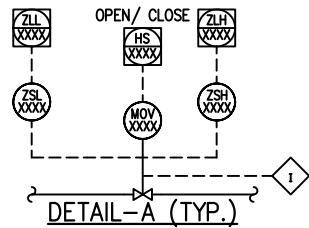


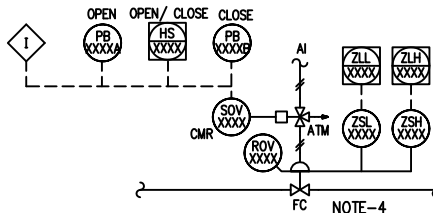
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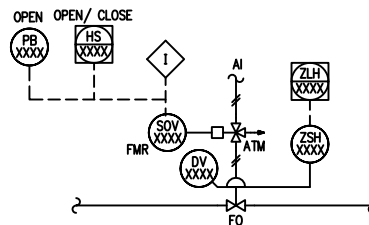
MOV SHOULD HAVE OPEN/CLOSE FACILITY AT FIELD AND FROM CONTROL ROOM.
ALL MOV WILL BE PRESSURE BALANCE PLUG TYPE.
TAG NUMBER WILL BE SAME AS CORRESPONDING MOV TAG NUMBER.
APPLICABLE TO ALL MOV'S

DETAIL-A
(TYP.)



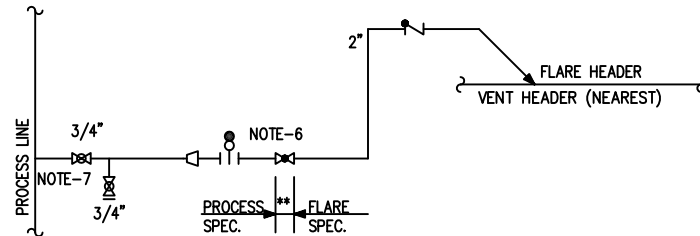
NUMBERS OF SOV, PB, ZSH,ZSL,ZLH,ZLL WILL BE SAME AS ROV.
ROV'S TO BE TSO TYPE.
SOV'S TO BE LOCATED CLOSE TO INDIVIDUAL ROV.
ALL ROV'S TO INCLUDE VOLUME BOTTLE ARRANGEMENT TO HAVE ATLEAST TWO OPERATIONS OF THE ROV'S & SOV'S DURING INSTRUMENT AIR FAILURE.
REFER NOTE-5 OF RESPECTIVE SECURITY SYSTEM P&ID FOR INTERLOCK ACTUATION/ MAINTENANACE BYPASS.

DETAIL-B
(TYP.)



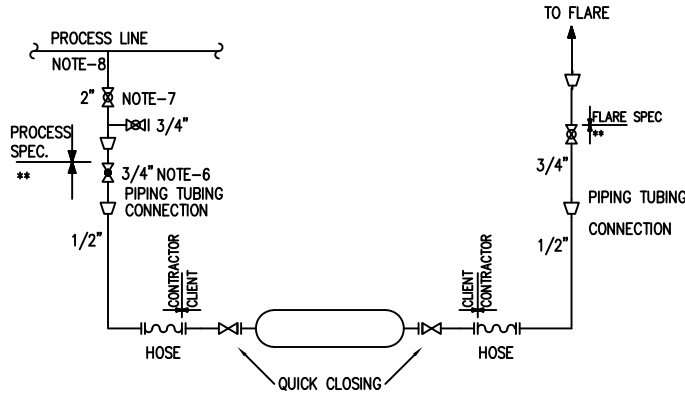
NUMBERS OF SOV, PB, ZSH,ZSL,ZLH,ZLL WILL BE SAME AS DV.
IN ADDITION TO OPERATION THROUGH SOLENOID AS INDICATED ABOVE, THE DELUGE VALVE SHALL BE OPERABLE DIRECTLY ALSO. REFER ENGINEERING (GEN. CIVIL) DOCUMENTS DV TO FMR TYPE.
REFER NOTE-5 OF RESPECTIVE SECURITY SYSTEM P&ID FOR INTERLOCK ACTUATION/ MAINTENANACE BYPASS.

DETAIL-C
(TYP.)



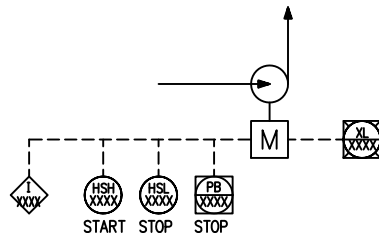
** VALVE SPEC TO BE B2K/B4A/A4A/A1A DEPENDING ON PROCESS/FLARE SPEC.

LIQUID BLEED DETAILS
DETAIL-D
(TYP.)

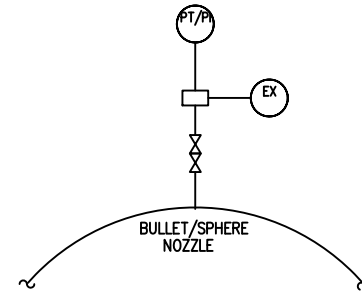


** VALVE SPEC TO BE B2K/B4A/A4A/A1A DEPENDING ON PROCESS/FLARE SPEC.

SAMPLE POINT DETAIL (SC-4)
DETAIL-E
(TYP.)



PUMP MOTOR INDICATION
DETAIL-F



DETAIL-G
PI/PG DETAILS

NOTES:

- FOR GENERAL NOTES AND TYPICAL DETAILS REFER P&ID NO. 6907-04-41-000-1191.
- ALL INSTRUMENTS TAGS TO BE PREFIXED BY RESPECTIVE UNIT No. .
- ALL LIQUID BLEEDS TO BE ROUTED TO FLARE AS PER DETAIL-D.
- ROV's TO BE OUTSIDE THE ENCLOSURE WALL AND SHOULD BE FIRE SAFE WITH FIRE SAFE ACTUATOR.
- ALL PRESSURE TAPS SHALL BE PROVIDED WITH TWO WAY MANIFOLD.
- VALVE TO BE ANTI FREEZE TYPE.
- ALL DRAIN AND SAMPLE POINT FIRST ISOLATION VALVE SHALL BE QUICK CLOSING AND TIGHT SHUT-OFF TYPE.
- SAMPLE POINT TAPPING SHALL BE TAKEN FROM EITHER TOP OR SIDE.

B	18.09.09	ISSUED FOR COMMENTS				PS			
A	13.07.09	ISSUED FOR COMMENTS				PS	RS	SC	NRK
संख्या No.	तिथि DATE	संशोधन REVISIONS				डॉन DRN	द्वारा BY	जैच CHKD	अनुमोदित APPD.
		THIS DWG IS GENERATED BY 41 DIVISION OF 04 DEPTT							

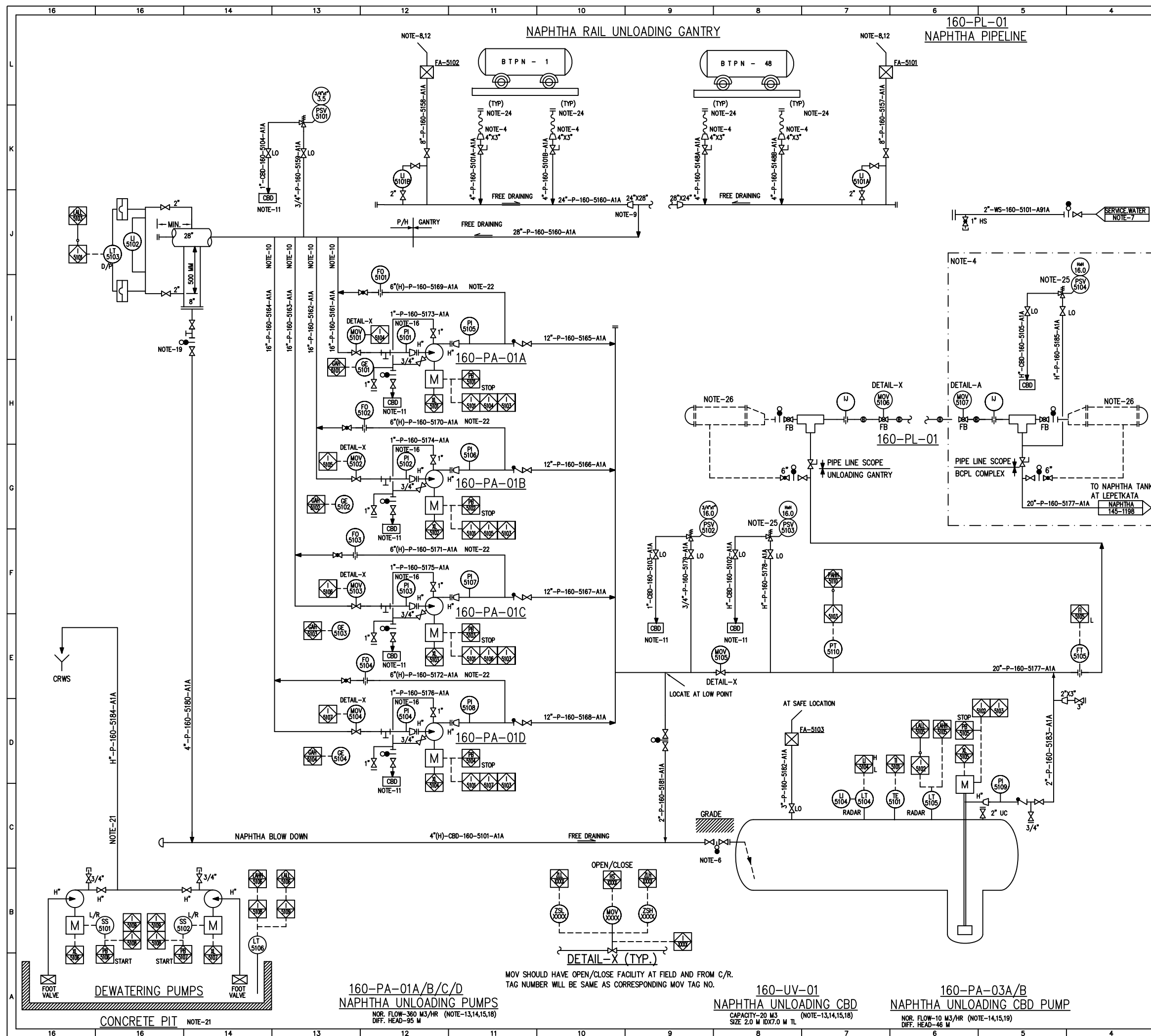
इंजिनियर्स इंडिया लिमिटेड (भारत सरकार का उपक्रम)			ENGINEERS INDIA LIMITED (A Govt. of India Undertaking)	
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BRAHAMAPUTRA CRACKERS AND POLYMERS LTD BRAHAMAPUTRA PETROCHEMICAL COMPLEX					
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पाइपिंग रण्ड इंस्ट्रुमेंटेशन डायग्राम PIPING AND INSTRUMENTATION DIAGRAM TYPICAL DETAILS OF MOV,ROV,DV,SC ETC.					
--	--	--	--	--	--

अनुमाप SCALE	कार्य संख्या JOB NO.	विभाग DEPT.	इकाई UNIT	उप इकाई SUB UNIT	आरेख संख्या DWG. No.	संशो. REV.
	6907	04	41	000	1193	B

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- NOTES:
1. FOR GENERAL NOTES TYPICAL DETAILS REFER P&ID No. 6907-04-41-000-1191/1193.
 2. PROVIDE ADEQUATE NUMBER OF BASINS FOR COLLECTING OILY WATER GENERATED IN THE GANTRY AS A RESULT OF SPILLAGE/LEAK DUE TO HOSE CONNECTION/DISCONNECTION.
 3. HOSES END CONNECTIONS TO BE COMPATIBLE WITH BTPN WAGON NOZZLE. ARRANGMENT OF 4" STUB CONNECTION TO BE SUCH THAT BOTTOM OF FLANGE CONNECTING HOSE IS MAXIMUM 6" FROM GRADE.
 4. THESE FACILITIES SHALL BE CONFIGURED IN LEPETKATA COMPLEX.
 5. ALL INSTRUMENT SIGNALS TO BE ROUTED TO NAPHTHA UNLOADING PLC CONTROL ROOM NEAR THE RAILWAY GANTRY.
 6. LOCATE IN A PIT AND SHALL BE OPERABLE FROM GRADE.
 7. ADEQUATE NO. OF SERVICE WATER HOSE POINTS TO BE PROVIDED IN GANTRY TO WASH AWAY ANY SPILLAGE TO CRWS. PROVIDE SERVICE WATER HOSE IN PUMP HOUSE.
 8. HEIGHT OF VENT TO BE MIN 0.5M ABOVE THE TOP OF RAIL WAGONS.
 9. UNLOADING HEADER SHALL BE FREE DRAINING TO PUMPS SUCTION WITH A MIN SLOPE OF 1:1000. 28" PUMP SUCTION HEADER SHALL START FROM THE MIDDLE OF 24"-P-160-5160-A1A. THE HEADER SHALL BE BURIED OR LAID IN A BELOW GRADE COVERED TRENCH.
 10. INDIVIDUAL SUCTION LINES TO BE TAPPED FROM BOTTOM OF THE MAIN SUCTION HEADER.
 11. ALL BLOW DOWN LINES FROM PIPING AND EQUIPMENT TO BE ROUTED TO NAPHTHA CBD VESSEL THROUGH A BURIED HEADER. SIZE OF THE HEADER TO BE CONFIRMED DURING DETAIL ENGINEERING.
 12. VENT TO BE OPERATED ONLY DURING HEADER FILLING & DECANATING.
 13. UNLOADING PUMPS TO BE LOCATED IN A PUMP HOUSE NEAR THE RAIL UNLOADING GANTRY. PUMP NOZZLE ELEVATION SHALL BE MIN. 3M BELOW FROM THE WAGON OUTLET NOZZLE.
 14. PUMP SEAL COOLER SHALL BE AIR COOLED TYPE AS SERVICE WATER IS NOT AVAILABLE CONTINUOUSLY FOR SEAL COOLING.
 15. SEAL FAILURE ALARM TO BE PROVIDED FOR EACH PUMP IN NAPHTHA UNLOADING PLC C/R. FOR SEAL PLAN REFER DRAWING NO. 6907-04-41-000-1194.
 16. THESE SHALL BE COMPOUND GAUGES.
 17. ALL INSTRUMENT TAGS TO BE PREFIXED WITH UNIT No. 160.
 18. DEPENDING ON LIQUID LEVEL IN SUCTION HEADER, PUMP SHALL BE STARTED IN SEQUENTIAL MANNER. 3 PUMP MAY RUN IN PARALLEL.
 19. 160-PA-03B IS WAREHOUSE SPARE.
 20. PROVIDE AIR VENTILATION FAN IN THE PUMP HOUSE, SUITABLE FOR THE AREA CLASSIFICATION.
 21. PROVIDE A CONCRETE PIT FOR COLLECTING NAPHTHA/WATER SPILLAGE IN THE P/H. PROVIDE DEWATERING PUMPS SUITABLE FOR OILY WATER FOR THE PUMP HOUSE. PUMP DISCHARGE TO BE ROUTED TO OWS. DETAILS TO DEVELOPED DURING DETAIL ENGINEERING BY ENG.
 22. MIN. FLOW LINE TO BE CONNECTED AT FARTHEST POINT OR 50 M AWAY FORM SUCTON.
 23. NO. OF GAS DETECTOR TO BE FINALISED DURING DETAIL ENGG.
 24. UNLOADING GANTRY DESIGN TO BE SUITABLE FOR NAPHTHA SIMULTANEOUS UNLOADING FROM A RACK OF 48 BTPN WAGONS. 2 CONNECTIONS TO BE PROVIDED FOR EACH WAGON.
 25. SIZE OF TSV AND LOCATION TO BE FINALISED AFTER PIPELINE ROUTING FINALISATION.
 26. TEMPORARY PIGGING FACILITIES TO BE CONSIDERED FOR PIPELINE.

<u>INTERLOCK NO.</u>	<u>ACTUATED BY</u>	<u>ACTION</u>
I-5101	LALL-5103	TRIP PUMP 160-PA-01A/B/C/D CLOSE MOV-5105
I-5102	LALL-5105	TRIP PUMP 160-PA-03A/B
I-5103	PAHH-5110	TRIP PUMP 160-PA-01A/B/C/D CLOSE MOV-5105
I-5104	NOT ZSH-5101	TRIP PUMP 160-PA-01A
I-5105	NOT ZSH-5102	TRIP PUMP 160-PA-01B
I-5106	NOT ZSH-5103	TRIP PUMP 160-PA-01C
I-5107	NOT ZSH-5104	TRIP PUMP 160-PA-01D
I-5108	LAHH-5106	START DEWATERING PUMP
I-5109	LALL-5106	STOP DEWATERING PUMP

0	10.12.09	ISSUED FOR ENGG.	PS	SC	DK	NRK
संख्या No.	तिथि DATE	संशोधन REVISIONS	ड्रॉन DRN	द्वारा BY	जॉच CHKD	अनुमोदित APPD.

इंजीनियर्स
इंडिया लिमिटेड
(भारत सरकार का उपक्रम)



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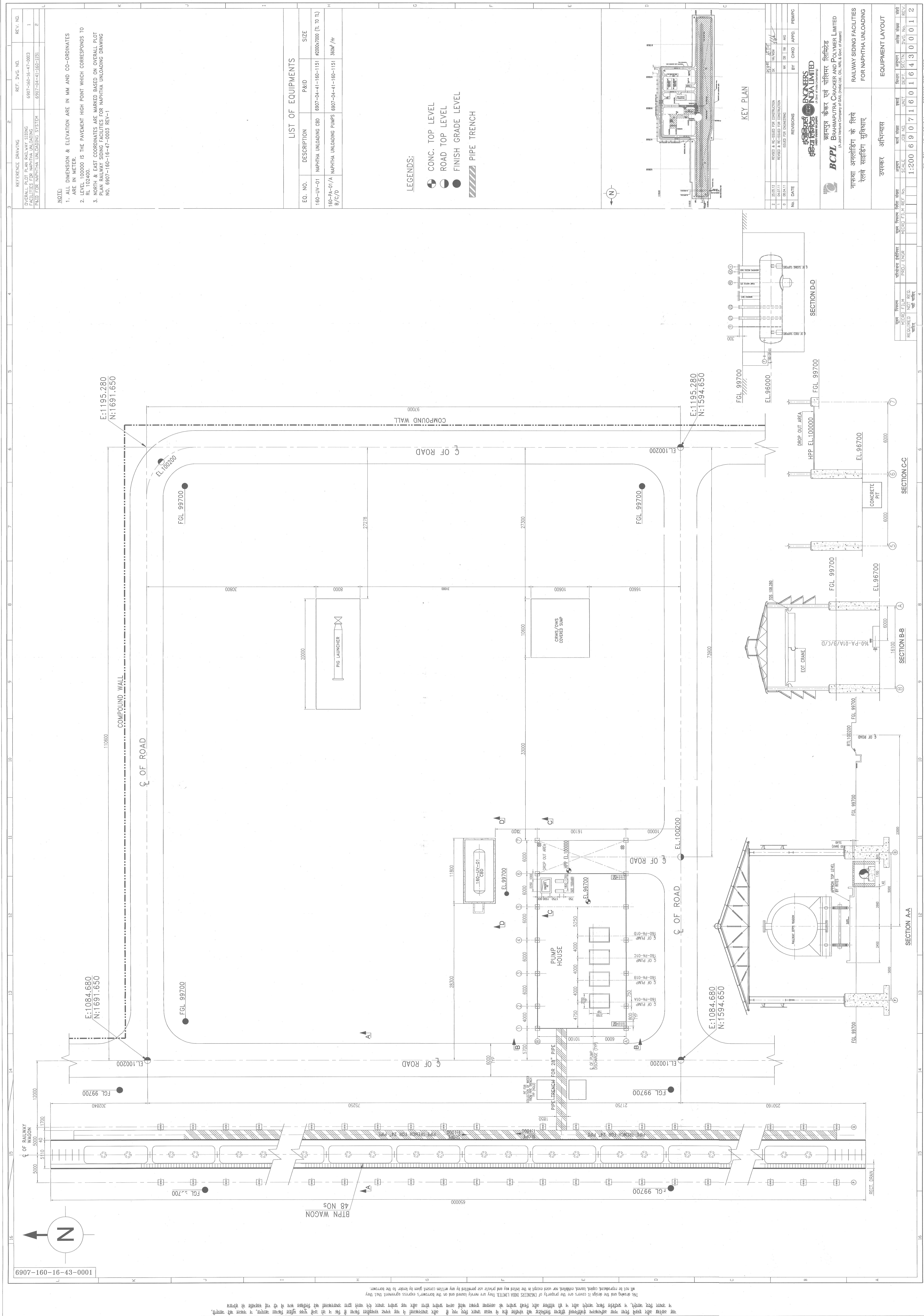


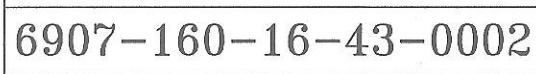
BRAHAMAPUTRA CRACKERS AND POLYMERS LTD
BRAHAMAPUTRA PETROCHEMICAL COMPLEX

पाइपिंग एण्ड इंस्ट्रुमेंटेशन डायग्राम
PIPING AND INSTRUMENTATION DIAGRAM
NAPHTHA UNLOADING SYSTEM

अनुमाप SCALE	कार्य संख्या JOB NO.	विभाग DEPT.	अनुभाग SECTN.	इकाई UNIT	आरेख संख्या DWG. No.	संशोधन REV.
S	6907	04	41	160	1151	0

EIL-0241-502-REV-0-A DISTRIBUTION CODE



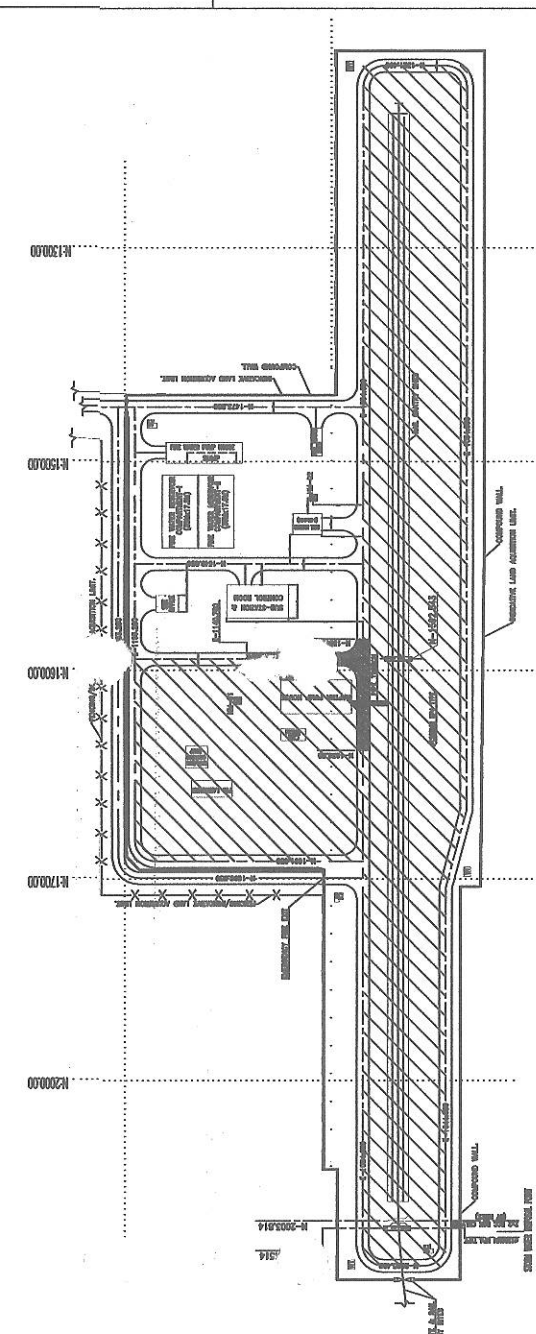


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AREA NO.	DRAWING NO.	DESCRIPTION	NO. OF DWGS.
1	6907-180-16-43-0101	PIPING PLAN AREA 1	1
2	6907-180-16-43-0201	PIPING PLAN AREA 2	1
3	6907-180-16-43-0301	PIPING PLAN AREA 3	1
4	6907-180-16-43-0401	PIPING PLAN AREA 4	1
		TOTAL NO. OF DRAWINGS	4

OTE:

[illegible]

**इंजीनियर्स
इंडिया लिमिटेड**
**ENGINEERS
INDIA LIMITED**
(A Govt. of India Undertaking)
(INCORPORATED IN INDIA)
(CAPITAL GUARANTEED BY GOVT. OF INDIA)

BCPL BRAHMAPUTRA CRACKER AND POLYMER LIMITED
(A Joint Venture Company of GAIL (India) Ltd., OIL, N.R.L. & Govt. of Assam)
ब्रह्मपुत्र क्रैकर एवं पोलिमा र लिमिटेड

नाफथा अनलोडिंग के लिये रेलवे साइडिंग संविधान	RAILWAY SIDING FACILITIES FOR NAPHTHA UNLOADING
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AREA DIVISION

सूचना संख्या	प्रोजेक्ट एंजिनियर	मूल्य निर्धारण संख्या	अनुपात	कार्य संख्या	इकाई	विभाग	अनुपात	आवृत्ति संख्या	रीटर्न
MICRO FILM	PROJ ENGR	MICRO FILM REF No.	SCALE	JOB NO.	UNIT	DEPT.	SECTN.	DWG. No.	REV.
REQUIRED वाशिर	NIT REQ नही वाशिर		1:200	6907	160	16	430	0022	2

EIL-501	AD-1189X841	DISTRIBUTION CODE

Client : BCPL	Dept./Sect. : 16/43
Project : BPC-ASSAM	
Location : ASSAM	Pipe Class : A1A Sheet 1 of 7

PIPE CLASS : A1A
RATING : 150
BASE MATERIAL : CARBON STEEL
CORROSION ALLOWANCE : 1.5 MM
SPECIAL REQUIREMENT :

TEMPERATURE (Deg. C) AND PRESSURE (Kg/Sq. cm g) RATINGS

TEMP	-29	38	93	149	204	260	316	343	371
PRESS	20.03	20.03	18.28	16.17	14.06	11.95	9.84	8.78	7.73

SERVICE

NON CORROSIVE/ FLAMMABLE / NON FLAMMABLE/ NON LETHAL -PROCESS & HYDROCARBONS; AMMONIA, STEAM & CONDENSATE (NON IBR); UTILITIES- INST AIR(BEYOND A3A), PLANT AIR, NITROGEN, CARBONDIOXIDE, PURGE GAS, CARRIER GAS,FUEL GAS, FLUSHING OIL, SILANE, VENT TO ATMOSPHERE; WATER - BEYOND A3A AND A10A; IN OFFSITES ONLY BEYOND A10A, QUENCH OIL,CALCIUM HYDROXIDE(LIME).
DILUTION STEAM

NOTES

- 5 FOR PERMANENT 'T' TYPE BW STRAINERS,REFER EIL'STD 7-44-0303 -44-0304; AND FOR TEMPORARY STRAINERS,REFER EIL'STD 7-44-0300; FOR SPACER AND BLIND REFER EIL'STD 7-44-0162.
- 7 FOR RESTRICTION ON USE OF BALL,PLUG & BUTTERFLY VALVES,REFER GENERAL NOTES.
- 73 GATE VALVES OF SIZE 26" AND ABOVE SHALL BE IN ACCORDANCE WITH BS-1414 AND FLANGE ENDS SHALL BE IN ACCORDANCE WITH ASME B16.47 SERIES B.
- 211 NDT REQUIREMENTS AS PER JOB SPECIFICATION 6907-6-44-0016

SPECIAL NOTES

ITEM	SIZE	DESCRIPTION	A.CODE
MAINTAINENCE JOINTS	ALL	FLANGED, TO BE KEPT MINIMUM	
PIPE JOINTS	1.5" & BELOW	SW COUPLING	
	2.0" & ABOVE	BUTTWELDED	
DRAINS	ON LINES <= 1.5"	REFER EILSTD 7-44-0350, DF3	
	ON LINES >= 2.0"	AS PER P&ID OR 0.75". REFER EIL STD. 7-44-0351, D4	
VENTS	ON LINES <= 1.5"	REFER EIL STD. 7-44-0350, VF3	
	ON LINES >= 2.0"	AS PER P&ID OR 0.75". REFER EIL STD 7-44-0351, V4	
TEMP.CONN	1.5"	FLANGED. REFER EIL STD 7-44-0353	
PRESS.CONN	0.75"	SW NIPPLE WITH VALVE TO SPEC AS PER EIL STD 7-44-0354	

A1A

Client : BCPL	Dept./Sect. : 16/43
Project : BPC-ASSAM	
Location : ASSAM	Pipe Class : A1A Sheet 2 of 7

[illegible]

<u>CODE</u>	<u>DESCRIPTION</u>
F	SADDLE FUSED JT
T	TEES
J	THREADOLET
H	H. COUPLING
W	WELDOLETS
P	PIPE TO PIPE
I	INSTRUMENT TEE
R	REINFORCED
X	Refer Notes
S	SOCKOLETS
L	SWEEPOLET

Client : BCPL	Dept./Sect. : 16/43
Project : BPC-ASSAM	
Location : ASSAM	Pipe Class : A1A Sheet 3 of 7

Note : (The shaded portion of PMS body shows Field Fabricated Items)

Input Id.	Item Type	Lower Size (Inch)	Upper Size (Inch)	Sch/Thk	Dmn. STD	Material	Description	Commodity Code	Note No
Pipe Group									
PIP	PIPE	0.50	0.75	S160	B-36.10	ASTM A 106 GR.B	PE, SEAMLESS	PI21977Z0	
PIP	PIPE	1.00	1.50	XS	B-36.10	ASTM A 106 GR.B	PE, SEAMLESS	PI21977Z0	
PIP	PIPE	2.00	2.00	XS	B-36.10	ASTM A 106 GR.B	BE, SEAMLESS	PI21917Z0	
PIP	PIPE	3.00	14.00	STD	B-36.10	ASTM A 106 GR.B	BE, SEAMLESS	PI21917Z0	
PIP	PIPE	16.00	36.00	STD	B-36.10	ASTM A 672 GR.B60 CL.12	BE, E.FS.W	PI2A813Z0	
PIP	PIPE	40.00	48.00	XS	B-36.10	ASTM A 672 GR.B60 CL.12	BE, E.FS.W	PI2A813Z0	
NIP	NIPPLE	0.50	0.75	M	B-36.10	ASTM A 106 GR.B	PBE, SEAMLESS	PN21967Z0	
NIP	NIPPLE	1.00	1.50	M	B-36.10	ASTM A 106 GR.B	PBE, SEAMLESS	PN21967Z0	
Flange Group									
FLG/300	FLNG.SW	0.50	1.50	M	B-16.5	ASTM A 105	300, RF/125AARH	FSC0147Z0	
FLG/600	FLNG.SW	0.50	1.50	M	B-16.5	ASTM A 105	600, RF/125AARH	FSC0167Z0	
FLG	FLNG.WN	0.50	24.00	M	B-16.5	ASTM A 105	150, RF/125AARH	FWC0127Z0	
FLG	FLNG.WN	26.00	48.00	M	B-16.47-B	ASTM A 105	150, RF/125AARH	FWB0127Z0	
FLG/150	FLNG.WN	0.50	10.00	M	B-16.5	ASTM A 105	150, RTJ/63AARH	FWC0129Z0	
FLG/300	FLNG.WN	2.00	24.00	M	B-16.5	ASTM A 105	300, RF/125AARH	FWC0147Z0	
FLG/600	FLNG.WN	2.00	24.00	M	B-16.5	ASTM A 105	600, RF/125AARH	FWC0167Z0	
FLB	FLNG.BLIND	0.50	24.00		B-16.5	ASTM A 105	150, RF/125AARH	FBC0127Z0	
FLB	FLNG.BLIND	26.00	48.00		B-16.47-B	ASTM A 105	150, RF/125AARH	FBB0127Z0	
FEF	FLNG.FIG.8	0.50	8.00		ASME-B16.48	ASTM A 105	150, FF/125AARH	FGK0121Z0	
FEF	SPCR&BLND	10.00	24.00		ASME-B16.48	ASTM A 105	150, FF/125AARH	FCK0121Z0	
FEF	SPCR&BLND	26.00	48.00		EIL'STD	ASTM A 516 GR.70	150, FF/125AARH	FCE6321Z0	
Fitting Group									
ELB90	ELBOW.90	0.50	0.75		B-16.11	ASTM A 105	SW, 6000	WA602D3Z0	
ELB90	ELBOW.90	1.00	1.50		B-16.11	ASTM A 105	SW, 3000	WA602D2Z0	

Client : BCPL	Dept./Sect. : 16/43
Project : BPC-ASSAM	
Location : ASSAM	Pipe Class : A1A Sheet 4 of 7

Note : (The shaded portion of PMS body shows Field Fabricated Items)

Input Id.	Item Type	Lower Size (Inch)	Upper Size (Inch)	Sch/ Thk	Dmn. STD	Material	Description	Commodity Code	Note No
Fitting Group									
ELB90	ELBOW.90	2.00	14.00	M	B-16.9	ASTM A 234 GR.WPB	BW, 1.5D	WAG684Z10	
ELB90	ELBOW.90	16.00	48.00	M	B-16.9	ASTM A 234 GR.WPB-W	BW, 1.5D	WAG754Z10	
ELB45	ELBOW.45	0.50	0.75		B-16.11	ASTM A 105	SW, 6000	WB602D3Z0	
ELB45	ELBOW.45	1.00	1.50		B-16.11	ASTM A 105	SW, 3000	WB602D2Z0	
ELB45	ELBOW.45	2.00	14.00	M	B-16.9	ASTM A 234 GR.WPB	BW, 1.5D	WBG684Z10	
ELB45	ELBOW.45	16.00	48.00	M	B-16.9	ASTM A 234 GR.WPB-W	BW, 1.5D	WBG754Z10	
BND	PIPE.BEND	2.00	14.00	M	MNF'STD	ASTM A 234 GR.WPB	BW, 6D	WCN6846Z0	
BND	PIPE.BEND	16.00	24.00	M	MNF'STD	ASTM A 234 GR.WPB-W	BW, 5D	WCN7545Z0	
BND/1	PIPE.BEND	2.00	2.00	M	MNF'STD	ASTM A 234 GR.WPB	BW, 10D	WCN684EZ0	
TEQ	T.EQUAL	0.50	0.75		B-16.11	ASTM A 105	SW, 6000	WE602D3Z0	
TEQ	T.EQUAL	1.00	1.50		B-16.11	ASTM A 105	SW, 3000	WE602D2Z0	
TEQ	T.EQUAL	2.00	14.00	M	B-16.9	ASTM A 234 GR.WPB	BW	WEG684ZZ0	
TEQ	T.EQUAL	16.00	48.00	M	B-16.9	ASTM A 234 GR.WPB-W	BW	WEG754ZZ0	
TRED	T.RED	0.50	0.75		B-16.11	ASTM A 105	SW, 6000	WR602D3Z0	
TRED	T.RED	1.00	1.50		B-16.11	ASTM A 105	SW, 3000	WR602D2Z0	
TRED	T.RED	2.00	14.00	M, M	B-16.9	ASTM A 234 GR.WPB	BW	WRG684ZZ0	
TRED	T.RED	16.00	48.00	M, M	B-16.9	ASTM A 234 GR.WPB-W	BW	WRG754ZZ0	
REDC	REDUC.CONC	2.00	14.00	M, M	B-16.9	ASTM A 234 GR.WPB	BW	WUG684ZZ0	
REDC	REDUC.CONC	16.00	48.00	M, M	B-16.9	ASTM A 234 GR.WPB-W	BW	WUG754ZZ0	
REDE	REDUC.ECC	2.00	14.00	M, M	B-16.9	ASTM A 234 GR.WPB	BW	WVG684ZZ0	
REDE	REDUC.ECC	16.00	48.00	M, M	B-16.9	ASTM A 234 GR.WPB-W	BW	WVG754ZZ0	
SWGC	SWAGE.CONC	0.50	3.00	M, M	BS-3799	ASTM A 105	PBE	WNH026ZZ0	
SWGE	SWAGE.ECC	0.50	3.00	M, M	BS-3799	ASTM A 105	PBE	WPH026ZZ0	

Client : BCPL	Dept./Sect. : 16/43
Project : BPC-ASSAM	
Location : ASSAM	Pipe Class : A1A Sheet 5 of 7

Note : (The shaded portion of PMS body shows Field Fabricated Items)

Input Id.	Item Type	Lower Size (Inch)	Upper Size (Inch)	Sch/Thk	Dmn. STD	Material	Description	Commodity Code	Note No
Fitting Group									
CAP	CAP	0.50	0.75		B-16.11	ASTM A 105	SCRF, 6000	WF60283Z0	
CAP	CAP	1.00	1.50		B-16.11	ASTM A 105	SCRF, 3000	WF60282Z0	
CAP	CAP	2.00	48.00	M	B-16.9	ASTM A 234 GR.WPB	BW	WFG684ZZ0	
CPLF	CPLNG.FULL	0.50	0.75		B-16.11	ASTM A 105	SW, 6000	WJ602D3Z0	
CPLF	CPLNG.FULL	1.00	1.50		B-16.11	ASTM A 105	SW, 3000	WJ602D2Z0	
CPLH	CPLNG.HALF	0.50	0.75		B-16.11	ASTM A 105	SW, 6000	WK602D3Z0	
CPLH	CPLNG.HALF	1.00	1.50		B-16.11	ASTM A 105	SW, 3000	WK602D2Z0	
CPLL	CPLNG.LH	0.50	0.75		B-16.11	ASTM A 105	SW, 6000	WL602D3Z0	
CPLL	CPLNG.LH	1.00	1.50		B-16.11	ASTM A 105	SW, 3000	WL602D2Z0	
CPLR	CPLNG.RED	0.50	0.75		B-16.11	ASTM A 105	SW, 6000	WM602D3Z0	
CPLR	CPLNG.RED	1.00	1.50		B-16.11	ASTM A 105	SW, 3000	WM602D2Z0	
UNN	UNION	0.50	0.75		BS-3799	ASTM A 105	SCRF, 6000	WQH0283Z0	
UNN	UNION	1.00	1.50		BS-3799	ASTM A 105	SCRF, 3000	WQH0282Z0	
Valves Group									
GAV	VLV.GATE	0.25	1.50		API-602	BODY-ASTM A 105,TRIM-STELLITED,STEM-13%CR.STEEL	SW, 800, 3000, B-16.11, SHT NO.- 51001	51001ZZZ0	
GAV	VLV.GATE	2.00	42.00		API-600	BODY-ASTM A 216 GR.WCB,TRIM-13% CR.STEEL	FLGD, 150, B-16.5, RF/125AARH, SHT NO.- 51301	51301ZZZ0	
GLV	VLV.GLOBE	0.25	1.50		BS-5352	BODY-ASTM A 105,TRIM-STELLITED,STEM-13%CR STEEL	SW, 800, 3000, B-16.11, SHT NO.- 52001	52001ZZZ0	
GLV	VLV.GLOBE	2.00	16.00		BS-1873	BODY-ASTM A 216 GR.WCB,TRIM-13% CR.STEEL	FLGD, 150, B-16.5, RF/125AARH, SHT NO.- 52301	52301ZZZ0	
CHV	VLV.CHECK	0.25	1.50		BS EN ISO 15761	BODY-ASTM A 105,TRIM-STELLITED	SW, 800, 3000, B-16.11, SHT NO.- 53001	53001ZZZ0	
CHV	VLV.CHECK	2.00	24.00		BS 1868	BODY-ASTM A 216 GR.WCB,TRIM-13% CR.STEEL	FLGD, 150, B-16.5, RF/125AARH, SHT NO.- 53301	53301ZZZ0	

Client : BCPL	Dept./Sect. : 16/43
Project : BPC-ASSAM	
Location : ASSAM	Pipe Class : A1A Sheet 6 of 7

Note : (The shaded portion of PMS body shows Field Fabricated Items)

Input Id.	Item Type	Lower Size (Inch)	Upper Size (Inch)	Sch/Thk	Dmn. STD	Material	Description	Commodity Code	Note No
Valves Group									
BLV	VLV.BALL	0.50	16.00		BS-5351	BODY-ASTM A 105 / A 216GR.WCB,TRIM-BODY SEAT-RPTFE	FLGD, 150, B-16.5, RF/125AARH, SHT NO.- 54301	54301ZZZ0	
BLV/1	VLV.BALL	0.50	16.00		BS EN ISO 17292	BODY-ASTM A 105 / A 216GR.WCB,TRIM-SS 304+STELLITE	FLGD, 150, B-16.5, RF/125AARH, SHT NO.- 54394	54394ZZZ0	
PLV	VLV.PLUG	0.50	24.00		BS-5353	BODY-ASTM A 105 / A 216GR.WCB,TRIM-PLUG-HARDENED	FLGD, 150, B-16.5, RF/125AARH, SHT NO.- 55301	55301ZZZ0	
PLV/1	VLV.PLUG	0.50	36.00		BS-5353	BODY-ASTM A 105 / A 216GR.WCB,TRIM-PLUG-HARDENED	FLGD, 150, B-16.5, RF/125AARH, SHT NO.- 55315	55315ZZZ0	
BFV	VLV.BTRFLY	3.00	24.00		BS EN 593	BODY-ASTM A 105 / A 216GR.WCB,TRIM-13% CR.STEEL	WAF, 150, B-16.5, WAF/125AARH, SHT NO.- 56301	56301ZZZ0	
BFV	VLV.BTRFLY	26.00	48.00		BS EN 593	BODY-ASTM A 105 / A 216GR.WCB,TRIM-13% CR.STEEL	FLGD, 150, B-16.47 B, RF/125AARH, SHT NO.- 56315	56315ZZZ0	
NDV	VLV.NEEDLE	0.50	1.50		BS-5352	BODY-ASTM A 105,TRIM-13% CR.STEEL	SW, 800, 3000, B-16.11, SHT NO.- 58092	58092ZZZ0	
Bolt Group									
BOS	BOLT.STUD	0.50	48.00		B-18.2	BOLT:A193 GR.B7, NUT:A194 GR.2H		BS40404Z0	
Gasket Group									
GAS	GASKET	0.50	24.00		B-16.20-ANSI B16.5	SP.WND SS316+GRAFIL	SPIRAL, 150	GK65072Z0	
GAS	GASKET	26.00	48.00		B-16.20-ANSI B16.47B	SP.WND SS316+GRAFIL+ I RING	SPIRAL, 150	GK56272Z0	
GAS/150	GASKET	0.50	10.00		B-16.20-ANSI B16.5	SOFT IRON	OCT-RING, 150	GK67232Z0	
GAS/300	GASKET	0.50	24.00		B-16.20-ANSI B16.5	SP.WND SS316+GRAFIL	SPIRAL, 300	GK65074Z0	
GAS/600	GASKET	0.50	24.00		B-16.20-ANSI B16.5	SP.WND SS316+GRAFIL	SPIRAL, 600	GK65076Z0	
Trap/Strainer Group									
TRP	TRAP.STEAM	0.50	1.50		MNF'STD	B:A105;T:13%CR;S:SS304	FLGD, THRMDNMC, 150,RF/125AARH	TR3065530	

Client : BCPL	Dept./Sect. : 16/43
Project : BPC-ASSAM	
Location : ASSAM	Pipe Class : A1A Sheet 7 of 7

Note : (The shaded portion of PMS body shows Field Fabricated Items)

Input Id.	Item Type	Lower Size (Inch)	Upper Size (Inch)	Sch/Thk	Dmn. STD	Material	Description	Commodity Code	Note No
Trap/Strainer Group									
TSR	STRNR.TEMP	1.50	24.00		EIL'STD	B:A516GR.70;INT:S304	CONETYPE, 150,FF/125AARH	ST16831Z0	
PSR	STRNR.PERM	0.50	1.50		MNF'STD	B:A105;INT:SS304	SW, Y-TYPE, 800	SP303D510	
PSR	STRNR.PERM	2.00	14.00	M	EIL'STD	B:A234GR.WPB;IN T:SS304	BW, T-TYPE	SP13344Z0	
PSR	STRNR.PERM	16.00	24.00	M	EIL'STD	B:A234GR.WPBW;I NT:SS304	BW, T-TYPE	SP13644Z0	

Client : BCPL	Dept./Sect. : 16/43
Project : BPC-ASSAM	
Location : ASSAM	Pipe Class : A91A Sheet 1 of 9

PIPE CLASS : A91A
RATING : 150
BASE MATERIAL : CARBON STEEL
CORROSION ALLOWANCE : 1.5 MM
SPECIAL REQUIREMENT :

TEMPERATURE (Deg. C) AND PRESSURE (Kg/Sq. cm g) RATINGS

TEMP	0	38	50	65
PRESS	10.55	10.55	10.55	10.55

SERVICE

CATEGORY 'D' FLUID- COOLING WATER (A/G & U/G) ,RAW WATER (A/G &U/G)

NOTES

- 5 FOR PERMANENT 'T' TYPE BW STRAINERS,REFER EIL'STD 7-44-0303 & 7-44-0304; AND FOR TEMPORARY STRAINERS,REFER EIL'STD 7-44-0300; FOR SPACER AND BLIND REFER EIL'STD 7-44-0162.
- 6 FOR FABRICATED REDUCERS,REFER EIL'STD 7-44-0485 & 7-44-0487. FOR MITRES, REFER EIL'STD 7-44-0033.
- 7 FOR RESTRICTION ON USE OF BALL,PLUG & BUTTERFLY VALVES,REFER GENERAL NOTES.
- 64 AWWA C207 CL.D FLANGES SHALL BE OF HUB TYPE.
- 65 FORGINGS ARE ACCEPTABLE IN LIEU OF PLATE MATERIAL FOR BLIND FLANGES AND SPACER & BLINDS.
- 77 FOR SIZES > 24", SPACER & BLIND SHALL BE DESIGNED BY THE MANUFACTURER AS PER ASME B31.3.
- 86 BUTTERFLY VALVES FOR THE SPEC ARE PN10 RATED WITH A MAXIMUM PRESSURE OF 10.2 KG/CM2G.
- 106 FOR SIZES ABOVE 30", TEMPERATURE AND PRESSURE RATINGS SHALL BE 65 DEG.C & 7.5 KG/CM2G RESPECTIVELY.
- 107 USE 4-PIECE 90 DEG. MITRE FOR 8" & 10", 5-PIECE 90 DEG. MITRE FOR SIZES FROM 12" TO 44" AND 6-PIECE 90 DEGREE MITRE FOR SIZES 48" TO 80".(45 MITRE SHALL REQUIRE ONE PIECE LESS)
- 112 GASKET INNER RING MATERIAL SHALL BE SAME AS SPIRAL STRIP MATERIAL OF THE CLASS.
- 113 MODULUS OF SOIL REACTION = 800 T/SQM (IN CUTTING AREA 1.0 M TO 3.5 M), 1200 T/SQM (IN FILLING AREA)
- 114 BULK DENSITY OF SOIL = 1.50 T/CUM TO 2.0 T/CUM
- 115 ANGLE OF FRICTION OF FILL MATERIAL (EXCAVATED MATERIALS FROM TRENCH) WITH 90 % COMPACTION OF STANDARD PROCTOR DRY DENSITY) =29 DEG. (SILTY FINE SAND), K.u (mew)=0.18
- 116 BURIED PIPES SHALL BE TAPE COATED AS PER EIL SPECIFICATION 6-79-011.
- 206 FOR U/G SERVICES,PIPE WALL THICKNESSES ARE CALCULATED BASED ON SOIL PARAMETERS AND BURIAL DEPTH OF 1500 MM FOR SIZE UPTO 24",1000MM FOR 26"TO 40" AND 2000 MM FOR SIZE 42" &ABOVE.
- 211 NDT REQUIREMENTS AS PER JOB SPECIFICATION 6907-6-44-0016
- 212 FOR EXCHANGER PIPING,COOLING WATER SUPPLY SIDE SHALL BE GATE VALVE AND RETURN SIDE SHALL BE GLOBE VALVE FOR SIZES LESS THAN OR EQUAL TO 16".

Client : BCPL	Dept./Sect. : 16/43
Project : BPC-ASSAM	
Location : ASSAM	Pipe Class : A91A Sheet 2 of 9

SPECIAL NOTES

ITEM	SIZE	DESCRIPTION	A.CODE
MAINTAINENCE JOINTS	ALL	FLANGED, TO BE KEPT MINIMUM	
PIPE JOINTS	1.5" & BELOW	SW COUPLING 3000 LBS.	
	2.0" & ABOVE	BUTTWELDED	
DRAINS	ON LINES <= 1.5"	REFER EILSTD 7-44-350, DF3	
	ON LINES >= 2.0"	0.75" OR AS PER P&ID. REFER EIL STD. 7-44-351, D4	
VENTS	ON LINES <= 1.5"	REFER EIL STD. 7-44-350, VC1	
	ON LINES >= 2.0"	0.75" OR AS PER P&ID. REFER EIL STD 7-44-351, V1	
TEMP.CONN	1.5"	FLANGED. REFER EIL STD 7-44-353	
PRESS.CONN	0.75"	SW, SH HVY NIPPLE WITH GATE VALVE TO SPEC AS PER EIL STD 7-44-354	

Client : BCPL	Dept./Sect. : 16/43
Project : BPC-ASSAM	
Location : ASSAM	Pipe Class : A91A Sheet 3 of 9

[illegible]

<u>CODE</u>	<u>DESCRIPTION</u>
F	SADDLE FUSED JT
T	TEES
J	THREADOLET
H	H. COUPLING
W	WELDOLETS
P	PIPE TO PIPE
I	INSTRUMENT TEE
R	REINFORCED
X	Refer Notes
S	SOCKOLETS
L	SWEEPOLET

Client : BCPL	Dept./Sect. : 16/43
Project : BPC-ASSAM	
Location : ASSAM	Pipe Class : A91A Sheet 4 of 9

		T	72.
	T	R	70.
T	R	R	68.
R	R	R	66.
R	R	R	64.
R	R	R	62.
R	R	R	60.
R	R	R	58.
R	R	R	56.
R	R	R	54.
R	R	R	52.
R	R	R	50.
R	R	R	48.
R	R	R	46.
R	R	R	44.
R	R	R	42.
R	R	R	40.
R	R	R	38.
R	R	R	36.
R	R	R	34.
R	R	R	32.
R	R	R	30.
R	R	R	28.
R	R	R	26.
R	R	R	24.
			22.
R	R	R	20.
R	R	R	18.
R	R	R	16.
R	R	R	14.
R	R	R	12.
R	R	R	10.
R	R	R	8.0
R	R	R	6.0
			5.0
R	R	R	4.0
			3.5
R	R	R	3.0
			2.5
R	R	R	2.0
H	H	H	1.5
			1.25
H	H	H	1.0
H	H	H	0.75
H	H	H	0.5
68,000			
70,000			
72,000			

BRANCH PIPE (SIZE IN INCHES)

Client : BCPL	Dept./Sect. : 16/43
Project : BPC-ASSAM	
Location : ASSAM	Pipe Class : A91A Sheet 5 of 9

Note : (The shaded portion of PMS body shows Field Fabricated Items)

Input Id.	Item Type	Lower Size (Inch)	Upper Size (Inch)	Sch/Thk	Dmn. STD	Material	Description	Commodity Code	Note No
Pipe Group									
PIP	PIPE	0.50	1.50	HVY	IS-1239-I	IS-1239 (BLACK)	PE, C.WELDED	PI6D471Z0	
PIP	PIPE	2.00	6.00	HVY	IS-1239-I	IS-1239 (BLACK)	BE, C.WELDED	PI6D411Z0	
PIP	PIPE	8.00	12.00	6.0	IS-3589	IS-3589 GR.330	BE, WELDED	PI7D919Z0	
PIP	PIPE	14.00	18.00	8.0	IS-3589	IS-3589 GR.330	BE, WELDED	PI7D919Z0	
PIP	PIPE	20.00	24.00	10.0	IS-3589	IS-3589 GR.330	BE, WELDED	PI7D919Z0	
PIP	PIPE	26.00	30.00	12.0	IS-3589	IS-3589 GR.330	BE, WELDED	PI7D919Z0	
PIP	PIPE	32.00	40.00	12.0	IS-3589	IS-3589 GR.410	BE, WELDED	PI7E319Z0	106
PIP	PIPE	42.00	44.00	14.0	IS-3589	IS-3589 GR.410	BE, WELDED	PI7E319Z0	106
PIP	PIPE	46.00	56.00	16.0	IS-3589	IS-3589 GR.410	BE, WELDED	PI7E319Z0	106
PIP	PIPE	58.00	64.00	18.0	IS-3589	IS-3589 GR.410	BE, WELDED	PI7E319Z0	106
PIP	PIPE	66.00	72.00	19.0	IS-3589	IS-3589 GR.410	BE, WELDED	PI7E319Z0	
NIP	NIPPLE	0.50	1.50	HVY	IS-1239-I	IS-1239 (BLACK)	PBE, C.WELDED	PN6D461Z0	
Flange Group									
FLG	FLNG.SW	0.50	1.50	M	B-16.5	ASTM A 105	150, RF/125AARH	FSC0127Z0	
FLG/300	FLNG.SW	0.50	1.50	M	B-16.5	ASTM A 105	300, RF/125AARH	FSC0147Z0	
FLG/300	FLNG.WN	26.00	40.00	M	B-16.47-B	ASTM A 105	300, RF/125AARH	FWB0147Z0	
FLG/600	FLNG.WN	2.00	24.00	M	B-16.5	ASTM A 105	600, RF/125AARH	FWC0167Z0	
FLG/300	FLNG.WN	2.00	24.00	M	B-16.5	ASTM A 105	300, RF/125AARH	FWC0147Z0	
FLG	FLNG.SO	2.00	24.00		B-16.5	ASTM A 105	150, RF/125AARH	FNC0127Z0	
FLG	FLNG.SO	26.00	72.00		AWWA-C207 CL.D	ASTM A 105	150, FF/125AARH	FN40121Z0	
FLB	FLNG.BLIND	0.50	24.00		B-16.5	ASTM A 105	150, RF/125AARH	FBC0127Z0	
FLB	FLNG.BLIND	26.00	72.00		AWWA-C207 CL.D	ASTM A 285 GR.C	150, FF/125AARH	FB45321Z0	
FEF	FLNG.FIG.8	0.50	8.00		ASME-B16.48	ASTM A 105	150, FF/125AARH	FGK0121Z0	
FEF	SPCR&BLND	10.00	24.00		ASME-B16.48	ASTM A 105	150, FF/125AARH	FCK0121Z0	

Package : IPMCS

Report No. : 50

A91A

Client : BCPL	Dept./Sect. : 16/43
Project : BPC-ASSAM	
Location : ASSAM	Pipe Class : A91A Sheet 6 of 9

Note : (The shaded portion of PMS body shows Field Fabricated Items)

Input Id.	Item Type	Lower Size (Inch)	Upper Size (Inch)	Sch/ Thk	Dmn. STD	Material	Description	Commodity Code	Note No
Flange Group									
FEF	SPCR&BLND	26.00	72.00		JOB'STD	ASTM A 285 GR.C	150, FF/125AARH	FCF5321Z0	
Fitting Group									
ELB90	ELBOW.90	0.50	1.50		B-16.11	ASTM A 105	SW, 3000	WA602D2Z0	
ELB90	ELBOW.90	2.00	6.00	STD	B-16.9	ASTM A 234 GR.WPB	BW, 1.5D	WAG684Z10	
ELB90	ELBOW.90	8.00	48.00	M	B-16.9	ASTM A 234 GR.WPB-W	BW, 1.5D	WAG754Z10	
ELB45	ELBOW.45	0.50	1.50		B-16.11	ASTM A 105	SW, 3000	WB602D2Z0	
ELB45	ELBOW.45	2.00	6.00	STD	B-16.9	ASTM A 234 GR.WPB	BW, 1.5D	WBG684Z10	
ELB45	ELBOW.45	8.00	48.00	M	B-16.9	ASTM A 234 GR.WPB-W	BW, 1.5D	WBG754Z10	
MIT90	MITRE.90	50.00	72.00	M	EIL'STD	IS-3589 GR.410	BW, 1.5D	WDKF241Z0	
MIT45	MITRE.45	50.00	72.00	M	EIL'STD	IS-3589 GR.410	BW, 1.5D	WGKF241Z0	
TEQ	T.EQUAL	0.50	1.50		B-16.11	ASTM A 105	SW, 3000	WE602D2Z0	
TEQ	T.EQUAL	2.00	6.00	STD	B-16.9	ASTM A 234 GR.WPB	BW	WEG684ZZ0	
TEQ	T.EQUAL	8.00	48.00	M	B-16.9	ASTM A 234 GR.WPB-W	BW	WEG754ZZ0	
TEQ	T.EQUAL	50.00	72.00	M	MNF'STD	ASTM A 234 GR.WPB-W	BW	WEN754ZZ0	
TRED	T.RED	0.50	1.50		B-16.11	ASTM A 105	SW, 3000	WR602D2Z0	
TRED	T.RED	2.00	6.00	STD, STD	B-16.9	ASTM A 234 GR.WPB	BW	WRG684ZZ0	
TRED	T.RED	8.00	48.00	M, M	B-16.9	ASTM A 234 GR.WPB-W	BW	WRG754ZZ0	
TRED	T.RED	50.00	72.00	M, M	MNF'STD	ASTM A 234 GR.WPB-W	BW	WRN754ZZ0	
REDC	REDUC.CONC	2.00	6.00	STD, STD	B-16.9	ASTM A 234 GR.WPB	BW	WUG684ZZ0	
REDC	REDUC.CONC	8.00	30.00	M, M	EIL'STD	IS-3589 GR.330	BW	WUKF14ZZ0	
REDC	REDUC.CONC	32.00	72.00	M, M	EIL'STD	IS-3589 GR.410	BW	WUKF24ZZ0	
REDE	REDUC.ECC	2.00	6.00	STD, STD	B-16.9	ASTM A 234 GR.WPB	BW	WVG684ZZ0	
REDE	REDUC.ECC	8.00	30.00	M, M	EIL'STD	IS-3589 GR.330	BW	WVKF14ZZ0	
REDE	REDUC.ECC	32.00	72.00	M, M	EIL'STD	IS-3589 GR.410	BW	WVKF24ZZ0	

Package : IPMCS

Report No. : 50

A91A

Client : BCPL	Dept./Sect. : 16/43
Project : BPC-ASSAM	
Location : ASSAM	Pipe Class : A91A Sheet 7 of 9

Note : (The shaded portion of PMS body shows Field Fabricated Items)

Input Id.	Item Type	Lower Size (Inch)	Upper Size (Inch)	Sch/ Thk	Dmn. STD	Material	Description	Commodity Code	Note No
Fitting Group									
SWGC	SWAGE.CONC	0.50	3.00	STD, STD	BS-3799	ASTM A 105	PBE	WNH026ZZ0	
SWGE	SWAGE.ECC	0.50	3.00	STD, STD	BS-3799	ASTM A 105	PBE	WPH026ZZ0	
CAP	CAP	0.50	1.50		B-16.11	ASTM A 105	SCRF, 3000	WF60282Z0	
CAP	CAP	2.00	6.00	STD	B-16.9	ASTM A 234 GR.WPB	BW	WFG684ZZ0	
CAP	CAP	8.00	48.00	M	B-16.9	ASTM A 234 GR.WPB	BW	WFG684ZZ0	
CAP	CAP	50.00	72.00	M	ASME-VIII	ASTM A 285 GR.C	BW	WF3J54ZZ0	
CPLF	CPLNG.FULL	0.50	1.50		B-16.11	ASTM A 105	SW, 3000	WJ602D2Z0	
CPLH	CPLNG.HALF	0.50	1.50		B-16.11	ASTM A 105	SW, 3000	WK602D2Z0	
CPLL	CPLNG.LH	0.50	1.50		B-16.11	ASTM A 105	SW, 3000	WL602D2Z0	
CPLR	CPLNG.RED	0.50	1.50		B-16.11	ASTM A 105	SW, 3000	WM602D2Z0	
UNN	UNION	0.50	1.50		BS-3799	ASTM A 105	SW, 3000	WQH02D2Z0	
Valves Group									
GAV	VLV.GATE	0.50	1.50		API-602	BODY-ASTM A 105,TRIM-STELLITED,STEM-13%CR.STEEL	SW, 800, 3000, B-16.11, SHT NO.- 51001	51001ZZZ0	
GAV	VLV.GATE	2.00	24.00		API-600	BODY-ASTM A 216 GR.WCB,TRIM-13% CR.STEEL	FLGD, 150, B-16.5, RF/125AARH, SHT NO.- 51321	51321ZZZ0	
GAV	VLV.GATE	26.00	80.00		BS-1414	BODY-ASTM A 216 GR.WCB,TRIM-13% CR.STEEL	FLGD, 150, AWWAC207, FF/125AARH, SHT NO.- 51920	51920ZZZ0	
GLV	VLV.GLOBE	0.50	1.50		BS-5352	BODY-ASTM A 105,TRIM-STELLITED,STEM-13%CR STEEL	SW, 800, 3000, B-16.11, SHT NO.- 52001	52001ZZZ0	
GLV	VLV.GLOBE	2.00	16.00		BS-1873	BODY-ASTM A 216 GR.WCB,TRIM-13% CR.STEEL	FLGD, 150, B-16.5, RF/125AARH, SHT NO.- 52321	52321ZZZ0	
CHV	VLV.CHECK	0.25	1.50		BS EN ISO 15761	BODY-ASTM A 105,TRIM-STELLITED	SW, 800, 3000, B-16.11, SHT NO.- 53001	53001ZZZ0	
CHV	VLV.CHECK	2.00	24.00		BS 1868	BODY-ASTM A 216 GR.WCB,TRIM-13% CR.STEEL	FLGD, 150, B-16.5, RF/125AARH, SHT NO.- 53321	53321ZZZ0	

Client : BCPL	Dept./Sect. : 16/43
Project : BPC-ASSAM	
Location : ASSAM	Pipe Class : A91A Sheet 8 of 9

Note : (The shaded portion of PMS body shows Field Fabricated Items)

Input Id.	Item Type	Lower Size (Inch)	Upper Size (Inch)	Sch/Thk	Dmn. STD	Material	Description	Commodity Code	Note No
Valves Group									
CHV	VLV.CHECK	26.00	48.00		API-594	BODY-ASTM A 216 GR.WCB,TRIM-13% CR.STEEL	FLGD, 150, AWWAC207, FF/125AARH, SHT NO.- 53316	53316ZZZ0	
BLV	VLV.BALL	0.50	16.00		BS-5351	BODY-ASTM A 105 / A 216GR.WCB,TRIM-BODY SEAT-RPTFE	FLGD, 150, B-16.5, RF/125AARH, SHT NO.- 54321	54321ZZZ0	7
BFV	VLV.BTRFLY	2.00	24.00		BS EN 593	BODY-ASTM A 216 GR.WCB,TRIM-13% CR.STEEL	WAF, 150, B-16.5, WAF/125AARH, SHT NO.- 56321	56321ZZZ0	7
BFV	VLV.BTRFLY	26.00	56.00		BS EN 593	BODY-ASTM A 216 GR.WCB,TRIM-13% CR.STEEL	FLGD, 150, AWWAC207, FF/125AARH, SHT NO.- 56316	56316ZZZ0	
NDV	VLV.NEEDLE	0.50	1.50		BS-5352	BODY-ASTM A 105,TRIM-13% CR.STEEL	SW, 800, 3000, B-16.11, SHT NO.- 58092	58092ZZZ0	
Bolt Group									
BOS	BOLT.STUD	18.00	72.00		B-18.2	BOLT:A193 GR.B7, NUT:A194 GR.2H		BS40404Z0	
BOM	BOLT.M/C	0.50	16.00		B-18.2	BOLT:A307 GR.B, NUT:A563 GR.B		BM41418Z0	
Gasket Group									
GAS	GASKET	0.50	24.00		B-16.21-ANSI B16.5	NONASBESTOS BS7531 GR X	RING, 150, 2 MM	GKBAX52Z0	
GAS	GASKET	26.00	72.00		AWWA-C207 CL.D	NONASBESTOS BS7531 GR X	FULLFACE, 150, 2 MM	GK2AX22Z0	
GAS/300	GASKET	26.00	40.00		B-16.20-ANSI B16.47B	SP.WND SS316+GRAFIL	SPIRAL, 300	GK55074Z0	
GAS/600	GASKET	2.00	24.00		B-16.20-ANSI B16.5	SP.WND SS316+GRAFIL	SPIRAL, 600	GK65076Z0	
GAS/300	GASKET	0.50	24.00		B-16.20-ANSI B16.5	SP.WND SS316+GRAFIL	SPIRAL, 300	GK65074Z0	
Trap/Strainer Group									
TSR	STRNR.TEMP	1.50	24.00		EIL'STD	B:A285GR.C;INT:S S304	CONETYPE, 150,FF/125AARH	ST14431Z0	
PSR	STRNR.PERM	0.50	1.50		MNF'STD	B:A105;INT:SS304	SW, Y-TYPE, 800	SP303D510	
PSR	STRNR.PERM	2.00	6.00	M	EIL'STD	B:A234GR.WPB;IN T:SS304	BW, T-TYPE	SP13344Z0	
PSR	STRNR.PERM	8.00	24.00	M	EIL'STD	B:A234GR.WPBW;I NT:SS304	BW, T-TYPE	SP13644Z0	

Client : BCPL	Dept./Sect. : 16/43
Project : BPC-ASSAM	
Location : ASSAM	Pipe Class : A91A Sheet 9 of 9

Note : (The shaded portion of PMS body shows Field Fabricated Items)

Input Id.	Item Type	Lower Size (Inch)	Upper Size (Inch)	Sch/Thk	Dmn. STD	Material	Description	Commodity Code	Note No
Trap/Strainer Group									
PSR	STRNR.PERM	26.00	48.00	M	MNF'STD	B:A234GR.WPB;IN T:SS304	BW, T-TYPE	SP33344Z0	

Client : BCPL	Dept./Sect. : 16/43
Project : BPC-ASSAM	
Location : ASSAM	Pipe Class : A96A Sheet 1 of 6

PIPE CLASS : A96A
RATING : 150
BASE MATERIAL : CARBON STEEL
CORROSION ALLOWANCE : 1.5 MM
SPECIAL REQUIREMENT :

TEMPERATURE (Deg. C) AND PRESSURE (Kg/Sq. cm g) RATINGS

TEMP	-29	38	93	149	204	260
PRESS	15	15	15	15	14.06	11.95

SERVICE

U/G AND A/G OWS (PRESSURE PIPING),U/G OWS (GRAVITY PIPING),PALLET WATER DRAIN

NOTES

- 7 FOR RESTRICTION ON USE OF BALL,PLUG & BUTTERFLY VALVES,REFER GENERAL NOTES.
- 73 GATE VALVES OF SIZE 26" AND ABOVE SHALL BE IN ACCORDANCE WITH BS-1414 AND FLANGE ENDS SHALL BE IN ACCORDANCE WITH ASME B16.47 SERIES B.
- 101 FOR U/G SERVICES, PIPE WALL THICKNESSES ARE CALCULATED BASED ON SOIL PERAMETERS AND BURIAL DEPTH OF 2500MM.
- 104 FOR PERMANENT AND TEMPORARY T-TYPE BW STRAINERS REFER EIL STD 7-44-0303 AND 7-44-0304
- 113 MODULUS OF SOIL REACTION = 800 T/SQM (IN CUTTING AREA 1.0 M TO 3.5 M), 1200 T/SQM (IN FILLING AREA)
- 114 BULK DENSITY OF SOIL = 1.50 T/CUM TO 2.0 T/CUM
- 115 ANGLE OF FRICTION OF FILL MATERIAL (EXCAVATED MATERIALS FROM TRENCH) WITH 90 % COMPACTION OF STANDARD PROCTOR DRY DENSITY) =29 DEG. (SILTY FINE SAND), K.u (mew)=0.18
- 208 FOR U/G SERVICES, PIPE WALL THICKNESSES ARE CALCULATED BASED ON SOIL PARAMETERS AND BURIAL DEPTH OF 3500 MM FOR 4" TO 24" AND1500 MM FOR LESS THAN 4".
- 211 NDT REQUIREMENTS AS PER JOB SPECIFICATION 6907-6-44-0016

SPECIAL NOTES

ITEM	SIZE	DESCRIPTION	A.CODE
MAINTAINENCE JOINTS	ALL	FLANGED, TO BE KEPT MINIMUM	
PIPE JOINTS	1.5" & BELOW	SW COUPLING	
	2.0" & ABOVE	BUTTWELDED	
DRAINS	ON LINES <= 1.5"	REFER EILSTD 7-44-0350, DF3	
	ON LINES >= 2.0"	AS PER P&ID OR 0.75". REFER EIL STD. 7-44-0351, D4	
VENTS	ON LINES <= 1.5"	REFER EIL STD. 7-44-0350, VF3	
	ON LINES >= 2.0"	AS PER P&ID OR 0.75". REFER EIL STD 7-44-0351, V4	
TEMP.CONN	1.5"	FLANGED. REFER EIL STD 7-44-0353	
PRESS.CONN	0.75"	SW NIPPLE WITH GATE VALVE TO SPEC AS PER EIL STD 7-44-0354	

Client : BCPL	Dept./Sect. : 16/43
Project : BPC-ASSAM	
Location : ASSAM	Pipe Class : A96A Sheet 3 of 6

Note : (The shaded portion of PMS body shows Field Fabricated Items)

Input Id.	Item Type	Lower Size (Inch)	Upper Size (Inch)	Sch/ Thk	Dmn. STD	Material	Description	Commodity Code	Note No
Pipe Group									
PIP	PIPE	0.50	0.75	S160	B-36.10	ASTM A 106 GR.B	PE, SEAMLESS	PI21977Z0	
PIP	PIPE	1.00	1.50	XS	B-36.10	ASTM A 106 GR.B	PE, SEAMLESS	PI21977Z0	
PIP	PIPE	2.00	2.00	XS	B-36.10	ASTM A 106 GR.B	BE, SEAMLESS	PI21917Z0	
PIP	PIPE	3.00	6.00	STD	B-36.10	ASTM A 106 GR.B	BE, SEAMLESS	PI21917Z0	
PIP	PIPE	8.00	14.00	STD	B-36.10	API 5L GR.B PSL1	BE, WELDED	PI2E919Z0	
PIP	PIPE	16.00	20.00	STD	B-36.10	API 5L GR.B PSL1	BE, WELDED	PI2E919Z0	
PIP	PIPE	24.00	24.00	XS	B-36.10	API 5L GR.B PSL1	BE, WELDED	PI2E919Z0	
NIP	NIPPLE	0.50	0.75	M	B-36.10	ASTM A 106 GR.B	PBE, SEAMLESS	PN21967Z0	
NIP	NIPPLE	1.00	1.50	M	B-36.10	ASTM A 106 GR.B	PBE, SEAMLESS	PN21967Z0	
Flange Group									
FLG	FLNG.SW	0.50	1.50	M	B-16.5	ASTM A 105	150, RF/125AARH	FSC0127Z0	
FLG/300	FLNG.SW	0.50	1.50	M	B-16.5	ASTM A 105	300, RF/125AARH	FSC0147Z0	
FLG	FLNG.WN	2.00	24.00	M	B-16.5	ASTM A 105	150, RF/125AARH	FWC0127Z0	
FLG/600	FLNG.WN	2.00	24.00	M	B-16.5	ASTM A 105	600, RF/125AARH	FWC0167Z0	
FLG/300	FLNG.WN	2.00	24.00	M	B-16.5	ASTM A 105	300, RF/125AARH	FWC0147Z0	
FLB	FLNG.BLIND	0.50	24.00		B-16.5	ASTM A 105	150, RF/125AARH	FBC0127Z0	
FEF	FLNG.FIG.8	0.50	8.00		ASME-B16.48	ASTM A 105	150, FF/125AARH	FGK0121Z0	
FEF	SPCR&BLND	10.00	24.00		ASME-B16.48	ASTM A 105	150, FF/125AARH	FCK0121Z0	
Fitting Group									
ELB90	ELBOW.90	0.50	0.75		B-16.11	ASTM A 105	SW, 6000	WA602D3Z0	
ELB90	ELBOW.90	1.00	1.50		B-16.11	ASTM A 105	SW, 3000	WA602D2Z0	
ELB90	ELBOW.90	2.00	14.00	M	B-16.9	ASTM A 234 GR.WPB	BW, 1.5D	WAG684Z10	
ELB90	ELBOW.90	16.00	24.00	M	B-16.9	ASTM A 234 GR.WPB-W	BW, 1.5D	WAG754Z10	
ELB45	ELBOW.45	0.50	0.75		B-16.11	ASTM A 105	SW, 6000	WB602D3Z0	

Client : BCPL	Dept./Sect. : 16/43
Project : BPC-ASSAM	
Location : ASSAM	Pipe Class : A96A Sheet 4 of 6

Note : (The shaded portion of PMS body shows Field Fabricated Items)

Input Id.	Item Type	Lower Size (Inch)	Upper Size (Inch)	Sch/Thk	Dmn. STD	Material	Description	Commodity Code	Note No
Fitting Group									
ELB45	ELBOW.45	1.00	1.50		B-16.11	ASTM A 105	SW, 3000	WB602D2Z0	
ELB45	ELBOW.45	2.00	14.00	M	B-16.9	ASTM A 234 GR.WPB	BW, 1.5D	WBG684Z10	
ELB45	ELBOW.45	16.00	24.00	M	B-16.9	ASTM A 234 GR.WPB-W	BW, 1.5D	WBG754Z10	
TEQ	T.EQUAL	0.50	0.75		B-16.11	ASTM A 105	SW, 6000	WE602D3Z0	
TEQ	T.EQUAL	1.00	1.50		B-16.11	ASTM A 105	SW, 3000	WE602D2Z0	
TEQ	T.EQUAL	2.00	14.00	M	B-16.9	ASTM A 234 GR.WPB	BW	WEG684ZZ0	
TEQ	T.EQUAL	16.00	24.00	M	B-16.9	ASTM A 234 GR.WPB-W	BW	WEG754ZZ0	
TRED	T.RED	0.50	0.75		B-16.11	ASTM A 105	SW, 6000	WR602D3Z0	
TRED	T.RED	1.00	1.50		B-16.11	ASTM A 105	SW, 3000	WR602D2Z0	
TRED	T.RED	2.00	14.00	M, M	B-16.9	ASTM A 234 GR.WPB	BW	WRG684ZZ0	
TRED	T.RED	16.00	24.00	M, M	B-16.9	ASTM A 234 GR.WPB-W	BW	WRG754ZZ0	
REDC	REDUC.CONC	2.00	14.00	M, M	B-16.9	ASTM A 234 GR.WPB	BW	WUG684ZZ0	
REDC	REDUC.CONC	16.00	24.00	M, M	B-16.9	ASTM A 234 GR.WPB-W	BW	WUG754ZZ0	
REDE	REDUC.ECC	2.00	14.00	M, M	B-16.9	ASTM A 234 GR.WPB	BW	WVG684ZZ0	
REDE	REDUC.ECC	16.00	24.00	M, M	B-16.9	ASTM A 234 GR.WPB-W	BW	WVG754ZZ0	
SWGC	SWAGE.CONC	0.50	3.00	M, M	BS-3799	ASTM A 105	PBE	WNH026ZZ0	
SWGE	SWAGE.ECC	0.50	3.00	M, M	BS-3799	ASTM A 105	PBE	WPH026ZZ0	
CAP	CAP	0.50	0.75		B-16.11	ASTM A 105	SCRF, 6000	WF60283Z0	
CAP	CAP	1.00	1.50		B-16.11	ASTM A 105	SCRF, 3000	WF60282Z0	
CAP	CAP	2.00	24.00	M	B-16.9	ASTM A 234 GR.WPB	BW	WFG684ZZ0	
CPLF	CPLNG.FULL	0.50	0.75		B-16.11	ASTM A 105	SW, 6000	WJ602D3Z0	
CPLF	CPLNG.FULL	1.00	1.50		B-16.11	ASTM A 105	SW, 3000	WJ602D2Z0	
CPLH	CPLNG.HALF	0.50	0.75		B-16.11	ASTM A 105	SW, 6000	WK602D3Z0	

Client : BCPL	Dept./Sect. : 16/43
Project : BPC-ASSAM	
Location : ASSAM	Pipe Class : A96A Sheet 5 of 6

Note : (The shaded portion of PMS body shows Field Fabricated Items)

Input Id.	Item Type	Lower Size (Inch)	Upper Size (Inch)	Sch/ Thk	Dmn. STD	Material	Description	Commodity Code	Note No
Fitting Group									
CPLH	CPLNG.HALF	1.00	1.50		B-16.11	ASTM A 105	SW, 3000	WK602D2Z0	
CPLL	CPLNG.LH	0.50	0.75		B-16.11	ASTM A 105	SW, 6000	WL602D3Z0	
CPLL	CPLNG.LH	1.00	1.50		B-16.11	ASTM A 105	SW, 3000	WL602D2Z0	
CPLR	CPLNG.RED	0.50	0.75		B-16.11	ASTM A 105	SW, 6000	WM602D3Z0	
CPLR	CPLNG.RED	1.00	1.50		B-16.11	ASTM A 105	SW, 3000	WM602D2Z0	
Valves Group									
GAV	VLV.GATE	0.25	1.50		API-602	BODY-ASTM A 105,TRIM-STELLITED,STEM-13%CR.STEEL	SW, 800, 3000, B-16.11, SHT NO.- 51001	51001ZZZ0	
GAV	VLV.GATE	2.00	42.00		API-600	BODY-ASTM A 216 GR.WCB,TRIM-13% CR.STEEL	FLGD, 150, B-16.5, RF/125AARH, SHT NO.- 51301	51301ZZZ0	
GLV	VLV.GLOBE	0.50	1.50		BS-5352	BODY-ASTM A 105,TRIM-STELLITED,STEM-13%CR STEEL	SW, 800, 3000, B-16.11, SHT NO.- 52001	52001ZZZ0	
GLV	VLV.GLOBE	2.00	16.00		BS-1873	BODY-ASTM A 216 GR.WCB,TRIM-13% CR.STEEL	FLGD, 150, B-16.5, RF/125AARH, SHT NO.- 52301	52301ZZZ0	
CHV	VLV.CHECK	0.25	1.50		BS EN ISO 15761	BODY-ASTM A 105,TRIM-STELLITED	SW, 800, 3000, B-16.11, SHT NO.- 53001	53001ZZZ0	
CHV	VLV.CHECK	2.00	24.00		BS 1868	BODY-ASTM A 216 GR.WCB,TRIM-13% CR.STEEL	FLGD, 150, B-16.5, RF/125AARH, SHT NO.- 53301	53301ZZZ0	
BLV	VLV.BALL	0.50	16.00		BS-5351	BODY-ASTM A 105 / A 216GR.WCB,TRIM-BODY SEAT-RPTFE	FLGD, 150, B-16.5, RF/125AARH, SHT NO.- 54301	54301ZZZ0	
PLV	VLV.PLUG	0.50	24.00		BS-5353	BODY-ASTM A 105 / A 216GR.WCB,TRIM-PLUG-HARDENED	FLGD, 150, B-16.5, RF/125AARH, SHT NO.- 55301	55301ZZZ0	
BFV	VLV.BTRFLY	3.00	24.00		BS EN 593	BODY-ASTM A 105 / A 216GR.WCB,TRIM-13% CR.STEEL	WAF, 150, B-16.5, WAF/125AARH, SHT NO.- 56301	56301ZZZ0	
Bolt Group									
BOS	BOLT.STUD	0.50	24.00		B-18.2	BOLT:A193 GR.B7, NUT:A194 GR.2H		BS40404Z0	

Client : BCPL	Dept./Sect. : 16/43
Project : BPC-ASSAM	
Location : ASSAM	Pipe Class : A96A Sheet 6 of 6

Note : (The shaded portion of PMS body shows Field Fabricated Items)

Input Id.	Item Type	Lower Size (Inch)	Upper Size (Inch)	Sch/Thk	Dmn. STD	Material	Description	Commodity Code	Note No
Gasket Group									
GAS	GASKET	0.50	24.00		B-16.20-ANSI B16.5	SP.WND SS316+GRAFIL	SPIRAL, 150	GK65072Z0	
GAS/600	GASKET	0.50	24.00		B-16.20-ANSI B16.5	SP.WND SS316+GRAFIL	SPIRAL, 600	GK65076Z0	
GAS/300	GASKET	0.50	24.00		B-16.20-ANSI B16.5	SP.WND SS316+GRAFIL	SPIRAL, 300	GK65074Z0	
Trap/Strainer Group									
PSR	STRNR.PERM	0.50	1.50		MNF'STD	B:A105;INT:SS304	SW, Y-TYPE, 800	SP303D510	
PSR	STRNR.PERM	2.00	14.00	M	EIL'STD	B:A234GR.WPB;INT:SS304	BW, T-TYPE	SP13344Z0	104
PSR	STRNR.PERM	16.00	24.00	M	EIL'STD	B:A234GR.WPBW;INT:SS304	BW, T-TYPE	SP13644Z0	104

Client : BCPL	Dept./Sect. : 16/43
Project : BPC-ASSAM	
Location : ASSAM	Pipe Class : A97A Sheet 1 of 5

PIPE CLASS : A97A
RATING : 150
BASE MATERIAL : CARBON STEEL
CORROSION ALLOWANCE : 1.5 MM
SPECIAL REQUIREMENT :

TEMPERATURE (Deg. C) AND PRESSURE (Kg/Sq. cm g) RATINGS

TEMP	0	38	50	65	65
PRESS	15.4	15.4	15.4	15.4	18.2

SERVICE

FIRE WATER (ABOVE AND UNDER GROUND),FOAM SOLUTION (A/G &U/G)

NOTES

- 65 FORGINGS ARE ACCEPTABLE IN LIEU OF PLATE MATERIAL FOR BLIND FLANGES AND SPACER & BLINDS.
- 88 AS PER TAC REQUIREMENTS, 10% OF THE BUTT WELD JOINTS SHALL BE RADIOGRAPHED. HOWEVER, 50% OF THESE BUTT WELD JOINTS SHALL BE FIELD WELD JOINTS.
- 101 FOR U/G SERVICES, PIPE WALL THICKNESSES ARE CALCULATED BASED ON SOIL PERAMETERS AND BURIAL DEPTH OF 2500MM.
- 104 FOR PERMANENT AND TEMPORARY T-TYPE BW STRAINERS REFER EIL STD 7-44-0303 AND 7-44-0304
- 107 FOR SIZE ABOVE 24"SPACER AND BLIND AS PER EIL 'STD 7-44-0162
- 114 BULK DENSITY OF SOIL = 1.50 T/CUM TO 2.0 T/CUM
- 115 ANGLE OF FRICTION OF FILL MATERIAL (EXCAVATED MATERIALS FROM TRENCH) WITH 90 % COMPACTION OF STANDARD PROCTOR DRY DENSITY) =29 DEG. (SILTY FINE SAND), K.u (mew)=0.18
- 199 FOR U/G SERVICES, PIPE WALL THICKNESSES ARE CALCULATED BASED ON SOIL PARAMETERS AND BURIAL DEPTH OF 1500MM.
- 211 NDT REQUIREMENTS AS PER JOB SPECIFICATION 6907-6-44-0016

SPECIAL NOTES

ITEM	SIZE	DESCRIPTION	A.CODE
MAINTAINENCE JOINTS	ALL	FLANGED, TO BE KEPT MINIMUM	
PIPE JOINTS	1.5" & BELOW	SW COUPLING 3000 LBS.	
	2.0" & ABOVE	BUTTWELDED	
DRAINS	ON LINES <= 1.5"	REFER EILSTD 7-44-350, DF3	
	ON LINES >= 2.0"	0.75" OR AS PER P&ID. REFER EIL STD. 7-44-351, D4	
VENTS	ON LINES <= 1.5"	REFER EIL STD. 7-44-350, VC1	
	ON LINES >= 2.0"	0.75" OR AS PER P&ID. REFER EIL STD 7-44-351, V1	
TEMP.CONN	1.5"	FLANGED. REFER EIL STD 7-44-353	
PRESS.CONN	0.75"	SW NIPPLE WITH GATE VALVE TO SPEC AS PER EIL STD 7-44-354	

Client : BCPL	Dept./Sect. : 16/43
Project : BPC-ASSAM	
Location : ASSAM	Pipe Class : A97A Sheet 3 of 5

Note : (The shaded portion of PMS body shows Field Fabricated Items)

Input Id.	Item Type	Lower Size (Inch)	Upper Size (Inch)	Sch/ Thk	Dmn. STD	Material	Description	Commodity Code	Note No
Pipe Group									
PIP	PIPE	0.50	1.50	HVY	IS-1239-I	IS-1239 (BLACK)	PE, C.WELDED	PI6D471Z0	
PIP	PIPE	2.00	6.00	HVY	IS-1239-I	IS-1239 (BLACK)	BE, C.WELDED	PI6D411Z0	
PIP	PIPE	8.00	14.00	6.0	IS-3589	IS-3589 GR.410	BE, WELDED	PI7E319Z0	
PIP	PIPE	16.00	24.00	10.0	IS-3589	IS-3589 GR.410	BE, WELDED	PI7E319Z0	
PIP	PIPE	26.00	32.00	12.0	IS-3589	IS-3589 GR.410	BE, WELDED	PI7E319Z0	
PIP	PIPE	34.00	36.00	14.0	IS-3589	IS-3589 GR.410	BE, WELDED	PI7E319Z0	
NIP	NIPPLE	0.50	1.50	M	IS-1239-I	IS-1239 (BLACK)	PBE, SEAMLESS	PN6D467Z0	
Flange Group									
FLG	FLNG.SW	0.50	1.50	M	B-16.5	ASTM A 105	150, RF/125AARH	FSC0127Z0	
FLG	FLNG.WN	2.00	36.00	M	B-16.47-B	ASTM A 105	150, FF/125AARH	FWB0121Z0	
FLG	FLNG.SO	2.00	24.00		B-16.5	ASTM A 105	150, RF/125AARH	FNC0127Z0	
FLB	FLNG.BLIND	0.50	24.00		B-16.5	ASTM A 105	150, RF/125AARH	FBC0127Z0	
FLB	FLNG.BLIND	26.00	36.00		B-16.47-B	ASTM A 285 GR.C	150, FF/125AARH	FBF5321Z0	
FEF	FLNG.FIG.8	0.50	8.00		ASME-B16.48	ASTM A 105	150, FF/125AARH	FGK0121Z0	
FEF	SPCR&BLND	10.00	24.00		ASME-B16.48	ASTM A 105	150, FF/125AARH	FCK0121Z0	
FEF	SPCR&BLND	26.00	36.00		EIL'STD	ASTM A 285 GR.C	150, FF/125AARH	FCE5321Z0	107
Fitting Group									
ELB90	ELBOW.90	0.50	1.50		B-16.11	ASTM A 105	SW, 3000	WA602D2Z0	
ELB90	ELBOW.90	2.00	6.00	STD	B-16.9	ASTM A 234 GR.WPB	BW, 1.5D	WAG684Z10	
ELB90	ELBOW.90	8.00	36.00	M	B-16.9	ASTM A 234 GR.WPB-W	BW, 1.5D	WAG754Z10	
ELB45	ELBOW.45	0.50	1.50		B-16.11	ASTM A 105	SW, 3000	WB602D2Z0	
ELB45	ELBOW.45	2.00	6.00	STD	B-16.9	ASTM A 234 GR.WPB	BW, 1.5D	WBG684Z10	
ELB45	ELBOW.45	8.00	36.00	M	B-16.9	ASTM A 234 GR.WPB-W	BW, 1.5D	WBG754Z10	
TEQ	T.EQUAL	0.50	1.50		B-16.11	ASTM A 105	SW, 3000	WE602D2Z0	

Client : BCPL	Dept./Sect. : 16/43
Project : BPC-ASSAM	
Location : ASSAM	Pipe Class : A97A Sheet 4 of 5

Note : (The shaded portion of PMS body shows Field Fabricated Items)

Input Id.	Item Type	Lower Size (Inch)	Upper Size (Inch)	Sch/Thk	Dmn. STD	Material	Description	Commodity Code	Note No
Fitting Group									
TEQ	T.EQUAL	2.00	6.00	STD	B-16.9	ASTM A 234 GR.WPB	BW	WEG684ZZ0	
TEQ	T.EQUAL	8.00	36.00	M	B-16.9	ASTM A 234 GR.WPB-W	BW	WEG754ZZ0	
TRED	T.RED	0.50	1.50		B-16.11	ASTM A 105	SW, 3000	WR602D2Z0	
TRED	T.RED	2.00	6.00	STD, STD	B-16.9	ASTM A 234 GR.WPB	BW	WRG684ZZ0	
TRED	T.RED	8.00	36.00	M, M	B-16.9	ASTM A 234 GR.WPB-W	BW	WRG754ZZ0	
REDC	REDUC.CONC	2.00	6.00	STD, STD	B-16.9	ASTM A 234 GR.WPB	BW	WUG684ZZ0	
REDC	REDUC.CONC	8.00	36.00	M, M	B-16.9	ASTM A 234 GR.WPB-W	BW	WUG754ZZ0	
REDE	REDUC.ECC	2.00	6.00	STD, STD	B-16.9	ASTM A 234 GR.WPB	BW	WVG684ZZ0	
REDE	REDUC.ECC	8.00	36.00	M, M	B-16.9	ASTM A 234 GR.WPB-W	BW	WVG754ZZ0	
SWGC	SWAGE.CONC	0.50	3.00	STD, STD	BS-3799	ASTM A 105	PBE	WNH026ZZ0	
SWGE	SWAGE.ECC	0.50	3.00	STD, STD	BS-3799	ASTM A 105	PBE	WPH026ZZ0	
CAP	CAP	0.50	1.50		B-16.11	ASTM A 105	SCRF, 3000	WF60282Z0	
CAP	CAP	2.00	6.00	STD	B-16.9	ASTM A 234 GR.WPB	BW	WFG684ZZ0	
CAP	CAP	8.00	36.00	M	B-16.9	ASTM A 234 GR.WPB	BW	WFG684ZZ0	
CPLF	CPLNG.FULL	0.50	1.50		B-16.11	ASTM A 105	SW, 3000	WJ602D2Z0	
CPLH	CPLNG.HALF	0.50	1.50		B-16.11	ASTM A 105	SW, 3000	WK602D2Z0	
CPLL	CPLNG.LH	0.50	1.50		B-16.11	ASTM A 105	SW, 3000	WL602D2Z0	
CPLR	CPLNG.RED	0.50	1.50		B-16.11	ASTM A 105	SW, 3000	WM602D2Z0	
UNN	UNION	0.50	1.50		BS-3799	ASTM A 105	SW, 3000	WQH02D2Z0	
Valves Group									
GAV	VLV.GATE	0.25	1.50		API-602	BODY-ASTM A 105,TRIM-STELLITED,STEM-13%CR.STEEL	SW, 800, 3000, B-16.11, SHT NO.- 51001	51001ZZZ0	
GAV	VLV.GATE	2.00	42.00		API-600	BODY-ASTM A 216 GR.WCB,TRIM-13% CR.STEEL	FLGD, 150, B-16.5, RF/125AARH, SHT NO.- 51301	51301ZZZ0	

Client : BCPL	Dept./Sect. : 16/43
Project : BPC-ASSAM	
Location : ASSAM	Pipe Class : A97A Sheet 5 of 5

Note : (The shaded portion of PMS body shows Field Fabricated Items)

Input Id.	Item Type	Lower Size (Inch)	Upper Size (Inch)	Sch/Thk	Dmn. STD	Material	Description	Commodity Code	Note No
Valves Group									
GLV	VLV.GLOBE	0.50	1.50		BS-5352	BODY-ASTM A 105,TRIM-STELLITED,STEM-13%CR STEEL	SW, 800, 3000, B-16.11, SHT NO.- 52001	52001ZZZ0	
GLV	VLV.GLOBE	2.00	16.00		BS-1873	BODY-ASTM A 216 GR.WCB,TRIM-13% CR.STEEL	FLGD, 150, B-16.5, RF/125AARH, SHT NO.- 52301	52301ZZZ0	
CHV	VLV.CHECK	0.25	1.50		BS EN ISO 15761	BODY-ASTM A 105,TRIM-STELLITED	SW, 800, 3000, B-16.11, SHT NO.- 53001	53001ZZZ0	
CHV	VLV.CHECK	2.00	24.00		BS 1868	BODY-ASTM A 216 GR.WCB,TRIM-13% CR.STEEL	FLGD, 150, B-16.5, RF/125AARH, SHT NO.- 53301	53301ZZZ0	
BFV	VLV.BTRFLY	3.00	24.00		BS EN 593	BODY-ASTM A 105 / A 216GR.WCB,TRIM-13% CR.STEEL	WAF, 150, B-16.5, WAF/125AARH, SHT NO.- 56301	56301ZZZ0	
BFV	VLV.BTRFLY	26.00	48.00		BS EN 593	BODY-ASTM A 105 / A 216GR.WCB,TRIM-13% CR.STEEL	FLGD, 150, B-16.47 B, RF/125AARH, SHT NO.- 56315	56315ZZZ0	
Bolt Group									
BOS	BOLT.STUD	0.50	36.00		B-18.2	BOLT:A193 GR.B7, NUT:A194 GR.2H		BS40404Z0	
Gasket Group									
GAS	GASKET	0.50	24.00		B-16.21-ANSI B16.5	NONASBESTOS BS7531 GR X	RING, 150, 2 MM	GKBAX52Z0	
GAS	GASKET	26.00	36.00		B-16.21-ANSI B16.47B	NONASBESTOS BS7531 GR X	FULLFACE, 150, 2 MM	GKAAX22Z0	
Trap/Strainer Group									
PSR	STRNR.PERM	0.50	1.50		MNF'STD	B:A105;INT:SS304	SW, Y-TYPE, 800	SP303D510	
PSR	STRNR.PERM	2.00	6.00	STD	EIL'STD	B:A234GR.WPB;IN T:SS304	BW, T-TYPE	SP13344Z0	104
PSR	STRNR.PERM	8.00	24.00	M	EIL'STD	B:A234GR.WPBW;I NT:SS304	BW, T-TYPE	SP13644Z0	104
PSR	STRNR.PERM	26.00	36.00	M	EIL'STD	B:A234GR.WPBW;I NT:SS304	BW, T-TYPE	SP13644Z0	104

JOB SPECIFICATION FOR NON DESTRUCTIVE EXAMINATION REQUIREMENTS OF PIPING

PROJECT - BPC-ASSAM
CLIENT - BCPL
JOB NO. - 6907
LOCATION - LEPTKETA (ASSAM)

1	21/05/2010	REVISED & REISSUED AS JOB SPECIFICATION	MKS	PVRM	VKB
0	14/01/2010	ISSUED AS JOB SPECIFICATION	MKS	PVRM	VKB
Rev. No	Date	Purpose	Prepared by	Checked by	Approved by

Abbreviations:

DP/LP :	Dye/Liquid Penetrant
MP :	Magnetic Particle
CS :	Carbon Steel
AS :	Alloy Steel
SS :	Stainless Steel
ASTM :	American Society for Testing & Materials
ASME :	American Society of Mechanical Engineers
IBR :	Indian Boiler Regulations
PMS:	Piping Material Specification

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1. GENERAL

Wherever 6907 is marked against specification, it refers to EIL Job no. This Job Specification is based upon Standard Specification 6-44-0016 Rev. 5.

1.1 SCOPE

This specification covers the general requirements for non destructive examination of shop & field fabricated piping.

1.2 RELATED CODES & ENGINEERING STANDARDS

Referred codes / standards are as follows. Latest editions of the Codes/Standards referred to shall be followed.

- a) ASME Boiler & Pressure Vessel Codes, Section V & VIII (Div.1) including addenda.
- b) ASME B31.3
- c) ASME B16.5
- d) ASME B16.34
- e) Piping Material Specification, 6907-6-44-0005
- f) Welding Specification Charts for Piping Classes, 6907-6-77-0005
- g) Standard Specification for Fabrication & Erection of Piping 6-44-0012
- h) ASTM E10
- i) Welding Specification for Fabrication of Piping, 6-77-0001
- j) Design Guide for Radiography Requirements, 8-77-0010

2. VISUAL EXAMINATION

2.1 Weld shall be visually inspected wherever accessible in accordance with the following requirements:

- | | | |
|----|---|---|
| a) | Internal misalignment | 1.5 mm or less |
| b) | Cracks or lack of fusion | not permitted |
| c) | Incomplete penetration
(For other than 100% radiography butt-weld) | Depth shall not exceed the lesser of 0.8mm or 0.2 times thickness of thinner component joined by butt-weld. The total length of such imperfections shall not exceed 38 mm in any 150 mm of weld length. |
| d) | Surface porosity and exposed slag inclusions
(For nom. wall thickness 4.7 mm and less) | not permitted |

- | | | |
|----|--|---|
| e) | Concave root surface
(Suck up) | For single sided welded joints, concavity of the root surface shall not reduce the total thickness of joint, including reinforcement, to less than the thickness of the thinner of the components being joined. |
| f) | Weld ripples irregularities | 2.5 mm or less. |
| g) | Lack of uniformity in bead width | 2.5 mm or less. |
| h) | Lack of uniformity of leg length | 2.5 mm or less. |
| i) | Unevenness of bead | 2.0 mm or less. |
| j) | Weld undercutting | 0.8 mm or 1/4 thickness of thinner components joined by butt weld, whichever is less. (shall be smooth finished) |
| k) | Overlap | 1.5 mm or less |
| l) | Bead deflection | 2.5 mm or less |
| m) | External weld reinforcement and internal weld protrusion (when backing rings are not used) shall be fused with and shall merge smoothly into the component surfaces. The height of the lesser projection of external weld reinforcement or internal weld protrusion from the adjacent base material surface shall not exceed the following limits: | |
| | Wall thickness of thinner component joined by butt weld (mm) | Weld reinforcement or internal weld protrusion (mm) max |
| | 6.4 and under | 1.6 |
| | Over 6.4 -12.7 | 3.2 |
| | Over 12.7 -25.4 | 4.0 |
| | Over 25.4 | 4.8 |
| n) | Throat thickness of fillet welds:

Nominal thickness of the thinner component x 0.7 or more. | |
| o) | Flattening

Flattening of a bend, as measured by difference between the nominal outside diameter and minimum or maximum diameter at any cross section shall not exceed 5 % of the nominal outside diameter of pipe. | |
| p) | Reduction of wall thickness

Reduction of wall thickness of a bend, as measured by difference between the nominal thickness and minimum thickness shall not exceed 10 % of the nominal wall thickness of pipe. | |

2.2 Welds having any of imperfections which exceed the limitations specified in various clauses of 2.1 shall be repaired by welding, grinding or overlaying etc. Number of times of repair welding for the same weld, however shall conform to applicable notes to Table 1- Note 6(b)b.5.

3. **NON DESTRUCTIVE EXAMINATION**

3.1 The type and extent of weld examination shall be in accordance with Table-1. All visual and supplementary methods of girth weld examination shall be in accordance with ASME B31.3 & the requirements of this standard specification.

3.2 Welds between dissimilar materials shall be examined by method & to the extent required for the material having the more stringent examination.

3.3 Following categories of critical piping are classified under inspection Class IV (100% radiography):

- | | | | |
|----|------------------|---|--|
| a) | High Pressure | : | Classes 600 # & above. |
| b) | Severe Cyclic | : | As defined by ASME B31.3. |
| c) | Low Temperature | : | Below temperature of -45°C. |
| d) | Critical Service | : | Hydrogen, Oxygen, NACE, Caustic, Chlorine & such other critical services. |
| e) | High Alloys | : | 5 Cr & above for all pressure classes |
| f) | High Temperature | : | Above 500° C |
| g) | Jacketed Systems | : | Circumferential pressure retaining butt welds of core piping for jacketed systems. |

4. TABLE-I (with applicable notes)

TABLE 1: CLASS, TYPE & EXTENT OF WELD EXAMINATION

INSPECTION CLASS: I

INSPN. CLASS	SERVICE	MATERIAL (NOTE 3)	P.NO.	TEMP. DEG.C	PRESS. CLASS B16.5/ B16.34	APPLICABLE PIPING CLASS	TYPE OF EXAMINATION	TYPE OF WELD EXAMINED				
								GIRTH BUTT WELD	SOCKET WELD (NOTE 2)	ATTACHMENT WELD	FAB. BRANCH WELD (NOTE 1)	FAB. WELDS OF MITRES / REDUC.
1	2	3	4	5	6	7	8	9	10	11	12	13
I	CATEGORY 'D' FLUID SERVICE	CARBON STEEL	1	0 TO 186	150# UPTO 10.55 KG/CM ²	A3A, J2A, J3A, A91A, A92A	a) VISUAL	100%	100 %	100%	100%	100%
		AUSTENIC S.S.	8	-29 TO 186		A3K						
		HDPE	---	-20 TO 50		A1Z, A91Z	b) LP (NOTE 4, 6, 9,)	---	---	---	10 %	10 %
		CURPO NICKEL	34	-29 TO 60			c) RADIOGRAPHY (NOTE 5,6)	---	---	----	---	---

REMARKS FOR ABOVE TABLE:

- (i) LP TEST NOT APPLICABLE TO NON-METALLIC CLASSES.
- (ii) MITRES & FABRICATED REDUCERS ARE PERMITTED ONLY IF SPECIFIED IN PMS.

TABLE 1: CLASS, TYPE & EXTENT OF WELD EXAMINATION (CONTD.)

INSPECTION CLASS: II

INSPN. CLASS	SERVICE	MATERIAL (NOTE 3)	P. NO.	TEMP. DEG.C	PRESS. CLASS B16.5/ B16.34	APPLICABLE PIPING CLASS	TYPE OF EXAMINATION	TYPE OF WELD EXAMINED				
								GIRTH BUTT WELD	SOCKET WELD (NOTE 2)	ATTACH- MENT WELD	FAB. BRANCH WELD (NOTE 1)	FAB. WELDS OF MITRES/ REDUC.
1	2	3	4	5	6	7	8	9	10	11	12	13
II	a) ALL SERVICES COVERED UNDER INSPECTION CLASS-I, BUT, EXCEEDING CATAGORY 'D' PR./T EMP LIMITATIONS.	CARBON STEEL	1	- 29 TO 371	150#	A1A,A27A, A29A,A7A, A71A,A73A, A8A, A9A, A10A, A11A, A13A, A32A, A33A, A96A, A97A ,	a) VISUAL	100%	100%	100%	100%	100%
							b) RADIOGRAPHY (NOTE 5,6)	10%	---	---	---	50%
	b) ALL SERVICES OTHER THAN THOSE COVERED UNDER INSPECTION CLASS-I BUT NON-TOXIC, NOT SUBJECTED TO SEVERE CYCLIC CONDITIONS.	CARBON STEEL (IBR)				A2A	c) MP / LP (NOTE 4,6,10,11)	---	10 %	---	10%	50%
							d) HARDNESS	NOTE 7	NOTE 7	NOTE-7	NOTE-7	NOTE-7

REMARKS FOR ABOVE TABLE:

- (i) FOR A2A IBR SERVICE NOTE- 8 IS ALSO APPLICABLE.
- (ii) FOR A33A , FIRE WATER SERVICE, NOTE-12 IS ALSO APPLICABLE.
- (iii) EXTENT OF HARDNESS TEST FOR A11A IS 100%.
- (iv) MITRES & FABRICATED REDUCERS ARE PERMITTED ONLY IF SPECIFIED IN PMS.

TABLE 1: CLASS, TYPE & EXTENT OF WELD EXAMINATION (CONTD.)

INSPECTION CLASS: III

INSPN. CLASS	SERVICE	MATERIAL (NOTE 3)	P. NO.	TEMP. DEG.C	PRESS. CLASS B16.5/ B16.34	APPLICABLE PIPING CLASS	TYPE OF EXAMINATION	TYPE OF WELD EXAMINED				
								GIRTH BUTT WELD	SOCKET WELD (NOTE 2)	ATTACH- MENT WELD	FAB. BRANCH WELDS (NOTE 1)	FAB. WELDS OF MITRES / REDUC.)
1	2	3	4	5	6	7	8	9	10	11	12	13
III	a) TOXIC, NON-LETHAL & FLAMMABLE.	CARBON STEEL	1	ABOVE - 29	150#	---	a) VISUAL b) RADIOGRAPHY (NOTE 5,6) c) LP / MP (NOTE 4,6,11) d) HARDNESS	100%	100%	100%	100%	100%
	b) FLAMMABLE / NON FLAMMABLE & TOXIC / NON-TOXIC; NOT SUBJECT TO SEVERE CYCLIC CONDITIONS.	KILLED CARBON STEEL		- 45 TO 204	150# TO 600#	A4A, B4A, D4A, A4A1,B4A1, D4A1		20%	---	---	---	100%
	ALL GENERAL SERVICES EXCEPT THOSE SUBJECT TO SEVERE CYCLIC CONDITIONS.	CARBON STEEL	1	- 29 TO 427	300# TO 600#	B1A, B11A, B29A, B3A,B9A, B13A B6A, B7A,B32A, D1A,D29A,D32A D6A,D9A		---	20 %	---	20%	---
		CARBON STEEL (IBR)				B2A, D2A.		NOTE 7	NOTE 7	NOTE 7	NOTE 7	NOTE 7

REMARKS FOR ABOVE TABLE:

- (i) FOR IBR SERVICE B2A & D2A NOTE- 8 IS ALSO APPLICABLE.
- (ii) MITRES & FABRICATED REDUCERS ARE PERMITTED ONLY IF SPECIFIED IN PMS.

TABLE 1: CLASS, TYPE & EXTENT OF WELD EXAMINATION (CONTD.)

INSPECTION CLASS: III (CONTD.)

INSPN. CLASS	SERVICE	MATERIAL (NOTE 3)	P. NO.	TEMP. DEG.C	PRESS. CLASS B16.5/ B16.34	APPLICABLE PIPING CLASS	TYPE OF EXAMINATION	TYPE OF WELD EXAMINED				
								GIRTH BUTT WELD	SOCKET WELD (NOTE 2)	ATTACH- MENT WELD	FAB. BRANCH WELDS (NOTE 1)	FAB. WELDS OF MITRES / REDUC.)
1	2	3	4	5	6	7	8	9	10	11	12	13
III (CONTD)	ALL GENERAL SERVICES EXCEPT THOSE SUBJECT TO SEVERE CYCLIC CONDITIONS.	C - 0.5 Mo STEEL.	3	ABOVE -29	150# TO 600#		a) VISUAL	100%	100%	100%	100%	100%
		0.5 Cr - 0.5 Mo STEEL					b) RADIOGRAPHY (NOTE 5,6)	20%	---	---	---	100%
		1 TO 2 Cr Mo. STEEL.	4			A1D, B1D, A9D, B9D	c) LP / MP (NOTE 4,6,11)	---	20%	---	20%	---
		C - 0.5 Mo STEEL (IBR).	3				d) HARDNESS	NOTE 7	NOTE 7	NOTE 7	NOTE 7	NOTE 7
		1 - 2 Cr Mo STEEL (IBR)	4									

REMARKS FOR ABOVE TABLE:

- (i) MITRES & FABRICATED REDUCERS ARE PERMITTED ONLY IF SPECIFIED IN PMS.

TABLE 1: CLASS, TYPE & EXTENT OF WELD EXAMINATION (CONTD.)

INSPECTION CLASS: III (CONTD.)

INSPN. CLASS	SERVICE	MATERIAL (NOTE 3)	P. NO.	TEMP . DEG. C	PRESS. CLASS B16.5/ B16.34	APPLICABLE PIPING CLASS	TYPE OF EXAMINATION	TYPE OF WELD EXAMINED				
								GIRTH BUTT WELD	SOCKET WELD (NOTE 2)	ATTACH- MENT WELD	FAB. BRANCH WELDS (NOTE 1)	FAB. WELDS OF MITRES / REDUC.)
1	2	3	4	5	6	7	8	9	10	11	12	13
III (CONTD)	ALL GENERAL SERVICES EXCEPT THOSE SUBJECT TO SEVERE CYCLIC CONDITIONS.	STEELS WITH Cr > 2% & < 5%	5	ALL	150# TO 600#							
		3.5 Ni STEEL	9	- 80 TO 120			a) VISUAL	100%	100 %	100%	100%	100%
		AUSTENITIC STAINLESS STEEL	8	- 29 TO 371	150#	A1K, A1N, A1M, A21K,A21N, A26K,A27K A29K,A24M,	b) RADIOGRAPHY (NOTE 5,6)	20%	---	---	---	100%
				- 29 TO 500	300# TO 600#	B1K, B21N, B28K,D1N, D21N	c) LP / MP (NOTE 4,6,10,11)	---	20%	---	20%	---
							d) HARDNESS	NOTE 7	NOTE 7	NOTE 7	NOTE 7	NOTE 7
		DUPLEX STAINLESS STEEL	10H			B21V						

REMARKS FOR ABOVE TABLE:

- (i) NOTE- 7 FOR HARDNESS IS NOT VALID FOR P. NOS. 1, 8, & 9.
- (ii) MITRES & FABRICATED REDUCERS ARE PERMITTED ONLY IF SPECIFIED IN PMS.
- (iii) APPLICABLE FOR UNCLADDED PORTION. CLADDED PORTION TO BE 100% RADIOGRAPHED.

TABLE 1: CLASS, TYPE & EXTENT OF WELD EXAMINATION (CONTD.)

INSPECTION CLASS: III (CONTD.)

INSPN. CLASS	SERVICE	MATERIAL (NOTE 3)	P. NO.	TEMP. DEG.C	PRESS. CLASS B16.5/ B16.34	APPLICABLE PIPING CLASS	TYPE OF EXAMINATION	TYPE OF WELD EXAMINED				
								GIRTH BUTT WELD	SOCKET WELD (NOTE 2)	ATTACH- MENT WELD	FAB. BRANCH WELDS (NOTE 1, NOTE 16)	FAB. WELDS OF MITRES / REDUC.)
1	2	3	4	5	6	7	8	9	10	11	12	13
III (CONTD)	ALL GENERAL SERVICES EXCEPT THOSE SUBJECT TO SEVERE CYCLIC CONDITIONS.	ALUMINIUM & ALUMINIUM BASE ALLOY	21 TO 25	ALL	150#		a) VISUAL	100%	100%	100%	100%	100%
		COPPER & COPPER BASE ALLOY	31				b) RADIOGRAPHY (NOTE 5,6)	20%	---	---	---	100%
		ALUMINIUM BRONZE	35				c) LP / MP (NOTE 4,6,10,11)	---	20%	---	20%	---
		OTHER NON FERROUS ALLOYS	---									

TABLE 1: CLASS, TYPE & EXTENT OF WELD EXAMINATION (CONTD.)

INSPECTION CLASS: IV

INSPN. CLASS	SERVICE	MATERIAL (NOTE 3)	P. NO.	TEMP. DEG.C	PRESS. CLASS B16.5/ B16.34	APPLICABLE PIPING CLASS	TYPE OF EXAMINATION	TYPE OF WELD EXAMINED				
								GIRTH BUTT WELD	SOCKET WELD (NOTE 2)	ATTACH- MENT WELD	FAB. BRANCH WELDS (NOTE 1)	FAB. WELDS OF MITRES / REDUC.)
1	2	3	4	5	6	7	8	9	10	11	12	13
IV	ALL SERVICES	CARBON STEEL	1	ALL	ABOVE 600#	E5A, E1A, F1A	a) VISUAL b) RADIOGRAPHY (NOTE 5,6) c) LP / MP (NOTE 4,6,10,11) d) HARDNESS	100%	100%	100%	100%	100%
		CARBON STEEL (IBR)				E2A, F2A						
		AUSTENITIC STEEL (IBR)	8			F2K						
		1 TO 2 Cr Mo. STEEL.	4			F1D						
		STEEL WITH Cr > 2% & < 5% (IBR)	5			G2E, G22E						
		0.5 TO 9 CR Mo STEEL (IBR)	5B			F22G						
		AUSTENITIC STEEL	8			F1M						

REMARKS FOR ABOVE TABLE:

- (i) FOR IBR SERVICE E2A, F2A, F2K, F22G, G22E & G2E, NOTE- 8 IS ALSO APPLICABLE.
- (ii) EXTENT OF HARDNESS TEST FOR CLASSES E5A IS 10%.
- (iii) MITRES & FABRICATED REDUCERS ARE PERMITTED ONLY IF SPECIFIED IN PMS.

(iv)

TABLE 1: CLASS, TYPE & EXTENT OF WELD EXAMINATION (CONTD.)

INSPECTION CLASS: IV (CONTD.)

INSPN. CLASS	SERVICE	MATERIAL (NOTE 3)	P. NO.	TEMP. DEG.C	PRESS. CLASS B16.5/ B16.34	APPLICABLE PIPING CLASS	TYPE OF EXAMINATION	TYPE OF WELD EXAMINED				
								GIRTH BUTT WELD	SOCKET WELD (NOTE 2)	ATTACH- MENT WELD	FAB. BRANCH WELDS (NOTE 1)	FAB. WELDS OF MITRES / REDUC.)
1	2	3	4	5	6	7	8	9	10	11	12	13
IV (CONTD)	ALL GENERAL SERVICES.	C - 0.5 Mo STEEL	3	ALL	ABOVE 600#	--	a) VISUAL	100 %	100 %	100 %	100 %	100 %
		5 Cr - 9 Cr Mo STEEL	5		150# TO 600#	A4F,						
		12 Cr (TYPE- 410 SS)	6		ALL	--						
		KILLED CARBON STEEL	1	UPTO - 45	ABOVE 600#	--	c) LP / MP (NOTE 4,6,10,11)	---	100 %	10 %	100 %	---
		1 TO 2 Cr STEEL (IBR)	4	ALL		F2D	d) HARDNESS	NOTE 7	NOTE 7	NOTE 7	NOTE 7	NOTE 7

REMARKS FOR ABOVE TABLE:

- (i) FOR IBR SERVICE F2D NOTE- 8 IS ALSO APPLICABLE.
- (ii) MITRES & FABRICATED REDUCERS ARE PERMITTED ONLY IF SPECIFIED IN PMS.
- (iii) APPLICABLE FOR CLADDED AS WELL AS FOR UNCLADDED PORTION ALSO.

TABLE 1: CLASS, TYPE & EXTENT OF WELD EXAMINATION (CONTD.)

INSPECTION CLASS: IV (CONTD.)

INSPN. CLASS	SERVICE	MATERIAL (NOTE 3)	P. NO.	TEMP. DEG.C	PRESS. CLASS B16.5/ B16.34	APPLICABLE PIPING CLASS	TYPE OF EXAMINATION	TYPE OF WELD EXAMINED				
								GIRTH BUTT WELD	SOCKET WELD (NOTE 2)	ATTACH- MENT WELD	FAB. BRANCH WELDS (NOTE 1, NOTE 16)	FAB. WELDS OF MITRES / REDUC.)
1	2	3	4	5	6	7	8	9	10	11	12	13
IV (CONTD)	SERVICES SUBJECT TO SEVERE CYCLIC CONDITIONS	CARBON STEEL & 0.5 TO 9 CR Mo STEEL	1, 3, 4, 5	ALL	ALL							
	SPECIAL SERVICES (NACE, O, H, CAUSTIC, CARCINOGEN, TEA-TRI ETHYL ALUMINIUM)					A16A, A19A, A24A,A23A, A28A,A36A, A39A, A5A, A51A, B16A, B19A,B1A3, B23A,B39A, B5A,B51A, B53A,B5D, D19A,D23A, D53A, D5A,						
	CORE PIPING FOR JACKETED PIPING SYSTEMS					a) VISUAL						
	SERVICES SUBJECT TO SEVERE CYCLIC CONDITIONS	12 CR STEEL (TYPE 410SS)	6			--	b) RADIOGRAPH Y (NOTE 5,6)	100%	---	---	---	100%
	SERVICES SUBJECT TO SEVERE CYCLIC CONDITIONS.	3.5 NI STEEL	9			--	c) LP / MP (NOTE 4,6,10,11,13)	---	100%	10%	100%	---
	SPECIAL SERVICES (NACE, O, H, CAUSTIC)					--	d) HARDNESS	NOTE 7	NOTE 7	NOTE 7	NOTE 7	NOTE 7
	SPECIAL SERVICES (NACE, O, H, CAUSTIC)	NI ALLOYS	43			B21Q,D21Q						
	ALL SERVICES		45									

REMARKS FOR ABOVE TABLE:

- NOTE-7 FOR HARDNESS IS NOT VALID FOR P.NO.9.
- EXTENT OF HARDNESS TEST FOR CLASSES A5A, A51A, B5A, B51A, B53A, D53A & D5A IS 10% & FOR CLASSES A16A, A19A, A24A, A36A, A39A, B16A, B19A & B39A IT IS 100%.
- MITRES & FABRICATED REDUCERS ARE PERMITTED ONLY IF SPECIFIED IN PMS.

TABLE 1: CLASS, TYPE & EXTENT OF WELD EXAMINATION (CONTD.)

INSPECTION CLASS: IV (CONTD.)

INSPN. CLASS	SERVICE	MATERIAL (NOTE 3)	P. NO.	TEMP. DEG.C	PRESS. CLASS B16.5/ B16.34	APPLICABLE PIPING CLASS	TYPE OF EXAMINATION	TYPE OF WELD EXAMINED				
								GIRTH BUTT WELD	SOCKET WELD (NOTE 2)	ATTACH- MENT WELD	FAB. BRANCH WELDS (NOTE 1)	FAB. WELDS OF MITRES / REDUC.)
1	2	3	4	5	6	7	8	9	10	11	12	13
IV (CONTD)	SERVICES SUBJECT TO SEVERE CYCLIC CONDITIONS.	AUSTENITIC STAINLESS STEEL	8	ALL	ALL	---	a) VISUAL	100%	100%	100 %	100%	100 %
	LOW TEMP. SERVICE			BELOW - 45	150# 300# & 600#	A2K, B2K, B2K1,D2K,A23K, B23K,D23K, D26N	b) RADIOGRAPHY (NOTE 5,6)	100%	---	---	---	100%
	GENERAL SERVICES			ALL	ABOVE 600#	---	c) LP / MP (NOTE 4,6,10,11)	--	100%	10 %	100%	---
	HIGH TEMP. SERVICES			> 500	ALL		d) HARDNESS	NOTE 7	NOTE 7	NOTE 7	NOTE 7	NOTE 7
	NACE & SPECIAL SERVICES (O,H, ETC.)			ALL	ALL	B25K,D25K						

REMARKS FOR ABOVE TABLE:

- (i) MITRES & FABRICATED REDUCERS ARE PERMITTED ONLY IF SPECIFIED IN PMS.

(ii) **Applicable Notes to Table I**

1. Branch welds shall consist of the welds between the pipe & reinforcing element (if any), nozzles & reinforcing element and the pipe & nozzle under the reinforcing element. Reinforcing element to be interpreted as pads, saddles, weldolets, sockolets etc.
2. Seal welds of threaded joints shall be given the same examination as socket welds.
3. Unless specifically stated, all materials shall be for "Non-IBR" service.
4. Magnetic Particle & the Liquid Penetrant method of examination shall be in accordance with Section V of the ASME Boiler and Pressure Vessel Code, Article VII and VI respectively. The entire area of the accessible finished weld surface shall be examined. Selected root runs, subject to a maximum of 10%, before finished weld, may also be examined, at the discretion of the engineer-in-charge.
 - a) Wherever MP / LP testing is specified, either MP or LP test may be used. But wherever only MP test is specified, LP method of examination may be used only if MP examination is impracticable in the field as concurred by EIL site-in-charge.
 - b) "Random 10%" of Liquid Penetrant / Magnetic Particle test shall mean testing, by applicable test, one weld for each ten welds or less made by the same welding procedure or operator or both. Similarly "Random 20%" shall mean testing, by applicable test, one weld for each five welds or less made by the same welding procedure or operator or both.
 - c) When Liquid Penetrant examination is specified, the surface shall be free of peened discontinuities. Abrasive blast cleaning shall be followed by light surface grinding prior to Liquid Penetrant examination.
 - d) Inspection shall be performed in the welds excluding those for which radiography has been done.
 - e) Girth weld, branch weld, attachment weld & socket weld of 3-1/2% Ni steel shall be Liquid Penetrant tested only when welded with austenitic material where MP test has been specified.
5. Radiography:
 - a) "Random 10% or 20% radiography" shall mean examining not less than one from each 10 welds or less in case of "Random 10% radiography" or one from each five welds or less in case of "Random 20% radiography" made by the same welding procedure or welder or both. Irrespective of percentage, no. of welds to be radiographed shall be minimum 1. However first two welds made by each welder shall also be radiographed in case of "Random radiography". Welds selected for examination shall not include flange welds and shall be radiographed for their entire length. However, where it is impossible or impracticable to examine the entire weld length of field welds for either random or 100% radiography, and if the same impossibility is agreeable to EIL site-in-charge, then a single 120 deg. exposure of the weld length may be given a Magnetic Particle test or Liquid Penetrant test. However in such cases for ferro-magnetic materials, only MP test shall be acceptable for classes higher than 600#.
 - b) In-process examination shall not be substituted for any required radiographic examination.

- c) Number of radiographs per one circumferential weld shall be as per ASME Sec. V Articles 2 and 22.
6. When radiography or other non destructive inspection is specified, acceptance criteria for repairs or defects shall be as follows:
- a) In case of 100% examination, any unacceptable weld shall be repaired and reinspected.
- b) If required random examination reveals a defect requiring repair, then:
- b.1 Two additional examinations of same type shall be made of the same kind of item (if welded joint, then by the same welding procedure or operator or both).
- b.2 If the group of items examined as required by b.1 above is acceptable, the items requiring repair shall be repaired or replaced and reexamined as required and all items represented by this additional examination shall be accepted.
- b.3 If any of the items examined as required by b.1 above reveals a defect requiring repair, two further comparable items shall be examined for each defective item found by examination.
- b.4 If all the items examined as required by b.3 are acceptable, the items requiring repair shall be repaired or replaced and reexamined as required, and all items represented by this further examination shall be accepted.
- b.5 Number of times repair welding could be done for the same weld before acceptance shall be as follows:

Material	No. of times repair welding is allowed
C.S. upto 300 #	3 or less
C.S. above 300 #	2 or less
Killed steel	2 or less
Low alloy steel	2 or less
Austenitic S.S.	2 or less
3.5 Ni steel	2 or less
Al & Al base alloy	2 or less
Cu & Cu base alloy	2 or less
Others	2 or less

- b.6 Welds not found acceptable for allowed number of times of repair as per b.5 above shall be replaced and reexamined.

b.7 If any of the items examined as required by b.4 above reveals a defect requiring repair, all items represented by these examinations shall be either :

- repaired or replaced and reexamined as required.
- fully examined and repaired or replaced as necessary, and reexamined as necessary.

7. Hardness Test:

- a) Hardness test shall be in accordance with ASTM specification E10. Hardness tests of the heat affected zone shall be made at a point as near as practicable to the edge of the weld. One test per weld shall be performed.
- b) Hardness test where specifically called out in Table-I of this specification or in PMS, shall be carried out irrespective of thickness and to the extent (%age) as mentioned therein.
- c) All welds which are given heat treatment shall be hardness tested. Hardness test shall be performed after final heat treatment.
- d) A minimum of 10% of welds, hot bends, and hot formed components in each furnace heat treated batch and 100% of those which are locally heat treated shall be hardness tested.
- e) Hardness test requirement not covered in this specification shall be as per ASME B31.3.
- f) The hardness limit applies to the weld and heat affected zone. Following hardness values shall be maintained:

Base Metal Group	Maximum Hardness (BHN/RC)
CS	238BHN/RC22
CS (NACE)	200BHN
Cr 0.5% or less	225BHN
Cr 0.5% & upto 2%	225BHN
Cr 2.25%-10%	241BHN
18/8 SS (NACE)	RC22

- g) In case hardness values are mentioned in both Welding Specification Charts for Piping Classes, (6907-6-77-0005) & table given in Note-7(f), the lower of the two values shall be applicable.

8. For IBR service lines, following IBR requirements shall apply in addition to the notes 4, 5, 6, 7, 12 and Table I. In case of conflict between above notes and these requirements, the more stringent ones shall apply. IBR piping shall be erected of IBR inspector approved material and construction procedure. Erected piping shall be hydro tested, inspected and approved by IBR inspector.
- a) Piping over 102 mm (4") bore:
- 10% of welds made by each welder on a pipeline with a minimum of two welds per welder, selected at random, shall be subjected to radiography.
- b) Piping 102 mm (4") bore and under, but not less than 38 mm (1-1/2") bore:
- Two percent of welds made by each welder on a pipeline with a minimum of one weld per welder, selected at random, shall be subjected to radiography or may be cut for visual examination and tests.
- c) Piping less than 38 mm (1.5") bore:
- Special tests are not normally required but 2% of welds by each welder on a pipe line may be cut out from the pipeline for the visual examination and bend tests.
- d) Retests:
- If any test specimen is unsatisfactory, two further weld specimens for retests shall be selected from the production welds and subjected to tests. In the event of failure of any retest specimens, the production welds carried out by this welder subsequent to the previous test shall be given special consideration.
9. For fabricated fittings LP test shall be done on the final pass of welding only, in addition to visual examination.
10. For mitres and fabricated reducers, LP / MP test shall be done on root pass in addition to radiography applicable to circumferential joint of respective piping class.
11. For branch connections, LP/MP test shall be done on root pass and final pass.
12. As per TAC requirements, 10% of the butt weld joints shall be radio graphed, however, 50% of these butt weld joints shall be field weld joints.
13. In addition to 100% radiography, butt weld joints for A16A and B16A classes shall be wet fluorescent magnetic particle tested.
14. For lined specs, testing (MP/LP/Radiography etc.) shall be performed before lining.

WELDING SPECIFICATION CHARTS FOR PIPING CLASSES, BCPL

1	15.5.10	REISSUED AS JOB SPECIFICATION	PC	SG	VRK
0	22.03.10	ISSUED AS JOB SPECIFICATION	PC	SG	VRK
Rev. No	Date	Purpose	Prepared by	Checked by	Approved by

PIPING CLASS: A1A, A7A, A8A, A9A, A10A, A13A, A32A, A96A, B1A, B1A3, B3A, B6A, B7A, B9A, B13A, B32A, D1A, D6A, D9A, D32A, E1A, F1A				
MATERIAL SPECIFICATIONS	PIPES	ASTM A106 GR.B, API 5L GR.B PSL1, ASTM A 672 GR.B60 CL.12, ASTM A 672 GR.B60 CL.22		
	FITTINGS	ASTM A105, ASTM A 234 GR.WPB, ASTM A 234 GR.WPB-W		
	FLANGES	ASTM A105, ASTM A 516 GR.70		
	OTHERS	-		
BASE METAL `P6NO	1			
WELDING PROCESS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: GTAW/SAW (NOTE-1)	FILLER PASS: GTAW / SMAW	ROOT PASS: GTAW / SMAW (NOTE-1)	FILLER PASS: GTAW / SMAW
	FILLET JOINTS/ SOCKET JOINTS: SMAW			
WELDING MATERIALS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: ER70S-2 / E6010	FILLER PASS: ER70S-2 / E7016 / E7018	ROOT PASS: ER70S-2 / E6010	FILLER PASS: ER70S-2 / E7016 / E7018
	FILLET JOINT/SOCKET JOINT: E7016 / E7018			
	BACKING RING: -		CONSUMABLE INSERT: -	
JOINT PREPARATION	AS PER ASME B31.3			
GASES	PURGING: -		SHIELDING: ARGON	
GAS COMPOSITION	PURGING: -		SHIELDING: 99.995%	
PREHEATING (NOTE-3)	PREHEAT TEMP: 10°C MIN/ 100°C FOR THK >25 mm		POST HEATING: -	
CONTINUITY OF WELDING AND PREHEAT:				
POST WELD HEAT TREATMENT (NOTE-4)	HOLDING TEMP: 595 - 620°C		HOLDING TIME: 1 HR / INCH THK	
	RATE OF HEATING: 200°C / HR MAX		MIN. HOLDING TIME: 1 HR	
	METHOD OF COOLING: CONTROLLED		RATE OF COOLING: 200°C / HR MAX	
MECHANICAL PROPERTY REQUIREMENTS	CHARPY `V6NOTCH VALUE:		MIN: -	AVERAGE: -
	AT TEMPERATURE:		-	
	HARDNESS: 200 BHN MAX (NOTE-4)			
CODE OF FABRICATION	AS PER ASME B31.3			

TECHNICAL NOTES:

- 1 THE ROOT PASS FOR SINGLE SIDE WELDING SHALL BE DONE BY GTAW PROCESS.
- 2 FOR PIPING SIZES 2" OD AND BELOW SHALL BE ENTIRELY WELDED BY GTAW PROCESS.
- 3 PRE-HEAT TEMPERATURE OF ATLEAST 50°C SHALL BE PROVIDED FOR THE FIRST TWO PASSES FOR THK>=12.5 mm & < 25 mm.
- 4 PWHT SHALL BE CARRIED OUT FOR WALL THICKNESS EXCEEDING 20 mm AND HARDNESS MEASUREMENT SHALL BE DONE AFTER PWHT.

PIPING CLASS: A2A, B2A, D2A, E2A, F2A				
MATERIAL SPECIFICATIONS	PIPES	ASTM A 106 GR.B, ASTM A 672 GR.B60 CL.12		
	FITTINGS	ASTM A 105, ASTM A 234 GR.WPB, ASTM A 234 GR.WPB-W		
	FLANGES	ASTM A 105		
	OTHERS	-		
BASE METAL P6NO	1			
WELDING PROCESS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: GTAW / SMAW (NOTE-1)	FILLER PASS: GTAW / SMAW	ROOTPASS: GTAW / SMAW (NOTE-1)	FILLER PASS: GTAW / SMAW
	FILLET JOINTS/ SOCKET JOINTS: SMAW			
WELDING MATERIALS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: ER70S-2 / E6010	FILLER PASS: ER70S-2 / E7016/E7018	ROOT PASS: ER70S-2 / E6010	FILLER PASS: ER70S-2 / E7016/E7018
	FILLET JOINT/SOCKET JOINT: E7016 / E7018			
	BACKING RING: -		CONSUMABLE INSERT: -	
JOINT PREPARATION		AS PER ASME B31.3 & IBR		
GASES		PURGING: -	SHIELDING: ARGON	
GAS COMPOSITION		PURGING: -	SHIELDING: 99.995%	
PREHEATING (NOTE-2)		PREHEAT TEMP: 10°C MIN/ 100°C FOR THK >25 mm	POST HEATING: -	
CONTINUITY OF WELDING AND PREHEAT: -				
POST WELD HEAT TREATMENT (NOTE-3)	HOLDING TEMP: 620 - 650°C		HOLDING TIME: 1 HR / INCH THK	
	RATE OF HEATING: 200°C / HR MAX		MIN. HOLDING TIME: 1 HR	
	METHOD OF COOLING: CONTROLLED		RATE OF COOLING: 200°C / HR MAX	
MECHANICAL PROPERTY REQUIREMENTS	CHARPY V6NOTCH VALUE:		MIN: -	AVERAGE: -
	AT TEMPERATURE: -		-	
	HARDNESS: 200 BHN MAX (NOTE – 3)			
CODE OF FABRICATION	AS PER ASME B31.3 & IBR			

TECHNICAL NOTES:

- 1 THE ROOT PASS FOR SINGLE SIDE WELDING SHALL BE DONE BY GTAW PROCESS.
- 2 PRE-HEAT TEMPERATURE OF ATLEAST 50°C SHALL BE PROVIDED FOR THE FIRST TWO PASSES FOR THK ≥ 12.5 mm & < 25 mm.
- 3 PWHT SHALL BE CARRIED OUT FOR WALL THICKNESS EXCEEDING 20 mm AND HARDNESS MEASUREMENT SHALL BE DONE AFTER PWHT.
- 4 FOR PIPING SIZES 2" OD AND BELOW SHALL BE ENTIRELY WELDED BY GTAW PROCESS.

PIPING CLASS: A3A, A33A, A91A, A92A, A97A				
MATERIAL SPECIFICATIONS	PIPES	IS-1239, IS-3589 GR.330, IS-3589 GR.410		
	FITTINGS	ASTM A105, ASTM A 234 GR.WPB, ASTM A 234 GR.WPB-W, IS-3589 GR.330		
	FLANGES	ASTM A105, ASTM A 285 GR.C		
	OTHERS	-		
BASE METAL `P6NO	1			
WELDING PROCESS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: SMAW	FILLER PASS: SMAW	ROOT PASS: SMAW	FILLER PASS: SMAW
	FILLET JOINTS/ SOCKET JOINTS: SMAW			
WELDING MATERIALS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: E6010	FILLER PASS: E7016/E7018	ROOT PASS: E6010	FILLER PASS: E7016/E7018
	FILLET JOINT/SOCKET JOINT: E7016 / E7018			
	BACKING RING: -		CONSUMABLE INSERT: -	
JOINT PREPARATION	AS PER ASME B31.3			
GASES	PURGING: -		SHIELDING: -	
GAS COMPOSITION	PURGING: -		SHIELDING: -	
PREHEATING	PREHEAT TEMP: 10°C MIN.		POST HEATING: -	
CONTINUITY OF WELDING AND PREHEAT: -				
POST WELD HEAT TREATMENT	HOLDING TEMP: -		HOLDING TIME: -	
	RATE OF HEATING: -		MIN. HOLDING TIME: -	
	METHOD OF COOLING: -		RATE OF COOLING: -	
MECHANICAL PROPERTY REQUIREMENTS	CHARPY `V6 NOTCH VALUE:		MIN: -	AVERAGE: -
	AT TEMPERATURE:		-	
	HARDNESS: -			
CODE OF FABRICATION	AS PER ASME B31.3			

PIPING CLASS: A4A, A4A1, B4A, B4A1, D4A, D4A1				
MATERIAL SPECIFICATIONS	PIPES	ASTM A 333 GR.6, ASTM A671 GR.CC60 CL.32		
	FITTINGS	ASTM A 350 GR.LF2, ASTM A 420 GR.WPL6, ASTM A 420 GR.WPL6-W		
	FLANGES	ASTM A 350 GR.LF2		
	OTHERS	-		
BASE METAL P6NO	1			
WELDING PROCESS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: GTAW	FILLERPASS: GTAW / SMAW	ROOTPASS: GTAW	FILLER PASS: GTAW / SMAW
	FILLET JOINTS/ SOCKET JOINTS: SMAW			
WELDING MATERIALS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: ER80S-Ni1 (NOTE-1)	FILLER PASS: ER80S-Ni1 / E7016-1/E7018-1 (NOTE-1)	ROOT PASS: ER80S-Ni1 (NOTE-1)	FILLER PASS: ER80S-Ni1 / E7016-1/E7018-1 (NOTE-1)
	FILLET JOINT/SOCKET JOINT: E7016-1/ E7018-1			
	BACKING RING: -		CONSUMABLE INSERT: -	
JOINT PREPARATION	AS PER ASME B31.3			
GASES	PURGING: -		SHIELDING: ARGON	
GAS COMPOSITION	PURGING: -		SHIELDING: 99.995%	
PREHEATING (NOTE-2)	PREHEAT TEMP: 10°C MIN/ 100°C FOR THK >25 mm		POST HEATING: -	
CONTINUITY OF WELDING AND PREHEAT: -				
POST WELD HEAT TREATMENT (NOTE-3)	HOLDING TEMP: 595 - 620°C		HOLDING TIME: 1 HR / INCH THK	
	RATE OF HEATING: 200°C / HR MAX		MIN. HOLDING TIME: 1 HR	
	METHOD OF COOLING: CONTROLLED		RATE OF COOLING: 200°C / HR MAX	
MECHANICAL PROPERTY REQUIREMENTS	CHARPY V6NOTCH VALUE:		MIN: 27 J	AVERAGE: -
	AT TEMPERATURE:		-45° C OR LOWEST DESIGN METAL TEMPERATURE.	
	HARDNESS: 200 BHN MAX (NOTE – 3)			
CODE OF FABRICATION	AS PER ASME B31.3			

TECHNICAL NOTES:

- 1 FILLER RODS/ELECTRODES SHALL BE IMPACT TESTED AT -45° C OR LOWEST DESIGN METAL TEMPERATURE AS PER LATEST EDITION OF ASME BPV SECTION II PART C.
- 2 PRE-HEAT TEMPERATURE OF ATLEAST 50°C SHALL BE PROVIDED FOR THE FIRST TWO PASSES FOR THK>=12.5 mm & < 25 mm.
- 3 PWHT SHALL BE CARRIED OUT FOR WALL THICKNESS EXCEEDING 20 mm AND HARDNESS MEASUREMENT SHALL BE DONE AFTER PWHT.
- 4 FOR PIPING SIZES 2" OD AND BELOW SHALL BE ENTIRELY WELDED BY GTAW PROCESS.

PIPING CLASS: A5A, A51A, B51A, B5A, B53A, D5A, D53A, E5A				
MATERIAL SPECIFICATIONS	PIPES	ASTM A106 GR.B, ASTM A 672 GR.B60 CL.12, ASTM A 672 GR.B60 CL.22		
	FITTINGS	ASTM A105, ASTM A 234 GR.WPB, ASTM A 234 GR.WPB-W		
	FLANGES	ASTM A105		
	OTHERS	-		
BASE METAL 'P6NO	1			
WELDING PROCESS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: GTAW/SMAW(NOTE-1)	FILLERPASS: GTAW / SMAW	ROOT PASS: GTAW /SMAW(NOTE-1)	FILLER PASS: GTAW / SMAW
	FILLET JOINTS/ SOCKET JOINTS: SMAW			
WELDING MATERIALS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: ER70S-2	FILLER PASS: ER70S-2 / E7016 / E7018	ROOT PASS: ER70S-2 / E6010	FILLER PASS: ER70S-2 / E7016 / E7018
	FILLET JOINT/SOCKET JOINT: E7016 / E7018			
	BACKING RING: -		CONSUMABLE INSERT: -	
JOINT PREPARATION	AS PER ASME B31.3			
GASES	PURGING: -		SHIELDING: ARGON	
GAS COMPOSITION	PURGING: -		SHIELDING: 99.995%	
PREHEATING (NOTE-2)	PREHEAT TEMP: 10°C MIN/ 100°C FOR THK >25 mm		POST HEATING: -	
CONTINUITY OF WELDING AND PREHEAT:				
POST WELD HEAT TREATMENT (NOTE-3)	HOLDING TEMP: 595 - 620°C		HOLDING TIME: 1 HR / INCH THK	
	RATE OF HEATING: 200°C / HR MAX		MIN. HOLDING TIME: 1 HR	
	METHOD OF COOLING: CONTROLLED		RATE OF COOLING: 200°C / HR MAX	
MECHANICAL PROPERTY REQUIREMENTS	CHARPY 'V6 NOTCH VALUE:		MIN: -	AVERAGE: -
	AT TEMPERATURE:		-	
	HARDNESS: 200 BHN MAX (NOTE-3)			
CODE OF FABRICATION	AS PER ASME B31.3			

TECHNICAL NOTES:

- 1 THE ROOT PASS FOR SINGLE SIDE WELDING SHALL BE DONE BY GTAW PROCESS.
- 2 PRE-HEAT TEMPERATURE OF ATLEAST 50°C SHALL BE PROVIDED FOR THE FIRST TWO PASSES FOR THK>=12.5 mm & < 25 mm.
- 3 PWHT SHALL BE CARRIED OUT FOR WALL THICKNESS EXCEEDING 20 mm AND HARDNESS MEASUREMENT SHALL BE DONE AFTER PWHT.
- 4 FOR PIPING SIZES 2" OD AND BELOW SHALL BE ENTIRELY WELDED BY GTAW PROCESS.

PIPING CLASS: A11A, A23A, B11A, B23A, D23A, A71A, A73A, B73A				
MATERIAL SPECIFICATIONS	PIPES	ASTM A106 GR.B, ASTM A 672 GR.B60 CL.12		
	FITTINGS	ASTM A105, ASTM A 234 GR.WPB, ASTM A 234 GR.WPB-W		
	FLANGES	ASTM A105, ASTM A 516 GR.70		
	OTHERS	-		
BASE METAL `P6 NO	1			
WELDING PROCESS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: GTAW / SMAW (NOTE-1)	FILLER PASS: SMAW / GTAW	ROOT PASS: SMAW / GTAW (NOTE-1)	FILLER PASS: SMAW / GTAW
	FILLET JOINTS/ SOCKET JOINTS: SMAW			
WELDING MATERIALS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: ER70S-2 / E6010	FILLER PASS: E7016 / E7018 / ER70S-2	ROOT PASS: E6010 / ER70S-2	FILLER PASS: E7016 / E7018 / ER70S-2
	FILLET JOINT/SOCKET JOINT: E7016 / E7018			
	BACKING RING: -		CONSUMABLE INSERT: -	
JOINT PREPARATION	AS PER ASME B31.3			
GASES	PURGING: -		SHIELDING: ARGON	
GAS COMPOSITION	PURGING: -		SHIELDING: 99.995%	
PREHEATING (NOTE-2)	PREHEAT TEMP: 10°C MIN/ 100°C FOR THK >25 mm		POST HEATING: -	
CONTINUITY OF WELDING AND PREHEAT:				
POST WELD HEAT TREATMENT (NOTE-3)	HOLDING TEMP: 595 - 620°C		HOLDING TIME: 1 HR / INCH THK	
	RATE OF HEATING: 200°C / HR MAX		MIN. HOLDING TIME: 1 HR	
	METHOD OF COOLING: CONTROLLED		RATE OF COOLING: 200°C / HR MAX	
MECHANICAL PROPERTY REQUIREMENTS	CHARPY `V6 NOTCH VALUE:		MIN: -	AVERAGE: -
	AT TEMPERATURE:		-	
	HARDNESS: 200 BHN MAX			
CODE OF FABRICATION	AS PER ASME B31.3			

TECHNICAL NOTES:

- 1 THE ROOT PASS FOR SINGLE SIDE WELDING SHALL BE DONE BY GTAW PROCESS.
- 2 PRE-HEAT TEMPERATURE OF ATLEAST 50°C SHALL BE PROVIDED FOR THE FIRST TWO PASSES FOR THK>=12.5 mm & < 25 mm.
- 3 PWHT SHALL BE CARRIED OUT FOR PIPE WALL THICKNESS EXCEEDING 20 mm.
- 4 FOR PIPING SIZES 2" OD AND BELOW SHALL BE ENTIRELY WELDED BY GTAW PROCESS.

PIPING CLASS: A16A, A36A				
MATERIAL SPECIFICATIONS	PIPES	ASTM A106 GR.B, ASTM A 672 GR.B60 CL.12		
	FITTINGS	ASTM A105, ASTM A234 GR.WPB, ASTM A234 GR.WPB-W		
	FLANGES	ASTM A105		
	OTHERS	-		
BASE METAL 'P6NO	1			
WELDING PROCESS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: GTAW/SAW (NOTE-2)	FILLER PASS: GTAW/ SMAW	ROOT PASS: GTAW/ SMAW (NOTE-2)	FILLER PASS: GTAW/ SMAW
	FILLET JOINTS/ SOCKET JOINTS: SMAW			
WELDING MATERIALS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: ER70S-2	FILLER PASS: ER70S-2/ E7016-1 / E7018-1	ROOT PASS: ER70S-2 / E6010	FILLER PASS: ER70S-2/ E7016-1 / E7018-1
	FILLET JOINT/SOCKET JOINT: E7016-1 / E7018-1			
	BACKING RING: -		CONSUMABLE INSERT: -	
JOINT PREPARATION	AS PER ASME B31.3			
GASES	PURGING: -		SHIELDING: ARGON	
GAS COMPOSITION	PURGING: -		SHIELDING: 99.995%	
PREHEATING (NOTE-3)	PREHEAT TEMP: 10°C MIN/ 100°C FOR THK >25 mm		POST HEATING: -	
CONTINUITY OF WELDING AND PREHEAT:				
POST WELD HEAT TREATMENT (NOTE-4)	HOLDING TEMP: 595 - 620°C		HOLDING TIME: 1 HR / INCH THK	
	RATE OF HEATING: 200°C / HR MAX		MIN. HOLDING TIME: 1 HR	
	METHOD OF COOLING: CONTROLLED		RATE OF COOLING: 200°C / HR MAX	
MECHANICAL PROPERTY REQUIREMENTS	CHARPY 'V6NOTCH VALUE:		MIN: -	AVERAGE: -
	AT TEMPERATURE:		-	
	HARDNESS: 200 BHN MAX (NOTE-4)			
CODE OF FABRICATION	AS PER ASME B31.3			

TECHNICAL NOTES:

- 1 WELDING FILLER MATERIALS SHALL BE QUALIFIED FOR NACE SERVICE.
- 2 THE ROOT PASS FOR SINGLE SIDE WELDING SHALL BE DONE BY GTAW PROCESS.
- 3 PRE-HEAT TEMPERATURE OF ATLEAST 50°C SHALL BE PROVIDED FOR THE FIRST TWO PASSES FOR THK >=12.5 mm & < 25 mm.
- 4 PWHT SHALL BE CARRIED OUT FOR ALL PIPE WALL THICKNESS AND POST HEAT TREATED HARDNESS OF WELD SHALL NOT EXCEED 200 BHN. ANY KIND OF ATTACHMENTS ON SUCH PIPING SHALL BE STRESS RELIEVED AND SHALL ALSO MEET THE HARDNESS LIMIT.
- 5 FOR PIPING SIZES 2" OD AND BELOW SHALL BE ENTIRELY WELDED BY GTAW PROCESS.

PIPING CLASS: A19A, B19A, D19A, A24A, A39A, B39A				
MATERIAL SPECIFICATIONS	PIPES	ASTM A106 GR.B, ASTM A 672 GR.B60 CL.22		
	FITTINGS	ASTM A105, ASTM A234 GR.WPB, ASTM A234 GR.WPB-W		
	FLANGES	ASTM A105, ASTM A 516 GR.70		
	OTHERS	-		
BASE METAL `P6 NO	1			
WELDING PROCESS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: GTAW/SAW (NOTE-1)	FILLERPASS: SMAW	ROOT PASS: GTAW/SAW (NOTE-1)	FILLER PASS: SMAW
	FILLET JOINTS/ SOCKET JOINTS: SMAW			
WELDING MATERIALS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: ER70S-2/E6010	FILLER PASS: E7016 / E7018	ROOT PASS: ER70S-2/E6010	FILLER PASS: E7016 / E7018
	FILLET JOINT/SOCKET JOINT: E7016 / E7018			
	BACKING RING: -		CONSUMABLE INSERT: -	
JOINT PREPARATION	AS PER ASME B31.3			
GASES	PURGING: -		SHIELDING: ARGON	
GAS COMPOSITION	PURGING: -		SHIELDING: 99.995%	
PREHEATING (NOTE-2)	PREHEAT TEMP: 10°C MIN/ 100°C FOR THK >25 mm		POST HEATING: -	
CONTINUITY OF WELDING AND PREHEAT: -				
POST WELD HEAT TREATMENT (NOTE-3)	HOLDING TEMP: 595 - 620°C		HOLDING TIME: 1 HR / INCH THK	
	RATE OF HEATING: 200°C / HR MAX		MIN. HOLDING TIME: 1 HR	
	METHOD OF COOLING: CONTROLLED		RATE OF COOLING: 200°C / HR MAX	
MECHANICAL PROPERTY REQUIREMENTS	CHARPY `V6 NOTCH VALUE:		MIN: -	AVERAGE: -
	AT TEMPERATURE:		-	
	HARDNESS: 200 BHN MAX (NOTE-3)			
CODE OF FABRICATION	AS PER ASME B31.3			

TECHNICAL NOTES:

- 1 THE ROOT PASS FOR SINGLE SIDE WELDING SHALL BE DONE BY GTAW PROCESS.
- 2 PRE-HEAT TEMPERATURE OF ATLEAST 50°C SHALL BE PROVIDED FOR THE FIRST TWO PASSES FOR THK>=12.5 mm & < 25 mm.
- 3 PWHT SHALL BE CARRIED OUT FOR ALL PIPE WALL THICKNESS AND POST HEAT TREATED HARDNESS OF WELD SHALL NOT EXCEED 200 BHN. ANY KIND OF ATTACHMENTS ON SUCH PIPING SHALL BE STRESS RELIEVED AND SHALL ALSO MEET THE HARDNESS LIMIT.
- 4 FOR PIPING SIZES 2" OD AND BELOW SHALL BE ENTIRELY WELDED BY GTAW PROCESS.

PIPING CLASS: A27A, B27A, A28A, A29A, B29A, D29A				
MATERIAL SPECIFICATIONS	PIPES	ASTM A106 GR.B, ASTM A672 GR.B60 CL.12		
	FITTINGS	ASTM A105, ASTM A234 GR.WPB, ASTM A234 GR.WPB-W		
	FLANGES	ASTM A105, ASTM A 516 GR.70		
	OTHERS	-		
BASE METAL `P6 NO	1			
WELDING PROCESS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: GTAW	FILLERPASS: GTAW / SMAW (NOTE-1)	ROOTPASS: GTAW	FILLER PASS: GTAW / SMAW
	FILLET JOINTS/ SOCKET JOINTS: SMAW			
WELDING MATERIALS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: ER70S-2	FILLER PASS: ER70S-2 / E7018	ROOT PASS: ER70S-2	FILLER PASS: ER70S-2 / E7018
	FILLET JOINT/SOCKET JOINT: E7018			
	BACKING RING: -		CONSUMABLE INSERT: -	
JOINT PREPARATION	AS PER ASME B31.3			
GASES	PURGING: -		SHIELDING: ARGON	
GAS COMPOSITION	PURGING: -		SHIELDING: 99.995%	
PREHEATING (NOTE-1)	PREHEAT TEMP: 10°C MIN/ 100°C FOR THK >25 mm		POST HEATING: -	
CONTINUITY OF WELDING AND PREHEAT:				
POST WELD HEAT TREATMENT (NOTE-2)	HOLDING TEMP: 595 - 620°C		HOLDING TIME: 1 HR / INCH THK	
	RATE OF HEATING: 200°C / HR MAX		MIN. HOLDING TIME: 1 HR	
	METHOD OF COOLING: CONTROLLED		RATE OF COOLING: 200°C / HR MAX	
MECHANICAL PROPERTY REQUIREMENTS	CHARPY `V6 NOTCH VALUE:		MIN: -	AVERAGE: -
	AT TEMPERATURE:		-	
	HARDNESS: 200 BHN MAX (NOTE – 2)			
CODE OF FABRICATION	AS PER ASME B31.3			

TECHNICAL NOTES:

- 1 PRE-HEAT TEMPERATURE OF ATLEAST 50°C SHALL BE PROVIDED FOR THE FIRST TWO PASSES FOR THK>=12.5 mm & < 25 mm.
- 2 PWHT SHALL BE CARRIED OUT FOR PIPE WALL THICKNESS GREATER THAN 20 mm AND HARDNESS MEASUREMENT SHALL BE DONE AFTER PWHT.
- 3 FOR PIPING SIZES 2" OD AND BELOW SHALL BE ENTIRELY WELDED BY GTAW PROCESS.
- 4 THE INTERNAL WELD REINFORCEMENT SHALL BE KEPT TO MINIMUM AND BEAR A SMOOTH PROFILE.

PIPING CLASS:A1D, A9D, B9D, B1D, B5D, F1D				
MATERIAL SPECIFICATIONS	PIPES	ASTM A 335GR.P11, ASTM A 691 GR.1.25CR CL.42		
	FITTINGS	ASTM A 182GR.F11 CL.2, ASTM A 234 GR.WP11 CL.1, ASTM A 234GR.WP11-W CL.1		
	FLANGES	ASTM A 182GR.F11 CL.2.		
	OTHERS	-		
BASE METAL 'P6NO	4			
WELDING PROCESS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: GTAW	FILLERPASS: GTAW/SAW	ROOTPASS: GTAW	FILLER PASS: GTAW/SAW
	FILLET JOINTS/ SOCKET JOINTS: SMAW			
WELDING MATERIALS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: ER70S-B2L	FILLER PASS: ER70S-B2L / E7016-B2L/E7018-B2L	ROOT PASS:ER70S-B2L	FILLER PASS: ER70S-B2L/E7016-B2L/E7018-B2L
	FILLET JOINT/SOCKET JOINT: E7016-B2L/E7018-B2L			
	BACKING RING: -		CONSUMABLE INSERT: -	
JOINT PREPARATION	ASME B31.3			
GASES	PURGING: -		SHIELDING: ARGON	
GAS COMPOSITION	PURGING: -		SHIELDING: 99.995%	
PREHEATING	PREHEAT TEMP: 150°C MIN		POST HEATING: -	
CONTINUITY OF WELDING AND PREHEAT: 150°C MIN				
POST WELD HEAT TREATMENT (NOTE-1)	HOLDING TEMP: 705-750°C		HOLDING TIME: 1HOUR PER INCH THK	
	RATE OF HEATING: 200°C/HR MAX		MIN. HOLDING TIME: 2HRS	
	METHOD OF COOLING: CONTROLLED		RATE OF COOLING: 200°C/HR MAX	
MECHANICAL PROPERTY REQUIREMENTS	CHARPY 'V6 NOTCH VALUE:		MIN: -	AVERAGE: -
	AT TEMPERATURE:		-	
	HARDNESS: 225 BHN MAX (NOTE-1)			
CODE OF FABRICATION	AS PER ASME B31.3			

TECHNICAL NOTES

- PWHT SHALL BE DONE FOR ALL WALL THICKNESSES AND POST HEAT TRATED HARDNESS OF WELD SHALL NOT EXCEED 225 BHN. ANY KIND OF ATTACHMENTS ON SUCH PIPING SHALL BE STRESS RELIEVED AND SHALL ALSO MEET THE HARDNESS LIMIT.
- FOR PIPING SIZES 2" OD AND BELOW SHALL BE ENTIRELY WELDED BY GTAW PROCESS.

PIPING CLASS: F2D				
MATERIAL SPECIFICATIONS	PIPES	ASTM A 335GR.P11, ASTM A 691 GR.1.25CR CL.42		
	FITTINGS	ASTM A 182GR.F11 CL.2, ASTM A 234 GR.WP11 CL.1, ASTM A 234GR.WP11-W CL.1		
	FLANGES	ASTM A 182GR.F11 CL.2.		
	OTHERS	-		
BASE METAL `P6NO	4			
WELDING PROCESS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: GTAW	FILLERPASS: GTAW/SAW	ROOTPASS: GTAW	FILLER PASS: GTAW/SAW
	FILLET JOINTS/ SOCKET JOINTS: SMAW			
WELDING MATERIALS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: ER70S-B2L	FILLER PASS: ER70S-B2L / E7016-B2L/E7018-B2L	ROOT PASS:ER70S-B2L	FILLER PASS: ER70S-B2L/E7016-B2L/E7018-B2L
	FILLET JOINT/SOCKET JOINT: E7016-B2L/E7018-B2L			
	BACKING RING: -		CONSUMABLE INSERT: -	
JOINT PREPARATION	ASME B31.3 & IBR			
GASES	PURGING: -		SHIELDING: ARGON	
GAS COMPOSITION	PURGING: -		SHIELDING: 99.995%	
PREHEATING	PREHEAT TEMP: 150°C MIN		POST HEATING: -	
CONTINUITY OF WELDING AND PREHEAT: 150°C MIN				
POST WELD HEAT TREATMENT (NOTE-1)	HOLDING TEMP: 620-660°C		HOLDING TIME: 1HOUR PER INCH THK	
	RATE OF HEATING: 200°C/HR MAX		MIN. HOLDING TIME: 2HRS	
	METHOD OF COOLING: CONTROLLED		RATE OF COOLING: 200°C/HR MAX	
MECHANICAL PROPERTY REQUIREMENTS	CHARPY `V6NOTCH VALUE:		MIN: -	AVERAGE: -
	AT TEMPERATURE:		-	
	HARDNESS: 225 BHN MAX (NOTE-1)			
CODE OF FABRICATION	AS PER ASME B31.3 & IBR			

TECHNICAL NOTES:

- PWHT SHALL BE DONE FOR ALL WALL THICKNESSES AND POST HEAT TREATED HARDNESS OF WELD SHALL NOT EXCEED 225 BHN. ANY KIND OF ATTACHMENTS ON SUCH PIPING SHALL BE STRESS RELIEVED AND SHALL ALSO MEET THE HARDNESS LIMIT.
- FOR PIPING SIZES 2" OD AND BELOW SHALL BE ENTIRELY WELDED BY GTAW PROCESS.

PIPING CLASS: G2E				
MATERIAL SPECIFICATIONS	PIPES	ASTM A 335GR.P22, ASTM A 691 GR.2.25CR CL.42		
	FITTINGS	ASTM A 182GR.F22 CL.3, ASTM A 234 GR.WP22 CL.1, ASTM A 234GR.WP22-W CL.1		
	FLANGES	ASTM A 182GR.F11 CL.3		
	OTHERS	-		
BASE METAL `P6NO	5A			
WELDING PROCESS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: GTAW	FILLERPASS: GTAW/SAW	ROOTPASS: GTAW	FILLER PASS: GTAW/SAW
	FILLET JOINTS/ SOCKET JOINTS: SMAW			
WELDING MATERIALS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: ER80S-B3L	FILLER PASS: ER80S-B3L / E8018-B3L	ROOT PASS:ER80S-B3L	FILLER PASS: ER80S-B3L // E8018-B3L
	FILLET JOINT/SOCKET JOINT: E8018-B3L			
	BACKING RING: -		CONSUMABLE INSERT: -	
JOINT PREPARATION	ASME B31.3 & IBR			
GASES	PURGING: ARGON		SHIELDING: ARGON	
GAS COMPOSITION	PURGING: 99.995%		SHIELDING: 99.995%	
PREHEATING	PREHEAT TEMP: 150°C MIN		POST HEATING: -	
CONTINUITY OF WELDING AND PREHEAT: 150°C MIN				
POST WELD HEAT TREATMENT (NOTE-1)	HOLDING TEMP: 620-660°C		HOLDING TIME: 1HOUR PER INCH THK	
	RATE OF HEATING: 200°C/HR MAX		MIN. HOLDING TIME: 2HRS	
	METHOD OF COOLING: CONTROLLED		RATE OF COOLING: 200°C/HR MAX	
MECHANICAL PROPERTY REQUIREMENTS	CHARPY `V6 NOTCH VALUE:		MIN: -	AVERAGE: -
	AT TEMPERATURE:		-	
	HARDNESS: 241 BHN MAX (NOTE-1)			
CODE OF FABRICATION	AS PER ASME B31.3 & IBR			

TECHNICAL NOTES

- 1 PWHT SHALL BE DONE FOR ALL WALL THICKNESSES AND POST HEAT TREATED HARDNESS OF WELD SHALL NOT EXCEED 241 BHN. ANY KIND OF ATTACHMENTS ON SUCH PIPING SHALL BE STRESS RELIEVED AND SHALL ALSO MEET THE HARDNESS LIMIT.
- 2 FOR PIPING SIZES 2" OD AND BELOW SHALL BE ENTIRELY WELDED BY GTAW PROCESS.

PIPING CLASS: A4F				
MATERIAL SPECIFICATIONS	PIPES	ASTM A 335 GR.P5, ASTM A 691 GR.5CR CL.42		
	FITTINGS	ASTM A 182 GR.F5 , ASTM A 234 GR.WP5, ASTM A 234 GR.WP5-W		
	FLANGES	ASTM A 182 GR.F5		
	OTHERS	-		
BASE METAL `P6NO	5B			
WELDING PROCESS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: GTAW	FILLERPASS: GTAW/SAW	ROOTPASS: GTAW	FILLER PASS: GTAW/SAW
	FILLET JOINTS/ SOCKET JOINTS: SMAW			
WELDING MATERIALS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: ER80S-B6	FILLER PASS: ER80S-B6 / E8016-B6L/ E8018-B6L	ROOT PASS:ER80S-B6	FILLER PASS: ER80S-B6 / / E8016-B6L/E8018-B6L
	FILLET JOINT/SOCKET JOINT: E8016-B6L/E8018-B6L			
	BACKING RING: -		CONSUMABLE INSERT: -	
JOINT PREPARATION		ASME B31.3		
GASES	PURGING: ARGON		SHIELDING: ARGON	
GAS COMPOSITION	PURGING: 99.995%		SHIELDING: 99.995%	
PREHEATING	PREHEAT TEMP: 150°C MIN		POST HEATING: 300°C MIN. FOR 30 MINUTES FOLLOWED BY ASBESTOS COVER	
CONTINUITY OF WELDING AND PREHEAT: INTERPASS TEMP. 250-300°C DURING WELDING SHALL BE MAINTAINED				
POST WELD HEAT TREATMENT (NOTE-1)	HOLDING TEMP: 705-760°C		HOLDING TIME: 1HOUR PER INCH THK	
	RATE OF HEATING: 200°C/HR MAX		MIN. HOLDING TIME: 2 HRS	
	METHOD OF COOLING: CONTROLLED		RATE OF COOLING: 200°C/HR MAX	
MECHANICAL PROPERTY REQUIREMENTS	CHARPY `V6 NOTCH VALUE:		MIN: -	AVERAGE: -
	AT TEMPERATURE:		-	
	HARDNESS: 241 BHN MAX (NOTE-1)			
CODE OF FABRICATION	AS PER ASME B31.3			

TECHNICAL NOTES:

- 1 PWHT SHALL BE DONE FOR ALL WALL THICKNESSES AND POST HEAT TRATED HARDNESS OF WELD SHALL NOT EXCEED 241 BHN. ANY KIND OF ATTACHMENTS ON SUCH PIPING SHALL BE STRESS RELIEVED AND SHALL ALSO MEET THE HARDNESS LIMIT.
- 2 THE MAXIMUM CARBON CONTENT SHALL NOT EXCEED 0.05% IN ER80S-B6.
- 3 FOR PIPING SIZES 2" OD AND BELOW SHALL BE ENTIRELY WELDED BY GTAW PROCESS.

PIPING CLASS: F22G				
MATERIAL SPECIFICATIONS	PIPES	ASTM A 335 GR.P91		
	FITTINGS	ASTM A 234 GR.WP91		
	FLANGES	ASTM A 182 GR.F91		
	OTHERS	-		
BASE METAL `P6NO	5B			
WELDING PROCESS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: GTAW	FILLERPASS: GTAW/SAW	ROOTPASS: GTAW	FILLER PASS: GTAW/SAW
	FILLET JOINTS/ SOCKET JOINTS: SMAW			
WELDING MATERIALS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: ER90S-B9	FILLER PASS: ER90S-B9 / E9016-B9/ E9018-B9	ROOT PASS:ER90S-B9	FILLER PASS: ER90S-B9 / / E9016-B9/E9018-B9
	FILLET JOINT/SOCKET JOINT: E9016-B9/E9018-B9			
	BACKING RING: -		CONSUMABLE INSERT: -	
JOINT PREPARATION	ASME B31.3 & IBR			
GASES	PURGING: ARGON		SHIELDING: ARGON	
GAS COMPOSITION	PURGING: 99.995%		SHIELDING: 99.995%	
PREHEATING	PREHEAT TEMP: 250-300°C MIN		POST HEATING: 300°C MIN. FOR 1 HOUR FOLLOWED BY ASBESTOS COVER AND CONTROLLED COOLING UP TO 93°C	
CONTINUITY OF WELDING AND PREHEAT: INTERPASS TEMP. 250-300°C DURING WELDING SHALL BE MAINTAINED				
POST WELD HEAT TREATMENT (NOTE-2)	HOLDING TEMP: 745-760°C		HOLDING TIME: 1HOUR PER INCH THK	
	RATE OF HEATING: 100°C/HR MAX		MIN. HOLDING TIME: 2 HRS	
	METHOD OF COOLING: CONTROLLED		RATE OF COOLING: 100°C/HR MAX	
MECHANICAL PROPERTY REQUIREMENTS	CHARPY `V6 NOTCH VALUE:		MIN: -	AVERAGE: -
	AT TEMPERATURE:		-	
	HARDNESS: 241 BHN MAX (NOTE-2)			
CODE OF FABRICATION	AS PER ASME B31.3 & IBR			

TECHNICAL NOTES:

- FOR PIPING SIZES 2" OD AND BELOW SHALL BE ENTIRELY WELDED BY GTAW PROCESS.
- PWHT SHALL BE DONE FOR ALL WALL THICKNESSES AND POST HEAT TREATED HARDNESS OF WELD SHALL NOT EXCEED 241 BHN. ANY KIND OF ATTACHMENTS ON SUCH PIPING SHALL BE STRESS RELIEVED AND SHALL ALSO MEET THE HARDNESS LIMIT.
- THE MAXIMUM CARBON CONTENT SHALL NOT EXCEED 0.05% IN ER90S-B9/E9016-B9/E9018-B9.

PIPING CLASS: A1K, A26K, A27K, A29K, A3K, B1K, B28K				
MATERIAL	PIPES	ASTM A 312 TP304, ASTM A 358 TP304 CL.1		
	FITTINGS	ASTM A 182 GR.F304, ASTM A 403 GR.WP304-S, ASTM A 403 GR.WP304-WX		
	FLANGES	ASTM A 182 GR.F304		
	OTHERS	-		
BASE METAL `P6NO	8			
WELDING PROCESS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: GTAW	FILLERPASS: GTAW/SAW	ROOTPASS: GTAW	FILLER PASS: GTAW/SAW
	FILLET JOINTS/ SOCKET JOINTS: SMAW			
WELDING MATERIALS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: ER308/ER308L	FILLER PASS:ER308/ ER308L / E308-15/16/E308L-15/16	ROOT PASS: ER308/ER308L	FILLER PASS:ER308/ ER308L / E308-15/16/E308L-15/16
	FILLET JOINT/SOCKET JOINT: E308-15/16/E308L-15/16			
	BACKING RING: -		CONSUMABLE INSERT: -	
JOINT PREPARATION	AS PER ASME B31.3			
GASES	PURGING: ARGON		SHIELDING: ARGON	
GAS COMPOSITION	PURGING: 99.995%		SHIELDING: 99.995 %	
PREHEATING	PREHEAT TEMP: 10 °C		POST HEATING:-	
CONTINUITY OF WELDING AND PREHEAT: -				
POST WELD HEAT TREATMENT	HOLDING TEMP: -		HOLDING TIME: -	
	RATE OF HEATING: -		MIN. HOLDING TIME: -	
	METHOD OF COOLING: -		RATE OF COOLING: -	
MECHANICAL PROPERTY REQUIREMENTS	CHARPY `V6NOTCH VALUE:		MIN: -	AVERAGE: -
	AT TEMPERATURE:		-	
	HARDNESS: -			
CODE OF FABRICATION	AS PER ASME 31.3			

TECHNICAL NOTES:

- FOR PIPING SIZES 2" OD AND BELOW SHALL BE ENTIRELY WELDED BY GTAW PROCESS.
- THE INTERNAL WELD REINFORCEMENT SHALL BE KEPT TO MINIMUM AND BEAR A SMOOTH PROFILE.
- THE WELD METAL FERRITE CONTENT SHALL BE IN THE RANGE OF 3-8%.

PIPING CLASS: A2K, B2K, B2K1, D2K				
MATERIAL	PIPES	ASTM A 312 TP304, ASTM A 358 TP304 CL.1		
	FITTINGS	ASTM A 182 GR.F304, ASTM A 403 GR.WP304-S, ASTM A 403 GR.WP304-WX		
	FLANGES	ASTM A 182 GR.F304		
	OTHERS	-		
BASE METAL `P6NO	8			
WELDING PROCESS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: GTAW	FILLERPASS: GTAW/SAW	ROOT PASS: GTAW	FILLER PASS: GTAW/SAW
	FILLET JOINTS/ SOCKET JOINTS: SMAW			
WELDING MATERIALS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: ER308/ER308L	FILLER PASS:ER308/ER308L/E308-15/16/E308L-15/16	ROOT PASS: ER308/ER308L	FILLER PASS: ER308/ER308L /E308-15/16/E308L-15/16
	FILLET JOINT/SOCKET JOINT: E308-15/16/E308L-15/16			
	BACKING RING: -		CONSUMABLE INSERT: -	
JOINT PREPARATION	AS PER ASME B31.3			
GASES	PURGING: ARGON		SHIELDING: ARGON	
GAS COMPOSITION	PURGING: 99.995%		SHIELDING: 99.995 %	
PREHEATING	PREHEAT TEMP: 10 °C		POST HEATING:	
CONTINUITY OF WELDING AND PREHEAT: -				
POST WELD HEAT TREATMENT	HOLDING TEMP: -		HOLDING TIME: -	
	RATE OF HEATING -		MIN. HOLDING TIME: -	
	METHOD OF COOLING: -		RATE OF COOLING: -	
MECHANICAL PROPERTY REQUIREMENTS	CHARPY `V6 NOTCH VALUE:		MIN: 0.38 MM	AVERAGE: 0.38 MM
	AT TEMPERATURE:		-196° C OR LOWEST DESIGN METAL TEMPERTAURE	
	HARDNESS: -			
CODE OF FABRICATION	AS PER ASME 31.3			

TECHNICAL NOTES:

- FOR PIPING SIZES 2" OD AND BELOW SHALL BE ENTIRELY WELDED BY GTAW PROCESS.
- THE FILLER METAL/ELECTRODES SHALL HAVE GURANTEED MINIMUM AS WELDED IMPACT VALUE OF 0.38MM LATERAL EXPANSION AT -196° C OR LOWEST DESIGN METAL TEMPERTAURE (ALL THE FIVE VALUES SHALL BE OVER 0.38MM).

PIPING CLASS: A23K, B23K, D23K				
MATERIAL SPECIFICATIONS	PIPES	ASTM A 312 TP304L, ASTM A 358 TP304L CL.1		
	FITTINGS	ASTM A 182 GR.F304L, ASTM A 403 GR.WP304L-S, ASTM A 403 GR.WP304L-WX		
	FLANGES	ASTM A 182 GR.F304		
	OTHERS	-		
BASE METAL `P6NO	8			
WELDING PROCESS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: GTAW	FILLERPASS: GTAW/SAW	ROOTPASS: GTAW	FILLER PASS: GTAW/SAW
	FILLET JOINTS/ SOCKET JOINTS: SMAW			
WELDING MATERIALS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: ER308L	FILLER PASS: ER308L/ E308L-15/16	ROOT PASS: ER308L	FILLER PASS: ER308L/ E308L-15/16
	FILLET JOINT/SOCKET JOINT: E308L-15/16			
BACKING RING: -		CONSUMABLE INSERT: -		
JOINT PREPARATION	AS PER ASME B31.3			
GASES	PURGING: ARGON		SHIELDING: ARGON	
GAS COMPOSITION	PURGING: 99.995%		SHIELDING: 99.995 %	
PREHEATING	PREHEAT TEMP: 10 °C		POST HEATING:-	
CONTINUITY OF WELDING AND PREHEAT: -				
POST WELD HEAT TREATMENT	HOLDING TEMP: -		HOLDING TIME: -	
	RATE OF HEATING: -		MIN. HOLDING TIME: -	
	METHOD OF COOLING: -		RATE OF COOLING: -	
MECHANICAL PROPERTY REQUIREMENTS	CHARPY `V6NOTCH VALUE:		MIN: 0.38 MM	AVERAGE: 0.38 MM
	AT TEMPERATURE:		-196° C OR LOWEST DESIGN METAL TEMPERTAURE	
	HARDNESS: -			
CODE OF FABRICATION	AS PER ASME 31.3			

TECHNICAL NOTES:

- FOR PIPING SIZES 2" OD AND BELOW SHALL BE ENTIRELY WELDED BY GTAW PROCESS.
- THE FILLER METAL/ELECTRODES SHALL HAVE GURANTEED MINIMUM AS WELDED IMPACT VALUE OF 0.38MM LATERAL EXPANSION AT -196° C OR LOWEST DESIGN METAL TEMPERTAURE (ALL THE FIVE VALUES SHALL BE OVER 0.38MM).

PIPING CLASS: A21K, A24M				
MATERIAL	PIPES	ASTM A 312 TP304L, ASTM A 358 TP304L CL.1		
	FITTINGS	ASTM A 182 GR.F304L, ASTM A 403 GR.WP304L-S, ASTM A 403 GR.WP304L-WX		
	FLANGES	ASTM A 182 GR.F304L		
	OTHERS	-		
BASE METAL P6NO	8			
WELDING PROCESS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: GTAW	FILLERPASS: GTAW/SAW	ROOTPASS: GTAW	FILLER PASS: GTAW/SAW
	FILLET JOINTS/ SOCKET JOINTS: SAW			
WELDING MATERIALS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: ER308L	FILLER PASS: ER308L / E308L-15/16	ROOT PASS: ER308L	FILLER PASS: ER308L / E308L-15/16
	FILLET JOINT/SOCKET JOINT: E308L-15/16			
	BACKING RING: -		CONSUMABLE INSERT: -	
JOINT PREPARATION	AS PER ASME B31.3			
GASES	PURGING: ARGON		SHIELDING: ARGON	
GAS COMPOSITION	PURGING: 99.995%		SHIELDING: 99.995 %	
PREHEATING	PREHEAT TEMP: 10 °C		POST HEATING: -	
CONTINUITY OF WELDING AND PREHEAT: -				
POST WELD HEAT TREATMENT	HOLDING TEMP: -		HOLDING TIME: -	
	RATE OF HEATING: -		MIN. HOLDING TIME: -	
	METHOD OF COOLING: -		RATE OF COOLING: -	
MECHANICAL PROPERTY REQUIREMENTS	CHARPY V6 NOTCH VALUE:		MIN: -	AVERAGE: -
	AT TEMPERATURE: -			
	HARDNESS: -			
CODE OF FABRICATION	AS PER ASME 31.3			

TECHNICAL NOTES:

- FOR PIPING SIZES 2" OD AND BELOW SHALL BE ENTIRELY WELDED BY GTAW PROCESS.

PIPING CLASS: B25K, D25K				
MATERIAL SPECIFICATIONS	PIPES	ASTM A 312 TP304		
	FITTINGS	ASTM A 182 GR.F304, ASTM A 403 GR.WP304-S		
	FLANGES	ASTM A 182 GR.F304		
	OTHERS	-		
BASE METAL `P6NO	8			
WELDING PROCESS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: GTAW	FILLERPASS: GTAW/SAW	ROOTPASS: GTAW	FILLER PASS: GTAW/SAW
	FILLET JOINTS/ SOCKET JOINTS: SMAW			
WELDING MATERIALS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: ER308/ER308L	FILLER PASS:ER308/ ER308L / E308-15/16/E308L-15/16	ROOT PASS: ER308/ER308L	FILLER PASS:ER308/ER308L /E308-15/16/E308L-15/16
	FILLET JOINT/SOCKET JOINT: E308-15/16/E308L-15/16			
	BACKING RING: -		CONSUMABLE INSERT: -	
JOINT PREPARATION	AS PER ASME B31.3			
GASES	PURGING: ARGON		SHIELDING: ARGON	
GAS COMPOSITION	PURGING: 99.995%		SHIELDING: 99.995 %	
PREHEATING	PREHEAT TEMP: 10 °C		POST HEATING: -	
CONTINUITY OF WELDING AND PREHEAT: -				
POST WELD HEAT TREATMENT	HOLDING TEMP: -		HOLDING TIME: -	
	RATE OF HEATING: -		MIN. HOLDING TIME: -	
	METHOD OF COOLING: -		RATE OF COOLING: -	
MECHANICAL PROPERTY REQUIREMENTS	CHARPY `V6NOTCH VALUE:		MIN: -	AVERAGE: -
	AT TEMPERATURE:		-	
	HARDNESS: -			
CODE OF FABRICATION	AS PER ASME 31.3			

TECHNICAL NOTES:

- FOR PIPING SIZES 2" OD AND BELOW SHALL BE ENTIRELY WELDED BY GTAW PROCESS.
- ALL WELDED JOINTS SHALL BE 100% RADIOGRAPHED.
- THE WELD METAL FERRITE CONTENT SHALL BE IN THE RANGE OF 3-8%.

PIPING CLASS: F2K				
MATERIAL	PIPES	ASTM A 312 TP304		
	FITTINGS	ASTM A 182 GR.F304, ASTM A 403 GR.WP304-S		
	FLANGES	ASTM A 182 GR.F304		
	OTHERS	-		
BASE METAL P6NO	8			
WELDING PROCESS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: GTAW	FILLERPASS: GTAW/SAW	ROOTPASS: GTAW	FILLER PASS: GTAW/SAW
	FILLET JOINTS/ SOCKET JOINTS: SMAW			
WELDING MATERIALS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: ER308/ER308L	FILLER PASS:ER308/ER308L / E308-15/16/E308L-15/16	ROOT PASS: ER308/ER308L	FILLER PASS:ER308/ER308L / E308-15/16/E308L-15/16
	FILLET JOINT/SOCKET JOINT: E308-15/16/E308L-15/16			
	BACKING RING: -		CONSUMABLE INSERT: -	
JOINT PREPARATION	AS PER ASME B31.3 & IBR			
GASES	PURGING: ARGON		SHIELDING: ARGON	
GAS COMPOSITION	PURGING: 99.995%		SHIELDING: 99.995 %	
PREHEATING	PREHEAT TEMP: 10 °C		POST HEATING: -	
CONTINUITY OF WELDING AND PREHEAT: -				
POST WELD HEAT TREATMENT	HOLDING TEMP: -		HOLDING TIME: -	
	RATE OF HEATING: -		MIN. HOLDING TIME: -	
	METHOD OF COOLING: -		RATE OF COOLING: -	
MECHANICAL PROPERTY REQUIREMENTS	CHARPY V6 NOTCH VALUE:		MIN: -	AVERAGE: -
	AT TEMPERATURE:		-	
	HARDNESS: -			
CODE OF FABRICATION	AS PER ASME 31.3 & IBR			

TECHNICAL NOTES:

- FOR PIPING SIZES 2" OD AND BELOW SHALL BE ENTIRELY WELDED BY GTAW PROCESS.

PIPING CLASS: A1M, F1M				
MATERIAL	PIPES	ASTM A 312 TP316, ASTM A 358 TP316 CL.1		
	FITTINGS	ASTM A 182 GR.F316, ASTM A 403 GR.WP316-S, ASTM A 403 GR.WP316-WX		
	FLANGES	ASTM A 182 GR.F316		
	OTHERS	-		
BASE METAL `P6NO	8			
WELDING PROCESS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: GTAW	FILLERPASS: GTAW/SAW	ROOTPASS: GTAW	FILLER PASS: GTAW/SAW
	FILLET JOINTS/ SOCKET JOINTS: SMAW			
WELDING MATERIALS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: ER316/ER316L	FILLER PASS: ER316/ER316L / E316-15/16/E316L-15/16	ROOT PASS: ER316/ER316L	FILLER PASS:ER316/ER316L / E316-15/16/E316L-15/16
	FILLET JOINT/SOCKET JOINT: E316-15/16/E316L-15/16			
BACKING RING: -		CONSUMABLE INSERT: -		
JOINT PREPARATION	AS PER ASME B31.3			
GASES	PURGING: ARGON		SHIELDING: ARGON	
GAS COMPOSITION	PURGING: 99.995%		SHIELDING: 99.995 %	
PREHEATING	PREHEAT TEMP: 10 °C		POST HEATING: -	
CONTINUITY OF WELDING AND PREHEAT: -				
POST WELD HEAT TREATMENT	HOLDING TEMP: -		HOLDING TIME: -	
	RATE OF HEATING: -		MIN. HOLDING TIME: -	
	METHOD OF COOLING: -		RATE OF COOLING: -	
MECHANICAL PROPERTY REQUIREMENTS	CHARPY `V6NOTCH VALUE:		MIN: -	AVERAGE: -
	AT TEMPERATURE:		-	
	HARDNESS: -			
CODE OF FABRICATION	AS PER ASME 31.3			

TECHNICAL NOTES:

- FOR PIPING SIZES 2" OD AND BELOW SHALL BE ENTIRELY WELDED BY GTAW PROCESS.
- THE WELD METAL FERRITE CONTENT SHALL BE IN THE RANGE OF 3-8%.

PIPING CLASS: A1N, A21N, B21N, D1N				
MATERIAL	PIPES	ASTM A 312 TP316L, ASTM A 358 TP316L CL.1		
	FITTINGS	ASTM A 182 GR.F316L, ASTM A 403 GR.WP316L-S, ASTM A 403 GR.WP316L-WX		
	FLANGES	ASTM A 182 GR.F316L		
	OTHERS	-		
BASE METAL `P6NO	8			
WELDING PROCESS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: GTAW	FILLERPASS: GTAW/SAW	ROOTPASS: GTAW	FILLER PASS: GTAW/SAW
	FILLET JOINTS/ SOCKET JOINTS: SMAW			
WELDING MATERIALS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: ER316L	FILLER PASS: ER316L / E316L-15/16	ROOT PASS: ER316L	FILLER PASS: ER316L / E316L-15/16
	FILLET JOINT/SOCKET JOINT: E316L-15/16			
	BACKING RING: -		CONSUMABLE INSERT: -	
JOINT PREPARATION	AS PER ASME B31.3			
GASES	PURGING: ARGON		SHIELDING: ARGON	
GAS COMPOSITION	PURGING: 99.995%		SHIELDING: 99.995 %	
PREHEATING	PREHEAT TEMP: 10 °C		POST HEATING: -	
CONTINUITY OF WELDING AND PREHEAT: -				
POST WELD HEAT TREATMENT	HOLDING TEMP: -		HOLDING TIME: -	
	RATE OF HEATING: -		MIN. HOLDING TIME: -	
	METHOD OF COOLING: -		RATE OF COOLING: -	
MECHANICAL PROPERTY REQUIREMENTS	CHARPY `V6 NOTCH VALUE:		MIN: -	AVERAGE: -
	AT TEMPERATURE:		-	
	HARDNESS: -			
CODE OF FABRICATION	AS PER ASME 31.3			

TECHNICAL NOTES:

- FOR PIPING SIZES 2" OD AND BELOW SHALL BE ENTIRELY WELDED BY GTAW PROCESS.

PIPING CLASS: D26N				
MATERIAL	PIPES	ASTM A 312 TP316L		
	FITTINGS	ASTM A 182 GR.F316L, ASTM A 403 GR.WP316L-S, ASTM A 403 GR.WP316L-WX		
	FLANGES	ASTM A 182 GR.F316L		
	OTHERS	-		
BASE METAL `P6NO	8			
WELDING PROCESS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: GTAW	FILLERPASS: GTAW/SAW	ROOTPASS: GTAW	FILLER PASS: GTAW/SAW
	FILLET JOINTS/ SOCKET JOINTS: SMAW			
WELDING MATERIALS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: ER316L	FILLER PASS: ER316L / E316L-15/16	ROOT PASS: ER316L	FILLER PASS: ER316L / E316L-15/16
	FILLET JOINT/SOCKET JOINT: E316L-15/16			
	BACKING RING: -		CONSUMABLE INSERT: -	
JOINT PREPARATION	AS PER ASME B31.3			
GASES	PURGING: ARGON		SHIELDING: ARGON	
GAS COMPOSITION	PURGING: 99.995%		SHIELDING: 99.995 %	
PREHEATING	PREHEAT TEMP: 10 °C		POST HEATING: -	
CONTINUITY OF WELDING AND PREHEAT: -				
POST WELD HEAT TREATMENT	HOLDING TEMP: -		HOLDING TIME: -	
	RATE OF HEATING: -		MIN. HOLDING TIME: -	
	METHOD OF COOLING: -		RATE OF COOLING: -	
MECHANICAL PROPERTY REQUIREMENTS	CHARPY `V6 NOTCH VALUE:		MIN: 0.38 MM	AVERAGE: 0.38 MM
	AT TEMPERATURE:		-48° C OR LOWEST DESIGN METAL TEMPERATURE	
	HARDNESS: -			
CODE OF FABRICATION	AS PER ASME 31.3			

TECHNICAL NOTES:

- FOR PIPING SIZES 2" OD AND BELOW SHALL BE ENTIRELY WELDED BY GTAW PROCESS.
- THE WELD METAL FERRITE CONTENT SHALL BE IN THE RANGE OF 3-8%.

PIPING CLASS: B21V				
MATERIAL SPECIFICATIONS	PIPES	ASTM A 790 (UNS S32750)		
	FITTINGS	ASTM A 815 GR.WP UNS S32750-S		
	FLANGES	ASTM A 182 GR.F53		
	OTHERS	-		
BASE METAL P6NO	10H			
WELDING PROCESS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: GTAW	FILLERPASS: GTAW/SAW (NOTE-1)	ROOTPASS: GTAW	FILLER PASS: GTAW / SAW
	FILLET JOINTS/ SOCKET JOINTS: GTAW / SAW			
WELDING MATERIALS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: ER2594	FILLER PASS: ER2594 / E2595-15/16	ROOT PASS: ER2594	FILLER PASS: ER2594 / E2595-15/16
	FILLET JOINT/SOCKET JOINT: E2595-15/16			
	BACKING RING: -		CONSUMABLE INSERT: -	
JOINT PREPARATION		AS PER ASME B31.3		
GASES	PURGING: ARGON		SHIELDING: ARGON	
GAS COMPOSITION	PURGING:99.995%		SHIELDING: 99.995%	
PREHEATING	PREHEAT TEMP: 10°C MIN		POST HEATING: -	
CONTINUITY OF WELDING AND PREHEAT: -				
POST WELD HEAT TREATMENT	HOLDING TEMP: -		HOLDING TIME: -	
	RATE OF HEATING: -		MIN. HOLDING TIME: -	
	METHOD OF COOLING: -		RATE OF COOLING: -	
MECHANICAL PROPERTY REQUIREMENTS	CHARPY V6 NOTCH VALUE:		MIN: -	AVERAGE: -
	AT TEMPERATURE:		-	
	HARDNESS: -			
CODE OF FABRICATION	AS PER ASME B31.3			

TECHNICAL NOTES:

- FOR PIPING SIZES 2" OD AND BELOW SHALL BE ENTIRELY WELDED BY GTAW PROCESS.
- THE INTERNAL WELD REINFORCEMENT SHALL BE KEPT TO MINIMUM AND BEAR A SMOOTH PROFILE.

PIPING CLASS: B21Q, D21Q				
MATERIAL SPECIFICATIONS	PIPES	ASTM B 167 (UNS N06600)		
	FITTINGS	ASTM B 366 GR.WPNCI-S (N06600)		
	FLANGES	ASTM B 564 (UNS N06600)		
	OTHERS	-		
BASE METAL `P6NO	43			
WELDING PROCESS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: GTAW	FILLERPASS:GTAW/SAW (NOTE-1)	ROOTPASS: GTAW	FILLER PASS: GTAW/SAW
	FILLET JOINTS/ SOCKET JOINTS: GTAW / SAW			
WELDING MATERIALS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: ERNiCr-3	FILLER PASS: ERNiCr-3/ ENiCrFe-3	ROOT PASS: ERNiCr-3	FILLER PASS: ERNiCr-3/ ENiCrFe-3
	FILLET JOINT/SOCKET JOINT: ENiCrFe-3			
	BACKING RING: -		CONSUMABLE INSERT: -	
JOINT PREPARATION	AS PER ASME B31.3			
GASES	PURGING: ARGON		SHIELDING: ARGON	
GAS COMPOSITION	PURGING: 99.995%		SHIELDING: 99.995%	
PREHEATING	PREHEAT TEMP: 10°C MIN		POST HEATING: -	
CONTINUITY OF WELDING AND PREHEAT: -				
POST WELD HEAT TREATMENT	HOLDING TEMP: -		HOLDING TIME: -	
	RATE OF HEATING: -		MIN. HOLDING TIME: -	
	METHOD OF COOLING:		RATE OF COOLING: --	
MECHANICAL PROPERTY REQUIREMENTS	CHARPY `V6NOTCH VALUE:		MIN: -	AVERAGE: -
	AT TEMPERATURE:		-	
	HARDNESS: -			
CODE OF FABRICATION	AS PER ASME B31.3			

TECHNICAL NOTES:

- FOR PIPING SIZES 2" OD AND BELOW SHALL BE ENTIRELY WELDED BY GTAW PROCESS.

PIPING CLASS: A1Z, A91Z				
MATERIAL SPECIFICATIONS	PIPES	ASTM D 3035 GR.PE 3406 CL.C		
	FITTINGS	ASTM D 3261 GR.P34 CL.C		
	FLANGES	ASTM A 516 GR.60, ASTM A 515 GR.60/HDPE		
	OTHERS	-		
BASE METAL `P6NO	-			
WELDING PROCESS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: NOTE-1	FILLERPASS: NOTE-1	ROOTPASS: NOTE-1	FILLER PASS: NOTE-1
	FILLET JOINTS/ SOCKET JOINTS: NOTE-1			
WELDING MATERIALS	GROOVE JOINTS			
	BUTT		OTHER THAN BUTT	
	ROOT PASS: NOTE-2	FILLER PASS: NOTE-2	ROOT PASS: NOTE-2	FILLER PASS: NOTE-2
	FILLET JOINT/SOCKET JOINT: NOTE-2			
	BACKING RING: -		CONSUMABLE INSERT: -	
JOINT PREPARATION	AS PER ASME B31.3			
GASES	PURGING: -		SHIELDING: -	
GAS COMPOSITION	PURGING:-		SHIELDING: -	
PREHEATING	PREHEAT TEMP: -		POST HEATING: -	
CONTINUITY OF WELDING AND PREHEAT: -				
POST WELD HEAT TREATMENT	HOLDING TEMP: -		HOLDING TIME: -	
	RATE OF HEATING: -		MIN. HOLDING TIME: -	
	METHOD OF COOLING: -		RATE OF COOLING:	
MECHANICAL PROPERTY REQUIREMENTS	CHARPY `V6NOTCH VALUE:		MIN: -	AVERAGE: -
	AT TEMPERATURE:		-	
	HARDNESS: -			
CODE OF FABRICATION	AS PER ASME B31.3			

TECHNICAL NOTES:

1. MANUAL HOT AIR / GAS WELDING SHALL BE USED FOR THE FABRICATION OF HDPE PIPE JOINTS. IF THE VENDOR PROPOSES ANY OTHER PROCESS, THE DETAILED PROCEDURE SHALL BE FURNISHED FOR REVIEW AND APPROVAL.
2. A FILLER ROD OF A SIMILAR COMPOSITION TO THE POLYMER BEING JOINT SHALL BE PROCURED FROM A QUALIFIED HDPE PIPE MANUFACTURER.
3. THE HOT GAS TEMPERATURE SHALL BE IN THE RANGE OF 200-600° C. THE GAS TEMPERATURE AND GAS TO BE USED, SHALL BE APPORVED THROUGH A PROCEDURE QUALIFICATION TESTING.