Régie du bâtiment
Québec
Direction générale de l'inspection

Montréal, March 4 2020

MME CATHERINE DIPLOCK
PRESSURE VESSEL ENGINEERING LTD
120 RANDAL DRIVE, SUITE B
WATERLOO, ONTARIO,
CANADA N2V 1C6

Manufacturer : THE PHOENIX FORGE GROUP
800 FRONT STREET
CATASAUQUA, PA 18032 USA

Our reference : 951675
Design number : CATALOGUE # 298, SCOPE 14095S-1 R8, #497 SCOPE 14095S-2 R9, #612
SCOPE 14095S-3 R10

Subject: Registration of designs – Confirmation of approval

Dear Madam,

The Régie du bâtiment du Québec (RBQ) informs you that your application for the registration of designs has been evaluated and that the design was registered under the Canadian Registration Number (CRN\NEC) : 0A09967.26

We bring your attention this requirement of the regulation respecting pressure vessels, and the codes and standards adopted:

- The manufacturer must maintain a valid quality control program to produce according to the CRN.

This notice of approval does not relieve the constructor of his responsibilities with respect to the design or construction of equipment manufactured according to this CRN.

Yours sincerely,

Bureau d'expertise et d'homologation en équipements sous pression

Montréal
545, boul. Crémazie Est, 7e étage
Montréal (Québec) H2M 2V2
Téléphone : 514 873-6459
Sans frais : 1 866 262-2084
www.rbq.gouv.qc.ca

Régie du bâtiment
Québec

Direction générale de l'inspection

Montréal, 4 Mars 2020

MME CATHERINE DIPLOCK
PRESSURE VESSEL ENGINEERING LTD
120 RANDAL DRIVE, SUITE B
WATERLOO, ONTARIO,
CANADA N2V 1C6

Fabricant : THE PHOENIX FORGE GROUP
800 FRONT STREET
CATASAUQUA, PA 18032 USA

Numéro de dossier : 951675
Numéro(s) de dessin (s) : CATALOGUE # 298 SCOPE 14095 S-1 R8, # 497 SCOPE 14095 S-2 R9, #612 SCOPE 14095 S-3 R10

Objet : Enregistrement des plans et devis – Confirmation de l'enregistrement

Madame,

La Régie du bâtiment du Québec (RBQ) vous informe que votre demande d'enregistrements de plans et devis a été traitée et que cette conception a été enregistrée sous le numéro d'enregistrement canadien (NEC\CRN) : 0A09967.26

Nous portons à votre attention cette exigence applicable à la règlementation sur les appareils sous pression et des codes et normes qui y sont associés :

- Le constructeur doit maintenir un système de contrôle de la qualité valide pour fabriquer selon ce NEC.

Le présent avis d'approbation ne dégage pas le constructeur de ses responsabilités quant à la conception ou à la construction des équipements fabriqués selon ce NEC.

Salutations distinguées,

Bureau d'expertise et d'homologation en équipements sous pression

N.B. Translation of this communication below.

Montréal
545, boul. Crémazie Est, 7e étage
Montréal (Québec) H2M 2V2
Téléphone : 514 873-6459
Sans frais : 1 866 262-2084
www.rbq.gouv.qc.ca

Régie du bâtiment Québec

Statutory Declaration Registration of Fittings

Building Act (B-1.1)
Regulation respecting pressure vessels (B-1.1, r. 6.1)
Boiler, pressure vessel, and pressure piping code (CSA B51)

This declaration must be filled out and sent to the Régie du bâtiment du Québec (RBQ) by pressure fitting manufacturers when they make an application registration for fittings.

For more information on the application registration for fittings, consult the www.rbq.gouv.qc.ca/fittings-pv.

1. Fittings to register

List the fittings included in this declaration and that you wish to register.

N°	Description	Additional information (detail, calculations or approval sheets)
1	See scope documents	14095s-1, 14095s-2, 14095s-3
2		
3	14095s-1 R8; December 19/2019	CATALOGUE # 298
4	14095s-2 R9; December 19/2019	" # 497
5	14095s-3 R10; November 06/2019	" # 612

2. Declaration of the person in charge

The person in charge is someone in a position of authority, such as a vice-president, a plant manager or a chief engineer.

2.1 Design

I, the undersigned, Guy Cuccio (Name of the person in charge) Technical Services Manager (Title of the person in charge)

from Capitol Manufacturing, CAMCO and CapProducts Ltd., Members of the Phoenix Forge Group located at 1125 Capitol Road, Crowley, LA, 70526, USA AND 25 Winnipeg Street, Vanastra, Ontario, NOM 1L0, Canada (Plant's address)

hereby declare that the above-mentioned fittings and subject to the Regulation respecting pressure installations:

☑ comply with the requirements of the ANSI/ASME codes as to their dimensions, identification, material and purpose

or

☐ are not covered by the ANSI/ASME codes, but are in compliance with _____ (Name of code or standard)

code or standard and are designed according to the best current engineering practice, as proven by the enclosed approval report.

2.2 Manufacturing quality control

I further declare that the manufacture of these fittings is controlled by a quality control program that complies with the requirements of the following code: ISO 9001:2015 (Name of code), and has been verified by DNV-GL (Authorized agency).

Signature of the person in charge:	Date (yyyy-mm-dd): 2019 November 14

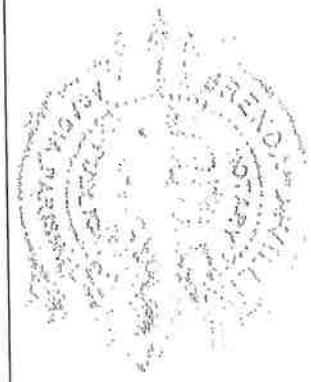
3. Declaration of commissioner for oaths

I certify that this declaration has been administered before me, at Louisiana (Location), on 2019 November 14 (Date (yyyy-mm-dd)).

Signature of commissioner for oaths: Brenda D. Miller

Date (yyyy-mm-dd): 2019-11-14

Stamp the seal:



4. Registration confirmation (for RBQ's use only)

As far as I know, this application complies with the requirements of the Act and with standard CSA B51, Part 1, section 4.2, and is accepted for registration in the class A.

This registration expires in ten (10) years after the date of registration indicated above, and it must be validated again after this period.

Canadian registration number (CRN): 0A09967.26

Registration date (yyyy-mm-dd):

QUÉBEC
ENREGISTRÉ
NEC (CRN) : 0A09967.26
DATE : 02 MARS 2020

Documents to attach

Any application registration for fittings must include these documents:

- Statutory Declaration Registration of Fittings (2 copies)
- Detailed calculations or burst test report (1 copy)
- Detailed technical drawings or catalogues (2 copies)
- Example of the manufacturer's marking (1 copy)
- Proof that a valid and approved quality control program has been implemented (1 copy)
- Form Application for design registration (1 copy)

Sending the form

This declaration is mandatory in order to submit an application registration of fittings.

Application registration for fittings must only be sent by mail to this address:
Bureau d'expertise et d'homologation en équipements sous pression
Régie du bâtiment du Québec
545, boulevard Crémazie Est, 7e étage
Montréal (Québec) H2M 2V2

Régie du bâtiment Québec

Statutory Declaration Registration of Fittings

Building Act (B-1.1)
Regulation respecting pressure vessels (B-1.1, r. 6.1)
Boiler, pressure vessel, and pressure piping code (CSA B51)

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2		
3	14095s-1 R8; December 19/2019	CATALOGUE # 298
4	14095s-2 R9; December 19/2019	" # 497
5	14095s-3 R10; November 06/2019	" # 612.

2. Declaration of the person in charge

The person in charge is someone in a position of authority, such as a vice-president, a plant manager or a chief engineer.

2.1 Design

I, the undersigned, Guy Cuccio (Name of the person in charge) Technical Services Manager (Title of the person in charge),

from Capitol Manufacturing, CAMCO and CapProducts Ltd., Members of the Phoenix Forge Group located at 1125 Capitol Road, Crowley, LA, 70526, USA AND 25 Winnipeg Street, Vanastra, Ontario, NOM 1L0, Canada (Plant's address)

hereby declare that the above-mentioned fittings and subject to the Regulation respecting pressure installations:

☑ comply with the requirements of the ANSI/ASME codes as to their dimensions, identification, material and purpose

or

☐ are not covered by the ANSI/ASME codes, but are in compliance with _____ (Name of code or standard)

code or standard and are designed according to the best current engineering practice, as proven by the enclosed approval report.

2.2 Manufacturing quality control

I further declare that the manufacture of these fittings is controlled by a quality control program that complies with the requirements of the following code: ISO 9001:2015 (Name of code), and has been verified by DNV-GL (Authorized agency).

Signature of the person in charge:	Date (yyyy-mm-dd): 2019 November 14

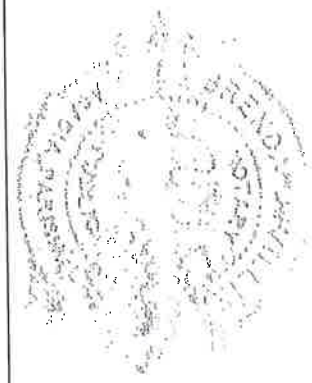
3. Declaration of commissioner for oaths

I certify that this declaration has been administered before me, at Louisiana (Location), on 2019 November 14 (Date (yyyy-mm-dd)).

Signature of commissioner for oaths: Brenda D. Nier

Date (yyyy-mm-dd): 2019-11-14

Stamp the seal:



4. Registration confirmation (for RBQ's use only)

As far as I know, this application complies with the requirements of the Act and with standard CSA B51, Part 1, section 4.2, and is accepted for registration in the class A.

This registration expires in ten (10) years after the date of registration indicated above, and it must be validated again after this period.

Canadian registration number (CRN): OA09967.26

Registration date (yyyy-mm-dd):

QUÉBEC
ENREGISTRÉ
NEC (CRN) : OA09967.26
DATE : 02 MARS 2020

Documents to attach

Any application registration for fittings must include these documents:

- Statutory Declaration Registration of Fittings (2 copies)
- Detailed calculations or burst test report (1 copy)
- Detailed technical drawings or catalogues (2 copies)
- Example of the manufacturer's marking (1 copy)
- Proof that a valid and approved quality control program has been implemented (1 copy)
- Form Application for design registration (1 copy)

Sending the form

This declaration is mandatory in order to submit an application registration of fittings.

Application registration for fittings must only be sent by mail to this address:
Bureau d'expertise et d'homologation en équipements sous pression
Régie du bâtiment du Québec
545, boulevard Crémazie Est, 7e étage
Montréal (Québec) H2M 2V2

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

OA09967.26

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:

1. 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)
  - Straight and Taper Tapped
    - Straight Thread = NPSC
    - Taper Thread = NPT
- Calculations: 14095c-6 R0
  - 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
  - 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.

GENREAL 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:

0A09967.26

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 ½" to 2"
- Couplings: NPS ½" to 2"
- Half Couplings: NPS ½" to 2"
- Pipe Caps: NPS ½" 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:
  - 1/2 x 3/8
  - 1/2 x 1/4
  - 3/4 x 1/2
  - 3/4 x 3/8
  - 3/4 x 1/4
  - 1 x 3/4
  - 1 x 1/2
  - 1 x 3/8
  - 1 x 1/4
  - 1-1/4 x 1
  - 1-1/4 x 3/4
  - 1-1/4 x 1/2
  - 1-1/4 x 3/8
  - 1-1/4 x 1/4
  - 1-1/2 x 1-1/4
  - 1-1/2 x 1
  - 1-1/2 x 3/4
  - 1-1/2 x 1/2
  - 1-1/2 x 3/8
  - 1-1/2 x 1/4
  - 2 x 1-1/2
  - 2 x 1-1/4
  - 2 x 1
  - 2 x 3/4
  - 2 x 1/2
  - 2 x 3/8
  - 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
Class 6000, 90 deg Elbow		4	3735
Class 6000 Coupling and Half Coupling		2 1/2	3720
		3	3685
		4	3735
Class 6000 Pipe Cap		2 1/2	2575
		3	2455
		4	2745

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"

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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" to3" (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:

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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"

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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"

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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.
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Verification:

Prepared by: Danial Havakhor
Title: Mechanical Engineering Technologist

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