PROCESS INDUSTRY PRACTICES

COMPLETE REVISION
October 2024

Piping

PIP PN12CS1G01
Piping Material Specification 12CS1G01
Class 125, Carbon Steel, Grooved, 0.063" C.A., Utility (Air and Water), Category D, Roll Grooved Joints

PURPOSE AND USE OF PROCESS INDUSTRY PRACTICES

This Practice has been prepared by harmonizing technical requirements from existing standards of major industrial operators, contractors, and standards development organizations. While this Practice is intended to incorporate the majority of requirements, individual applications may have requirements which take precedence over this Practice. Determinations concerning fitness for purpose or application of this Practice to specific project or engineering situations should not be made solely on information contained in this Practice. All Practices are intended to be consistent with applicable laws and regulations. Should this Practice conflict with applicable laws or regulations, such laws or regulations must be followed. Consult an appropriate professional before applying or acting on any material contained in or suggested by this Practice.

Use of trade names should not be viewed as an expression of preference. Other brands having the same specifications are equally correct and may be substituted for those named.

This Practice is subject to revision at any time. For more information refer to PIP ADG001, *Specification for Developing Practices*.

Process Industry Practices
3925 West Braker Lane (R4500)
Austin, Texas 78759

PUBLISHING HISTORY

November 2000	*Issued*	*January 2019*	*Complete Revision*
March 2007	*Complete Revision*	*October 2024*	*Complete Revision*

Not printed with State funds

SERVICE:	Utility (Air and Water) Category D	MATERIAL:	Carbon Steel
RATING CLASS:	150 psig, ASME B31.3, Category D	DESIGN CODE:	ASME B31.3-2022
TEMPERATURE LIMIT:	-29°C to 82°C (-20°F to 180°F)	STRESS RELIEF:	PIP PNSC0001
NOMINAL CORROSION ALLOWANCE:	1.5 mm (0.063 in.) [1.2 mm (0.050 in.) MIN]	EXAMINATION:	PIP PNSC0001

PRESSURE - TEMPERATURE RATINGS – METRIC
For NPS 1/2 through NPS 24 (Limited by ASME B31.3 Category D Fluid Service pressure limit), Pressure rated components are based on US customary units

TEMP °C	-29 to 38	82
BAR	10.35	10.35

PRESSURE – TEMPERATURE RATINGS – US CUSTOMARY UNITS
For NPS 1/2 through NPS 24 (Limited by ASME B31.3 Category D Fluid Service pressure limit), Pressure rated components are based on US customary units

TEMP °F	-20 to 100	180
PSIG	150	150

ITEM	NOTES	NPS	SCH/RAT	ENDS	DESCRIPTION	USER CODE
PIPE	188					
		1/2 – 2	XS		CS, ASTM A53 Gr A, Type F, T&C, GALV, (Ej = 0.60)	
	133	3 – 24	STD		CS, ERW, ASTM A53 Gr B, Type E, (E_j=0.85)	
NIPPLES						
Branch		1/2 – 2	XS		CS, ASTM A53 Gr A, Type F, GALV (E_j=0.60), A733	
Swage (CONC)		3/4 – 2	XS	TBE	CS, ASTM A234 Gr WPB-S, MSS SP-95, GALV	
		1/2 – 1-1/2	XS			
Swage (CONC)	133	3 – 6	STD	GRVD	CS, ASTM A234 Gr WPB-S, MSS SP-95, GALV	
		1/2 – 2	XS	TSE		
Swage (ECC)		3/4 – 2	XS	TBE	CS, ASTM A234 Gr WPB-S, MSS SP-95, GALV	
		1/2 – 1-1/2	XS			
Swage (ECC)	133	3 – 6	STD	GRVD	CS, ASTM A234 Gr WPB-S, MSS SP-95, GALV	
		1/2 – 2	XS	TSE		
FITTINGS						
Thredolet		3 – 24	Class 3000	Weld	CS, ASTM A105, MSS SP-97	
		1/2 – 2				
THRD Latrolet		3 – 24	Class 3000	Weld	CS, ASTM A105, MSS SP-97	
		1/2 – 2				
THRD Elbolet	170	3 – 24	Class 3000	Weld	CS, ASTM A105	
		1/2 – 2				
90 ELL		1/2 – 2	Class 300	THRD	MI, ASTM A197, ASME B16.3, GALV	
45 ELL		1/2 – 2	Class 300	THRD	MI, ASTM A197, ASME B16.3, GALV	
Tee		1/2 – 2	Class 300	THRD	MI, ASTM A197, ASME B16.3, GALV	
Tee (RED)		3/4 – 2	Class 300	THRD	MI, ASTM A197, ASME B16.3, GALV	
		1/2 – 1-1/2				
Plug		1/2 – 2		THRD	CS, ASTM A105, round head, ASME B16.11	
Coupling		1/2 – 2	Class 300	THRD	MI, ASTM A197, ASME B16.3, GALV	
Coupling (RED)		3/4 – 2	Class 300	THRD	MI, ASTM A197, ASME B16.3, GALV	
		1/2 – 1-1/2				
Cap		1/2 – 2	Class 300	THRD	MI, ASTM A197, ASME B16.3, GALV	
Union (GJ)		1/2 – 2	Class 300	THRD	MI, ASTM A197, integral brass seats, ASME B16.39, GALV	
Bolt-on Outlet		3 – 4	500 psi	THRD	DI, ASTM A536 Gr 65-45-12	
		1/2 – 2				
Bolt-on Outlet		6 – 8	500 psi	THRD	DI, ASTM A536 Gr 65-45-12	
		1-1/2 – 2				
Bolt-on Outlet		4 – 8	500 psi	GRVD	DI, ASTM A536 Gr 65-45-12	
		3				
Bolt-on Outlet		6 – 8	500 psi	GRVD	DI, ASTM A536 Gr 65-45-12	
		4				
Coupling, Rigid	133, 135	3 – 24			DI, ASTM A536 Gr 65-45-12, EPDM, w/ bolts	
Coupling, Flexible	133, 135	3 – 24			DI, ASTM A536 Gr 65-45-12, EPDM, w/ bolts	
Reducer (CONC)		4 – 8	STD	GRVD	DI, ASTM A536 Gr 65-45-12	
		3 – 6	STD			
Reducer (CONC)	132, 133	10 – 24	STD	GRVD	CS, ASTM A53 Gr B	
		4 – 20	STD			

ITEM	NOTES	NPS	SCH/RAT	ENDS	DESCRIPTION	USER CODE
FITTINGS (cont'd)						
Reducer (ECC)	132, 133	4 – 8	STD	GRVD	DI, ASTM A536 Gr 65-45-12 or ASTM A53 Gr B	
		3 – 6	STD			
Reducer (ECC)	132, 133	10 – 24	STD	GRVD	CS, ASTM A53 Gr B	
		4 – 20	STD			
90 LR ELL	132, 133	3 – 24	STD	GRVD	DI, ASTM A536 Gr 65-45-12 or ASTM A53 Gr B	
90 SR ELL	132, 133	3 – 16	STD	GRVD	DI, ASTM A536 Gr 65-45-12	
45 LR ELL	132, 133	3 – 24	STD	GRVD	DI, ASTM A536 Gr 65-45-12 or CS, ASTM A53 Gr B	
22½ ELL	132, 133	3 – 24	STD	GRVD	DI, ASTM A536 Gr 65-45-12 or CS, ASTM A53 Gr B	
11¼ ELL	132, 133	3 – 24	STD	GRVD	DI, ASTM A536 Gr 65-45-12 or CS, ASTM A53 Gr B	
Tee	132, 133	3 – 24	STD	GRVD	DI, ASTM A536 Gr 65-45-12 or CS, ASTM A53 Gr B	
RED Tee	132, 133	4 – 24	STD	GRVD	DI, ASTM A635 Gr 65-45-12 or CS, ASTM A53 Gr B	
		3 – 20	STD			
Cap	132, 133	3 – 24	STD	GRVD	DI, ASTM A536 Gr 65-45-12 or CS, ASTM A53 Gr B	
True Wye	132, 133	3 – 24	STD	GRVD	CS, ASTM A53 Gr B	
Cross	132, 133	3 – 24	STD	GRVD	CS, ASTM A53 Gr B	
45 Lateral	132, 133	3 – 24	STD	GRVD	CS, ASTM A53 Gr B	
45 RED Lateral	132, 133	4 – 24	STD	GRVD	CS, ASTM A53 Gr B	
		3 – 20	STD			
VALVES						
Gate		1/2 – 2	Class 200	THRD	Bronze body, bronze trim, UB, ISRS	GA02BT000
Globe		1/2 – 2	Class 200	THRD	Bronze body, bronze trim, UB, ISRS	GL02BT000
Globe	132, 133	3 – 10	300 psi CWP	GRVD	DI body, brass trim, Y-pattern	GL00DF900
Check	62	1/2 – 2	Class 200	THRD	Bronze body, bronze trim, swing, TC	CS02BT000
Check	62, 132, 133	3 – 14	300 psi CWP	GRVD	DI body, DI EPDM coated or Al BR disc, swing	CS00DF900
Ball		1/2 – 2	600 psi CWP	THRD	Bronze body, bronze/brass trim, PTFE ST, MFG STD	BA00BT000
Ball	132, 133	3 – 6	600 psi CWP	GRVD	DI body, PTFE ST, MFG STD	BA00DF900
Butterfly	132, 133	3 – 12	300 psi CWP	GRVD	DI epoxy/PPS/polyamide coated body, DI EPDM coated disc, SS stem	BF00DF900
Butterfly	132, 133	14 – 24	300 psi CWP	GRVD	DI PPS coated body, DI PPS coated disc, SS Stem, EPDM ST, GO	BF00DF901
FLANGES						
Threaded		1/2 – 2	Class 150	FF	CS, ASTM A105, ASME B16.5, GALV	
Blind		1/2 – 24	Class 150	FF	CS, ASTM A105, ASME B16.5	
Slip-On		3 – 24	Class 150	FF	CS, ASTM A105, ASME B16.5	
Flange Adapter	133	3 – 24	Class 125 or 150	FF	DI, ASTM A536 Gr 65-45-12	
Adapter Nipple	132, 133	3 – 24	Class 150	FF X GRVD	CS, ASTM A105, ASME B16.5	
LINE BLANKS	192					
Figure-8		1/2 – 12	Class 150	FF	CS, ASTM A516 Gr 70, ASME B16.48	
Paddle Blank		1/2 – 24	Class 150	FF	CS, ASTM A516 Gr 70, ASME B16.48	
Paddle Spacer		1/2 – 24	Class 150	FF	CS, ASTM A516 Gr 70, ASME B16.48	
GASKETS						
Flange		1/2 – 2	Class 150	FF	1/16" thick, Full Face gasket, Neoprene, ASME B16.21	
Flange		3 – 24	Class 150	FF	1/8" thick, Full Face gasket, Neoprene, ASME B16.21	
BOLTING						
Stud Bolts					ASTM A307, Gr B, GALV, w/ heavy hex nuts, ASTM A563, Gr A, GALV	
Stud Bolts					ASTM A307, Gr B, GALV, w/ heavy hex nut, ASTM A563, Gr A, GALV, GALV Washer	

90° Branch Connection Table

BRANCH SIZE	HEADER SIZE															
	24	20	18	16	14	12	10	8	6	4	3	2	1-1/2	1	3/4	1/2
24	T															
20	E	T														
18	E	E	T													
16	E	E	E	T												
14	E	E	E	E	T											
12	E	E	E	E	E	T										
10	E	E	E	E	E	E	T									
8	E	E	E	E	E	E	E	T								
6	E	E	E	E	E	E	E	E	T							
4	E	E	E	E	E	E	E	E	E	T						
3	E	E	E	E	E	E	E	E	E	E	T					
2	D	D	D	D	D	D	D	D	D	D	D	T				
1-1/2	D	D	D	D	D	D	D	D	D	D	D	E	T			
1	D	D	D	D	D	D	D	D	D	D	D	E	E	T		
3/4	D	D	D	D	D	D	D	D	D	D	D	E	E	E	T	
1/2	D	D	D	D	D	D	D	D	D	D	D	E	E	E	E	T

D Thredolet
E Reducing Tee or Reducing Tee with Reducer (CONC)
T Tee

NOTES:

62 These check valves shall be installed in a horizontal position with cover up or in a vertical position with upward flow.

132 GRVD shall be the designation for roll-grooved ends.

133 All roll grooving dimensions and procedures shall be in accordance with manufacturer's recommendations and with ANSI/AWWA C606. Roll grooving tool shall be provided by the same manufacturer as the couplings. Parts or components from different manufacturers shall not be interchanged.

135 Grade of gasket material shall be verified as suitable for the intended service. EPDM shall not be used for water containing hydrocarbons or air containing hydrocarbon vapors. If hydrocarbons or hydrocarbon vapors are present, nitrile gasket material shall be used. Design limit for nitrile in hot water shall be 66°C (150°F).

170 These items shall be qualified for use in this specification in accordance with ASME B31.3, Paragraph 304.7.2.

188 Wall thickness calculations in this specification are based on values in US customary units.

192 Paddle blanks or paddle spacers shall be used in place of figure 8 type blanks for cold-insulated piping less than 21°C (70°F).

REFERENCES:

Process Industry Practices (PIP)

PIP PNC00005 - *Design of ASME B31.3 Metallic Piping Systems*
PIP PNF0200 - *Vents, Drains, and Instrument Connection Details*
PIP PNSC0001 - *Fabrication and Examination Specification for ASME B31.3 Metallic Piping*
PIP PNSC0021 - *Leak Testing of Piping Systems*
PIP PNSMV033 - *Bronze and Iron Gate Valve Descriptions*
PIP PNSMV034 - *Bronze and Iron Globe Valve Descriptions*
PIP PNSMV035 - *Bronze and Iron Check Valve Descriptions*
PIP PNSMV036 - *Bronze and Iron Ball Valve Descriptions*
PIP PNSMV037 - *Bronze and Iron Butterfly Valve Descriptions*