:-

- ALL DIMENSIONS, ELEVATIONS AND CO-ORDINATES ARE IN MM UNLESS OTHERWISE SPECIFIED.
- ELEVATIONS ARE CENTRE LINE ELEVATIONS UNLESS OTHERWISE SPECIFIED.
- DIRECTION OF VALVE HANDWHEEL SHALL BE CHECKED FOR INTERFERENCE BEFORE ERECTION.
- PIPE FABRICATOR TO CONFIRM THE VALVE/INSTRUMENT DIMENSIONS BEFORE FABRICATING THE SPOOL PIPE. THE OVERALL LEG LENGTH SHOULD REMAIN AS PER THE ISOMETRIC AFTER ACCOUNTING FOR THE DEVIATIONS IN INLINE COMPONENT DIEMENSIONS.
- FOR PIPE EDGE PREPARATION DETAIL, WELDING DETAILS OF PIPE TO PIPE, WELDING DETAILS OF STUBS/OLETS, REFER TO "STANDARD PIPING FABRICATION DETAILS" DRG.NO. 2-38101-04000 REV.00
- FOR WPS, TESTING AND INSPECTION REQUIREMENTS, REFER BHEL PE&SD STANDARD GT 57 124 REV 03.
- ROUTING OF LINES NB <= 1.5" CAN BE MODIFIED SUITABLY AS PER SITE CONDITIONS, IF REQUIRED.
- SUPPORT LOCATIONS TO BE ADJUSTED SUITABLY TO SUIT AS PER SITE CONDITIONS, IF REQUIRED.
- THE HIGH POINT VENTS & LOW POINT DRAINS SHOWN IN THIS DRG CAN BE RELOCATED TO SUIT TO SITE REQUIREMENT, IF REQUIRED.
- DRAWING DOES NOT INCLUDE ANY ERECTION ALLOWANCE UNLESS OTHERWISE SPECIFIED.
- PIPES ARE SENT LOOSE IN COMMERCIAL LENGTHS AND ARE TO BE CUT SUITABLY AND EDGE PREPARED AT SITE.
- PIPE FITTINGS, FLANGES AND VALVES ARE SENT LOOSE WITH EDGE PREPARATION.
- REINFORCEMENT PAD TO BE CUT FROM RESPECTIVE RUN PIPE.

CLIENT:	TATA CHEMICALS LIMITED MITHAPUR - INDIA
PROJECT:	1 X 14.9 MW BACK PRESSURE STG SET TOPPER TURBINE (TT) - 1 MITHAPUR, GUJARAT
CONSULTANT:	TATA CONSULTING ENGINEERS (TCE)

 BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING & SYSTEMS DIVISION R.C.PURAM, HYDERABAD-502032. PE&SD LAYOUTS & PIPING ENGINEERING	NAME	SIGN	DATE
	DRN. IH	-SD-	25-05-19
	CHKD. GUK	-SD-	25-05-19
	APPRD. GS	-SD-	25-05-19
SCALE: NTS			
TITLE: 11-PSV-6102 SAFETY VALVE OUTLET LINE TO VENT SILENCER 11-LZ-1104		DRAWING NO: PY-DX-1-M117-1006-07	REV 02
		SHT. No. 1	NO. OF SHTS. 1

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CHECKLIST FORMAT
PRE-FORMED CALCIUM SILICATE INSULATION

ANNEXURE-C TO PEMC-07415
JOB SPECIFICATION FOR PRE-FORMED CALCIUM SILICATE INSULATION
TCL MITHAPUR

BHEL's Enquiry No & Date : Bidder to Specify
 Bidder's Name : Bidder to Specify
 Bidder's Offer No & Date : Bidder to Specify
 Bidder's Ref No & Date : Bidder to Specify

SI No	Description	Yes / No
1	Bidder to confirm that ALL THE DOCUMENTS SPECIFIED in Clause No 7.0 of purchaser's Job Specification (Doc.No. PEMC-07415) are submitted along with the technical offer.	
	Unpriced Price Bid Format	YES
	Deviation Schedule	YES
	Stamped & Signed copy of PEMC-07415 and PY52036-R01	YES
	Stamped & Signed copy of Engineering Isometrics	YES
	Stamped & Signed copy of Bill of Material	YES



BHARAT HEAVY ELECTRICALS LIMITED
 RAMACHANDRAPURAM, HYDERABAD-32
PROJECT ENGINEERING & SYSTEMS DIVISION

DEVIATION SCHEDULE
PRE-FORMED CALCIUM SILICATE THERMAL INSULATION PACKAGE

ANNEXURE-D TO PEMC-07415
JOB SPECIFICATION FOR PRE-FORMED CALCIUM SILICATE THERMAL INSULATION PACKAGE
TCL MITHAPUR

BHEL's Enquiry No & Date : Bidder to Specify
 Bidder's Name : Bidder to Specify
 Bidder's Offer No & Date : Bidder to Specify
 Bidder's Ref No & Date : Bidder to Specify

SI No	Reference			BHEL Specification's Requirement	Deviation sought by Bidder
	Doc No	Page No	Clause No		

A. INSTRUCTIONS TO BIDDERS

1. All of bidder's deviations to the BHEL specification shall be intimated to BHEL in a consolidated manner in this document only. Deviations listed elsewhere will be summarily rejected and shall be ignored.
2. BHEL will clarify in writing to the bidder regarding the acceptance / non acceptance of the deviations sought by bidder.
3. In case no deviations are raised by bidder, it will be assumed that the bidder has accepted and confirmed to all the requirements of BHEL's specification in totality without any deviation.
4. No deviations other than those that have been specifically mentioned in this document and have been accepted by BHEL during the post-bid stage, will be accepted or allowed during the offer execution stage.
5. Additional sheets, if necessary for bidder's deviations, may be enclosed.

B. BIDDER'S DECLARATION.

1. We confirm that all our deviations to BHEL's specifications and its annexures are listed in this document only.
2. We confirm that except for those deviations, covered in this document, it will be our responsibility to fully meet the intent and the requirements of the specifications and all its annexures within the quoted price, without any deviation.

Bidder's Authorised Signature:

Date:

Bidder's Name:

Bidder's Seal:



BHARAT HEAVY ELECTRICALS LIMITED
 RAMACHANDRAPURAM, HYDERABAD-32
PROJECT ENGINEERING & SYSTEMS DIVISION

PRE-BID QUERY FORMAT
PRE-FORMED CALCIUM SILICATE THERMAL INSULATION PACKAGE

ANNEXURE-E TO PEMC-07415
JOB SPECIFICATION FOR PRE-FORMED CALCIUM SILICATE THERMAL INSULATION PACKAGE
TCL MITHAPUR

BHEL's Enquiry No & Date : Bidder to Specify
 Bidder's Name : Bidder to Specify
 Bidder's Offer No & Date : Bidder to Specify
 Bidder's Ref No & Date : Bidder to Specify

SI No	Reference			BHEL Specification’s Requirement	Bidder’s Query / Observation	BHEL’s Clarification
	Doc No	Page No	Clause No			
(To be filled by the Bidder)						(To be filled by BHEL)

A. INSTRUCTIONS TO BIDDERS

1. All of bidder's queries / clarifications / observations to the BHEL specification shall be intimated to BHEL in a consolidated manner in this document only.
2. BHEL will clarify in writing to the bidder all such queries / clarifications / observations raised by the bidder.
3. Decision of BHEL on all such queries / clarifications / observations raised by bidder will be final and binding on bidder.
4. In case no pre-bid query is raised by bidder, it will be assumed that the bidder has accepted and confirmed to all the requirements of BHEL's specification in totally without any deviation.
5. None of the bidder's queries / clarifications / observations (except those that have been specifically mentioned in this document and have been accepted by BHEL during the pre-bid stage) will be accepted or allowed during post bid stage / offer execution stage.
6. Additional sheets, if necessary for bidder's queries / clarifications / observations, may be enclosed.

B. BIDDER'S DECLARATION.

1. We confirm that all our queries / clarifications / observations to the BHEL's Specifications and its annexures are listed in this document only.
2. We confirm that except for those queries / clarifications / observations covered in this document, it will be our responsibility to fully meet the intent and the requirements of the specifications and all its annexures within the quoted price, without any deviation.

Bidder's Authorised Signature:

Date:

Bidder's Name:

Bidder's Seal: