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Technical Standards Bulletin

Title: Threaded Body Ball Valves (NPS 2 and smaller)		
Bulletin #: BUL-019-2009	**Date**: July 30, 2009	**File #:**
Issued By: Radojka Tadic		
Approved By: Jim Huber, Manager Engineering Services Canada		
This Change is Effective Immediately		
In Reference To:		
Design Standard D06-106: *Piping Design & Construction, Auxiliary* Equipment Specification EES105: *Specification for Gate, Check, Plug, Ball Valves* Equipment Specification EES109: *Specification for Wedge Gate Steel Valves* Equipment Specification EES03: *Meter Bidirectional Provers* Equipment Specification EES15: *Mainline Pumps* Equipment Specification EES27: *Booster Pump and Booster Pump Motor* Construction Specification FCS012: *Facility Piping Construction* Construction Specification FCS013: *Piping Classes* *Fabricated or modular assemblies utilizing small valves such as Densitometer Cabinet, Modular Sampling Systems, Custody Transfer Metering Skids, Pipeline Traps, etc.*		

The requirements referenced in the above mentioned standards and specifications are superseded by:

Threaded body ball valves (NPS 2 and smaller) shall not be used. This is to prevent accidental disassembly. The future purchase and/or installation of threaded body ball valves shall be discontinued. This includes:

1) spare valves that are held in local inventory or stores across LP Operations;
2) valves that are purchased by local Operations staff or the various Procurement groups;
3) valves that are provided by Contractors as auxiliary piping during construction; and
4) valves that are provided as components of manufactured systems or equipment (such as meter manifolds, piping skids, pumps, etc.).

There are 3 types of ball valves that may be used:

1) one piece;
2) bolted body; or
3) 2- piece seal welded.

General review including specific application for each valve type is underway. Please contact Engineering Services in Edmonton with any inquiries regarding appropriate use of ball valves.

JUSTIFICATION:
Operations has experienced release incidents involving the inadvertent dismantling of these types of valves while under pressure and is currently taking steps to clearly identify all installed threaded body ball valves to help prevent future incidents.

Please post this bulletin and file with any hardcopies of the above referenced standards or specifications. The change will be incorporated into the next revision.

Piping Classes
FCS013-SECTION 13

Enbridge Pipelines Inc.

Enbridge Energy Partners L.P.

Revision: 1.1
Approval Date: November 1, 2009

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1 Scope

This section of the Specification for Facility Construction includes the minimum requirements for pipe and piping components NPS 6 and smaller where proven notch toughness is not required. When materials with proven notch toughness are required, the details will be provided by the Company on the Drawings or in another appropriate manner.

This section covers metallic piping materials used in lines carrying petroleum liquids, oil, oil vapour or gas up to a maximum pressure temperature rating of 9,930 kPa (1440 psig) at 120°C. Unless otherwise specified, all materials used shall be suitable through the temperature range of -45°C to +40°C.

Standards and specifications referred to shall be the latest revision.
In case of conflict between this specification and any codes, standards and other specifications, the more stringent requirements shall govern unless specifically noted otherwise.

2 Related Standards, Definitions, and Abbreviations

2.1 Industry Standards

Everything in this specification, in addition to the requirements given here, shall be in accordance with the latest revision of CSA Z662 – Oil and Gas Pipeline Systems.

3 General Requirements

Prior to purchase of pipe or pipe components given in this specification, verify with the Company that Category I notch toughness requirements are acceptable (no proven notch toughness).

Piping smaller than 60.3 mm (NPS 2) shall not be buried.

All buried piping shall be coated.

4 Piping Wall Thickness

The following piping shall have a minimum wall thickness of Schedule 80:

a) all buried piping;
b) all piping NPS 2 and smaller;
c) all above grade drain piping;
d) all instrument piping in PN 50 (ANSI 300) or greater pressure service;
e) threaded piping; and
f) all pipe nipples.

All other piping shall have a minimum wall thickness of Schedule 40.

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5 Pipe

Pipe shall be supplied in accordance with:

a) CSA Z245.1; or
b) ASTM A53-Type S, Grade A.

All piping must be pressure tested with liquid.

6 Fittings

Fittings less than NPS 2 diameter shall be supplied in accordance with:

a) ANSI 16.11 – Class 3000, forged steel, ASTM A234/A234M WPB.

Fittings from NPS 2 to NPS 6 shall be supplied in accordance with:

a) CSA Z245.11; or
b) ANSI 16.9 – ASTM 2A34/A234M WPB.

7 Flanges

Flanges shall be in accordance with:

a) CSA Z245.12; or
b) ASME/ANSI B16.5 (NPS 24 and smaller) or ASME/ANSI B16.47 Series "A" (Larger than NPS 24), ASTM A105/A105M.

Flanges shall be weld neck and raised face, except as noted on the Drawings. Flange pressure rating shall be as per piping system requirements as detailed on the Drawings.

The Contractor shall confirm flange pressure rating requirements with the Company prior to order and installation.

8 End Connections

End connections shall be in accordance with Table 8.1 below.

Table 8.1 End Connection Requirements

Component	Sizes	End Connection		
		Above Grade	Below Grade*	Buried
Valves	1 ½" and smaller	Threaded	Flanged	N/A
	2" to 6"	Flanged	Flanged	Butt Welded
Pipe	1 ½" and smaller	Threaded	Socket Welded**	N/A
	2" to 6"	Butt Welded	Butt Welded	Butt Welded
Fittings	1 ½" and smaller	Threaded	Socket Welded**	N/A
	2" to 6"	Butt Welded	Butt Welded	Butt Welded
Unions	1 ½" and smaller	Threaded	Socket Welded**	N/A

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Table 8.1 NOTES:
* Below grade, but not buried (i.e., culvert installation).
** Piping smaller than NPS 2 should be socket welded construction with allowances, such as threaded connections, for the removal of equipment for calibration or maintenance. The Contractor shall coordinate locating threaded connections with the Inspector. Buried threaded connections are not permitted.

9 Gaskets

For fire protection water systems with flat face connections, use a 1.6 mm (1/16 in.) minimum thickness, full faced gasket. A Garlock style wire inserted gasket is typical.

Gaskets used for hydrotesting of piping joints, which must be disconnected, shall be discarded at completion of testing, and new spiral wound gaskets shall be installed.

For dimensional details, refer to the Company Stud Bolt and Gasket Sizing Table below.

For other requirements regarding gaskets refer to clause 8.3, clause 11, Appendix B and Appendix C of *FCS012 - SECTION 12 - Facility Piping Construction*. Please note that Spiral Wound gaskets shall be 3.2 mm (1/8 in.) thick.

10 Stud Bolts

Stud bolts shall be steel, meeting the requirements of ASTM A193, Gr. B7, threaded for the full length. Nuts shall be hexagon, semi-finished, steel, meeting the requirements of ASTM A194, Gr. 2H.

Bolting to be installed with components that require proven notch toughness shall also have proven notch toughness properties.

Refer to Table 10.1 Company Stud Bolt and Gasket Sizing below.

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Table 10.1 Company Stud Bolt and Gasket Sizing

Nominal Pipe Size (in.)	150 lb. Stud Bolts No. Req'd	Dia.	Length L	Raised or Flat Face Flange Ring O.D. (in.)	Gasket I.D. (in.)
2	4	5/8	3 3/4	4 1/8	2 3/4
3	4	5/8	4	5 3/8	4
4	8	5/8	4	6 7/8	5
6	8	3/4	4 1/2	8 3/4	7 3/16
8	8	3/4	4 3/4	11	9 3/16
10	12	7/8	5	13 3/8	11 5/16
12	12	7/8	5 1/4	16 1/8	13 3/8
14	12	1	5 3/4	17 3/4	14 5/8
16	16	1	5 3/4	20 1/4	16 5/8
18	16	1 1/8	6 1/4	21 5/8	18 11/16
20	20	1 1/8	6 3/4	23 7/8	20 11/16
22	20	1 1/4	7 1/4	26	
24	20	1 1/4	7 1/4	28 1/4	24 3/4
26	24	1 1/4	9 1/4	30 1/2	26 1/2
30	28	1 1/4	9 3/4	34 3/4	30 1/2
34	32	1 1/2	10 3/4	39	34 1/2
36	32	1 1/2	11 1/4	41 1/4	36 1/2
48	44	1 1/2	12 1/2	54 1/2	48 1/2

Nominal Pipe Size (in.)	300 lb. Stud Bolts No. Req'd	Dia.	Length L	Raised or Flat Face Flange Ring O.D. (in.)	Gasket I.D. (in.)
2	8	5/8	4	4 3/8	2 3/4
3	8	3/4	4 3/4	5 7/8	4
4	8	3/4	5	7 1/8	5
6	12	3/4	5 1/4	9 7/8	7 3/16
8	12	7/8	6	12 1/8	9 3/16
10	16	1	6 3/4	14 1/4	11 5/16
12	16	1 1/8	7 1/4	16 5/8	13 3/8
14	20	1 1/8	7 1/2	19 1/8	14 5/8
16	20	1 1/4	8	21 1/4	16 5/8
18	24	1 1/4	8 1/4	23 1/2	18 11/16
20	24	1 1/4	8 1/2	25 3/4	20 11/16
22	24	1 1/2	9 1/4	27 3/4	
24	24	1 1/2	9 1/2	30 1/2	24 3/4
26	28	1 5/8	11	32 7/8	27
30	28	1 3/4	12 1/4	37 1/2	31 1/4
34	28	1 7/8	13 1/4	41 5/8	35 1/2
36	32	2	13 3/4	44	37 3/4
48	32	1 7/8	15 1/4	52 1/8	
IPL 48	36	2 1/4	16		

Nominal Pipe Size (in.)	400 lb. Stud Bolts No. Req'd	Dia.	Length L	Raised or Flat Face Flange Ring O.D. (in.)	Gasket I.D. (in.)
2	8	5/8	4 3/4	4 3/8	2 3/4
3	8	3/4	5 1/2	5 7/8	4
4	8	7/8	6	7	4 3/4
6	12	7/8	6 1/2	9 3/4	6 7/8
8	12	1	7 1/4	12	8 7/8
10	16	1 1/8	8	14 1/8	10 13/16
12	16	1 1/4	8 1/2	16 1/2	12 7/8
14	20	1 1/4	8 3/4	19	14 1/4
16	20	1 3/8	9 1/4	21 1/8	16 1/4
18	24	1 3/8	9 1/2	23 3/8	18 1/2
20	24	1 1/2	10	25 1/2	20 1/2
24	24	1 3/4	11	30 1/4	24 3/4
26	28	1 3/4	12 1/2	32 3/4	27
30	28	2	14	37 1/4	31 1/4
34	28	2	14 3/4	41 1/2	35 1/2
36	32	2	15	44	37 3/4
48	28	2 1/4	19	56 1/4	52 1/8
IPL 48	32	2 3/4	18	53	49

Nominal Pipe Size (in.)	600 lb. Stud Bolts No. Req'd	Dia.	Length L	Raised or Flat Face Flange Ring O.D. (in.)	Gasket I.D. (in.)
2	8	5/8	4 3/4	4 3/8	
3	8	3/4	5 1/2	5 7/8	2 3/4
4	8	7/8	6 1/4	7 5/8	4
6	12	1	7 1/4	10 1/2	4 3/4
8	12	1 1/8	8	12 5/8	6 7/8
10	16	1 1/4	9	15 3/4	8 7/8
12	20	1 1/4	9 1/4	18	10 13/16
14	20	1 3/8	9 3/4	19 3/8	12 7/8
16	20	1 1/2	10 1/2	22 1/4	14 1/4
18	20	1 5/8	11 1/4	24 1/8	16 1/4
20	24	1 5/8	11 3/4	26 7/8	18 1/2
22	24	1 5/8	12 1/2	28 7/8	20 1/2
24	24	1 7/8	13 1/4	31 1/8	
26	28	1 7/8	14 1/4	34 1/8	24 3/4
30	28	2	15	38 1/4	27
34	28	2 1/4	16	42 1/4	31 1/4
36	28	2 1/2	16 3/4	44 1/2	35 1/2
42	28	2 1/2	20 1/4	48	37 3/4
46	32	2 1/2	20 3/4	52 1/4	
48	32	2 3/4	21 1/2	54 3/4	
IPL 48	36	2 1/4	19 3/4		

Nominal Pipe Size (in.)	900 lb. Stud Bolts No. Req'd	Dia.	Length L	Raised or Flat Face Flange Ring O.D. (in.)	Gasket I.D. (in.)
2	8	7/8	6 1/4	5 5/8	2 5/16
3	8	7/8	6 1/4	6 5/8	3 3/4
4	8	1 1/8	7 1/4	8 1/8	4 3/4
6	12	1 1/8	8	11 3/8	6 7/8
8	12	1 3/8	9 1/4	14 1/8	8 7/8
10	16	1 3/8	9 3/4	17 1/8	10 13/16
12	20	1 3/8	10 1/2	19 5/8	12 7/8
14	20	1 1/2	11 1/4	20 1/2	14 1/4
16	20	1 5/8	11 1/4	22 1/2	16 1/4
18	20	1 7/8	12 3/4	25	18 1/4
20	20	2	13 3/4	27 3/8	20 1/4
24	20	2 1/2	17 1/2	33	24 1/4
26	20	2 3/4	18	37 1/8	29
30	20	3	19 1/2	39 5/8	31 1/4
34	20	3 1/2	21 3/4	44 5/8	35 1/2
36	20	3 1/2	22 1/4	47 1/8	37 3/4

Refer to Stud Bolts:

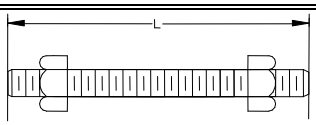
ANSI/ASME B16.47 Large Diameter Steel Flanges
ANSI/ASME B16.5 Pipe Flanges and Flanged Fittings
ANSI/ASME B1.1 Unified Inch Screw Threads

Flanges:

Up to 24 in. – CAN/CSA-Z245.12; ANSI/ASME B16.5
Larger than 24 in. – CAN/CSA-Z245.12; ANSI/ASME B16.47 Series "A"
48 in. – by specification
Optimum Flange Surface Finish
Roughness = 125 - 200 micro-inch

Notes:

1) These gaskets conform to standard industry sizing, except for the ring O.D., which is 1/8 in. smaller than the standard size. Standard industry sizing is an acceptable alternate if availability or delivery time is unacceptable
2) On existing equipment, use the 1972 Enbridge standard, unless advised otherwise. On new installations, use the CAN/CSA-Z245.12 or ANSI/ASME B16.47 Series "A"
3) When calling up flanges or gaskets in these sizes, specify whether they are to special Enbridge dimensions or to the B16.47 Series "A".
4) Consult *FCS012 - SECTION 12 - Facility Piping Construction for gasket types by application*. This table assumes gaskets are 1/8" thick.



Stud Bolt with Nuts

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11 Tubing

Tubing shall be 304, seamless, annealed, stainless steel, ASTM 269 with minimum wall thickness per Table 11.1 below.

Table 11.1 Minimum Tubing Thickness

Tube Diameter	Minimum Wall Thickness
1/8”	0.035”
3/16”	0.049”
5/8” to 3/4"	0.065”
7/8” to 1”	0.083”

Fittings shall be Swagelok.

12 Valves

12.1 General

Prior to purchase, the Contractor shall obtain approval from the Company on the make and model of the valves.

a) All valves shall be supplied in accordance with CSA Z245.15 or API 6D.
b) Prior to purchase, the Contractor shall verify with the Company which valves shall be fire safe. Fire safe valves shall be supplied in accordance with API 6FA.
c) All valves shall be bolted or one piece construction.
d) When not inherent in the valve design, anti-static provision shall be required to provide electrical conductance between the valve internals and the body.
e) All above grade, double block and bleed valves shall be equipped with a thermal pressure relief system that relieves pressure back to the upstream side of the valve. Under no circumstances shall the relief calve vent to atmosphere or to a sump. Pressure relief can be by external piping or an integral part of valve design.
f) The manual valve operator shall be capable of being chained or locked in the open and closed position.
g) All valves shall be non-lubricated.
h) Elastomers must be compatible with the fluids and be suitable throughout a temperature range of -45°C to +40°C.

12.2 Gate Valves

Less than 2”	PN 100 (ANSI 600), steel, rising stem, solid wedge or gate. Confirm port size with the Company prior to purchase (i.e., full port or reduced port).
2” to 6”	Steel, rising stem, handwheel operated with enclosed stem. If valve is buried, chevron (or equivalent) type packing is required. Pressure rating to meet piping pressure requirements as detailed on the Drawings. Confirm port size with the Company prior to purchase (i.e., full port or reduced port). Confirm gate design with the Company prior to purchase (i.e., slab gate or solid wedge).

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12.3 Ball Valves

Less than 2”	PN 100 (ANSI 600), steel. Confirm port size with the Company prior to purchase (i.e., full port or reduced port).
2” to 6”	Steel, confirm actuation method prior to purchase. Pressure rating to meet piping pressure requirements as detailed on the Drawings. Confirm port size with the Company prior to purchase (i.e., full port or reduced port).

12.4 Check Valves

Less than 2”	PN 100 (ANSI 600), steel, lift type, horizontal.
2” to 6”	Pressure rating to meet piping pressure requirements as detailed on the Drawings. Confirm style of check valve with the Company prior to purchase.

13 Revisions

13.1 Revision 1.0, August 1, 2007

Clause 6 - Flanges

- Added reference to ANSI/ASME B16.47 Series “A”.

Clause 8 - Gaskets

- Added requirements from other documents. Replaced other requirements with reference to other document, facilitating removal of Technical Standards Bulletins BUL-001-2004 and BUL-004-2005.

Clause 9 - Stud Bolts

- Added Company Stud Bolt and Gasket Sizing Table from D06-104.

13.2 Revision 1.1, November 1, 2009

Clause 8 - Gaskets

- Replaced reference to *Operating and Maintenance Procedures Manual – Book 3* with a reference to *clause 8.3, clause 11, Appendix B and Appendix C of FCS012 - SECTION 12 - Facility Piping Construction*.

Clause 9 - Stud Bolts (Company Stud Bolt and Gasket Sizing Table)

- Deleted text “*Flexitallic Style CG Gasket*” in the column header from each table.
- Added to table: Note 4) *“Consult FCS012 - SECTION 12 - Facility Piping Construction for gasket types by application. This table assumes gaskets are 1/8” thick.”*
- Updated bolt lengths in table to agree with PLM Manual. Revised bolt length sketch for table.

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