



345 Carlingview Drive
Toronto, Ontario M9W 6N9
Tel.: 416.734.3300
Fax: 416.231.1626
Toll Free: 1.877.682.8772

www.tssa.org

February 06, 2020

CATHERINE DIPLOCK
PRESSURE VESSEL ENGINEERING LTD.
120 RANDALL DR SUITE B
WATERLOO ON N2V 1C6
CA

Service Request Type: BPV-Fitting Registration
Service Request No.: 2758074
Your Reference No.: PVE-14095
Registered to: PHOENIX FORGE GROUP

Dear CATHERINE DIPLOCK,

Technical Standards and Safety Authority (TSSA) is pleased to inform you that your submission has been reviewed and registered as follows:

CRN: **0A09967.25**

Main Design No.: CATALOGUES NO 298, 497 & 612 PIPE FITTINGS - SEE SCOPES OF
REGISTRATION: 19095S-1 REV 8, 19095S-2 REV 9 & 14095S-3 REV 10
Expiry Date: 19-Dec-2029

Please be advised that a valid quality control system must be maintained for the fitting registration to remain valid until the expiry date.

Notes:

1. Please see updated scope: Catalog: Capitol #497, 14095s-2 R9; Camco #298, 14095s-1 R8 ,& Cap Products #309 14095s-3 R10
2. Unlisted components comply with ASME B31.3 - 2018 ed.
3. See statutory declaration documents for manufacturing location addresses.
4. Client wishes to continue registration number from 0A9967.2 for 0A14977.5 renewal.

A stamped copy of the approved registration and invoice for engineering services will be mailed to you shortly. Should you have any questions or require further assistance, however, please contact a Customer Service Advisor at 1.877.682.TSSA (8772) or e-mail customerservices@tssa.org. We will be happy to assist you. When contacting TSSA regarding this file, please refer to the Service Request number provided above.

Yours truly,

Alan Wu P. Eng.
Mechanical Engineer, BPV
Tel. : 416-734-3443
Fax : 416-231-6183
Email : awu@tssa.org



Technical Standards and Safety Authority
 345 Carlingview Drive
 Toronto, Ontario M9W 6N9
 www.tssa.org

CAPITOL
 manufacturing
 CAMCO, CAPPRODUCTS,
 CAPP



STATUTORY DECLARATION Registration of Fittings

I, Guy Cuccio Technical Services Manager
(Name and Position, e.g. President, Plant Manager, Chief Engineer)

of Capitol Manufacturing, CAMCO and CapProducts Ltd., Members of the Phoenix Forge Group
(Name of Manufacturer)

Located at 1125 Capitol Road, Crowley, LA, 70526, USA AND 25 Winnipeg Street,
 Vanastra, Ontario, NOM 1L0, Canada
(Plant Address) (Telephone No.) (Fax No.)

do solemnly declare that the fittings listed hereunder, which are subject to the **Technical Standards and Safety Act**, Boilers and Pressure Vessels Regulation, comply with all of the requirements of
ASME B16.11, MSS SP-79, MSS SP-83, MSS SP-95, MSS SP-114, ASTM A733 and API 5L
(Title of recognized North American Standard)

which specifies the dimensions, materials of construction, pressure/temperature ratings, identification marking the fittings and service;

or are not covered by the provisions of a recognized North American standard and are therefore manufactured to comply with _____ as supported by the attached data which identifies the dimensions, material of construction, pressure/temperature ratings and the basis for such ratings, the marking of the fitting for identification and service.

I further declare that the manufacture of these fittings is controlled by a quality system meeting the requirements of _____
ISO 9001:2015 which has been verified by the following authority, DNV-GI

The items covered by this declaration, for which I seek registration, are category A type fittings. In support of this application, the following information and/or test data are attached as follows:

See scope documents 14095s-1, 14095s-2, 14095s-3
(drawings, calculations, test reports, etc.)

Declared before me at Crowley in the State of Louisiana

the 14 day of November AD 2019

Commissioner for Oaths:

Brenda DeVillier
(Printed name)

Brenda DeVillier
(Signature)

Guy Cuccio
(Signature of Declarer)



FOR OFFICE USE ONLY

To the best of my knowledge and belief, the application meets the requirements of the **Technical Standards and Safety Act**, Boilers and Pressure Vessels Regulation, and CSA Standard B51 and is accepted for registration in Category A

CRN: OA0996725

Registered by: [Signature]

Dated: Feb 6, 2020

NOTE: This registration expires on: Dec 19, 2029

Technical Standards and Safety Authority
 Boilers and Pressure Vessels Safety Program

REGISTERED

C.R.N.: OA0996725

Signed: [Signature]

Date: Feb 6, 2020

SEE REGISTRATION LETTER FOR NOTES

PVE Engineering Document: 14095s-1 R8

December 19, 2019

PRESSURE VESSEL ENGINEERING SCOPE OF DESIGN VERIFICATION CAPITOL MANUFACTURING

Catalogue No. 298 Pipe Fitting – Canadian Registration Renewal – 2019

Class 2000 Stainless Steel Threaded Fittings:

Industry Standard: ASME B16.11

Design Code: ASME B31.3

Material: A182 F304/F304L, F316/F316L

- 90 Degree Elbows: NPS 1/8" to 2"
- 45 Degree Elbows: NPS 1/8" to 2"
- Tees: NPS 1/8" to 2"
- Crosses: NPS 1/8" to 2"



Class 3000 Stainless Steel Threaded Fittings:

Industry Standard: ASME B16.11

Design Code: ASME B31.3

Material: A182 F304/F304L, F316/F316L

- 90 Degree Elbows: NPS 1/8" to 2"
- 45 Degree Elbows: 1/8" to 2"
- Tees: NPS 1/8" to 2"
- Crosses: NPS 1/8" to 2"
- Street Elbows: NPS 1/8" to 1"
- Couplings: NPS 1/8" to 4"
- Half Couplings: NPS 1/8" to 4"
- Pipe Caps: NPS 1/8" to 4"

High Pressure Stainless Steel Hex Bushings:

Industry Standard: ASME B16.11

Material: A182 F304/F304L, F316/F316L

- NPS 1/4" to 4"

Stainless Steel Threaded Plugs:

Industry Standard: ASME B16.11

Design Code: ASME B31.3

Material: A182 F304/F304L, F316/F316L

- Square Head Plugs: NPS 1/8" to 4"
- Round Head Plugs: NPS 1/8" to 4"
- Hex Head Plugs: NPS 1/8" to 2"

Class 3000 Stainless Steel Threaded Reducing Couplings:

Industry Standard: ASME B16.11

Design Code: ASME B31.3

Material: A182 F304/F304L, F316/F316L

- NPS 1/4" to 4"

Class 6000 Stainless Steel Threaded Fittings:

Industry Standard: ASME B16.11

Design Code: ASME B31.3

Material: A182 F304/F304L, F316/F316L

- 90 Degree Elbows: NPS 1/8" to 2"
- 45 Degree Elbows: NPS 1/8" to 2"
- Tees: NPS 1/8" to 2"
- Crosses: NPS 1/8" to 1-1/4"
- Couplings: NPS 1/8" to 4"
- Half Couplings: NPS 1/8" to 4"
- Pipe Caps: NPS 1/8" to 4"

Class 6000 Stainless Steel Threaded Reducing Couplings:

Industry Standard: ASME B16.11

Design Code: ASME B31.3

Material: A182 F304/F304L, F316/F316L

- NPS 1/4" to 4"

Class 3000 Stainless Steel Threaded Unions:

Industry Standard: MSS SP-83

Design Code: ASME B31.3

Material: A182 F304/F304L, F316/F316L

- NPS 1/8" to 3"

Stainless Steel Swage Nipples [Threaded/Plain/Bevel Ends]:

Industry Standard: MSS SP-95

Design Code: ASME B31.3

Material: A403/SA403 F304/F304L, F316/F316L

- NPS 1/2" to 4"

Class 3000 Stainless Steel Socket-Welding Fittings:

Industry Standard: ASME B16.11

Design Code: ASME B31.3

Material: A182 F304/F304L, F316/F316L

- 90 Degree Elbows: NPS 1/8" to 2"
- 45 Degree Elbows: NPS 1/8" to 2"
- Tees: NPS 1/8" to 2"
- Crosses: NPS 1/8" to 2"
- Couplings: NPS 1/8" to 4"
- Half Couplings: NPS 1/8" to 4"
- Pipe Caps: NPS 1/8" to 4"

Class 3000 Stainless Steel Socket-Welding Reducer Inserts:

Industry Standard: MSS SP-79

Design Code: ASME B31.3

Material: A182 F304/F304L, F316/F316L

NPS

- 1/4" x 1/8"
- 3/8" x 1/4", 1/8"
- 1/2" x 3/8, 1/4, 1/8
- 3/4" x 1/2, 3/8, 1/4, 1/8
- 1" x 3/4, 1/2, 3/8, 1/4, 1/8
- 1-1/4" x 1, 3/4, 1/2, 3/8, 1/4, 1/8
- 1-1/2" x 1-1/4, 1, 3/4, 1/2, 3/8, 1/4, 1/8
- 2" x 1-1/2, 1-1/4, 1, 3/4, 1/2, 3/8, 1/4, 1/8
- 2-1/2" x 2, 1-1/2, 1-1/4, 1, 3/4, 1/2, 3/8, 1/4, 1/8
- 3" x 2-1/2, 2, 1-1/2, 1-1/4, 1, 3/4, 1/2, 3/8, 1/4, 1/8
- 4" x 3, 2-1/2, 2, 1-1/2, 1-1/4, 1, 3/4, 1/2, 3/8, 1/4, 1/8

Class 3000 Stainless Steel Socket-Welding Reducing Couplings:

Industry Standard: ASME B16.11

Design Code: ASME B31.3

Material: A182 F304/F304L, F316/F316L

- NPS 1/4" to 4"

Class 3000 Stainless Steel Socket-Welding Unions:

Industry Standard: MSS SP-83

Design Code: ASME B31.3

Material: A182 F304/F304L, F316/F316L

- NPS 1/8" to 3"

Class 6000 Stainless Steel Socket-Welding Unions:

Industry Standard: MSS SP-83

Design Code: ASME B31.3

Material: A182 F304/F304L, F316/F316L

- NPS 1/2" to 2"

Class 6000 Stainless Steel Socket-Welding Fittings:

Industry Standard: ASME B16.11

Design Code: ASME B31.3

Material: A182 F304/F304L, F316/F316L

- 90 Degree Elbows: NPS 1/8" to 2"
- 45 Degree Elbows: NPS 1/8" to 2"
- Tees: NPS 1/8" to 2"
- Crosses: NPS 1/2" to 2"
- Couplings: NPS 1/8" to 2"
- Half Couplings: NPS 1/8" to 2"
- Pipe Caps: NPS 1/8" to 2"

Class 6000 Stainless Steel Socket-Welding Reducer Inserts:

Industry Standard: MSS SP-79

Design Code: ASME B31.3

Material: A182 F304/F304L, F316/F316L

NPS

- 1/2" x 3/8, 1/4
- 3/4" x 1/2, 3/8, 1/4
- 1" x 3/4, 1/2, 3/8, 1/4
- 1-1/4" x 1, 3/4, 1/2, 3/8, 1/4
- 1-1/2" x 1-1/4, 1, 3/4, 1/2, 3/8, 1/4
- 2" x 1-1/2, 1-1/4, 1, 3/4, 1/2, 3/8, 1/4

Class 6000 Stainless Steel Socket-Welding Reducing Couplings:

Industry Standard: ASME B16.11

Design Code: ASME B31.3

Material: A182 F304/F304L, F316/F316L

- NPS 1/4" to 2"

Class 9000 Stainless Steel Socket-Welding Fittings:

Industry Standard: ASME B16.11

Design Code: ASME B31.3

Material: A182 F304/F304L, F316/F316L

- Couplings: NPS 1/2" to 2"
- Pipe Caps: NPS 1/2" to 2"

Class 9000 Stainless Steel Socket-Welding Reducing Couplings:

Industry Standard: ASME B16.11

Design Code: ASME B31.3

Material: A182 F304/F304L, F316/F316L

- NPS 1/2" to 2"

Proprietary Design - Unlisted Components:

Class 3000 Stainless Steel Socket-Welding Reducing Couplings:

Industry Standard: Proprietary Design – Unlisted Component

Design Code: ASME B31.3

Material: A182 F304/F304L, F316/F316L

- NPS Any with 3-1/2"

Table 1 - Class 3000 Stainless Steel Socket Weld Reducing Couplings 3.5" MAWP

Product	Large Bore NPS (in)	Large Bore Min Wall Thickness (in)	Material	Pressure (PSI) at 850 °F
Socket Weld Reducing Coupling 3.5"	3 1/2	0.348	ASTM A 182 F304	2195
	3 1/2	0.348	ASTM A 182 F304L	1885
	3 1/2	0.348	ASTM A 182 F316	2310
	3 1/2	0.348	ASTM A 182 F316L	1870

Notes:

The allowable working pressures were calculated based on allowable stress at design temperature using formulas specified in ASME B31.3 Section 304.

Class 6000 Stainless Steel Socket-Welding Fittings:

Industry Standard: Proprietary Design – Unlisted Component

Design Code: ASME B31.3

Material: A182 F304/F304L, F316/F316L

- NPS 2-1/2" to 4"

Table 2 - Class 6000 Stainless Steel Socket Weld Couplings, Pipe Caps and Tees MAWP

Product	Large Bore NPS (in)	Large Bore Min Wall Thickness (in)	Material	Pressure (PSI) at 850 °F
Socket Weld Coupling 2.5"	2 1/2	0.41	ASTM A 182 F304	3115
			ASTM A 182 F304L	2675
			ASTM A 182 F316	3280
			ASTM A 182 F316L	2655
Socket Weld Pipe Caps 2.5"			ASTM A 182 F304	2155
			ASTM A 182 F304L	1850
			ASTM A 182 F316	2270
			ASTM A 182 F316L	1840
Socket Weld Coupling 3"	3	0.478	ASTM A 182 F304	3080
			ASTM A 182 F304L	2650
			ASTM A 182 F316	3250
			ASTM A 182 F316L	2625
Socket Weld Pipe Caps 3"			ASTM A 182 F304	2135
			ASTM A 182 F304L	1835
			ASTM A 182 F316	2250
			ASTM A 182 F316L	1820
Socket Weld Coupling 4"	4	0.581	ASTM A 182 F304	3125
			ASTM A 182 F304L	2685
			ASTM A 182 F316	3295
			ASTM A 182 F316L	2665
Socket Weld Pipe Caps 4"			ASTM A 182 F304	2415
			ASTM A 182 F304L	2075
			ASTM A 182 F316	2545
			ASTM A 182 F316L	2060

Notes:

The allowable working pressures were calculated based on allowable stress at design temperature using formulas specified in ASME B31.3 Section 304.

Class 6000 Stainless Steel Socket-Welding Reducing Couplings:

Industry Standard: Proprietary Design – Unlisted Component

Design Code: ASME B31.3

Material: A182 F304/F304L, F316/F316L

- NPS 2-1/2" to 4"

Table 3 - Class 6000 Stainless Steel Socket Weld Reducing Couplings MAWP

Product	Large Bore NPS (in)	Large Bore Min Wall Thickness	Material	Pressure (PSI) at 850 °F
Socket Weld Reducing Coupling 2.5"	2 1/2	0.41	ASTM A 182 F304	3115
			ASTM A 182 F304L	2675
			ASTM A 182 F316	3280
			ASTM A 182 F316L	2655
Socket Weld Reducing Coupling 3"	3	0.478	ASTM A 182 F304	3080
			ASTM A 182 F304L	2650
			ASTM A 182 F316	3250
			ASTM A 182 F316L	2625
Socket Weld Reducing Coupling 4"	4	0.581	ASTM A 182 F304	3125
			ASTM A 182 F304L	2685
			ASTM A 182 F316	3295
			ASTM A 182 F316L	2665

Notes:

The allowable working pressures were calculated based on allowable stress at design temperature using formulas specified in ASME B31.3 Section 304.

General Note:

- 1) No allowances were made for corrosion, erosion, mechanical loads, and/or bending moments.
- 2) Allowable working pressures listed are non-shock working pressures.
- 3) For temperatures and working pressures above those listed consult the end users piping engineer.
- 4) Specifying the correct pipe schedule and pressure class of fitting depends on many different factors. Therefore, it is the ultimate responsibility of the end user's piping engineer to specify the correct pipe schedule and pressure class of fitting that will safely work in his intended application.
- 5) The dimensions and Pressure/Temperature tables shown in this scope document are property of Pheonix Forge Group and copyrighted that must not be shared or used to quality competitors fittings.

Verification:

Prepared by: Danial Havakhor
 Title: Mechanical Engineering Technologist

Reviewer by: Matt Hiskett, P.Eng
 Title: Engineering Supervisor
 Date: 12/19/2019
 Signature:

PVE Engineering Document: 14095s-2 R9

December 19, 2019

PRESSURE VESSEL ENGINEERING SCOPE OF DESING VERIFICATION CAPITOL MANUFACTURING

Capitol Manufacturing Catalogue No. 497 Pipe Fitting – Canadian Registration Renewal – 2019

Class 2000 Forged Carbon Steel Threaded Fittings:

Industry Standard: ASME B16.11

Design Code: ASME B31.3

Material: ASTM A105

- 90 Degree Elbows: NPS 1/8" to 4"
- 45 Degree Elbows: NPS 1/8" to 4"
- Crosses: NPS 1/8" to 4"



Class 3000 Forged Carbon Steel Threaded Fittings:

Industry Standard: ASME B16.11

Design Code: ASME B31.3

Material: ASTM A105

- 90 Degree Elbows: NPS 1/8" to 4"
- 45 Degree Elbows: NPS 1/8" to 4"
- Crosses: NPS 1/8" to 4"
- Street Elbow: NPS 1/8" to 2"
- Couplings: NPS 1/8" to 4"
- Half Couplings: NPS 1/8" to 4"
- Pipe Caps: NPS 1/8" to 4"
- Couplets: NPS 1/4" to 4"

Class 3000 Forged Carbon Steel Threaded Reducing Couplings:

Industry Standard: ASME B16.11

Design Code: ASME B31.3

Material: ASTM A105

- NPS 1/4" to 4"

Class 6000 Forged Carbon Steel Threaded Fittings:

Industry Standard: ASME B16.11

Design Code: ASME B31.3

Material: ASTM A105

- 90 Degree Elbows: NPS 1/8" to 4"
- 45 Degree Elbows: NPS 1/8" to 4" – Excluding NPS 3"
- Crosses: NPS 1/8" to 4"
- Street Elbow: NPS 1/4" to 2"
- Couplings: NPS 1/8" to 4"
- Half Couplings: NPS 1/8" to 4"
- Pipe Caps: NPS 1/8" to 4"
- Couplets: NPS 1/4" to 4"

Class 6000 Carbon Forged Steel Threaded Reducing Couplings:

Industry Standard: ASME B16.11

Design Code: ASME B31.3

Material: ASTM A105

- NPS 1/4" to 4"

Forged Carbon Steel Hex Bushings:

Industry Standard: ASME B16.11

Design Code: ASME B31.3

Material: ASTM A105

- NPS 1/4" to 4"

Forged Carbon Steel Threaded Plugs:

Industry Standard: ASME B16.11

Design Code: ASME B31.3

Material: ASTM A105

- Square Head Plugs: NPS 1/8" to 2"
- Round Head Plugs: NPS 1/8" to 2"
- Hex Head Plugs: NPS 1/8" to 2"
- Hex Head Refinery: NPS 1/4" to 2"

Class 3000 Forged Carbon Steel Socket Weld Fittings:

Industry Standard: ASME B16.11

Design Code: ASME B31.3

Material: ASTM A105

- 90 Degree Elbows: NPS 1/8" to 4"
- 45 Degree Elbows: NPS 1/8" to 4"
- Crosses: NPS 1/8" to 4"
- Couplings: NPS 1/8" to 2"
- Half Couplings: NPS 1/8" to 2"
- Pipe Caps: NPS 1/8" to 4"
- Couplets: NPS 1/8" to 4"

Class 6000 Forged Carbon Steel Socket Weld Fittings:

Industry Standard: ASME B16.11

Design Code: ASME B31.3

Material: ASTM A105

- 90 Degree Elbows: NPS 1/8" to 2"
- 45 Degree Elbows: NPS 1/8" to 2"
- Crosses: NPS 1/2" to 2"
- Couplings: NPS 1/8" to 2"
- Half Couplings: NPS 1/8" to 2"
- Pipe Caps: NPS 1/8" to 2"
- Couplets: NPS 1/8" to 3"

Class 9000 Forged Carbon Steel Socket Weld Fittings:

Industry Standard: ASME B16.11

Design Code: ASME B31.3

Material: ASTM A105

- 90 Degree Elbows: NPS 1/2" to 2"
- 45 Degree Elbows: NPS 1/2" to 2"
- Couplings: NPS 1/2" to 2"
- Half Couplings: NPS 1/2" to 2"
- Pipe Caps: NPS 1/2" to 2"

Class 3000 Forged Carbon Steel Socket Weld Reducing Couplings:

Industry Standard: ASME B16.11

Design Code: ASME B31.3

Material: ASTM A105

- NPS 1/4" to 4" (Except NPS 3-1/2")

Class 6000 Forged Carbon Steel Socket Weld Reducing Couplings:

Industry Standard: ASME B16.11

Design Code: ASME B31.3

Material: ASTM A105

- NPS 1/4" to 2"

Class 9000 Forged Carbon Steel Socket Weld Reducing Couplings:

Industry Standard: ASME B16.11

Design Code: ASME B31.3

Material: ASTM A105

- NPS 1/2" to 2"

Class 3000 Forged Carbon Steel Socket Weld Reducer Inserts:

Industry Standard: MSS SP-79

Design Code: ASME B31.3

Material: ASTM A105

- NPS 1/2in to 4in, with reductions to 1/8in.

Class 6000 Forged Carbon Steel Socket Weld Reducer Inserts:

Industry Standard: MSS SP-79

Design Code: ASME B31.3

Material: ASTM A105

- NPS:
 - o 1/2 x 3/8
 - o 1/2 x 1/4
 - o 3/4 x 1/2
 - o 3/4 x 3/8
 - o 3/4 x 1/4
 - o 1 x 3/4
 - o 1 x 1/2
 - o 1 x 3/8
 - o 1 x 1/4
 - o 1-1/4 x 1
 - o 1-1/4 x 3/4
 - o 1-1/4 x 1/2
 - o 1-1/4 x 3/8
 - o 1-1/4 x 1/4
 - o 1-1/2 x 1-1/4
 - o 1-1/2 x 1
 - o 1-1/2 x 3/4
 - o 1-1/2 x 1/2
 - o 1-1/2 x 3/8
 - o 1-1/2 x 1/4
 - o 1-1/2 x 3/8
 - o 1-1/2 x 1/4
 - o 2 x 1-1/2
 - o 2 x 1-1/4
 - o 2 x 1
 - o 2 x 3/4
 - o 2 x 1/2
 - o 2 x 3/8
 - o 2 x 1/4
- Note: 1"x3/4"

Class 3000 Forged Carbon Steel Threaded Unions X-Series:

Industry Standard: MSS SP-83

Design Code: ASME B31.3

Material: ASTM A105

- Threaded X-Series: NPS 1/8" to 3"
- Brass Seat X-Series: NPS 1/4" to 2"

Class 6000 Forged Carbon Steel Threaded Unions X-Series:

Industry Standard: MSS SP-83

Design Code: ASME B31.3

Material: ASTM A105

- Threaded, X-Series: NPS 1/8" to 2"

Class 3000 Forged Carbon Steel Socket Weld Unions X-Series:

Industry Standard: MSS SP-83

Design Code: ASME B31.3

Material: ASTM A105

- Socket Welding X-Series: NPS 1/8" to 3"

Class 6000 Forged Carbon Steel Socket Weld Unions X-Series:

Industry Standard: MSS SP-83

Design Code: ASME B31.3

Material: ASTM A105

- Socket Welding X-Series: NPS 1/2" to 2"

Pipe Nipples:

Industry Standard: ASTM 733

Design Code: ASME B31.3

Material: ASTM A53 type F, ASTM A53 type E, ASTM A53 type S, ASTM A106 Gr B, API 5L Gr B, ASTM A333 Gr 6, ASTM A312 Type 304/304L or 316/316L

- NPS 1/8" to 8"

Swage Nipples – Threaded Both Ends:

Industry Standard: MSS SP-95

Design Code: ASME B31.3

Material: ASTM A234 Grade WPB

- NPS 1/2" to 6"

Swage Nipples – Bevelled Both Ends:

Industry Standard: MSS SP-95

Design Code: ASME B31.3

Material: ASTM A234 Grade WPB

- NPS 1/2" to 6"

Swage Nipples – Plain Both Ends:

Industry Standard: MSS SP-95

Design Code: ASME B31.3

Material: ASTM A234 Grade WPB

- NPS 1/2" to 6"

Swage Nipples – Eccentric TBE, BBE, PBE:

Industry Standard: MSS SP-95

Design Code: ASME B31.3

Material: ASTM A234 Grade WPB

- NPS 3/8" to 4"

Bull Plugs:

Industry Standard: MSS SP-95

Design Code: ASME B31.3

Material: ASTM A234 Grade WPB

- Hollow, Threaded: NPS 1" to 4"
- Hollow, Welding Bevel: NPS 2-1/2", 3" and 4"
- Hollow, API 8 Round Threads: NPS 2" to 3-1/2"
- Round, Threaded: NPS 1/8" to 2"
- Hollow, Threaded, Tapped: NPS 1" to 2"
- Hex, Threaded: NPS 1/4" to 1"

Proprietary Design - Unlisted Components:

Class 6000 Forged Carbon Steel Socket Weld Fittings:

Industry Standard: Proprietary Design – Unlisted Component

Design Code: ASME B31.3

Material: ASTM A105

- 90 Degree Elbows: NPS 2-1/2", 3" and 4"
- 45 Degree Elbows: NPS 2-1/2", 3"
- Couplings: NPS 2-1/2", 3" and 4"
- Half Couplings: NPS 2-1/2", 3" and 4"
- Pipe Caps: NPS 2-1/2", 3" and 4"

Table 4 - Class 6000 Forged Carbon Steel Socket Weld Fittings MAWP

Product	Material	NPS	Pressure (PSI) at 650 °F
Class 6000, 45 deg and 90 deg Elbow	ASTM A105	2 1/2	3970
		3	3895
		4	3735
Class 6000, 90 deg Elbow		2 1/2	3720
		3	3685
		4	3735
Class 6000 Coupling and Half Coupling		2 1/2	2575
		3	2455
		4	2745
Class 6000 Pipe Cap			

Notes:

The allowable working pressures were calculated based on allowable stress at design temperature using formulas specified in ASME B31.3 Section 304.

Class 9000 Forged Carbon Steel Socket Weld Fittings:

Industry Standard: Proprietary Design – Unlisted Component

Design Code: ASME B31.3

Material: ASTM A105

- 90 Degree Elbows: NPS 1/4", 3/8", 2-1/2" and 3"
- 45 Degree Elbows: NPS 1/4", 3/8", 2-1/2"

Table 5 - Class 9000 Forged Carbon Steel Socket Weld Fittings MAWP

Product	Material	NPS	Pressure (PSI) at 650 °F
Class 9000, 45 deg and 90 deg Elbow	ASTM A105	1/4	8285
		3/8	7605
		2 1/2	5035
Class 9000, 90 deg Elbow		3	4465

Notes:

The allowable working pressures were calculated based on allowable stress at design temperature using formulas specified in ASME B31.3 Section 304.

Class 6000 Forged Carbon Steel Socket Weld Reducing Couplings:

Industry Standard: Proprietary Design – Unlisted Component

Design Code: ASME B31.3

Material: ASTM A105

- NPS 2-1/2" to 4"

Table 6 - Class 6000 Forged Carbon Steel Socket Weld Reducing Couplings MAWP

Product	Material	NPS	Pressure (PSI) at 650 °F
Class 6000 Socket Weld Reducing Coupling	ASTM A105	2 1/2	3720
		3	3685
		4	3735

Notes:

The allowable working pressures were calculated based on allowable stress at design temperature using formulas specified in ASME B31.3 Section 304.

Class 9000 Forged Carbon Steel Socket Weld Reducing Couplings:

Industry Standard: Proprietary Design – Unlisted Component

Design Code: ASME B31.3

Material: ASTM A105

- NPS 1/4" to 3/8", 2-1/2"

Table 7 - Class 9000 Forged Carbon Steel Socket Weld Reducing Couplings

Product	Material	NPS	Pressure (PSI) at 650 °F
Class 9000 Socket Weld Reducing Coupling	ASTM A105	1/4	6530
		3/8	9720
		2 1/2	10145

Notes:

The allowable working pressures were calculated based on allowable stress at design temperature using formulas specified in ASME B31.3 Section 304.

Class 3000 Forged Carbon Steel Threaded Unions X-Series:

Industry Standard: Proprietary Design – Unlisted Component

Design Code: ASME B31.3

Material: ASTM A105

- High Speed, Acme Threads, Threaded, X-Series: NPS 1/2" to 3" (Acme thread was not found in the standard)
- High Speed, Acme Threads, O-Ring, Threaded, X-Series: NPS 1/2" to 3" (Acme thread was not found in the standard)
- Lug, Threaded X-Series: NPS 1/4" to 3"
- Lug, O-Ring, Threaded X-Series: NPS 1/2" to 3"

Table 8 - Class 3000 Forged Carbon Steel Threaded Unions X-Series MAWP

Product	Material	NPS	Pressure (PSI) at 650 °F
Class 3000 Threaded High Speed ACME Thread Lug	ASTM A105	1/4	7780
Class 3000 Threaded High Speed ACME Thread/ O-Ring/ Lug/ Lug, O-Ring		3/8	6970
		1/2	6460
		3/4	5685
		1	5280
		1 1/4	4540
		1 1/2	4420
		2	4180
		2 1/2	3895
		3	3925

Notes:

The allowable working pressures were calculated based on allowable stress at design temperature using formulas specified in ASME B31.3 Section 304.

Class 6000 Forged Carbon Steel Threaded Unions X-Series:

Industry Standard: Proprietary Design – Unlisted Component

Design Code: ASME B31.3

Material: ASTM A105

- NPS 1/2" to 2"

Table 9 - Class 6000 Forged Carbon Steel Lug, Threaded X-Series Unions MAWP

Product	Material	NPS	Pressure (PSI) at 650 °F
Class 6000 Lug, Threaded, X-Series	ASTM A105	1/2	8870
		3/4	7550
		1	7485
		1 1/4	6255
		1 1/2	5210
		2	5025

Notes:

The allowable working pressures were calculated based on allowable stress at design temperature using formulas specified in ASME B31.3 Section 304.

Class 3000 Forged Carbon Steel Socket Weld Unions X-Series:

Industry Standard: Proprietary Design – Unlisted Component

Design Code: ASME B31.3

Material: ASTM A105

- High Speed, Acme Threads, Socket Welding, X-Series: NPS 1/2" to 3" (Acme thread was not found in the standard)
- High Speed, Acme Threads, O-Ring, Socket Welding, X-Series: NPS 1/2" to 3" (Acme thread was not found in the standard)
- Lug, Socket Welding X-Series: NPS 1/2" to 3"
- Lug, O-Ring, Socket Welding X-Series: NPS 1/2" to 3"

Table 10 - Class 3000 Forged Carbon Steel Socket Weld Unions X-Series MAWP

Product	Material	NPS	Pressure (PSI) at 650 °F
Class 3000 SW High Speed ACME Thread/ O-Ring/ Lug/ Lug, O-Ring	ASTM A105	1/2	5190
		3/4	4490
		1	4270
		1 1/4	3700
		1 1/2	3400
		2	2985
		2 1/2	3200
		3	2815

Notes:

The allowable working pressures were calculated based on allowable stress at design temperature using formulas specified in ASME B31.3 Section 304.

Class 6000 Forged Carbon Steel Socket Weld Unions X-Series:

Industry Standard: Proprietary Design – Unlisted Component

Design Code: ASME B31.3

Material: ASTM A105

- NPS 1/2" to 2-1/2"

Table 11 - Class 6000 Forged Carbon Steel Lug, Socket Weld X-Series Unions MAWP

Product	Material	NPS	Pressure (PSI) at 650 °F
Class 6000 Lug, SW, X-Series	ASTM A105	1/2	8595
		3/4	7550
		1	7485
		1 1/4	6255
		1 1/2	5210
		2	5025
		2 1/2	4255

Notes:

The allowable working pressures were calculated based on allowable stress at design temperature using formulas specified in ASME B31.3 Section 304.

Couplings – Standard Merchant, Couplings:

Industry Standard: Proprietary Design – Unlisted Component

Design Code: ASME B31.3

- Couplings, Standard Merchant: NPS 1/8" to 6"
- Standard Merchant, R&L: NPS 1/8" to 4"
- Half Couplings, Standard Merchant: NPS 1/8" to 6"
- Couplings, XH No Recess, Threaded: NPS 1/8" to 6"
- Half Couplings, XH, Recess, Taper Thread: NPS 3/4" to 12"
- Half Couplings, XH, No Recess, Taper Thread: NPS 1/4" to 6"

Table 12 - Couplings – Standard Merchant, Couplings MAWP

Product	Material	NPS	Pressure (PSI) at 650 °F
Coupling, Couplings - Standard Merchant, Full and Half, R&L	ASTM A106 Gr B	1/8	4685
		1/4	4125
		3/8	3760
		1/2	3410
		3/4	3250
		1	2660
		1 1/4	2000
		1 1/2	2165
		2	2165
		2 1/2	1820
		3	1975
		3 1/2	2145
		4	1565
		5	1835
6	1625		
8	1640		
10	1335		
12	1400		

Notes:

The allowable working pressures were calculated based on allowable stress at design temperature using formulas specified in ASME B31.3 Section 304.

Couplings:

Industry Standard: Proprietary Design – Unlisted Component

Design Code: ASME B31.3

Material: ASTM A106 Gr B

- NPS 1 1/4” – 4”

Table 13 - Waterwell Ream & Drifted, Threaded Couplings MAWP

Product	Material	NPS	Pressure (PSI) at 650 °F
Waterwell Ream & Drifted, Threaded	ASTM A106 Gr B	1 1/4	515
		1 1/2	535
		2	575
		2 1/2	480
		3	395
		3 1/2	350
		4	310

Notes:

The allowable working pressures were calculated based on allowable stress at design temperature using formulas specified in ASME B31.3 Section 304.

Siphons:

Industry Standard: Proprietary Design – Unlisted Component

Design Code: ASME B31.3

Material: A53F, A106 Gr B, A312 TP304, A312 TP304L, A312 TP316, A312 TP316L

- NPS 1/4 and 1/2 (Sch STD and XH)

Table 15 – Siphons, Angle, Pigtail, Straight MAWP

Product	Material	NPS	Schedule	Pressure (PSI) at 650 °F CS / 850 °F SS
Siphons, Angle, Pigtail, Straight	A53 F	1/4	STD	1845
		1/4	XH	3540
		1/2	STD	1375
		1/2	XH	2665
	A106 Gr B	1/4	STD	2190
		1/4	XH	4195
		1/2	STD	1630
		1/2	XH	3155
	A312 TP304	1/4	STD	1885
		1/4	XH	3610
		1/2	STD	1405
		1/2	XH	2720
	A312 TP304L	1/4	STD	1620
		1/4	XH	3100
		1/2	STD	1205
		1/2	XH	2335
	A312 TP316	1/4	STD	1985
		1/4	XH	3805
		1/2	STD	1480
		1/2	XH	2865
	A312 TP316L	1/4	STD	1605
		1/4	XH	3075
		1/2	STD	1195
		1/2	XH	2315

Notes:

The allowable working pressures were calculated based on allowable stress at design temperature using formulas specified in ASME B31.3 Section 304.

General Note:

- 1) No allowances were made for corrosion, erosion, mechanical loads, and/or bending moments.
- 2) Allowable working pressures listed are non-shock working pressures.
- 3) For temperatures and working pressures above those listed consult the end users piping engineer.
- 4) Specifying the correct pipe schedule and pressure class of fitting depends on many different factors. Therefore, it is the ultimate responsibility of the end user's piping engineer to specify the correct pipe schedule and pressure class of fitting that will safely work in his intended application.
- 5) The dimensions and Pressure/Temperature tables shown in this scope document are property of Pheonix Forge Group and copyrighted that must not be shared or used to quality competitors fittings.

Verification:

Prepared by: Danial Havakhor
Title: Mechanical Engineering Technologist

Reviewer by: Matt Hiskett, P.Eng
Title: Engineering Supervisor
Date: 12/20/2019
Signature:

PVEng Document No. 14095s-3 R10

November 6, 2019

PRESSURE VESSEL ENGINEERING SCOPE OF DESIGN VERIFICATION CAPITOL MANUFACTURING**CATALOG CapProducts Ltd. – Product Catalog Rev.612 – CANADIAN REGISTRATION RENEWAL - 2019****Carbon Steel Couplings (Standard Merchant):**

Design Code: ASTM A865

Materials: A53 F, A106 Gr.B

- NPS 1/8" to 6"
 - Straight and Taper Tapped
 - Full Couplings
 - Half Couplings

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Technical Standards and Safety Authority
Boilers and Pressure Vessels Safety
Program**Carbon Steel Couplings (XH):**

Design Code: ASTM A865

Materials: A105

- NPS 1/8"-6" (XH No Recess, Threaded)
 - Full Couplings
 - Half Couplings

API Line Pipe Couplings:

Design Code: ASME B31.3

Industry Standard: API 5L

Materials: API 5L

- NPS 1/8" to 12"
 - Full Couplings

Unlisted Components:**Carbon Steel & Stainless Pipe Nipples:**

Industry Code: ASTM A733-16

Design Code: ASME B31.3

Material: A53 F, A53 ERW, A106 Gr.B, A333 Gr.6, A312 304/304L, A312 316/316L

- NPS 1/8" to 8"
 - SCH40, SCHXS, SCH160, SCH XXS
 - Plain End
 - NPTF
 - BST
 - NPSM
 - NPSL
 - LH Thread
- Calculations: 14095c-6 R0
 - CS MAX TEMP: 650°F
 - SS MAX TEMP: 850°F

Table 1 - Maximum Pressure (PSI) for Pipe Nipples

NPS	SCH40		SCHXS		SCH160		SCHXXS	
	CS	SS	CS	SS	CS	SS	CS	SS
0.125	2,285	2,335	4,310	4,400	-	-	-	-
0.250	1,845	1,885	3,540	3,610	-	-	-	-
0.375	1,585	1,620	3,085	3,150	-	-	-	-
0.500	1,375	1,405	2,665	2,720	4,155	4,240	8,315	8,485
0.750	1,195	1,220	2,290	2,340	4,165	4,250	6,955	7,095
1.000	1,065	1,090	2,040	2,080	3,640	3,715	6,315	6,440
1.250	955	975	1,800	1,835	2,825	2,885	5,335	5,445
1.500	900	920	1,695	1,730	2,925	2,985	4,885	4,985
2.000	815	835	1,550	1,585	3,085	3,145	4,285	4,370
2.500	805	820	1,495	1,525	2,470	2,520	4,350	4,440
3.000	755	770	1,405	1,435	2,525	2,575	3,925	4,005
3.500	725	740	1,345	1,375	-	-	3,665	3,740
4.000	710	720	1,310	1,335	2,530	2,580	3,480	3,550
5.000	670	685	1,235	1,260	2,505	2,555	3,170	3,235
6.000	650	660	1,265	1,290	2,490	2,540	3,140	3,200
8.000	625	635	1,175	1,200	2,505	2,555	2,400	2,450

NOTES:

- The allowable working pressures were calculated based on the allowable stress at design temperature using formulas specified in ASME B31.3, Section 304.

Half Couplings (Standard Merchant):

Industry Code: ASTM A865

Design Code: ASME B31.3

Materials: A53 F, A106 Gr.B

- Half Couplings 1/8" – 6" (Standard Merchant)
 - o Straight and Taper Tapped
 - Straight Thread = NPSC
 - Taper Thread = NPT
- Calculations: 14095c-6 R0
 - o CS MAX TEMP: 650°F

Half Couplings XH:

Industry Code: ASTM A865

Design Code: ASME B31.3

Materials: A105

- Half Couplings (XH No Recess, Threaded)
- Calculations: 14095c-6 R0
 - o CS MAX TEMP: 650°F

Table 2: Maximum Pressure (PSI)

	Standard Merchant Coupling		XH Cplng
	Straight THD	NPT THD	NPT
0.125	12,290	3,340	4,070
0.250	10,510	3,055	3,725
0.375	9,235	2,880	3,510
0.500	8,610	2,695	3,290
0.750	6,835	2,645	3,240
1.000	5,740	2,165	2,640
1.250	5,375	-	3,290
1.500	4,975	-	2,205
2.000	4,200	-	3,040
2.500	-	1,565	2,565
3.000	-	1,770	2,145
3.500	-	1,960	2,370
4.000	-	1,400	2,380
5.000	-	1,680	2,045
6.000	-	1,490	1,815

NOTES:

1. The allowable working pressures were calculated based on the allowable stress at design temperature using formulas specified in ASME B31.3, Section 304.

GENERAL NOTES:

1. No allowances were made for corrosion, erosion, mechanical loads, and/or bending moments.
2. Allowable working pressures listed are non-shock working pressures.
3. For temperatures and working pressures above those listed consult the end users piping engineer.
4. Specifying the correct pipe schedule and pressure class of fitting depends on many different factors. Therefore, it is the ultimate responsibility of the end user's piping engineer to specify the correct pipe schedule and pressure class of fitting that will safely work in his/her intended application.
5. The dimensions and Pressure/Temperature tables shown in this scope document are property of Pheonix Forge Group and copyrighted that must not be shared or used to quality competitors fittings.

Verification:

Prepared by: Michael Tomlinson
 Title: Mechanical Engineering Technologist

Reviewer by: Matt Hiskett, P.Eng
 Title: Engineering Supervisor
 Date: 11/14/2019
 Signature: