	PIPING MATERIAL SPECIFICATION				
				TOTAL SHEETS	48
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PIPING MATERIAL SPECIFICATION

REV	DATE	DESCRIPTION	PREP	CHK	APPR
3	07.09.2018	RE-ISSUED AS STANDARD	CM	MC	AD
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TABLE OF CONTENTS

1.0 INTRODUCTION

This specification cover minimum requirements for the material specification for pipe, fittings, flanges, line blinds, bolts, gaskets, and valves that shall be used for natural gas pipeline and associated facilities in accordance with ASME B31.8, OISD-226 and PNGRB guideline
This specification also defines, by piping class for each listed service, and defines the pressure/temperature limitations within which they may be used.

This specification shall be read in conjunction with various codes and standards as applicable.

2.0 CODES AND STANDARDS

2.1 Pipeline and pipeline terminal facilities envisaged as part of this project shall be designed and engineered primarily in accordance with the provisions of the latest edition of the following codes:

(i) **ASME B 31.8** - Gas transmissions and Distribution Piping System

(ii) **ASME B 31.3** - Chemical Plant and Petroleum Refinery Piping

(iii) **OISD Standard 226** - Natural Gas transmission Pipelines.

(iv) **PNGRB** - Petroleum & Natural Gas Regulatory Board

2.2 All codes, standards and specifications referred herein shall be the latest edition of such documents.

2.3 For sake of brevity the initials of the society to which the codes are referred may be omitted in the specifications, for example, B16.5 is a code referring to ASME A106 is a code referring to ASTM.

2.4 In addition to this PMS, various piping and pipeline materials shall also be applicable.

3.0 MATERIAL SPECIFICATIONS

Individual piping class has been generally designed to cover a set of service operating within pressure-temperature consideration as per ASME B16.5/ B16.34 or part of it. Deviations of material from class specifications may occur due to specific design conditions and/or availability. These deviations are permissible if they equal or better the individual class requirements and shall be subjected to approval on case-to-case basis.

4.0 CLASS DESIGNATION CODE

The piping class designation shall generally consist of three digits made up of a letter, number & letter e.g. 15HC, 15HLT , 30HC, 30 HLT, 60HC etc. as follows:

First two numerals letter indicates ASME class rating, e.g.,

15 - 150 Class
30 - 300 Class
60 - 600 Class

The first alphabet indicates differences in the specifications within the same class rating and material, e.g. H stands for Hydrocarbon, etc.

The last letter indicates type of material, e.g.,
C - Carbon steel
S - Stainless Steel
LT- LTCS

5.0 PIPELINE

5.1 Line pipe material grade and wall thickness details are indicated in PMS.

6.0 PIPES

6.1 Carbon steel pipe shall be made by open hearth, electric furnace or basic oxygen process only. The steel used shall be fully killed and made with fine grain structure. The grade and wall thickness of various sizes of pipes shall be as per piping material specification for the applicable class.

6.2 Pipe dimensions shall be in accordance with ASME B 36.10 for carbon steel ASTM standard pipes & API 5L for carbon steel API 5L grade pipes.

6.3 All pipe threads shall conform to American Standard taper as per ASME B 1.20.1 NPT, unless otherwise specified.

6.4 For butt weld end, bevel shall be in accordance with API specification 5L or ASME B16.25 as applicable.

7.0 FITTINGS

7.1 Fully killed carbon steel shall be used in the manufacture of fittings. The fitting shall have carbon equivalent not exceeding 0.45, based on check analysis.

7.2 Threaded joints, if used, shall conform to American Standard taper as per ASME B1.20.1 NPT.

7.3 Dimensions of socket welded/screwed fittings shall conform to ASME B 16.11. Swage shall be as per BS 3799.

7.4 Dimensions of steel butt welded fittings shall be as per ASME B 16.9.

7.5 Bore of socket welded fittings shall suit outside diameter (OD) of pipe and its thickness.

7.6 Butt welding ends shall conform to API specification 5L or ASME B 16.25 as applicable. In case of difference in thickness of matching ends, requirements of ASME B 31.4 shall apply.

7.7 Integrally reinforced forged branch fittings such as Sockolet, Weldolet etc. shall be as per MSS-SP-97. Fittings not covered in ASME B16.9 and MSS-SP-97 shall conform to manufacturer's standard.

7.8 Fittings thickness tolerances shall match pipe thickness tolerance.

8.0 BENDS

8.1 Unless otherwise specified for process piping, elbow of radius R = 1.5 D shall only be used.

8.2 In order to accommodate changes in vertical and horizontal alignment in piggable section of pipeline, Elastic bends/ Cold field bends/ Hot formed long radius bends shall be used.

D = Specified Outside Diameter

Long Radius Bend shall be used only when indicated in AFC drawing.

8.3 Miters shall not be used.

9.0 FLANGES

9.1 Pressure Temperature rating of flanges shall conform to B16.5/ MSS-SP44/ B16.47 Series A, as applicable.

9.2 Dimensions of flanges shall be in accordance with B16.5/ MSS-SP44/ B16.47 Series A, as applicable.

9.3 Neck of weld neck (WN) flanges shall suit pipe bore and thickness.

9.4 Bore of socket welded (SW) flanges shall suit pipe O.D. and its thickness.

9.5 Threads for screwed flanges, if used, shall conform to American Standard taper as per ASME B 1.20.1 NPT.

9.6 Sizes for blind flanges shall be indicated by nominal pipe size.

9.7 Unless specified otherwise in Piping Material Specification the flange face finish shall be as per ASME B16.5.

9.8 Butt welding ends of WN flanges shall conform to ASME B 16.25.

9.9 Spectacle blind/spacer & blinds shall be in accordance with ASME B 16.48/ manufacturer's standard.

10.0 GASKETS

10.1 Spiral wound metallic gasket with Graphite filled winding with SS304 inner ring and CS outer ring and shall conform to ASME B 16.20/ API 601.

10.2 Spiral wound gasket shall be self-aligning type.

11.0 BOLTING & THREADS

11.1 Nuts for stud bolts shall be American Standard Hexagon Heavy Series and double chamfered.

11.2 Dimension and tolerances for stud bolts and nuts shall be as per ASME B 18.2.1 and 18.2.2 with full threading to ASME B 1.1 Class 2A thread for bolts and Class 2B for nuts. Diameter and length of stud bolts shall be as per ASME B 16.5/ASME B16.47 with full threading.

11.3 Threads for nuts shall be as per ASME B 1.1 as follows,

Nuts for stud bolts dia ¼" to 1"	:	UNC-2B
Nuts for stud bolts dia 1⅛" to 3¼"	:	8UN-2B

11.4 Threads for stud bolts shall be as per ASME B 1.1, as follows:

Stud bolts dia ¼" to 1"	:	UNC-2A
Stud bolts dia 1⅛" to 3¼"	:	8UN-2A

11.5 Threads for threaded pipe, fitting, flanges and valve shall be in accordance with B 1.20.1 taper threads, unless specified otherwise.

11.6 Heads of jack screws shall be heavy hexagonal type. Jack screw end shall be rounded. Stud bolts shall be fully threaded with two hexagonal nuts.

12.0 THREAD SEALANT

12.1 Threaded joints shall be made with 1" wide PTFE jointing tape.

13.0 VALVES

13.1 Valve ends shall be as per valve data sheets for various piping class.

13.2 Sectionalizing valves, Block valves and other isolation valves installed on the main pipeline shall be ball valves with butt welding ends. All inline isolation valves on the mainline (pipeline) shall be full bore valves to allow smooth passage of cleaning as well as intelligent pigs.

13.3 All buried valves shall be provided with stem extension, sealant, vent/drain and shall have butt welded ends as per relevant specification/ data sheet.

13.4 Flange dimensions and face finish of flanged end valves shall conform to clause 9.0 of this specification.

13.5 Butt welding ends of Butt Welded valves shall conform to ASME B 16.25.

13.6 Face to face and end to end dimensions shall conform to applicable standards.

13.7 Valves shall conform to following standards unless specified otherwise in piping material specification for various piping class.

Flanged/Socket Welded end valves (1½" and below)

Design STD. for Process lines

Gate Valves	:	API 602
Globe Valves	:	BS EN ISO 15761
Check Valves	:	BS EN ISO 15761
Ball Valves	:	BS EN ISO 17292
Plug Valves	:	BS 5353

Flanged/Butt Welded end valves (2" and above)

Design STD. for Process Lines

Gate Valves	:	API 6D
Globe Valves	:	BS 1873
Check Valves	:	API 6D
Ball Valves	:	API 6D
Plug Valves	:	API 6D

13.8 All manual operated valves shall be provided with wrench / hand wheel or gear operator as specified here in below.

13.8.1 **Gate Valves**

For ANSI class 150 and 300 -Hand wheel operated for size ≤ 12" NB.
Gear operated for size ≥ 14" NB.

For ANSI class 600	-Hand wheel operated for size ≤ 10" NB. Gear operated for size ≥ 12" NB.

13.8.2 **Globe Valves**

For ANSI class 150, 300, 600 and 900	-Hand Wheel operated for all size

13.8.3 **Ball valves & Plug Valves**

For all ANSI class	-	Wrench operated for size ≤ 4" NB. Gear operated for size ≥ 6" NB.

13.8.4 **Actuated Valves**

Actuated valves shall be as per P & IDs. The actuator shall have provision for remote operation as per P & IDs. All Actuated valves shall have additional provision of hand wheel operation.

14.0 QUICK OPENING END CLOSURE

Quick opening end closure to be installed on scraper traps shall be designed in accordance with Section VIII of ASME Boiler and Pressure Vessel Code and equipped with safety locking devices in compliance with Section VIII, division 1, UG-35.2 of ASME Boiler and Pressure Vessel Code.

15.0 HYDROTESTING VENTS AND DRAINS

In terminal piping, high point vents and low point drains required for the purpose of hydro testing shall be of size 0.75". These vents & drains shall consist of gate valves with blind flange assembly.

16.0 PIPELINE SPECIATLITY ITEMS

Pipeline specialty items viz. scraper traps, flow tees, insulating joints, LR bends etc. shall be as per data sheets and specification.
For Mainline Items, corrosion allowance shall be as per data sheet

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17.0 INSULATING GASKET, SLEEVE AND WASHER

The insulating gasket shall consist of a PTFE (Teflon) spring-energized face seal, or an elastomeric O-ring, seated in an isolating laminate, which shall be permanently bonded to a high strength metal gasket core. Due to this unique pressure activated sealing mechanism, the gasket requires far less bolt stress to seal than any other gasket. The gasket inner diameter shall be exactly matched to the flange bore to eliminate turbulent flow and flange face erosion/ corrosion. The seal elements shall be replaceable in the reusable gasket retainer. The core of gasket shall be made of annealed 316 stainless steel or other metals including duplex and Inconel etc.

Insulating gasket shall include the following applications,

- Flange isolation in conjunction with cathodic protection.
- Isolation between dissimilar metals to prevent galvanic corrosion.
- Mating mismatched ring-joint to raised –face flanges.
- Eliminate fluid trap corrosion between ring-joint (RTJ) flanges where high concentrations of Co_2, H_2S and other aggressive hydrocarbon media are present.
- Eliminate turbulence and flow induced erosion between ring-joint (RTJ) flanges.
- Protect against coating impingement on coated flange faces.
- To seal between flanges subjected to vibration/ cavitation.

17.1 Insulating Gasket, sleeves and washers material properties :

Compressive strength	:	65000 PSI
Average Dielectric strength	:	15 KV
Electrical resistance	:	> 1 Mega Ohm (When tested with 500-1000 V DC megger)
Max. Operating temp.	:	302°F (150°C)
Min. Operating temp.	:	(minus) -200°F
Water absorption	:	5%
Flexural strength	:	70000 PSI
Tensile strength	:	50000 PSI
Bond strength	:	2600 lb
Shear strength	:	22000 lb.

17.2 Seal Material

The sealing elements shall intended to provide an impervious barrier through which no contained media or other substance can penetrate. The composite retainer backing material behind the seal remains uncontaminated and thus permanently holds the seal in place in a static, fully encapsulated manner.

Viton as a seal material shall consist following properties,

- General purpose oilfield elastomer.
- Excellent resistance to aliphatic hydrocarbons, glycols and H_2S.
- Good resistance to aromatic hydrocarbons.

Isolating Sleeve

Mylar as a seal material shall consist following properties,

- Spiral wound Mylar is a general purpose material recommended for bolting application with flange temperatures below 250°F.

- Material shall be fair resistance to crushing, cracking, breaking and thread pinch.

Isolating washer: 1/8” (0.125) Thick washer

Steel Washer: ZPS standard – Zinc plated steel washers.

Butt weld (BW) ends of the insulating assembly shall be protected by metallic or high impact plastic bevel protectors.

The dimensions of insulating components (gaskets, sleeves and washers) shall be as indicated in Data Sheet. The insulating gasket and washers shall have adequate compressive strength to permit proper tightening of flange bolts for leak proof joint.

The insulating material shall be suitable for pressure and temperature indicated in Data Sheet under connecting pipeline details and shall be resistant to the fluid to be handled through the pipeline.

I.D. and O.D. of insulating washers shall be designed to fit over insulating sleeves and within spot faces on flanges.

After the hydrostatic test, insulating flange assembly shall be tested with air at 5 kg/cm^2 for 10 minutes. The tightness shall be checked by immersion or with a frothing agent. No leakage shall be accepted.

Insulating gasket, sleeve and washer after the field hydrostatic test shall be tested for dielectric integrity at 5000 V A.C., 50 Hz for one minute and the leakage current before and after shall be equal. Testing time, voltage and leakage shall be recorded and certified. The test shall be carried out in dry conditions.

18.0 CHARPY V-NOTCH TEST

All piping material like valves, fittings, flanges bolting etc. shall be Charpy impact tested. Charpy V-notch impact tests are required for the base metal weld metal and heat-affected zone (HAZ)

PIPING MATERIAL SPECIFICATION INDEX

PIPE CLASS	**:**	**15HC**
RATING	:	150
BASE MATERIAL	:	Carbon Steel
CORROSION ALLOWANCE	:	1.5 MM
SPECIAL REQUIREMENT	:	Non IBR

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

Natural Gas, Utilities (water, inst. air, plant air, nitrogen, carbon dioxide)

NOTES

1. All vents and drains shall be provided with gate valve with blind flange assembly unless otherwise indicated in P&ID.
2. NDT of welds shall be as follows:
   Radiography : All butt welds 100%
   MPI : Socket welds 100%
3. Piping design as per ASME B 31.8, OISD 226 & PNGRB Guidelines
4. Charpy V notch test and hardness test shall be conducted for pipes, fittings and flanges at (-) 29°C.
5. All branch connections including vent, drain, pressure and temperature connection shall be as per branch connection table.
6. For valves, refer valve data sheets.

ITEM	SIZE	DESCRIPTION
Maintainence joints	ALL	Flanged, to be kept minimum
Pipe joints	1.5" & BELOW	SW coupling
	2.0" & ABOVE	Butt welded
Drains	ON LINES <= 1.5"	Refer std. SD-PI-019
	ON LINES >= 2.0"	As per P&ID or 0.75". Refer std. SD-PI-018
Vents	ON LINES <= 1.5"	Refer std. SD-PI-019
	ON LINES >= 2.0"	As per P&ID or 0.75". Refer std. SD-PI-018
Temp. Connection	1.5"	Flanged, installation as per std. SD-PI-014 & 015, except skin temperature measurement.
Press. Connection	0.75"	SW nipple with Plug/ Ball Valve to spec. as per Refer std. SD-PI-011, 012 & 013

BRANCH TABLE

BRANCH PIPE	0.05	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	24
24																T
20															T	T
18														T	T	T
16													T	T	T	T
14												T	T	T	T	T
12											T	T	T	T	T	T
10										T	T	T	T	T	T	T
8									T	T	T	T	T	T	T	W
6								T	T	T	T	T	T	W	W	W
4							T	T	T	W	W	W	W	W	W	W
3						T	T	T	W	W	W	W	W	W	W	W
2					T	T	T	W	W	W	W	W	W	W	W	W
1.5				T	T	T	T	S	S	S	S	S	S	S	S	S
1			T	T	T	S	S	S	S	S	S	S	S	S	S	S
0.75		T	T	T	T	S	S	S	S	S	S	S	S	S	S	S
0.50	T	T	T	T	S	S	S	S	S	S	S	S	S	S	S	S

RUN PIPE

CODE DESCRIPTION

T	TEES
W	WELDOLETS
S	SOCKOLETS

Item	Lower Size (Inch)	Upper Size (Inch)	Sch./ Thk.	Dmn. STD	Material (Charpy)	Description
Pipe Group						
PIPE	00.500	00.750	S160	B-36.10	ASTM A 106 GR.B	PE, SEAMLESS
PIPE	01.000	01.500	XS	B-36.10	ASTM A 106 GR.B	PE, SEAMLESS
PIPE	02.000	02.000	XS	B-36.10	ASTM A 106 GR.B (Charpy)	BE, SEAMLESS
PIPE	03.000	24.000	STD	B-36.10	ASTM A 106 GR.B (Charpy)	BE, SEAMLESS
NIPPLE	00.500	01.500	M	B-36.10	ASTM A 106 GR.B	PBE, SEAMLESS
Flange Group						
FLNG.SW	00.500	01.500	M	B-16.5	ASTM A 105	150, RF/125AARH
FLNG.WN	2.000	24.000	M	B-16.5	ASTM A 105 (Charpy)	150, RF/ 125AARH
FLNG.BLIND	00.500	01.500		B-16.5	ASTM A 105	150, RF/ 125AARH
FLNG.BLIND	00.500	24.000		B-16.5	ASTM A 105 (Charpy)	150, RF/ 125AARH
FLNG.FIG.8	00.500	08.000		ASME B16.48	ASTM A 105 (Charpy)	150, FF/ 125AARH
SPCR&BLND	10.000	24.000		ASME B16.48	ASTM A 105 (Charpy)	150, FF/ 125AARH
Fitting Group						
ELBOW.90	00.500	01.500		B-16.11	ASTM A 105	SW, 6000
ELBOW.90	02.000	26.000	M	B-16.9	ASTM A 234 GR.WPB (Charpy)	BW, 1.5D
ELBOW.45	00.500	01.500		B-16.11	ASTM A 105	SW, 6000
ELBOW.45	02.000	26.000	M	B-16.9	ASTM A 234 GR.WPB (Charpy)	BW, 1.5D
T.EQUAL	00.500	01.500		B-16.11	ASTM A 105	SW, 6000
T.EQUAL	02.000	26.000	M	B-16.9	ASTM A 234 GR.WPB (Charpy)	BW
T.RED	00.500	01.500		B-16.11	ASTM A 105	SW, 6000
T.RED	02.000	26.000	M, M	B-16.9	ASTM A 234 GR.WPB (Charpy)	BW
REDUC. CONC	02.000	26.000	M, M	B-16.9	ASTM A 234 GR.WPB (Charpy)	BW

Item	Lower Size (Inch)	Upper Size (Inch)	Sch./ Thk.	Dmn. STD	Material (Charpy)	Description
REDUC. ECC	02.000	26.000	M, M	B-16.9	ASTM A 234 GR.WPB (Charpy)	BW
SWAGE. CONC	00.500	03.000	M, M	BS-3799	ASTM A 105 (Charpy)	PBE
SWAGE.ECC	00.500	03.000	M, M	BS-3799	ASTM A 105 (Charpy)	PBE
CAP	00.500	00.750		B-16.11	ASTM A 105	SCRF, 6000
CAP	01.000	01.500		B-16.11	ASTM A 105	SCRF, 3000
CAP	02.000	18.000	M	B-16.9	ASTM A 234 GR.WPB (Charpy)	BW
PLUG	00.500	00.750		B-16.11	ASTM A 105	SCRM, 6000
O'let						
WELDOLET	02.000	06.000	M, S160	MSS-SP97	ASTM A 105 (Charpy)	BW
SOCKOLET	00.500	00.750		MSS-SP97	ASTM A 105	SCRF, 6000
SOCKOLET	01.000	01.500		MSS-SP97	ASTM A 105	SW, 3000
Valves						
VLV.GLOBE	00.250	01.500		BS EN 1SO 15761	BODY-ASTM A 105,TRIM-STELLITED,STEM-13%CR STEEL	SW, 800, 3000, B-16.11
VLV.GLOBE	02.000	18.000		BS-1873	BODY-ASTM A 216 GR.WCB,TRIM- 13% CR.STEEL	FLGD, 150, B-16.5, RF/125AARH
VLV.CHECK	00.250	01.500		BS EN 1SO 15761	BODY-ASTM A 105,TRIM- STELLITED	SW, 800, 3000, B-16.11
VLV.CHECK	02.000	26.000		API-6D	BODY-ASTM A 216 GR.WCB,TRIM- 13% CR.STEEL	FLGD, 150, B-16.5, RF/125AARH
VLV.BALL	00.500	01.500		BS EN 1SO 17292	BODY-ASTM A 105,TRIM-13% CR.STEEL, SEAT-RPTFE	SW, 150, B-16.5, RF/125AARH
VLV.BALL	02.000	30.000		API-6D	BODY-ASTM A216 GR.WCB,TRIM/BA LL SEAT-(AISI 4140 + 0.003"ENP)/AISI 410	FLGD, 150, B-16.5, RF/125AARH
VLV.BALL	02.000	18.000		API-6D	BODY-ASTM A 216 GR.WCB, TRIM- BALL, SEAT-(AISI 4140 + 0.003"ENP) / AISI 410	BW, 150, B-16.25

Item	Lower Size (Inch)	Upper Size (Inch)	Sch./ Thk.	Dmn. STD	Material (Charpy)	Description
VLV.PLUG	00.500	01.500		BS-5353	BODY-ASTM A 105,PLUG - A105 + 0.003" ENP	SW, 800, 3000, B-16.11,
Bolt Group						
BOLT.STUD	00.500	48.000		B-18.2	BOLT:A193 GR.B7, NUT:A194 GR.2H	
Gasket Group						
GASKET	00.500	24.000		B-16.20-ANSI B16.5	SP.WND METTALIC WITH GRAPHITEFILLER	SPIRAL, 150
GASKET	26.000	48.000		B-16.20-ANSI B16.47A	SP.WND METTALIC WITH GRAPHITEFILLER	SPIRAL, 150

PIPE CLASS	**:**	**15HLT**
RATING	:	150
BASE MATERIAL	:	Carbon Steel
CORROSION ALLOWANCE	:	1.5 MM
SPECIAL REQUIREMENT	:	Low Temperature Service

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

TEMP	-45	38	93
PRESS	18.63	18.63	17.57

SERVICE

Natural Gas, Utilities (water, inst. air, plant air, nitrogen, carbon dioxide)

NOTES

1. All vents and drains shall be provided with gate valve with blind flange assembly unless otherwise indicated in P&ID.
2. NDT of welds shall be as follows:
   Radiography : All butt welds 100%
   MPI : Socket welds 100%
3. Piping design as per ASME B 31.8 , OISD 226 & PNGRB Guidelines
4. Charpy V notch test and hardness test shall be conducted for pipes, fittings and flanges at (-) 45°C.
5. All branch connections including vent, drain, pressure and temperature connection shall be as per branch connection table.
6. For valves, refer valve data sheets.

ITEM	SIZE	DESCRIPTION
Maintenance joints	ALL	Flanged, to be kept minimum
Pipe joints	1.5" & BELOW	SW coupling
	2.0" & ABOVE	Butt welded
Drains	ON LINES <= 1.5"	Refer std. SD-PI-019
	ON LINES >= 2.0"	As per P&ID or 0.75". Refer std. SD-PI-018
Vents	ON LINES <= 1.5"	Refer std. SD-PI-019
	ON LINES >= 2.0"	As per P&ID or 0.75". Refer std. SD-PI-018
Temp. Connection	1.5"	Flanged, installation as per std. SD-PI-014 & 015, except skin temperature measurement.
Press. Connection	0.75"	SW nipple with Plug/ Ball Valve to spec. as per Refer std. SD-PI-011, 012 & 013

BRANCH TABLE

0.05	0.75	1	1.5	2	3	4	6	BRANCH PIPE
							T	6
						T	T	4
					T	T	T	3
				T	T	T	W	2
			T	T	T	T	S	1.5
		T	T	T	S	S	S	1
	T	T	T	T	S	S	S	0.75
T	T	T	T	S	S	S	S	0.50
RUN PIPE								

CODE DESCRIPTION

T	TEES
W	WELDOLETS
S	SOCKOLETS

Item	Lower Size (Inch)	Upper Size (Inch)	Sch./ Thk.	Dmn. STD	Material (Charpy)	Description
Pipe Group						
PIPE	00.500	00.750	S160	B-36.10	ASTM A 333 GR.6	PE, SEAMLESS
PIPE	01.000	01.500	XS	B-36.10	ASTM A 333 GR.6	PE, SEAMLESS
PIPE	02.000	02.000	XS	B-36.10	ASTM A 333 GR.6	BE, SEAMLESS
PIPE	03.000	06.000	STD	B-36.10	ASTM A 333 GR.6	BE, SEAMLESS
NIPPLE	00.500	01.500	M	B-36.10	ASTM A 333 GR.6	PBE, SEAMLESS
Flange Group						
FLNG.WN	00.500	06.00	M	B-16.5	ASTM A 350 GR.LF2	150, RF/125AARH
FLNG.BLIND	00.500	06.00		B-16.5	ASTM A 350 GR.LF2	150, RF/125AARH
FLNG.FIG.8	00.500	06.00		ASME B16.48	ASTM A 350 GR.LF2	150, FF/ 125AARH
Fitting Group						
ELBOW.90	00.500	00.75		B-16.11	ASTM A 350 GR.LF2	SW, 6000
ELBOW.90	01.000	01.500		B-16.11	ASTM A 350 GR.LF2	SW, 3000
ELBOW.90	02.000	6.000	M	B-16.9	ASTM A 420 GR.WPL6	BW, 1.5D
ELBOW.45	00.500	00.75		B-16.11	ASTM A 350 GR.LF2	SW, 6000
ELBOW.45	01.000	01.500		B-16.11	ASTM A 350 GR.LF2	SW, 3000
ELBOW.45	02.000	6.000	M	B-16.9	ASTM A 420 GR.WPL6	BW, 1.5D
T.EQUAL	00.500	00.75		B-16.11	ASTM A 350 GR.LF2	SW, 6000
T.EQUAL	01.000	01.500		B-16.11	ASTM A 350 GR.LF2	SW, 3000

Item	Lower Size (Inch)	Upper Size (Inch)	Sch./ Thk.	Dmn. STD	Material (Charpy)	Description
T.EQUAL	02.000	6.000	M	B-16.9	ASTM A 420 GR.WPL6	BW
T.RED	00.500	00.75		B-16.11	ASTM A 350 GR.LF2	SW, 6000
T.RED	01.000	01.500		B-16.11	ASTM A 350 GR.LF2	SW, 3000
T.RED	02.000	6.000	M, M	B-16.9	ASTM A 420 GR.WPL6	BW
REDUC. CONC	02.000	6.000	M, M	B-16.9	ASTM A 420 GR.WPL6	BW
REDUC. ECC	02.000	6.000	M, M	B-16.9	ASTM A 420 GR.WPL6	BW
SWAGE. CONC	00.500	03.000	M, M	BS-3799	ASTM A 350 GR.LF2	PBE
SWAGE.ECC	00.500	03.000	M, M	BS-3799	ASTM A 350 GR.LF2	PBE
CAP	00.500	01.500		B-16.11	ASTM A 350 GR.LF2	SCRF, 3000
CAP	02.000	6.000	M	B-16.9	ASTM A 420 GR.WPL6	BW
PLUG	00.500	01.500		B-16.11	ASTM A 350 GR.LF2	SCRM, 3000
COUPLING FULL	00.500	00.75		B-16.11	ASTM A 350 GR.LF2	SW, 6000
COUPLING FULL	01.000	01.500		B-16.11	ASTM A 350 GR.LF2	SW, 3000
COUPLING HALF	00.500	00.75		B-16.11	ASTM A 350 GR.LF2	SW, 6000
COUPLING HALF	01.000	01.500		B-16.11	ASTM A 350 GR.LF2	SW, 3000
O'let						
WELDOLET	02.000	06.000	M, XXS	MSS-SP97	ASTM A 350 GR.LF2	BW
SOCKOLET	00.500	00.750		MSS-SP97	ASTM A 350 GR.LF2	SW, 6000
SOCKOLET	01.000	01.500		MSS-SP97	ASTM A 350	SW, 3000

Item	Lower Size (Inch)	Upper Size (Inch)	Sch./ Thk.	Dmn. STD	Material (Charpy)	Description
					GR.LF2	
Valves						
VLV.GLOBE	00.50	01.500		BS EN 1SO 15761	BODY-ASTM A 350 GR.LF2,TRIMSTELLITED, STEMSS304	SW, 800, 3000, B-16.11
VLV.CHECK	00.50	01.500		BS EN 1SO 15761	BODY-ASTM A 350 GR.LF2,TRIMSTELLITED	SW, 800, 3000, B-16.11
VLV.BALL	00.500	01.500		BS EN 1SO 17292	BODY-ASTM A352 GR.LCB / ASTM A350 GR.LF2 CL.1,TRIM-BODY SEAT-RPTFE	SW, 800, 3000, B-16.11
VLV.BALL	02.000	6.000		API-6D	BODY-ASTM A352 GR.LCB / ASTM A350 GR.LF2 CL.1,TRIM-BODY SEAT-RPTFE	FLGD, 150, B-16.5, RF/125AARH
VLV.BALL	02.000	6.000		API-6D	BODY-ASTM A352 GR.LCB / ASTM A350 GR.LF2 CL.1,TRIM-BODY SEAT-RPTFE	BW, 150, B-16.25
Bolt Group						
BOLT.STUD	00.500	6.000		B-18.2	BOLT:A320 GR.L7, NUT:A194 GR.4	
Gasket Group						
GASKET	00.500	6.000		B-16.20-ANSI B16.5	SP.WND SS316+ GRAFOIL	SPIRAL, 150

PIPE CLASS	:	**30HC**
RATING	:	300
BASE MATERIAL	:	Carbon Steel
CORROSION ALLOWANCE	:	1.5 MM
SPECIAL REQUIREMENT	:	Non IBR

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

TEMP	-29	38	93	149	204	260	316	343
PRESS	52.02	52.02	47.45	46.05	44.64	42.18	38.66	37.61

SERVICE

Natural Gas, Utilities (water, inst. air, plant air, nitrogen, carbon dioxide)

NOTES

1. All vents and drains shall be provided with gate valve with blind flange assembly unless otherwise indicated in P&ID
2. NDT of welds shall be as follows:
   Radiography : All butt welds 100%
   MPI : Socket welds 100%
3. Piping design as per ASME B 31.8 , OISD 226 & PNGRB Guidelines
4. Charpy V notch test and hardness test shall be conducted for pipes, fittings and flanges at (-) 29°C.
5. Corrosion allowance of 1.5 mm has been considered for terminal piping.
6. All branch connections including vent, drain, pressure and temperature connection shall be as per branch connection table.
7. For valves, refer valve data sheets as enclosed.
8. Design factor 0.5.
9. Ball Valve to be used in main pipeline shall have butt welded ends.

ITEM	SIZE	DESCRIPTION
Maintenance Joints	all	Flanged, to be kept minimum
Pipe joints	1.5" & below	SW coupling
	2.0" & above	Butt welded
Drains	on lines <= 1.5"	Refer std. SD-PI-019
	on lines >= 2.0"	As per P&ID or 0.75". Refer std. SD-PI-018
Vents	on lines <= 1.5"	Refer std. SD-PI-019
	on lines >= 2.0"	As per P&ID or 0.75". Refer std. SD-PI-018
Temp. Connection	1.5"	Flanged, installation as per std. SD-PI-014 & 015, except skin temperature measurement.
Press. Connection	0.75"	SW nipple with Plug/ Ball Valve to spec. as per Refer std. SD-PI-011, 012 & 013

BRANCH TABLE

RUN PIPE	0.05	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	24	30	32	36	42	BRANCH PIPE
0.50	T	T	T	T	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	0.50
0.75		T	T	T	T	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	0.75
1			T	T	T	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	1
1.5				T	T	T	T	S	S	S	S	S	S	S	S	S	S	S	S	S	1.5
2					T	T	T	W	W	W	W	W	W	W	W	W	W	W	W	W	2
3						T	T	T	W	W	W	W	W	W	W	W	W	W	W	W	3
4							T	T	T	T	W	W	W	W	W	W	W	W	W	W	4
6								T	T	T	T	T	T	W	W	W	W	W	W	W	6
8									T	T	T	T	T	T	T	W	W	W	W	W	8
10										T	T	T	T	T	T	T	T	T	T	T	10
12											T	T	T	T	T	T	T	T	T	T	12
14												T	T	T	T	T	T	T	T	T	14
16													T	T	T	T	T	T	T	T	16
18														T	T	T	T	T	T	T	18
20															T	T	T	T	T	T	20
24																T	T	T	T	T	24
30																	T	T	T	T	30
32																		T	T	T	32
36																			T	T	36
42																				T	42

CODE DESCRIPTION

T	TEES
W	WELDOLETS
S	SOCKOLETS

Item	Lower Size (Inch)	Upper Size (Inch)	Sch./ Thk.	Dmn. STD	Material (Charpy)	Description
PIPE GROUP						
PIPE	00.500	00.750	S160	B-36.10	ASTM A 106 GR.B	PE, SEAMLESS
PIPE	01.000	01.500	XS	B-36.10	ASTM A 106 GR.B	PE, SEAMLESS
PIPE	02.000	02.000	XS	B-36.10	ASTM A 106 GR.B (CHARPY)	BE, SEAMLESS
PIPE	03.000	03.000	STD	B-36.10	ASTM A 106 GR.B (CHARPY)	BE, SEAMLESS
PIPE	04.000	06.000	XS	B-36.10	ASTM A 106 GR.B (CHARPY)	BE, SEAMLESS
PIPE	08.000	08.000	6.4	API 5L	API 5L GR.X 52/60 PSL 2, (CHARPY)	BE, SEAMLESS
PIPE	10.000	10.000	6.4	API 5L	API 5L GR.X 52/60 PSL 2, (CHARPY)	BE, SEAMLESS
PIPE	12.000	16.000	7.1	API 5L	API 5L GR.X 52/60 PSL 2, (CHARPY)	BE, SEAMLESS
PIPE	18.000	18.000	7.9 / 7.1	API 5L	API 5L GR.X 52/60 PSL 2, (CHARPY)	BE, SAW
PIPE	20.000	20.000	8.7 / 7.9	API 5L	API 5L GR.X 52/60 PSL 2, (CHARPY)	BE, SAW
PIPE	24.000	24.000	10.3 / 9.5	API 5L	API 5L GR.X 52/60 PSL 2, (CHARPY)	BE, SAW
NIPPLE	00.500	01.500	M	B-36.10	ASTM A 106 GR.B	PBE, SEAMLESS
FLANGE GROUP						
FLNG.SW	00.500	01.500	M	B-16.5	ASTM A 105	300, RF/125AARH
FLNG.WN	02.000	16.000	M	B-16.5	ASTM A 105 (CHARPY)	300, RF/125AARH
FLNG.WN	18.000	24.000	M	B-16.5	ASTM A 694 GR.F- 52/60 (CHARPY)	300, RF/125AARH
FLNG.WN	26.000	30.000	M	B-16.47-A	ASTM A 694 GR.F- 52/60 (CHARPY)	300, RF/125AARH
FLNG.BLIND	00.500	01.500		B-16.5	ASTM A 105	300, RF/125AARH
FLNG.BLIND	02.000	24.000		B-16.5	ASTM A 105 (CHARPY)	300, RF/125AARH
FLNG.BLIND	26.000	30.000		B-16.47-A	ASTM A 105 (CHARPY)	300, RF/125AARH
FLNG.FIG.8	00.500	01.500		ASME- B 16.48	ASTM A 105	300, FF/125AARH
FLNG.FIG.8	02.000	08.000		ASME- B 16.48	ASTM A 105 (CHARPY)	300, FF/125AARH

Item	Lower Size (Inch)	Upper Size (Inch)	Sch./ Thk.	Dmn. STD	Material (Charpy)	Description
SPCR&BLND	10.000	24.000		ASME- B 16.48	ASTM A 105 (CHARPY)	300, FF/125AARH
FITTING GROUP						
ELBOW.90	00.500	00.750		B-16.11	ASTM A 105	SW, 6000
ELBOW.90	01.000	01.500		B-16.11	ASTM A 105	SW, 3000
ELBOW.90	02.000	16.000	M	B-16.9	ASTM A 234 GR.WPB (CHARPY)	BW, 1.5D
ELBOW.90	18.000	30.000	M	MSS-SP75	MSS SP-75 GR.WPHY-52/60	BW, 1.5D
ELBOW.45	00.500	00.750		B-16.11	ASTM A 105	SW, 6000
ELBOW.45	01.000	01.500		B-16.11	ASTM A 105	SW, 3000
ELBOW.45	02.000	16.000	M	B-16.9	ASTM A 234 GR.WPB (CHARPY)	BW, 1.5D
ELBOW.45	18.000	30.000	M	MSS-SP75	MSS SP-75 GR.WPHY-52/60	BW, 1.5D
T.EQUAL	00.500	00.750		B-16.11	ASTM A 105	SW, 6000
T.EQUAL	01.000	01.500		B-16.11	ASTM A 105	SW, 3000
T.EQUAL	02.000	16.000	M	B-16.9	ASTM A 234 GR.WPB (CHARPY)	BW
T.EQUAL	18.000	30.000	M	MSS-SP75	MSS SP-75 GR.WPHY-52/60	BW
T.RED	00.500	00.750		B-16.11	ASTM A 105	SW, 6000
T.RED	01.000	01.500		B-16.11	ASTM A 105	SW, 3000
T.RED	02.000	16.000	M, M	B-16.9	ASTM A 234 GR.WPB (CHARPY)	BW
T.RED	18.000	30.000	M, M	MSS-SP75	MSS SP-75 GR.WPHY-52/60	BW
REDUC. CONC	02.000	16.000	M, M	B-16.9	ASTM A 234 GR.WPB (CHARPY)	BW
REDUC. CONC	18.000	30.000	M, M	MSS-SP75	MSS SP-75 GR.WPHY-52/60	BW
REDUC. ECC	02.000	16.000	M, M	B-16.9	ASTM A 234 GR.WPB (CHARPY)	BW
REDUC. ECC	18.000	30.000	M, M	MSS-SP75	MSS SP-75 GR.WPHY-52/60	BW
SWAGE. CONC	00.500	03.000	M, M	BS-3799	ASTM A 105 (CHARPY)	PBE

Item	Lower Size (Inch)	Upper Size (Inch)	Sch./ Thk.	Dmn. STD	Material (Charpy)	Description
SWAGE. ECC	00.500	03.000	M, M	BS-3799	ASTM A 105 (CHARPY)	PBE
CAP	00.500	00.750		B-16.11	ASTM A 105	SCRF, 6000
CAP	01.000	01.500		B-16.11	ASTM A 105	SCRF, 3000
CAP	02.000	16.000	M	B-16.9	ASTM A 234 GR.WPB (CHARPY)	BW
CAP	18.000	30.000	M	MSS-SP75	MSS SP-75 GR.WPHY-52/60	BW
PLUG	00.500	00.750		B-16.11	ASTM A 105	SCRM, 6000
PLUG	01.000	01.500		B-16.11	ASTM A 105	SCRM, 3000
CPLNG.FULL	00.500	00.750		B-16.11	ASTM A 105	SW, 6000
CPLNG.FULL	01.000	01.500		B-16.11	ASTM A 105	SW, 3000
CPLNG.HALF	00.500	00.750		B-16.11	ASTM A 105	SW, 6000
CPLNG.HALF	01.000	01.500		B-16.11	ASTM A 105	SW, 3000
CPLNG.LH	00.500	00.750		B-16.11	ASTM A 105	SW, 6000
CPLNG.LH	01.000	01.500		B-16.11	ASTM A 105	SW, 3000
CPLNG.RED	00.500	00.750		B-16.11	ASTM A 105	SW, 6000
CPLNG.RED	01.000	01.500		B-16.11	ASTM A 105	SW, 3000
O'let						
SOCKOLET	00.500	00.750		MSS-SP97	ASTM A 105	SW, 6000
SOCKOLET	01.000	01.500		MSS-SP97	ASTM A 105	SW, 3000
WELDOLET	02.000	08.000	M, XXS	MSS-SP97	ASTM A 105 (CHARPY)	BW
VALVE GROUP						
VLV.GATE	00.500	01.500		API-602	BODY-ASTM A 105,TRIM-STELLITED,STEM- 13% CR.STEEL	SW, 600, 3000, B-16.11
VLV.GLOBE	00.500	01.500		BS EN 1SO 15761	BODY-ASTM A 105,TRIM-STELLITED,STEM- 13% CR STEEL	SW, 600, 3000, B-16.11
VLV.GLOBE	02.000	12.000		BS 1873	BODY-ASTM A 216 GR.WCB, TRIM-13% CR.STEEL	FLGD, 300, B-16.5, RF/125AARH
VLV.CHECK	00.500	01.500		BS EN 1SO 15761	BODY-ASTM A 105, TRIM- STELLITED	SW, 600, 3000, B-16.11

Item	Lower Size (Inch)	Upper Size (Inch)	Sch./ Thk.	Dmn. STD	Material (Charpy)	Description
VLV.BALL	00.500	01.500		BS EN 1SO 17292	BODY-ASTM A 105, TRIM-BODY SEAT - RPTFE	SW, 600, B-16.5, RF/125AARH
VLV.BALL	02.000	24.000		API-6D	BODY-ASTM A 216 GR.WCC/A234 GR.WPC,TRIM:SEAT: AISI4140+0.003 "ENP/AISI410	FLGD, 300, B-16.5, RF/125AARH
VLV.BALL	26.000	30.000		API-6D	BODY-ASTM A 216 GR.WCC/A234 GR. WPC,TRIM: SEAT: AISI4140 + 0.003"ENP/ AISI 4140	FLGD, 300, B-16.47 A, RF/125AARH
VLV.BALL	02.000	30.000	M	API-6D	BODY-ASTM A 216 GR.WCC/A234 GR. WPC,TRIM: SEAT : AISI 4140+0.003"ENP/AISI 410	BW, 300, B-16.25
VLV.PLUG	00.500	01.500		BS-5353	BODY-ASTM A 105,PLUG-A105 +0.003" ENP	SW, 600, 3000, B-16.11
VLV.PLUG	02.000	24.000		API-6D	BODY- A 216GR. WCB,PLUG: A216 GR.WCB + 0.003" ENP	FLGD, 300, B-16.5, RF/125AARH
VLV.PLUG	02.000	02.000	M	API-6D	BODY-ASTM A 216 GR.WCB,PLUG: A216 GR.WCB + 0.003"ENP	BW, 300, B-16.25
BOLT GROUP						
BOLT.STUD	00.500	30.000		B-18.2	BOLT:A193 GR.B7, NUT:A194 GR.2H	
GASKET						
GASKET	00.500	24.000		B-16.20-ANSI B16.5	SP.WND METTALIC WITH GRAPHITEFILLER	SPIRAL, 300
GASKET	26.000	30.000		B-16.20-ANSI B16.47A	SP.WND METTALIC WITH GRAPHITEFILLER	SPIRAL, 300

PIPE CLASS	**:**	**30HLT**
RATING	:	300
BASE MATERIAL	:	Carbon Steel
CORROSION ALLOWANCE	:	1.5 MM
SPECIAL REQUIREMENT	:	Low Temperature Service

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

TEMP	-45	38	93	120	149	204
PRESS	48.86	48.86	46.05	45.54	44.99	43.59

SERVICE

Natural Gas, Utilities (water, inst. air, plant air, nitrogen, carbon dioxide)

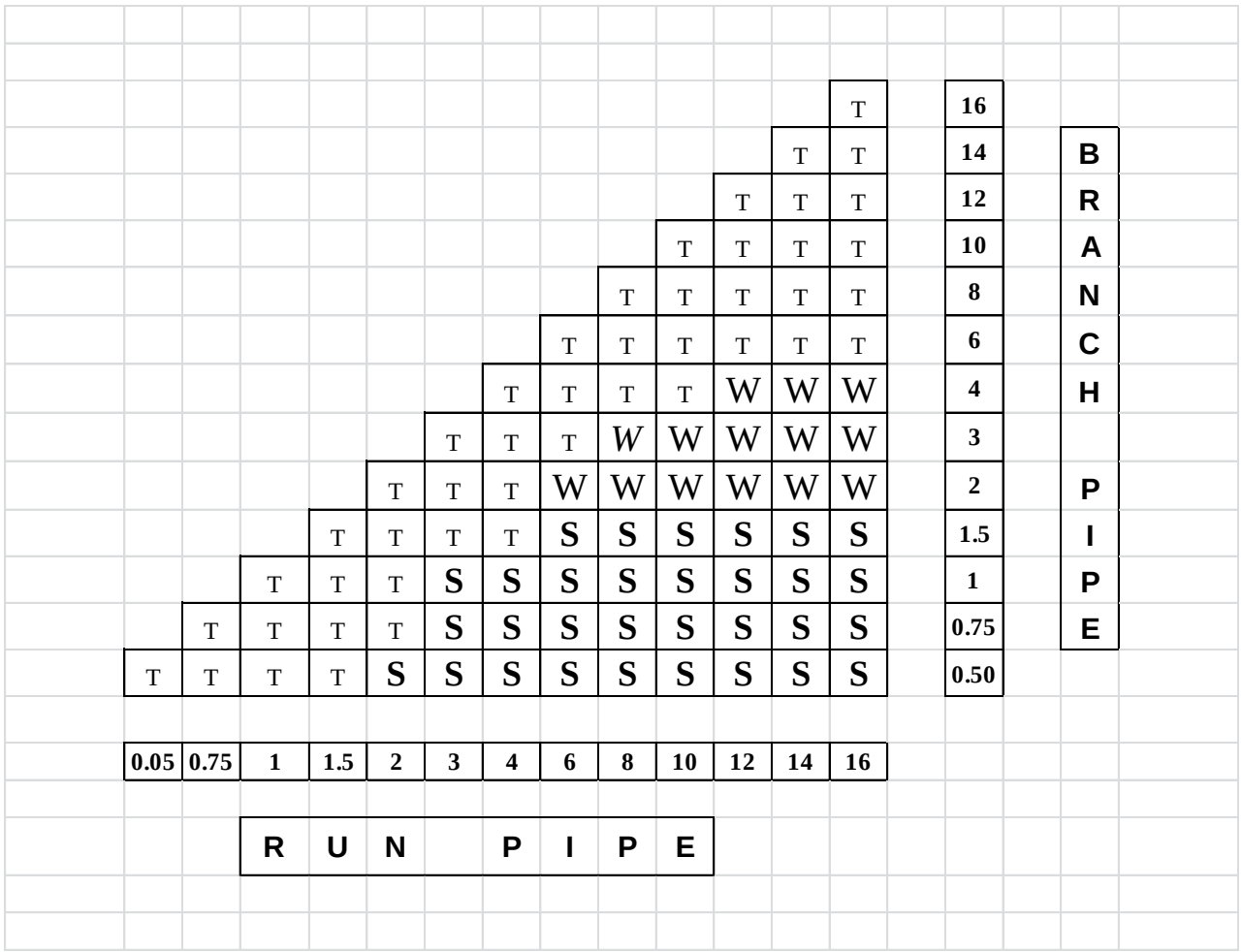
NOTES

a. All vents and drains shall be provided with gate valve with blind flange assembly unless otherwise indicated in P&ID.
b. Piping design as per ASME B 31.8 , OISD 226 & PNGRB Guidelines
c. Flanged end shall be as per ASME B 16.5 for valve upto 24" (excluding 22"), for 22" as per MSS-SP-44.
d. Impact testing is required at (-45) Deg C.
e. NDT of welds within terminal shall be as follows:

Radiography	:	All Butt welds 100%
MPI	:	Socket welds 100%

ITEM	SIZE	DESCRIPTION
Maintenance Joints	all	Flanged, to be kept minimum
Pipe joints	1.5" & below	SW coupling
	2.0" & above	Butt welded
Drains	on lines <= 1.5"	Refer std. SD-PI-019
	on lines >= 2.0"	As per P&ID or 0.75". Refer std. SD-PI-018
Vents	on lines <= 1.5"	Refer std. SD-PI-019
	on lines >= 2.0"	As per P&ID or 0.75". Refer std. SD-PI-018
Temp.conn	1.5"	Flanged, installation as per std. SD-PI-014 & 015, except skin temperature measurement.
Press.conn	0.75"	SW nipple with Plug/ Ball Valve to spec. as per Refer std. SD-PI-011, 012 & 013

BRANCH TABLE



CODE DESCRIPTION

T	TEES
W	WELDOLETS
S	SOCKOLETS

Item	Lower Size (Inch)	Upper Size (Inch)	Sch./ Thk.	Dmn. STD	Material (Charpy)	Description
PIPE GROUP						
PIPE	00.500	00.750	S160	B-36.10	ASTM A 333 GR.6	PE, SEAMLESS
PIPE	01.000	01.500	XS	B-36.10	ASTM A 333 GR.6	PE, SEAMLESS
PIPE	02.000	02.000	XS	B-36.10	ASTM A 333 GR.6	BE, SEAMLESS
PIPE	03.000	03.000	STD	B-36.10	ASTM A 333 GR.6	BE, SEAMLESS
PIPE	04.000	04.000	XS	B-36.10	ASTM A 333 GR.6	BE, SEAMLESS
PIPE	06.000	10.000	XS	B-36.10	ASTM A 333 GR.6	BE, SEAMLESS
NIPPLE	00.500	00.750	M	B-36.10	ASTM A 333 GR.6	PBE, SEAMLESS
NIPPLE	01.000	01.500	M	B-36.10	ASTM A 333 GR.6	PBE, SEAMLESS
FLANGE GROUP						
FLNG.SW	00.500	01.500	M	B-16.5	ASTM A 350 GR.LF2	300, RF/125AARH
FLNG.WN	02.000	10.000	M	B-16.5	ASTM A 350 GR.LF2	300, RF/125AARH
FLNG.BLIND	00.500	10.000		B-16.5	ASTM A 350 GR.LF2	300, RF/125AARH
FLNG.FIG.8	00.500	08.000		ASME- B 16.48	ASTM A 350 GR.LF2	300, FF/125AARH
SPCR&BLND	10.000	10.000		ASME-B16.48	ASTM A 350 GR.LF2	300, FF/125AARH
FITTINGS						
ELBOW.90	00.500	00.750		B-16.11	ASTM A 350 GR.LF2	SW, 6000
ELBOW.90	01.000	01.500		B-16.11	ASTM A 350 GR.LF2	SW, 3000
ELBOW.90	02.000	10.000	M	B-16.9	ASTM A 420 GR.WPL6	BW, 1.5D
ELBOW.45	00.500	00.750		B-16.11	ASTM A 350 GR.LF2	SW, 6000
ELBOW.45	01.000	01.500		B-16.11	ASTM A 350 GR.LF2	SW, 3000
ELBOW.45	02.000	10.000	M	B-16.9	ASTM A 420 GR.WPL6	BW, 1.5D
T.EQUAL	00.500	00.750		B-16.11	ASTM A 350 GR.LF2	SW, 6000
T.EQUAL	01.000	01.500		B-16.11	ASTM A 350 GR.LF2	SW, 3000
T.EQUAL	02.000	10.000	M	B-16.9	ASTM A 420 GR.WPL6	BW
VALVE GROUP						

VLV.GATE	00.500	01.500		API-602	BODY-ASTM A 350 GR.LF2,TRIM-STELLITED,STEM- SS 304	SW, 600, 3000, B-16.11
VLV.GLOBE	00.500	01.500		BS EN ISO 15761	BODY-ASTM A 350 GR.LF2,TRIM-STELLITED,STEM- SS304	SW, 600, 3000, B-16.11
VLV.CHECK	00.500	01.500		BS EN ISO 15761	BODY-ASTM A 350 GR.LF2,TRIM- STELLITED	SW, 600, 3000, B-16.11
VLV.PLUG	00.500	01.500		BS-5353	BODY-ASTM A 350 GR.LF2,PLUG: A350 GR.LF2 + 0.003" ENP	SW, 600, 3000, B-16.11
VLV.PLUG	02.000	10.000		API-6D	BODY-ASTM A 352 GR.LCB / A350 GR.LF2,STEM-SS 304/SS316	FLGD, 300, B-16.5, RF/125AARH
VLV.PLUG	02.000	10.000		API-6D	BODY-ASTM A 352 GR.LCB/ ASTM A350GR.LF2,TRIM- SS 304/ SS316	BW, 300, B-16.25
BOLT & GASKET						
BOLT.STUD	00.500	10.000		B-18.2	BOLT:A320 GR.L7, NUT:A194 GR.4	
GASKET	00.500	10.000		B-16.20-ANSI B16.5	SP.WND METTALIC WITH GRAPHITEFILLER	SPIRAL, 300

PIPE CLASS	:	**60HC**
RATING	:	600
BASE MATERIAL	:	Carbon Steel
CORROSION ALLOWANCE	:	1.5 MM
SPECIAL REQUIREMENT	:	Non IBR

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

TEMP	-29	38	93	149	204	260	316	343
PRESS	104.05	104.05	94.91	92.45	89.29	84.36	79.68	75.58

SERVICE

Natural Gas, Utilities (water, inst. air, plant air, nitrogen, carbon dioxide).

NOTES

1. All vents and drains for hydrotest shall be provided with gate valve with blind flange assembly unless otherwise indicated in P&ID
2. NDT of welds shall be as follows:
   Radiography : All butt welds 100%
   MPI : Socket welds 100%
3. Piping design as per ASME B 31.8 , OISD 226 & PNGRB Guidelines
4. Charpy V notch test and hardness test shall be conducted for pipes, fittings and flanges at (-) 29°C.
5. Corrosion allowance of 1.5 mm has been considered for terminal piping.
6. All branch connections including vent, drain, pressure and temperature connection shall be as per branch connection table.
7. For valves, refer valve data sheets as enclosed.
8. Design factor 0.5
9. Ball Valve to be used in main pipeline shall have butt welded ends.

ITEM	SIZE	DESCRIPTION
Maintenance Joints	all	Flanged, to be kept minimum
Pipe joints	1.5" & below	SW coupling
	2.0" & above	Butt welded
Drains	on lines <= 1.5"	Refer std. SD-PI-019
	on lines >= 2.0"	As per P&ID or 0.75". Refer std. SD-PI-018
Vents	on lines <= 1.5"	Refer std. SD-PI-019
	on lines >= 2.0"	As per P&ID or 0.75". . Refer std. SD-PI-018
Temp. Connection	1.5"	Flanged, installation as per std. SD-PI-014 & 015, except skin temperature measurement.
Press. Connection	0.75"	SW nipple with Plug/ Ball Valve to spec. as per Refer std. SD-PI-011, 012 & 013

BRANCH TABLE

BRANCH PIPE	0.05	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	24	30	32	36	42
42																				T
36																			T	T
32																		T	T	T
30																	T	T	T	T
24																T	T	T	T	T
20															T	T	T	T	T	T
18														T	T	T	T	T	T	T
16													T	T	T	T	T	T	T	T
14												T	T	T	T	T	T	T	T	T
12											T	T	T	T	T	T	T	T	T	T
10										T	T	T	T	T	T	T	T	T	T	T
8									T	T	T	T	T	T	T	W	W	W	W	W
6								T	T	T	T	T	T	W	W	W	W	W	W	W
4							T	T	T	T	W	W	W	W	W	W	W	W	W	W
3						T	T	T	W	W	W	W	W	W	W	W	W	W	W	W
2					T	T	T	W	W	W	W	W	W	W	W	W	W	W	W	W
1.5				T	T	T	T	S	S	S	S	S	S	S	S	S	S	S	S	S
1			T	T	T	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
0.75		T	T	T	T	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
0.50	T	T	T	T	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S

RUN PIPE

CODE DESCRIPTION

T	TEES
W	WELDOLETS
S	SOCKOLETS

Item	Lower Size (Inch)	Upper Size (Inch)	Sch./ Thk.	Dmn. STD	Material (Charpy)	Description
PIPE GROUP						
PIPE	00.500	00.750	S160	B-36.10	ASTM A 106 GR.B	PE, SEAMLESS
PIPE	01.000	01.500	XS	B-36.10	ASTM A 106 GR.B	PE, SEAMLESS
PIPE	02.000	02.000	XS	B-36.10	ASTM A 106 GR.B (CHARPY)	BE, SEAMLESS
PIPE	03.000	03.000	STD	B-36.10	ASTM A 106 GR.B (CHARPY)	BE, SEAMLESS
PIPE	04.000	06.000	XS	B-36.10	ASTM A 106 GR.B (CHARPY)	BE, SEAMLESS
PIPE	08.000	08.000	7.9/ 7.1	API 5L	API 5L GR.X- 52/60 PSL2, (CHARPY)	BE, SEAMLESS
PIPE	10.000	10.000	8.7/ 7.8	API 5L	API 5L GR.X- 52/60 PSL2, (CHARPY)	BE, SEAMLESS
PIPE	12.000	12.000	10.3/ 8.7	API 5L	API 5L GR.X- 52/60 PSL2, (CHARPY)	BE, SEAMLESS
PIPE	14.000	14.000	11.1/ 9.5	API 5L	API 5L GR.X- 52/60 PSL2, (CHARPY)	BE, SEAMLESS
PIPE	16.000	16.000	12.7/ 11.1	API 5L	API 5L GR.X- 52/60 PSL2, (CHARPY)	BE, SAW
PIPE	18.000	18.000	14.3/ 11.9	API 5L	API 5L GR.X- 52/60 PSL2, (CHARPY)	BE, SAW
PIPE	20.000	20.000	15.9/ 14.3	API 5L	API 5L GR.X- 52/60 PSL2, (CHARPY)	BE, SAW
PIPE	24.000	24.000	17.5/ 15.9	API 5L	API 5L GR.X- 52/60 PSL2, (CHARPY)	BE, SAW
NIPPLE	00.500	01.500	M	B-36.10	ASTM A 106 GR.B	PBE, SEAMLESS
FLANGE GROUP						
FLNG.SW	00.500	01.500	M	B-16.5	ASTM A 105	600, RF/125AARH
FLNG.WN	02.000	16.000	M	B-16.5	ASTM A 105 (CHARPY)	600, RF/125AARH
FLNG.WN	18.000	24.000	M	B-16.5	ASTM A 694 GR.F- 52/60 (CHARPY)	600, RF/125AARH
FLNG.WN	26.000	30.000	M	B-16.47-A	ASTM A 694 GR.F- 52/60 (CHARPY)	600, RF/125AARH
FLNG.BLIND	00.500	01.500		B-16.5	ASTM A 105	600, RF/125AARH
FLNG.BLIND	02.000	24.000		B-16.5	ASTM A 105 (CHARPY)	600, RF/125AARH
FLNG.BLIND	26.000	30.000		B-16.47-A	ASTM A 105 (CHARPY)	600, RF/125AARH
FLNG.FIG.8	00.500	01.500		ASME- B 16.48	ASTM A 105	600, FF/125AARH

Item	Lower Size (Inch)	Upper Size (Inch)	Sch./ Thk.	Dmn. STD	Material (Charpy)	Description
FLNG.FIG.8	02.000	08.000		ASME- B 16.48	ASTM A 105 (CHARPY)	600, FF/125AARH
SPCR&BLND	10.000	24.000		ASME- B 16.48	ASTM A 105 (CHARPY)	600, FF/125AARH
FITTING GROUP						
ELBOW.90	00.500	00.750		B-16.11	ASTM A 105	SW, 6000
ELBOW.90	01.000	01.500		B-16.11	ASTM A 105	SW, 3000
ELBOW.90	02.000	16.000	M	B-16.9	ASTM A 234 GR.WPB (CHARPY)	BW, 1.5D
ELBOW.90	18.000	30.000	M	MSS-SP75	MSS SP-75 GR.WPHY-52	BW, 1.5D
ELBOW.45	00.500	00.750		B-16.11	ASTM A 105	SW, 6000
ELBOW.45	01.000	01.500		B-16.11	ASTM A 105	SW, 3000
ELBOW.45	02.000	16.000	M	B-16.9	ASTM A 234 GR.WPB (CHARPY)	BW, 1.5D
ELBOW.45	18.000	30.000	M	MSS-SP75	MSS SP-75 GR.WPHY- 52	BW, 1.5D
T.EQUAL	00.500	00.750		B-16.11	ASTM A 105	SW, 6000
T.EQUAL	01.000	01.500		B-16.11	ASTM A 105	SW, 3000
T.EQUAL	02.000	16.000	M	B-16.9	ASTM A 234 GR.WPB (CHARPY)	BW
T.EQUAL	18.000	30.000	M	MSS-SP75	MSS SP-75 GR.WPHY-52	BW
T.RED	00.500	00.750		B-16.11	ASTM A 105	SW, 6000
T.RED	01.000	01.500		B-16.11	ASTM A 105	SW, 3000
T.RED	02.000	16.000	M, M	B-16.9	ASTM A 234 GR.WPB (CHARPY)	BW
T.RED	18.000	30.000	M, M	MSS-SP75	MSS SP-75 GR.WPHY-52	BW
REDUC. CONC	02.000	16.000	M, M	B-16.9	ASTM A 234 GR.WPB (CHARPY)	BW
REDUC. CONC	18.000	30.000	M, M	MSS-SP75	MSS SP-75 GR.WPHY-52	BW
REDUC. ECC	02.000	16.000	M, M	B-16.9	ASTM A 234 GR.WPB (CHARPY)	BW
REDUC. ECC	18.000	30.000	M, M	MSS-SP75	MSS SP-75 GR.WPHY-52	BW
SWAGE. CONC	00.500	03.000	M, M	BS-3799	ASTM A 105 (CHARPY)	PBE

Item	Lower Size (Inch)	Upper Size (Inch)	Sch./ Thk.	Dmn. STD	Material (Charpy)	Description
SWAGE. ECC	00.500	03.000	M, M	BS-3799	ASTM A 105 (CHARPY)	PBE
CAP	00.500	00.750		B-16.11	ASTM A 105	SCRF, 6000
CAP	01.000	01.500		B-16.11	ASTM A 105	SCRF, 3000
CAP	02.000	16.000	M	B-16.9	ASTM A 234 GR.WPB (CHARPY)	BW
CAP	18.000	30.000	M	MSS-SP75	MSS SP-75 GR.WPHY-52	BW
PLUG	00.500	00.750		B-16.11	ASTM A 105	SCRM, 6000
PLUG	01.000	01.500		B-16.11	ASTM A 105	SCRM, 3000
CPLNG.FULL	00.500	00.750		B-16.11	ASTM A 105	SW, 6000
CPLNG.FULL	01.000	01.500		B-16.11	ASTM A 105	SW, 3000
CPLNG.HALF	00.500	00.750		B-16.11	ASTM A 105	SW, 6000
CPLNG.HALF	01.000	01.500		B-16.11	ASTM A 105	SW, 3000
CPLNG.LH	00.500	00.750		B-16.11	ASTM A 105	SW, 6000
CPLNG.LH	01.000	01.500		B-16.11	ASTM A 105	SW, 3000
CPLNG.RED	00.500	00.750		B-16.11	ASTM A 105	SW, 6000
CPLNG.RED	01.000	01.500		B-16.11	ASTM A 105	SW, 3000
O'let						
SOCKOLET	00.500	00.750		MSS-SP97	ASTM A 105	SW, 6000
SOCKOLET	01.000	01.500		MSS-SP97	ASTM A 105	SW, 3000
WELDOLET	02.000	08.000	M, XXS	MSS-SP97	ASTM A 105 (CHARPY)	BW
VALVE GROUP						
VLV.GATE	00.500	01.500		API-602	BODY-ASTM A 105,TRIM-STELLITED,STEM- 13% CR.STEEL	SW, 800, 3000, B-16.11
VLV.GLOBE	00.500	01.500		BS EN 1SO 15761	BODY-ASTM A 105,TRIM-STELLITED,STEM- 13% CR STEEL	SW, 800, 3000, B-16.11
VLV.GLOBE	02.000	12.000		BS 1873	BODY-ASTM A 216 GR.WCB, TRIM- 13% CR.STEEL	FLGD, 600, B-16.5, RF/125AARH
VLV.CHECK	00.500	01.500		BS EN 1SO 15761	BODY-ASTM A 105, TRIM- STELLITED	SW, 800, 3000, B-16.11

Item	Lower Size (Inch)	Upper Size (Inch)	Sch./ Thk.	Dmn. STD	Material (Charpy)	Description
VLV.BALL	00.500	01.500		BS EN 1SO 17292	BODY-ASTM A 105, TRIM-BODY SEAT - RPTFE	SW, 600, B-16.5, RF/125AARH
VLV.BALL	02.000	24.000		API-6D	BODY-ASTM A 216 GR.WCC/A234 GR.WPC,TRIM:SEAT: AISI4140+0.003 "ENP/AISI410	FLGD, 600, B-16.5, RF/125AARH
VLV.BALL	26.000	30.000		API-6D	BODY-ASTM A 216 GR.WCC/A234 GR. WPC,TRIM: SEAT: AISI4140 + 0.003"ENP/ AISI 410	FLGD, 600, B-16.47 A, RF/125AARH
VLV.BALL	02.000	30.000	M	API-6D	BODY-ASTM A 216 GR.WCC/A234 GR. WPC,TRIM: SEAT : AISI 4140+0.003"ENP/AISI 410	BW, 600, B-16.25
VLV.PLUG	00.500	01.500		BS-5353	BODY-ASTM A 105,PLUG-A105 +0.003" ENP	SW, 800, 3000, B-16.11
VLV.PLUG	02.000	24.000		API-6D	BODY- A 216GR. WCB,PLUG: A216 GR.WCB + 0.003" ENP	FLGD, 600, B-16.5, RF/125AARH
VLV.PLUG	02.000	02.000	M	API-6D	BODY-ASTM A 216 GR.WCB,PLUG: A216 GR.WCB + 0.003"ENP	BW, 600, B-16.25
BOLT GROUP						
BOLT.STUD	00.500	30.000		B-18.2	BOLT:A193 GR.B7, NUT:A194 GR.2H	
GASKET						
GASKET	00.500	24.000		B-16.20-ANSI B16.5	SP.WND METTALIC WITH GRAPHITEFILLER	SPIRAL, 600
GASKET	26.000	30.000		B-16.20-ANSI B16.47A	SP.WND METTALIC WITH GRAPHITEFILLER	SPIRAL, 600

PIPE CLASS	:	**60HLT**
RATING	:	600
BASE MATERIAL	:	Carbon Steel
CORROSION ALLOWANCE	:	1.5 MM
SPECIAL REQUIREMENT	:	Low Temperature Services

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

TEMP	-45	38	93	120
PRESS	98.07	98.07	92.79	91.27

SERVICE

Natural Gas, Utilities (water, inst. air, plant air, nitrogen, carbon dioxide)

NOTES

1. All vents and drains for hydro test shall be provided with gate valve with blind flange assembly unless otherwise indicated in P&ID
2. NDT of welds shall be as follows:
   Radiography : All butt welds 100%
   MPI : Socket welds 100%
3. Piping design as per ASME B 31.8 , OISD 226 & PNGRB Guidelines
4. Charpy V notch test and hardness test shall be conducted for pipes, fittings and flanges at (-) 45°C.
5. Corrosion allowance of 1.5 mm has been considered for terminal piping.
6. All branch connections including vent, drain, pressure and temperature connection shall be as per branch connection table.
7. For valves, refer valve data sheets as enclosed.
8. Design factor 0.5
9. Ball Valve to be used in main pipeline shall have butt welded ends.

ITEM	SIZE	DESCRIPTION
Maintenance Joints	all	Flanged, to be kept minimum
Pipe joints	1.5" & below	SW coupling
	2.0" & above	Butt welded
Drains	on lines <= 1.5"	Refer std. SD-PI-019
	on lines >= 2.0"	As per P&ID or 0.75". Refer std. SD-PI-018
Vents	on lines <= 1.5"	Refer std. SD-PI-019
	on lines >= 2.0"	As per P&ID or 0.75". . Refer std. SD-PI-018
Temp. Connection	1.5"	Flanged, installation as per std. SD-PI-014 & 015, except skin temperature measurement.
Press. Connection	0.75"	SW nipple with Plug/ Ball Valve to spec. as per Refer std. SD-PI-011, 012 & 013

BRANCH TABLE

							T	6
						T	T	4
					T	T	T	3
				T	T	T	W	2
			T	T	T	T	S	1.5
		T	T	T	S	S	S	1
	T	T	T	T	S	S	S	0.75
T	T	T	T	S	S	S	S	0.50
0.05	0.75	1	1.5	2	3	4	6	

BRANCH PIPE

RUN PIPE

CODE DESCRIPTION

T	TEES
W	WELDOLETS
S	SOCKOLETS

Item	Lower Size (Inch)	Upper Size (Inch)	Sch./ Thk.	Dmn. STD	Material (Charpy)	Description
PIPE GROUP						
PIPE	00.500	00.750	S160	B-36.10	ASTM A 333 GR.6	PE, SEAMLESS
PIPE	01.000	01.500	XS	B-36.10	ASTM A 333 GR.6	PE, SEAMLESS
PIPE	02.000	06.000	XS	B-36.10	ASTM A 333 GR.6	BE, SEAMLESS
NIPPLE	00.500	01.500	M	B-36.10	ASTM A 333 GR.6	PBE, SEAMLESS
FLANGE GROUP						
FLNG.SW	00.500	01.500	M	B-16.5	ASTM A 350 GR.LF2	600, RF/125AARH
FLNG.WN	02.000	06.000	M	B-16.5	ASTM A 350 GR.LF2	600, RF/125AARH
FLNG.BLIND	00.500	06.000		B-16.5	ASTM A 350 GR.LF2	600, RF/125AARH
FLNG.FIG.8	00.500	06.000		ASME- B 16.48	ASTM A 350 GR.LF2	600, FF/125AARH
FITTING GROUP						
ELBOW.90	00.500	00.75		B-16.11	ASTM A 350 GR.LF2	SW, 6000
ELBOW.90	01.000	01.500		B-16.11	ASTM A 350 GR.LF2	SW, 3000
ELBOW.90	02.000	6.000	M	B-16.9	ASTM A 420 GR.WPL6	BW, 1.5D
ELBOW.45	00.500	00.75		B-16.11	ASTM A 350 GR.LF2	SW, 6000
ELBOW.45	01.000	01.500		B-16.11	ASTM A 350 GR.LF2	SW, 3000
ELBOW.45	02.000	6.000	M	B-16.9	ASTM A 420 GR.WPL6	BW, 1.5D
T.EQUAL	00.500	00.75		B-16.11	ASTM A 350 GR.LF2	SW, 6000
T.EQUAL	01.000	01.500		B-16.11	ASTM A 350 GR.LF2	SW, 3000
T.EQUAL	02.000	6.000	M	B-16.9	ASTM A 420 GR.WPL6	BW
T.RED	00.500	00.75		B-16.11	ASTM A 350 GR.LF2	SW, 6000
T.RED	01.000	01.500		B-16.11	ASTM A 350 GR.LF2	SW, 3000

Item	Lower Size (Inch)	Upper Size (Inch)	Sch./ Thk.	Dmn. STD	Material (Charpy)	Description
T.RED	02.000	6.000	M, M	B-16.9	ASTM A 420 GR.WPL6	BW
REDUC. CONC	02.000	6.000	M, M	B-16.9	ASTM A 420 GR.WPL6	BW
REDUC. ECC	02.000	6.000	M, M	B-16.9	ASTM A 420 GR.WPL6	BW
SWAGE. CONC	00.500	03.000	M, M	BS-3799	ASTM A 350 GR.LF2	PBE
SWAGE.ECC	00.500	03.000	M, M	BS-3799	ASTM A 350 GR.LF2	PBE
CAP	00.500	01.500		B-16.11	ASTM A 350 GR.LF2	SCRF, 3000
CAP	02.000	6.000	M	B-16.9	ASTM A 420 GR.WPL6	BW
PLUG	00.500	01.500		B-16.11	ASTM A 350 GR.LF2	SCRM, 3000
COUPLING FULL	00.500	00.75		B-16.11	ASTM A 350 GR.LF2	SW, 6000
COUPLING FULL	01.000	01.500		B-16.11	ASTM A 350 GR.LF2	SW, 3000
COUPLING FULL	00.500	01.500		B-16.11	ASTM A 350 GR.LF2	SCRF, 3000
COUPLING HALF	00.500	00.75		B-16.11	ASTM A 350 GR.LF2	SW, 6000
COUPLING HALF	01.000	01.500		B-16.11	ASTM A 350 GR.LF2	SW, 3000
COUPLING HALF	00.500	01.500		B-16.11	ASTM A 350 GR.LF2	SCRF, 3000
O'let						
WELDOLET	02.000	04.000	M, XXS	MSS-SP97	ASTM A 350 GR.LF2	BW
SOCKOLET	00.500	00.750		MSS-SP97	ASTM A 350 GR.LF2	SW, 6000
SOCKOLET	01.000	01.500		MSS-SP97	ASTM A 350 GR.LF2	SW, 3000

Item	Lower Size (Inch)	Upper Size (Inch)	Sch./ Thk.	Dmn. STD	Material (Charpy)	Description
VALVE GROUP						
VLV.GATE	00.50	01.500		API 602	BODY-ASTM A 350 GR.LF2,TRIMSTELLITED, STEM-SS 304	SW, 800, 3000, B-16.11
VLV.GLOBE	00.50	01.500		BS EN 1SO 15761	BODY-ASTM A 350 GR.LF2,TRIMSTELLITED, STEM-SS304	SW, 800, 3000, B-16.11
VLV.CHECK	00.50	01.500		BS EN 1SO 15761	BODY-ASTM A 350 GR.LF2,TRIM-STELLITED	SW, 800, 3000, B-16.11
VLV.BALL	00.500	01.500		BS EN 1SO 17292	BODY-ASTM A352 GR.LCB / ASTM A350 GR.LF2 CL.1,TRIM-BODY SEAT-RPTFE	SW, 800, 3000, B-16.11
VLV.BALL	02.000	6.000		API-6D	BODY-ASTM A 352 GR.LCB / A 350GR.LF2,TRIM: SEAT: SS 304, SS316	FLGD, 600, B-16.5, RF/125AARH
VLV.BALL	02.000	6.000		API-6D	BODY-ASTM A 352 GR.LCB / A 350GR.LF2,TRIM: SEAT: SS 304, SS316	BW, 600, B-16.25
VLV.PLUG	00.500	01.500		BS-5353	BODY-ASTM A 350 GR.LF2,PLUG: A350 GR.LF2 + 0.003" ENP	SW, 800, 3000, B-16.11
VLV.PLUG	02.000	06.000		API-6D	BODY-ASTM A 352 GR.LCB / A350 GR.LF2,STEM-SS 304/SS316	FLGD, 600, B-16.5, RF/125AARH
VLV.PLUG	02.000	06.000	M	API-6D	BODY-ASTM A 352 GR.LCB / A350 GR.LF2,STEM-SS 304/SS316	BW, 600, B-16.25

Item	Lower Size (Inch)	Upper Size (Inch)	Sch./ Thk.	Dmn. STD	Material (Charpy)	Description
BOLT GROUP						
BOLT.STUD	00.500	06.000		B-18.2	BOLT:A320 GR.L7, NUT:A194 GR.4	
GASKET						
GASKET	00.500	6.000		B-16.20-ANSI B16.5	SP.WND SS316+ GRAFOIL	SPIRAL, 600

PIPE CLASS	**15FW**
RATING	150
BASE MATERIAL	CARBON STEEL
CORROSION ALLOWANCE	1.5 MM
SPECIAL REQUIREMENT	NON IBR

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

TEMP	0	38	50	65
PRESS	18.9	18.9	18.9	18.9

SERVICE: FIRE WATER (ABOVE GROUND / UNDER GROUND)

NOTES

1.0 All vents and drains shall be provided with gate valve with blind flange assembly unless otherwise indicated in P&ID.
2.0 Forgings are acceptable in Lieu of Plate material.
3.0 Sizes given in PMS are nominal bore for O.D. of IS 3589 pipes refer ANSI B36.10.
4.0 Butterfly Valves shall be lugged wafer type up to 24" and double flanged body for sizes beyond 24".
5.0 Pipe thicknesses are job specific based on the soil properties of job site and depth of top of pipe of 1.5m. No live load has been considered for calculation of pipe thickness. Live loads wherever expected shall be suitably taken care of.
6.0 NDT of welds shall be as follows:
Radiography : All Butt welds 10%
MPI : Socket welds 10%

SPECIAL NOTES

ITEM	SIZE	DESCRIPTION	A.CODE
MAINTENANCE JOINTS	ALL	FLANGED, TO BE KEPT MINIMUM	
PIPE JOINTS	1.5" & BELOW	SW COUPLING	
	2.0" & ABOVE	BUTT WELDED	
DRAINS	ON LINES <= 1.5"	Refer std. SD-PI-019	
	ON LINES >= 2.0"	As per P&ID or 0.75". Refer std. SD-PI-018	
VENTS	ON LINES <= 1.5"	Refer std. SD-PI-019	
	ON LINES >= 2.0"	As per P&ID or 0.75". Refer std. SD-PI-018	
TEMP.CONN	1.5"	Flanged, installation as per std. SD-PI-014 & 015, except skin temperature measurement.	
PRESS.CONN	0.75"	SW nipple with Plug/ Ball Valve to spec. as per Refer std.SD-PI-011, 012 & 013	

CODE DESCRIPTION

F	SADDLE FUSED JT	T	TEES
H	H. COUPLING	W	WELDOLETS
P	PIPE TO PIPE	I	INSTRUMENT TEE
R	REINFORCED	X	Refer Notes
S	SOCKOLETS	L	SWEEPOLET

BRANCH TABLE

											T	14
										T	R	12
									T	R	R	10
								T	R	R	R	8
							T	P	R	R	R	6
						T	R	P	R	R	R	4
					T	P	R	P	R	R	R	3
				T	P	P	R	P	R	R	R	2
			T	T	H	H	H	H	H	H	H	1.5
		T	T	H	H	H	H	H	H	H	H	1
	T	T	T	H	H	H	H	H	H	H	H	0.75
T	T	T	T	H	H	H	H	H	H	H	H	0.50
0.05	**0.75**	**1**	**1.5**	**2**	**3**	**4**	**6**	**8**	**10**	**12**	**14**	

RUN PIPE

BRANCH PIPE

Item Type	Lower Size (Inch)	Upper Size (Inch)	Sch/ Thk	Dmn. STD	Material	Description
Pipe Group						
PIPE	00.500	01.500	HVY	IS-1239-I	IS-1239 (BLACK)	PE, C.WELDED
PIPE	02.000	06.000	HVY	IS-1239-I	IS-1239 (BLACK)	BE, C.WELDED
PIPE	08.000	12.000	6.0	IS-3589	IS-3589 GR.410	BE, WELDED
PIPE	14.000	14.000	8.0	IS-3589	IS-3589 GR.410	BE, WELDED
NIPPLE	00.500	01.500	HVY	VCS 'STD	IS-1239 (BLACK)	PBE, C.WELDED
Flange Group						
FLNG.SW	00.500	01.500	M	B-16.5	ASTM A 105	150, RF/125AARH
FLNG.SO	02.000	14.000		B-16.5	ASTM A 105	150, RF/125AARH
FLNG.BLIND	00.500	14.000		B-16.5	ASTM A 105	150, RF/125AARH
FLNG.FIG.8	00.500	08.000		ASME- B16.48	ASTM A 105	150, FF/125AARH
SPCR&BLND	10.000	14.000		ASME- B16.48	ASTM A 105	150, FF/125AARH
Fitting Group						
ELBOW.90	00.500	01.500		B-16.11	ASTM A 105	SW, 3000
ELBOW.90	02.000	06.000	STD	B-16.9	ASTM A 234 GR.WPB	BW, 1.5D
ELBOW.90	08.000	14.000	M	B-16.9	ASTM A 234 GR.WPB-W	BW, 1.5D
ELBOW.45	00.500	01.500		B-16.11	ASTM A 105	SW, 3000
ELBOW.45	02.000	06.000	STD	B-16.9	ASTM A 234 GR.WPB	BW, 1.5D
ELBOW.45	08.000	14.000	M	B-16.9	ASTM A 234 GR.WPB-W	BW, 1.5D
T.EQUAL	00.500	01.500		B-16.11	ASTM A 105	SW, 3000
T.EQUAL	02.000	06.000	STD	B-16.9	ASTM A 234 GR.WPB	BW
T.EQUAL	08.000	14.000	M	B-16.9	ASTM A 234 GR.WPB-W	BW
T.RED	00.500	01.500		B-16.11	ASTM A 105	SW, 3000
T.RED	02.000	06.000	STD, STD	B-16.9	ASTM A 234 GR.WPB	BW
T.RED	08.000	14.000	M, M	B-16.9	ASTM A 234 GR.WPB-W	BW

Item Type	Lower Size (Inch)	Upper Size (Inch)	Sch/ Thk	Dmn. STD	Material	Description
Fitting Group						
REDUC.CONC	02.000	06.000	STD, STD	B-16.9	ASTM A 234 GR.WPB	BW
REDUC.CONC	08.000	14.000	M, M	B-16.9	ASTM A 234 GR.WPB-W	BW
REDUC.ECC	02.000	06.000	STD, STD	B-16.9	ASTM A 234GR.WPB	BW
REDUC.ECC	08.000	14.000	M, M	B-16.9	ASTM A 234 GR.WPB-W	BW
SWAGE.CONC	00.500	03.000	M, M	BS-3799	ASTM A 105	PBE
SWAGE.ECC	00.500	03.000	M, M	BS-3799	ASTM A 105	PBE
CAP	00.500	01.500		B-16.11	ASTM A 105	SCRF, 3000
CAP	02.000	06.000	STD	B-16.9	ASTM A 234 GR.WPB	BW
CAP	08.000	14.000	M	B-16.9	ASTM A 234 GR.WPB	BW
CPLNG.FULL	00.500	01.500		B-16.11	ASTM A 105	SW, 3000
CPLNG.HALF	00.500	01.500		B-16.11	ASTM A 105	SW, 3000
CPLNG.LH	00.500	01.500		B-16.11	ASTM A 105	SW, 3000
CPLNG.RED	00.500	01.500		B-16.11	ASTM A 105	SW, 3000
SOCKOLET	00.500	01.500		MSS-SP97	ASTM A 105	SW, 3000
UNION	00.500	01.500		BS-3799	ASTM A 105	SW, 3000
Valves Group						
VLV.GATE	00.500	01.500		API-602	BODY-ASTM A 105,TRIM-STELLITED,STEM-13%CR.STEEL	SW, 800, 3000, B-16.11.
VLV.GATE	02.000	24.000		API-600	BODY-ASTM A 216 GR.WCB,TRIM-13% CR.STEEL	FLGD, 150, B-16.5, RF/125AARH.
VLV.GLOBE	00.500	01.500		BS-5352	BODY-ASTM A 105,TRIM-STELLITED,STEM-	SW, 800, 3000, B-16.11.
VLV.GLOBE	02.000	16.000		BS-1873	BODY-ASTM A 216 GR.WCB,TRIM-13% CR.STEEL	FLGD, 150, B-16.5, RF/125AARH.
VLV.CHECK	00.500	01.500		BS-5352	BODY-ASTM A 105,TRIM- STELLITED	SW, 800, 3000, B-16.11.
VLV.CHECK	02.000	24.000		BS 1868	BODY-ASTM A 216 GR.WCB,TRIM-13% CR.STEEL	FLGD, 150, B-16.5, RF/125AARH.

Item Type	Lower Size (Inch)	Upper Size (Inch)	Sch/ Thk	Dmn. STD	Material	Description
Valves Group						
VLV.BTRFLY	03.000	24.000		BS-5155	BODY-ASTM A 216 GR.WCB,TRIM-13% CR.STEEL	WAFL, 150, B-16.5, WAF/125AARH.
Bolt Group						
BOLT.STUD	00.500	14.000		B-18.2	BOLT:A193 GR.B7, NUT:A194 GR.2H	
Gasket Group						
GASKET	00.500	14.000		B-16.21-ANSI B16.5	IS-2712-GR.W/3	RING, 150, 2 MM
Trap/Strainer Group						
STRNR.PERM	00.500	01.500		MNF'STD	B:A105;INT:SS304	SW, Y-TYPE, 800
STRNR.PERM	02.000	06.000	M	VCS'STD	B:A234GR.WPB;INT:SS304	BW, T-TYPE
STRNR.PERM	08.000	14.000	M	VCS'STD	B:A234GR.WPBW;INT:SS304	BW, T-TYPE