

### CERTIFICATION/LISTINGS



**NOTE**

- See Victaulic [Publication 10.01](#) for more details

The American Society of Mechanical Engineers (ASME) established the B31 Pressure Piping Code Committees to promote safety in pressure piping design and construction through published engineering criteria. The basic consideration of the Codes is safety; however, the Codes are not designed to replace competent engineering design or judgment. Most importantly, the Codes do not “approve,” “rate,” or “endorse” any items of construction, proprietary devices, or activity. The Codes do not put a limit on conservatism and, conversely, the Codes also allow for designs that are capable of more rigorous engineering analysis which justifies less conservative designs. A final point of importance is that the Codes strive to keep abreast of all current technologies regarding improvements to materials, fabrication, and any other new developments in the piping industry. They are not intended to limit the introduction of new products. Numerous sections of the B31 Codes provide the necessary guidelines to analyze new or nontraditional products so that sound engineering judgments can be made regarding Code conformance.

The Victaulic Vic-Press® for Schedule 10S system is acceptable for used on ASME B31.3 Process Piping Code applications. Stainless steel pipe conforming to ASTM A-312 (Types 304/304L and Types 316/316L) are permitted by the ASME B31.3 in Table A-1 as an acceptable piping material. VicPress for schedule 10S fittings are constructed from A-312, Type 304 or Type 316 Stainless Steel making the material a code listed material. Victaulic also recommends the use of ASTM A-312 schedule 10S stainless steel pipe (Types 304, 304L, 316 or 316L) with the Vic-Press for Schedule 10S system.

ASME B31.3 permits the use of mechanical joints as a method for joining pipe. The Vic-Press for Schedule 10S system may be qualified for use based upon Paragraph **304.7 Pressure Design of Other Components, which states:**

#### 304.7.2 Unlisted Components.

Pressure design of unlisted components to which the rules elsewhere in para. 304 do not apply shall be based on the pressure design criteria of this Code. The designer shall ensure that the pressure design has been substantiated through one or more of the means stated in (a) through (d). Note that designs are also required to be checked for adequacy of mechanical strength as described in para. 302.5. Documentation showing compliance with this paragraph shall be available for the owner’s approval.

- (a) extensive, successful service experience under comparable conditions with similarly proportioned components of the same or like material.
- (b) experimental stress analysis, such as described in ASME BPVC, Section VIII, Division 2, Annex 5.F.
- (c) proof test in accordance with ASME B16.9, MSS SP-97, or ASME BPVC, Section VIII, Division 1, UG-101.
- (d) detailed stress analysis (e.g., finite element method) with results evaluated as described in ASME BPVC, Section VIII, Division 2, Part 5. The basic allowable stress from Table A-1 or Table A-1M shall be used in place of the allowable stress, S, in Division 2 where applicable. Load design factors used in a Division 2 evaluation shall be consistent with the design bases in para. 302.3.2. At design temperatures in the creep range, additional considerations beyond the scope of Division 2 may be necessary.
- (e) For any of the above, the designer may interpolate between sizes, wall thicknesses, and pressure classes, and may determine analogies among related materials.

**ALWAYS REFER TO ANY NOTIFICATIONS AT THE END OF THIS DOCUMENT REGARDING PRODUCT INSTALLATION, MAINTENANCE OR SUPPORT.**

System No.		Location	
Submitted By		Date	

Spec Section		Paragraph	
Approved		Date	

The calculations referenced in Paragraph 304.7.2 show that Victaulic Vic-Press for Schedule 10S stainless steel fittings and Schedule 10 stainless steel pipe compliant with ASTM A-312 may be used on ASME B31.3 applications in excess of the 500psi (34.5 Bar), the working pressure limit established by Victaulic for Vic-Press for Schedule 10S systems. The ASME B31.3, Paragraph 304.1.2(a) calculations show that the maximum calculated pressure rating for Schedule 10 ASTM A-312, Type 316L, and Type 304L stainless steel pipe is in excess of our 500psi (34.5 Bar) maximum joint rating. (Type 316 and Type 304 stainless steel pipe would have slightly higher maximum design pressures due to a higher maximum allowable material stress per ASME B31.3). Therefore, the Victaulic established 500psi (34.5 Bar) maximum recommended pressure rating is within the design requirements of ASME B31.3. (Note: The stress level at 300°F was chosen as it is the upper limit of the VicPress for Schedule 10S highest temperature seal material.)

Using Equation (3a) in Paragraph **304.1.2 Straight Pipe Under Internal Pressure** and substituting the minimum wall thickness for “t” and then solving for “P” yields the maximum working pressure for the piping material:

$$t_m = (P \times D) \div [2(SEW + P \times Y)]$$

$$P = 2(S \times E \times W \times t_m) \div [D - 2(Y \times t_m)]$$

Where:

P = Maximum Design Pressure

S = 16,700 psi (Maximum Allowable Material Stress at 300°F for ASTM A312 Type 304L/316L Pipe) (Table A-1)

E = 0.8 (Table A-1B Basic Quality Factor for Longitudinal Weld Joints in Pipe...for ASTM A312 electric fusion welded tube)

W = 1 (Table 302.3.5 Weld Joint Strength Reduction Factor)

t<sub>m</sub> = Minimum Pipe Wall Thickness

D = Nominal Pipe Outside Diameter

Y = 0.4 (per Table 304.1.1)

The Maximum Design Pressures for ASTM A312 Type 304L/316L Schedule 10 Stainless Steel pipe are:

½" = 2438 psi (168 Bar)

¾" = 1951 psi (134 Bar)

1" = 2115 psi (146 Bar)

1½" = 1410 psi (97 Bar)

2" = 1104psi (76 Bar)

(See Appendix A for the calculations.)

Victaulic substantiates the calculations of Paragraph 304.7.2 by following the requirements of both paragraphs A (extensive experience) and C (proof testing)

Victaulic introduced the technology of Press mechanical pipe joining systems to North America in 1991 with its Pressfit System. Press joining technology was invented in the late 1950's and was first used commercially in Europe during the early 1960's. The Victaulic Pressfit System was a time proven reliable pipe joining solution that became a standard method for joining small bore water and gaseous utility piping. The earlier Victaulic Pressfit System technology used schedule 5 carbon and stainless steel pipe and fittings with working pressures up to 300psi (21 Bar). The introduction of Vic-Press for Schedule 10S stainless steel system has built upon the years of experience and created a more robust product with more commercially available pipe, resulting in improved performance. The 500psi Vic-Press for Schedule 10S working pressure was established through extensive testing of all sizes and configurations and based on safety factors consistent with standard industry practice.

Victaulic has also completed hydrostatic burst pressure testing on Vic-Press for Schedule 10S fittings in accordance with the aforementioned paragraph 304.7.2(C). ASME Boiler and Pressure Vessel code, Section VIII, Division 1, UG-101 was used to validate published pressure ratings in accordance with the ASME B31.3 maximum allowable working pressure using the formula UG-101(m)(2):

$$P = (B \div 4) \times (Su \times E \div Su \text{ ave})$$

Where:

P = Maximum allowable working pressure

B = Bursting test pressure

Su = Specified minimum tensile strength (75,000psi)

Su ave = Average actual tensile strength of test specimens

E = efficiency of welded joint

(Actual pressure test data is maintained under file and is available for viewing. Please contact your local Victaulic representatives for details.)

In addition to the above methods of qualification, Vic-Press for Schedule 10S system can be qualified under Paragraph **318 SPECIAL JOINTS**. Under this heading Paragraph **318.1.2 Unlisted Joints** allows joints whose pressure design is qualified by Paragraph 304.7.2. Paragraph **318.2.1 Joint Integrity** states:

“Separation of the joint shall be prevented by a means which has sufficient strength to withstand anticipated conditions of service.” and Paragraph **318.2.2 Joint Interlocks** states:

“Either mechanical or welded interlocks shall be provided to prevent separation of any joint used for a fluid service which is flammable, toxic or damaging to human tissue...”. The press region of an installed joint provides a mechanical interlock that prevents separation and the aforementioned experience and testing validate the systems “pressure design is qualified by paragraph 304.7.2”, and that the joint “has sufficient strength to withstand anticipated condition of service”, when used within Vic-Press for Schedule 10S system published recommendations. Finally, ASME provided an interpretation on pressed (crimped) joints to Paragraph 318.2.2, 2002 Edition, (Interpretation number 03-01345), which confirmed that “a joint in which the mechanical strength is developed by crimping a female part onto a pipe or tube,” would “qualify as having a mechanical interlock in accordance with paragraph 318.2.2. (See Appendix B) The wording of paragraph 318.2.2 in the 2010 Edition remains identical to that published in the 2002 Edition.

The conformance of the Vic-Press for Schedule 10S systems to the B31.3 Process Piping Code should also be reviewed by the piping system designer for the type of B31.3 application. Victaulic Vic-Press for Schedule 10S products will be acceptable on B31.3 applications that are within the scope of the Victaulic published performance limitations. Services such as hot and cold fluids and compressed air and other gases are permitted provided that the system temperature is within published temperature ranges, and the system pressure is equal to or less than the published working pressure of the Vic-Press for Schedule 10S system (500psi/34.5 Bar).

**Appendix A – Calculations:**

<b>Pipe Calculations</b>	
ASME B31.3 Paragraph 304.1.2 Equation #3a	
$P =$	$\frac{2(S \times E \times W \times t_m)}{D_o - 2(y \times t_m)}$
Where:	
S =	16,700psi (Maximum Allowable Material Stress at 300°F for ASTM A312 Type 304L/316L Pipe) (Table A-1)
E =	0.8 (Table A-1B Basic Quality Factor for Longitudinal Weld Joints in Pipe...for ASTM A312 electric fusion welded tube)
W =	1 (Table 302.3.5 Weld Joint Strength Reduction Factor)
y =	0.4 (per Table 304.1.1)
<b>D<sub>o</sub> =</b>	<b>Nominal Pipe Outside Diameter</b>
½"	= 0.855"
¾"	= 1.065"
1"	= 1.330"
1 ½"	= 1.915"
2"	= 2.406"
<b>t<sub>m</sub> =</b>	<b>Minimum Wall Thickness</b>
½"	=0.083" – 12.5% = 0.073" (ASTM A-312)
¾"	=0.083" – 12.5% = 0.073" (ASTM A-312)
1"	=0.109" – 12.5% = 0.095" (ASTM A-312)
1 ½"	=0.109" – 12.5% = 0.095" (ASTM A-312)
2"	=109" – 12.5% = 0.095" (ASTM A-312)
½": P =	$\frac{2 \times 16,700 \text{ psi} \times 0.8 \times 1 \times 0.073"}{0.840" - 2 \times 0.4 \times 0.073"} = 2438 \text{ PSI}$
¾": P =	$\frac{2 \times 16,700 \text{ psi} \times 0.8 \times 1 \times 0.073}{1.050" - 2 \times 0.4 \times 0.073"} = 1951 \text{ PSI}$
1": P =	$\frac{2 \times 16,700 \text{ psi} \times 0.8 \times 1 \times 0.095}{1.315" - 2 \times 0.4 \times 0.095"} = 2115 \text{ PSI}$
1 ½": P =	$\frac{2 \times 16,700 \text{ psi} \times 0.8 \times 1 \times 0.095}{1.900" - 2 \times 0.4 \times 0.095"} = 1410 \text{ PSI}$
2": P =	$\frac{2 \times 16,700 \text{ psi} \times 0.8 \times 1 \times 0.095}{2.375" - 2 \times 0.4 \times 0.095"} = 1104 \text{ PSI}$

Appendix B – ASME B31.3 Interpretation Number 03-01345:

Codes and Standards



Three Park Avenue  
New York NY 10016-5980  
U.S.A.

October 9, 2003

Kevin J. Simko  
Victaulic Company of America  
P.O. Box 31  
Easton, PA 18040

Subject: ASME B31.3 Process Piping, 2002 Edition  
Paragraph 318.2.2  
#03-01345

Reference: Your letter dated August 18, 2003

Dear Sir:

The B31.3 Section Committee considered your request for interpretation. Our understanding of your inquiry, and our response, are as follows:

Question: In accordance with ASME B31.3-2002, would a joint in which the mechanical strength is developed by crimping a female part onto a pipe or tube qualify as having a mechanical interlock in accordance with paragraph 318.2.2?

Reply: Yes.

Sincerely,

Melissa Aranzamendez  
Secretary, B31.3  
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1-212-591-8501 (fax)  
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encl.

ASME procedures provide for reconsideration of this interpretation when or if additional information is available which the inquirer believes might affect the interpretation. Further, persons aggrieved by this interpretation may appeal to the cognizant ASME committee or subcommittee. As stated in the foreword of the code documents, ASME does not "approve," "certify," "rate," or "endorse" any item, construction, proprietary device or activity.

The American Society of Mechanical Engineers

REFERENCE MATERIALS

[18.13 - Vic-Press™ Qualification Tests Schedule 10S Type 304/304L and 316/316L Stainless Steel](#)

User Responsibility for Product Selection and Suitability

Each user bears final responsibility for making a determination as to the suitability of Victaulic products for a particular end-use application, in accordance with industry standards and project specifications, as well as Victaulic performance, maintenance, safety, and warning instructions. Nothing in this or any other document, nor any verbal recommendation, advice, or opinion from any Victaulic employee, shall be deemed to alter, vary, supersede, or waive any provision of Victaulic Company's standard conditions of sale, installation guide, or this disclaimer.

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Note

This product shall be manufactured by Victaulic or to Victaulic specifications. All products to be installed in accordance with current Victaulic installation/assembly instructions. Victaulic reserves the right to change product specifications, designs and standard equipment without notice and without incurring obligations.

Installation

Reference should always be made to the Victaulic installation handbook or installation instructions of the product you are installing. Handbooks are included with each shipment of Victaulic products, providing complete installation and assembly data, and are available in PDF format on our website at www.victaulic.com.

Warranty

Refer to the Warranty section of the current Price List or contact Victaulic for details.

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