



**PIPING MATERIAL  
SPECIFICATIONS**

**REV. 01**

**TRANSNET PIPELINES**

**AUGUST 2013**

## **MATERIAL STANDARDS AND SPECIFICATIONS GUIDELINE**

### **PIPING**

- ASTM A106 Grade B for manifolds - avoid using outside a depot boundary  
 - avoid using underground other than internal link lines eg. between tanks and manifolds in same depot.  
 - Seamless, dimensions to ASME B36.10M – Welded and Seamless Wrought Steel Pipe.
- API 5L X42 for feederlines - To requirements of Petronet Specification PL 401 latest except for grade.  
 - Minimum wall thickness as per Policy Document.  
 < 4mm for NPS 0 to 6" diameter  
 < 4,8 mm NPS 8" to 10" diameter  
 < 5,6 mm for NPS 12" to 16" diameter
- API 5L X52 for mainline - Petronet specification PL 401 /latest.

### **FLANGES (WELD NECK)**

- Material : ASTM A105  
 Dimensional : ASME B16.5 – Pipe Flanges and Flanged Fitting.  
 Other : Weld neck and Raised face with concentric serrated grooves to ASME B16.5. Slip on flanges may only be used by special concession from Technical Manager.

### **STEEL BUTT WELD FITTINGS**

- Material : ASTM A234 WPB  
 Dimensional : ASME B16.9 – Factory-Made Wrought Steel Buttwelding Fittings.

### **WELDING**

- API 1104 or Section IX of the ASME Boiler and Pressure Vessel Code – Welding Procedures & Welder Qualifications.  
 Petronet Specification PL804 /latest – mainly for pipeline welding.

### **STUDS & NUTS**

- Material : Studs : ASTM A 193 Grade B7  
 Nuts : ASTM A194 Grade 2H
- Dimensional : Sizing to ASME B16.5 – Pipe Flanges and Flanged Fittings  
 Heavy Hex Nuts  
 Threads to UNC to 1" and UN8 above 1".  
 Studs shall be of sufficient length to protrude no less than 1½ threads and no more than 3 threads through the nuts.

**GASKET MATERIAL**

For 150#, 300# and 600#, but NOT for insulating gasket purposes

Spiral wound gaskets as per Transnet Pipelines specification : GASKET SPECIFICATION - SPIRAL WOUND.

For 150#, but NOT for insulating gasket purposes

1,5mm sheeting

- KLINGERtop-graph-2000
- Novus 49 (Graftec)

**THREADED FITTINGS – SOCKETS/COUPLINGS, NIPPLES, PLUGS ETC.**

Material : ASTM A105

Dimensional : ASME B16.11 – Forged Fittings, Socket-Welding and Threaded.  
Limited to less than 2”.

Fitting shall be Class 3000 for threaded and Class 6000 for socket-welding.

Threads shall be pipe threads to ASME B1.20.1. – Pipe Threads, General Purpose (Inch)

**PROPRIETY FITTINGS – WELD-O-LETS, SOCK-O-LETS.**

Material : ASTM A105

Dimensional : Sizing to be to ASME B36.10M – Welded and Seamless Wrought Steel Pipe. -  
Welding and Threaded.

Design of fitting to meet requirements of ASME B31.4 – Liquid

Transportation Systems for Hydrocarbons, Liquid Petroleum Gas, Anhydrous Ammonia, and Alcohols.

**1 GENERAL NOTES**

1.1 Line class notes

01	Size range is the size of the header and not the branch line. For branch line size please refer to the branch table
02	Size range is the size of the branch and not the header line. For header line size please refer to the branch table
03	Refer to MSS SP-95 for available reducing sizes
04	Refer to ANSI B16.9 for available reducing sizes
05	Only for instrument connections were required
06	
07	
08	

1.2 Branch tables

Table A																
															T	24
														T	T	22
													T	T	T	20
													T	T	T	18
													T	T	T	16
													T	T	T	14
													T	T	T	12
													T	T	T	10
													T	T	T	8
													T	T	T	6
													T	T	T	4
													T	T	T	3
													T	T	T	2
													T	T	O	1.5
													T	T	O	1
													T	T	O	0.75
													T	T	O	0.5
0.5	0.75	1	1.5	2	3	4	6	8	10	12	14	16	18	20	22	24
Header																
T = ASME B16.9 forged Tee																
O = Thredolets and weldolets																
W = Weldolets																



## 2 LINE CLASSES

### 2.1 Index

NAME	A	B	C	D
DESIGN CODE	ASME B31.4	ASME B31.4	ASME B31.4	ASME B31.4
PROCESS FLUID	ULP LRP Diesel Jet fuel Synthetics	ULP LRP Diesel Jet fuel Synthetics	ULP LRP Diesel Jet fuel Synthetics	ULP LRP Diesel Jet fuel Synthetics
DESIGN PRESSURE	2 000 kPa <sub>(g)</sub>	5 000 kPa <sub>(g)</sub>	10 000 kPa <sub>(g)</sub>	See NMPP
OPERATING PRESSURE	1 900 kPa	4 900 kPa	9 900 kPa	See NMPP
DESIGN TEMPERATURE	-10°C – 50°C	-10°C – 50°C	-10°C – 50°C	See NMPP
OPERATING TEMPERATURE	0°C – 42 °C	0°C – 42 °C	0°C – 42 °C	See NMPP
PIPE NOMINAL BORE SIZE RANGE	0.5"(15mm) - 24"(600mm)	0.5"(15mm) - 24"(600mm)	0.5"(15mm) - 24"(600mm)	0.5"(15mm) - 24"(600mm)

2.2 Line Class A

ITEM CODE	SIZE RANGE (IN)	DESCRIPTION	NOTE
<b>PIPES</b>			
	½ - 2 ½	PIPE SCH 80 SMLS CS A106-B	
	3 - 16	PIPE SCH 40 SMLS CS A106-B	
	18 - 24	PIPE SCH 20 SMLS CS A106-B	
<b>BOLTS</b>			
	ALL	STUD BOLT A193 GR B7 W/A194 GR 2H NUTS	
<b>BRANCHES</b>			
	½ - 2 ½	TEE SCH 80 BW CS A234 WPB	01
	3 - 16	TEE SCH 40 BW CS A234 WPB	01
	18 - 24	TEE SCH 20 BW CS A234 WPB	01
	1 - 1 ½	THREDOLET CL 3000 NPT CS A105	02
	1 - 2 ½	WELDOLET SCH 80 CS A105	02
	3 - 8	WELDOLET SCH 40 CS A105	02
<b>BUSHINGS</b>			
	½ - 1	BUSHING CL 3000 CS A105	
<b>CAPS</b>			
	½ - 1 ½	CAP CL 3000 FT NPT CS A105	
	½ - 2 ½	CAP SCH 80 BW CS A234 WPB	
	3 - 16	CAP SCH 40 BW CS A234 WPB	
	18 - 24	CAP SCH 20 BW CS A234 WPB	
<b>COUPLINGS</b>			
	½ - 1 ½	COUPLING CL 3000 FT NPT CS A105	
<b>REDUCERS</b>			
	1 - 2 ½	REDUCER ECC SCH 80 BW CS A234 WPB	04
	3 - 16	REDUCER ECC SCH 40 BW CS A234 WPB	04
	18 - 24	REDUCER ECC SCH 20 BW CS A234 WPB	04
	1 - 2 ½	REDUCER CON SCH 80 BW CS A234 WPB	04
	3 - 16	REDUCER CON SCH 40 BW CS A234 WPB	04
	18 - 24	REDUCER CON SCH 20 BW CS A234 WPB	04



ITEM CODE	SIZE RANGE (IN)	DESCRIPTION	NOTE
<b>ELBOWS</b>			
	½ - 2 ½	ELL 90 DEG LR SCH 80 BW CS A234 WPB	
	½ - 2 ½	ELL 45 DEG LR SCH 80 BW CS A234 WPB	
	3 - 16	ELL 90 DEG LR SCH 40 BW CS A234 WPB	
	3 - 16	ELL 45 DEG LR SCH 40 BW CS A234 WPB	
	18 - 24	ELL 90 DEG LR SCH 20 BW CS A234 WPB	
	18 - 24	ELL 45 DEG LR SCH 20 BW CS A234 WPB	
<b>FLANGES</b>			
	½ - 2 ½	FLANGE WN CL 150 SCH 80 BORE RF CS A105	
	3 - 16	FLANGE WN CL 150 SCH 40 BORE RF CS A105	
	18 - 24	FLANGE WN CL 150 SCH 20 BORE RF CS A105	
	1 - 24	FLANGE BLIND CL 150 RF CS A105	
<b>NIPPLES</b>			
	½ - 1 ½	HEX PIPE NIPPLE NPT CL 3000 CS A105	
<b>PLUGS</b>			
	½ - 1 ½	PLUG HEX HEAD MT NPT CL 3000 CS A105	



2.3 Line Class B

ITEM CODE	SIZE RANGE (IN)	DESCRIPTION	NOTE
<b>PIPES</b>			
	½ - 2 ½	PIPE SCH 80 SMLS CS A106-B	
	3 - 16	PIPE SCH 40 SMLS CS A106-B	
	18 - 24	PIPE SCH 20 SMLS CS A106-B	
<b>BOLTS</b>			
	ALL	STUD BOLT A193 GR B7 W/A194 GR 2H NUTS	
<b>BRANCHES</b>			
	½ - 2 ½	TEE SCH 80 BW CS A234 WPB	01
	3 - 16	TEE SCH 40 BW CS A234 WPB	01
	18 - 24	TEE SCH 20 BW CS A234 WPB	01
	1 - 1 ½	THREADOLET CL 3000 NPT CS A105	02
	1 - 2 ½	WELDOLET SCH 80 CS A105	02
	3 - 8	WELDOLET SCH 40 CS A105	02
<b>BUSHINGS</b>			
	½ - 1	BUSHING CL 3000 CS A105	
<b>CAPS</b>			
	½ - 1 ½	CAP CL 3000 FT NPT CS A105	
	½ - 2 ½	CAP SCH 80 BW CS A234 WPB	
	3 - 16	CAP SCH 40 BW CS A234 WPB	
	18 - 24	CAP SCH 20 BW CS A234 WPB	
<b>COUPLINGS</b>			
	½ - 1 ½	COUPLING CL 3000 FT NPT CS A105	
<b>REDUCERS</b>			
	1 - 2 ½	REDUCER ECC SCH 80 BW CS A234 WPB	04
	3 - 16	REDUCER ECC SCH 40 BW CS A234 WPB	04
	18 - 24	REDUCER ECC SCH 20 BW CS A234 WPB	04
	1 - 2 ½	REDUCER CON SCH 80 BW CS A234 WPB	04
	3 - 16	REDUCER CON SCH 40 BW CS A234 WPB	04
	3 - 16	REDUCER CON SCH 20 BW CS A234 WPB	04



ITEM CODE	SIZE RANGE (IN)	DESCRIPTION	NOTE
<b>ELBOWS</b>			
	½ - 2 ½	ELL 90 DEG LR SCH 80 BW CS A234 WPB	
	½ - 2 ½	ELL 45 DEG LR SCH 80 BW CS A234 WPB	
	3 - 16	ELL 90 DEG LR SCH 40 BW CS A234 WPB	
	3 - 16	ELL 45 DEG LR SCH 40 BW CS A234 WPB	
	18 - 24	ELL 90 DEG LR SCH 20 BW CS A234 WPB	
	18 - 24	ELL 45 DEG LR SCH 20 BW CS A234 WPB	
<b>FLANGES</b>			
	½ - 2 ½	FLANGE WN CL 300 SCH 80 BORE RF CS A105	
	3 - 16	FLANGE WN CL 300 SCH 40 BORE RF CS A105	
	18 - 24	FLANGE WN CL 300 SCH 20 BORE RF CS A105	
	1 - 24	FLANGE BLIND CL 300 RF CS A105	
<b>NIPPLES</b>			
	½ - 1 ½	HEX PIPE NIPPLE NPT CL 3000 CS A105	
<b>PLUGS</b>			
	½ - 1 ½	PLUG HEX HEAD MT NPT CL 3000 CS A105	



2.4 Line Class C

ITEM CODE	SIZE RANGE (IN)	DESCRIPTION	NOTE
<b>PIPES</b>			
	½ - 2 ½	PIPE SCH 80 SMLS CS A106-B	
	3 - 20	PIPE SCH 40 SMLS CS A106-B	
	22 - 24	PIPE SCH 60 SMLS CS A106-B	
<b>BOLTS</b>			
	ALL	STUD BOLT A193 GR B7 W/A194 GR 2H NUTS	
<b>BRANCHES</b>			
	½ - 2 ½	TEE SCH 80 BW CS A234 WPB	01
	3 - 20	TEE SCH 40 BW CS A234 WPB	01
	22 - 24	TEE SCH 60 BW CS A234 WPB	01
	1 - 1 ½	THREDOLET CL 3000 NPT CS A105	02
	1 - 2 ½	WELDOLET SCH 80 CS A105	02
	3 - 8	WELDOLET SCH 40 CS A105	02
<b>BUSHINGS</b>			
	½ - 1	BUSHING CL 3000 CS A105	
<b>CAPS</b>			
	½ - 1 ½	CAP CL 3000 FT NPT CS A105	
	½ - 2 ½	CAP SCH 80 BW CS A234 WPB	
	3 - 12	CAP SCH 40 BW CS A234 WPB	
<b>COUPLINGS</b>			
	½ - 1 ½	COUPLING CL 3000 FT NPT CS A105	
<b>REDUCERS</b>			
	1 - 2 ½	REDUCER ECC SCH 80 BW CS A234 WPB	04
	3 - 20	REDUCER ECC SCH 40 BW CS A234 WPB	04
	22- 24	REDUCER ECC SCH 60 BW CS A234 WPB	04
	1 - 2 ½	REDUCER CON SCH 80 BW CS A234 WPB	04
	3 - 20	REDUCER CON SCH 40 BW CS A234 WPB	04
	22- 24	REDUCER CON SCH 60 BW CS A234 WPB	04



ITEM CODE	SIZE RANGE (IN)	DESCRIPTION	NOTE
<b>ELBOWS</b>			
	½ - 2 ½	ELL 90 DEG LR SCH 80 BW CS A234 WPB	
	½ - 2 ½	ELL 45 DEG LR SCH 80 BW CS A234 WPB	
	3 - 20	ELL 90 DEG LR SCH 40 BW CS A234 WPB	
	3 - 20	ELL 45 DEG LR SCH 40 BW CS A234 WPB	
	22 - 24	ELL 90 DEG LR SCH 60 BW CS A234 WPB	
	22 - 24	ELL 45 DEG LR SCH 60 BW CS A234 WPB	
<b>FLANGES</b>			
	½ - 2 ½	FLANGE WN CL 600 SCH 80 BORE RF CS A105	
	3 - 20	FLANGE WN CL 600 SCH 40 BORE RF CS A105	
	22 - 24	FLANGE WN CL 600 SCH 60 BORE RF CS A105	
	1 - 24	FLANGE BLIND CL 600 RF CS A105	
<b>NIPPLES</b>			
	½ - 1 ½	HEX PIPE NIPPLE NPT CL 3000 CS A105	
<b>PLUGS</b>			
	½ - 1 ½	PLUG HEX HEAD MT NPT CL 3000 CS A105	

**3 CALCULATIONS**

<b>ALLOWANCE FOR VARIATION FROM DESIGN PRESSURE</b>	10% of internal design pressure (ASME B31.4 sec 401.2.4)			
<b>TEMPERATURE USED FOR MATERIAL PROPERTIES</b>	40 °C (ASME B31.4 sec 401.3.1/402.2.1)			
<b>ALLOWANCES</b>	<b>TYPE</b>	<b>Allowance</b>	<b>Reason</b>	<b>Code</b>
	CORROSION	None	Pipes will be painted	ASME B31.4 sec 402.4.1
	THREADING	Depth of thread to be added to calculated wall thickness		ASME B31.4 sec 402.4.2
	WELD FACTOR	1	Seamless pipe will be used	ASME B31.4 Table 402.4.3
	VARIATION IN WALL THICKNESS	None	Compensated for in code	ASME B31.4 sec 402.3.1
<b>ALLOWABLE STRESS</b>	$S = F \times E \times SMYS \dots\dots\dots (1.1)$ (ASME B31.4 sec 402.3.1)			
	S	Allowable stress	173.52 MPa	Equation 1.1
	F	Design factor	0.72	ASME B31.4 sec 402.3.1
	E	Weld factor	1	ASME B31.4 Table 402.4.3