



I-300

FIELD INSTALLATION HANDBOOK

Mechanical Piping Products for
AWWA Ductile Iron Pipe



Revision E 02/2026

WARNING



- Read and understand all instructions before attempting to install any Victaulic products.
- Always verify that the piping system has been completely depressurized and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.
- Confirm that any equipment, branch lines, or sections of piping that may have been isolated for/during testing or due to valve closures/positioning are identified, depressurized, and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.
- Wear safety glasses, hardhat, foot protection, and hearing protection.

Failure to follow these instructions could result in death or serious personal injury and property damage.

Contact Victaulic with any questions regarding safe and proper installation of products featured in this handbook.
Visit victaulic.com for the most up-to-date information on Victaulic products.

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INTRODUCTION

This I-300 Field Installation Handbook contains important information regarding pipe preparation and installation of Victaulic® mechanical piping products for AWWA ductile iron pipe.

Always follow good piping practices and local building codes and requirements. Specified pressures, temperatures, external loads, internal loads, performance standards, and tolerances shall never be exceeded.

Qualified engineers shall reference Victaulic Section 26 publications and publication 05.01 for additional information regarding special conditions, code requirements, and the use of safety factors. These publications can be downloaded at victaulic.com.

Products featured in this handbook are designed for use only with AWWA ductile iron pipe that is specified by a system designer/engineer or contractor and then prepared to Victaulic specifications.

Victaulic grooved pipe couplings featured in this handbook are designed for use only with AWWA ductile iron pipe that is grooved to Victaulic specifications. In addition, these couplings are for use only with Victaulic grooved-end fittings, valves, and related grooved-end components. They are not intended for use with plain-end pipe and/or fittings.

Victaulic gaskets are designed to perform in a wide range of temperatures and operating conditions. As with all installations, there is a direct relationship between temperature, continuity of service, and gasket life. Always reference Victaulic publications 05.01 and GSG-100 to determine gasket material grades that may be specified for each application.

The term “mating component” used throughout this handbook applies to pipe, fitting, valve, or accessory ends that are prepared to the appropriate Victaulic groove specification.

Metric values listed throughout this handbook are converted from the Imperial values and may be rounded.

In addition to this I-300, Victaulic offers field installation handbooks, installation sheets, or installation tags for mechanical piping products that join alternate piping materials or other dedicated groove profile technologies. These instructions are shipped with the applicable product and can be downloaded at victaulic.com.



**SCAN QR CODE FOR ADDITIONAL FIELD INSTALLATION
HANDBOOKS THAT VICTAULIC OFFERS**

**ADDITIONAL COPIES OF FIELD INSTALLATION HANDBOOKS ARE
AVAILABLE FROM YOUR LOCAL VICTAULIC SALES REPRESENTATIVE**

NOTICE

- Victaulic maintains a policy of continuous product improvement. Therefore, Victaulic reserves the right to change product specifications, designs, and standard equipment without notice and without incurring obligation.
- VICTAULIC IS NOT RESPONSIBLE FOR SYSTEM DESIGN, NOR DOES THE COMPANY ASSUME ANY RESPONSIBILITY FOR SYSTEMS THAT ARE DESIGNED IMPROPERLY.
- This handbook is not intended to be a substitute for competent, professional engineering/piping system design and installation, which are prerequisites for any product application.
- This handbook is intended for use only by professional piping system designers, engineers, and installers.
- The information published in this handbook and other Victaulic literature supersedes all previously published information.
- Drawings and/or pictures in this manual may be exaggerated for clarity.
- The field installation handbook contains trademarks, copyrights, and products with patented features that are the exclusive property of Victaulic.
- WHILE EVERY EFFORT HAS BEEN MADE TO ENSURE ITS ACCURACY, VICTAULIC, ITS SUBSIDIARIES, AND ITS AFFILIATED COMPANIES MAKE NO EXPRESS OR IMPLIED WARRANTY OF ANY KIND REGARDING THE INFORMATION CONTAINED OR REFERENCED IN THIS HANDBOOK. ANYONE WHO USES THE INFORMATION CONTAINED HEREIN DOES SO AT THEIR RISK AND ASSUMES ANY LIABILITY THAT RESULTS FROM SUCH USE.

California Customers – Proposition 65 Compliance

	WARNING: The painted surface of these products can expose you to chemicals, including BBP, which are known to the State of California to cause birth defects or other reproductive harm. For more information, go to www.p65warnings.ca.gov. WARNING: Grades V and M2 can expose you to trace amounts of chemicals, such as ethylene thiourea, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information, go to www.p65warnings.ca.gov. WARNING: Brass components, even those manufactured from “low lead” or “no lead” brass, can expose you to trace amounts of chemicals, such as lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information, go to www.p65warnings.ca.gov.
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Hazard Identification

Definitions for identifying the various hazard levels are provided below.



This safety alert symbol indicates important safety messages. When you see this symbol throughout this handbook, be alert to the possibility of personal injury. Carefully read and fully understand the message that follows.

! DANGER • The use of the word “DANGER” identifies an immediate hazard with a likelihood of death or serious personal injury if instructions, including recommended precautions, are not followed.	! WARNING • The use of the word “WARNING” identifies the presence of hazards or unsafe practices that could result in death or serious personal injury if instructions, including recommended precautions, are not followed.
! CAUTION • The use of the word “CAUTION” identifies possible hazards or unsafe practices that could result in personal injury and product or property damage if instructions, including recommended precautions, are not followed.	NOTICE • The use of the word “NOTICE” identifies special instructions that are important but not related to hazards.

Pipe Preparation and Grooving Specifications

PIPE PREPARATION

AWWA ductile iron pipe shall be prepared to Victaulic specifications outlined for each product style. Preparation may vary according to pipe wall thickness, outside diameter ("OD") dimensions, and other factors. Refer to all pipe preparation and groove specification sections on the following pages for detailed information.

TOOL RATINGS

 WARNING	
	• Before setting up and operating any Victaulic pipe preparation tools, read and understand the operating and maintenance manual that is shipped with the tool. • Learn the operation requirements, applications, and potential hazards associated with the tool. Failure to follow these instructions could cause improper product installation, resulting in death or serious personal injury and property damage.

Victaulic offers pipe preparation tools that are designed for field use or shop fabrication. For detailed information on pipe preparation tool ratings and capacities, refer to Victaulic publication 24.01, which can be downloaded at victaulic.com. For information about maintenance and operation of pipe preparation tools, refer to the applicable operating and maintenance manual that is shipped with the tool and that can be downloaded at victaulic.com.

AWWA ductile iron pipe shall be noted at the time of ordering a pipe preparation tool, along with whether rigid radius-cut grooves or flexible radius-cut grooves are required for the particular application.

PIPE LENGTHS SUITABLE FOR GROOVING

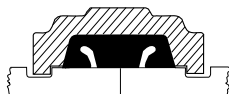
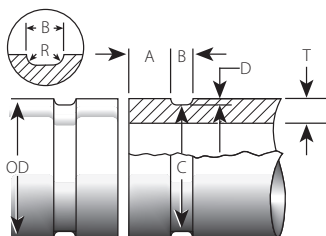
For tool and pipe stand setup requirements, and for pipe lengths required for safe and proper operation of Victaulic Cut Grooving Tools, always refer to the operating and maintenance manual that is shipped with the applicable tool. Manuals and repair parts lists can be downloaded at victaulic.com.

EXPLANATION OF CRITICAL RADIUS-CUT GROOVE SPECIFICATIONS

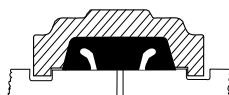
! WARNING

- Pipe dimensions and groove dimensions shall be within the tolerances specified in the tables on the following pages to ensure proper joint performance.

Failure to follow these instructions could cause joint failure, resulting in death or serious personal injury and property damage.



Rigid Radius-Cut Groove
(Standard Preparation)



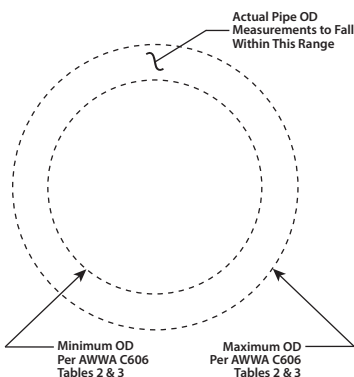
Flexible Radius-Cut Groove
(Alternate Preparation - May be used to provide expansion/contraction or angular movement allowance at the joint)

Illustrations are exaggerated for clarity - Pipe and grooves are not shown to scale

- All pipe ends to be used with the Victaulic products featured in this handbook shall conform to the pipe dimensions and groove dimensions specified in ANSI/AWWA Standard C606 and CSA B242, as well as Victaulic publication 25.05 (Radius-Cut Groove Specifications).
- Groove dimensions are the same for any pipe outside diameter "OD," regardless of pipe class and pressure.
- Victaulic recommends the use of Gauged Full Length (GFL) pipe due to better dimensional control.
- For re-rounding of field-cut pipe for proper joint assembly, refer to the ductile iron pipe manufacturer's guidelines and instructions.
- If pipe materials other than AWWA C151 ductile iron are to be used, contact Victaulic.

Pipe Outside Diameter "OD" – The actual pipe "OD," inclusive of diameter tolerances and ovality, shall fall within the ranges defined in Tables 2 & 3 of AWWA C606. Inspections shall include measurements with BOTH of the following methods to verify that the average diameter and ovality are within specification:

- Taken with a pi tape (to determine the average diameter)
- Using a caliper or tape measure, find the maximum and minimum outer diameters of the pipe end face. These values must meet the allowable ranges defined in Tables 2 & 3 of AWWA C606.



Victaulic requires square-cut pipe. The maximum allowable deviation from square-cut pipe ends is:

- .020 inch/0.5 mm for rigid radius-cut grooved pipe
- .063 inch/1.6 mm for flexible radius-cut grooved pipe



EXPLANATION OF CRITICAL RADIUS-CUT GROOVE SPECIFICATIONS (CONTINUED)

“A” Dimension – The “A” dimension, or the distance from the pipe end to the groove, identifies the gasket seating area. Uncoated pipe is not permitted. This area between the groove and the pipe end shall contain 1-mil minimum of shop primer or other coating. Additionally, this area shall be generally free from indentations, projections, deep pits, and swells to ensure a leak-tight seal. All oil, grease, loose paint, rust, scale, dirt, and cutting particles shall be removed. Peened surfaces may require corrective action to ensure a leak-tight seal (consult ANSI/AWWA Standard C606 and CSA B242 for requirements).

“B” Dimension – The “B” dimension, or groove width, controls expansion and angular deflection by the distance it is located from the pipe and its width in relation to the coupling housings’ “key” width. The bottom of the groove shall be free from loose paint, rust, scale, dirt, and cutting particles that may interfere with proper coupling assembly.

“C” Dimension – The “C” dimension is the average diameter at the base of the groove. This dimension shall be within the diameter’s tolerance and concentric with the OD for proper coupling fit. The groove shall be of uniform depth for the entire pipe circumference.

“D” Dimension – The “D” dimension is the groove depth, which shall be uniform within the limits listed in the following tables.

“R” Dimension – The “R” dimension is the radius required at the bottom of the groove to eliminate a point of stress concentration.

“T” Dimension – The “T” dimension is the minimum nominal wall thickness of pipe that is suitable for cut grooving. Tolerances shall conform to Class 53 ANSI/AWWA C151/A21.51.

NOTICE

Coatings that are applied to the interior surfaces of Victaulic grooved pipe couplings listed in this handbook shall not exceed 0.010 inch/0.25 mm. This includes the bolt pad mating surfaces.

The coating thickness applied to the gasket sealing surface and within the groove on the pipe exterior shall not exceed 0.010 inch/0.25 mm. This pipe coating thickness will affect the groove specifications listed on the following pages. Allowances shall be made for the following:

- Pipe Outside Diameter, Gasket Seat “A”, Groove Diameter “C”, and Minimum Allowable Wall Thickness “T” will be **INCREASED** by up to 0.020 inch/0.50 mm.
- Groove Width “B” will be **REDUCED** by up to 0.020 inch/0.50 mm.

GROOVE DIMENSIONS

Rigid Radius-Cut Groove Specifications

Nominal Pipe Size inches	Pipe Outside Diameter "OD"			Gasket Seat	Groove Width	Groove Diameter		Radius	Minimum Wall Thickness		Squarness	Groove Depth "D"	
	Actual inches mm	Tolerance + inches mm	Tolerance – inches mm			"A" +0.000 –0.020 inches mm	"B" +0.031 –0.016 inches mm		"C" Actual inches mm	Tolerance +0.000 inches mm		"R" inches mm	Ductile Iron Nominal "T" inches mm
3	3.96 100.6	0.045 1.14	0.045 1.14	0.840 21.34	0.375 9.53	3.723 94.56	0.375 9.53	0.120 3.05	0.310 7.87	0.260 6.60	0.020 0.51	0.096 2.44	0.151 3.84
4	4.80 121.9	0.045 1.14	0.045 1.14	0.840 21.34	0.375 9.53	4.563 115.90	0.375 9.53	0.120 3.05	0.320 8.13	0.270 6.86	0.020 0.51	0.096 2.44	0.151 3.84
6	6.90 175.3	0.060 1.52	0.060 1.52	0.840 21.34	0.375 9.53	6.656 169.06	0.375 9.53	0.120 3.05	0.340 8.64	0.290 7.37	0.020 0.51	0.100 2.54	0.154 3.91
8	9.05 229.9	0.060 1.52	0.060 1.52	0.950 24.13	0.500 12.70	8.781 223.04	0.500 12.70	0.145 3.68	0.360 9.14	0.310 7.87	0.020 0.51	0.104 2.64	0.177 4.50
10	11.10 281.9	0.060 1.52	0.060 1.52	1.015 25.78	0.500 12.70	10.813 274.65	0.500 12.70	0.145 3.68	0.380 9.65	0.320 8.13	0.020 0.51	0.114 2.90	0.186 4.72
12	13.20 335.3	0.060 1.52	0.060 1.52	1.015 25.78	0.500 12.70	12.906 327.81	0.500 12.70	0.145 3.68	0.400 10.16	0.340 8.64	0.020 0.51	0.117 2.97	0.192 4.88
14	15.30 388.6	0.050 1.27	0.080 2.03	1.015 25.78	0.625 15.88	14.969 380.21	0.625 15.88	0.165 4.19	0.420 10.67	0.350 8.89	0.020 0.51	0.126 3.20	0.206 5.23
16	17.40 442	0.050 1.27	0.080 2.03	1.340 34.04	0.625 15.88	17.063 433.40	0.625 15.88	0.165 4.19	0.430 10.92	0.360 9.14	0.020 0.51	0.128 3.25	0.208 5.28

GROOVE DIMENSIONS

Rigid Radius-Cut Groove Specifications

Nominal Pipe Size inches	Pipe Outside Diameter "OD"			Gasket Seat	Groove Width	Groove Diameter		Radius	Minimum Wall Thickness		Squareness	Groove Depth "D"	
	Actual inches mm	Tolerance + inches mm	Tolerance - inches mm	"A" +0.000 -0.020 inches mm	"B" +0.031 -0.016 inches mm	"C" Actual inches mm	Tolerance +0.000 inches mm	"R" inches mm	Ductile Iron Nominal "T" inches mm	Ductile Iron Minimum inches mm	"S" Max. inches mm	Min. inches mm	Max. inches mm
18	19.50 495.3	0.050 1.27	0.080 2.03	1.340 34.04	0.625 15.88	19.125 485.78	-0.030 -0.76	0.185 4.70	0.440 11.18	0.370 9.40	0.020 0.51	0.148 3.76	0.228 5.79
20	21.60 548.6	0.050 1.27	0.080 2.03	1.340 34.04	0.625 15.88	21.219 538.96	-0.030 -0.76	0.185 4.70	0.450 11.43	0.380 9.65	0.020 0.51	0.150 3.81	0.230 5.84
24	25.80 655.3	0.050 1.27	0.080 2.03	1.340 34.04	0.625 15.88	25.406 645.31	-0.030 -0.76	0.185 4.70	0.470 11.94	0.400 10.16	0.020 0.51	0.157 3.99	0.237 6.02
30	32.00 812.8	0.080 2.03	0.060 1.52	1.625 41.28	0.750 19.05	31.550 801.37	-0.035 -0.89	0.215 5.46	0.510 12.95	0.440 11.18	0.020 0.51	0.195 4.95	0.282 7.16
36	38.30 972.8	0.080 2.03	0.060 1.52	1.625 41.28	0.750 19.05	37.850 961.39	-0.035 -0.89	0.215 5.46	0.580 14.73	0.510 12.95	0.020 0.51	0.195 4.95	0.282 7.16



GROOVE DIMENSIONS

Flexible Radius-Cut Groove Specifications

Nominal Pipe Size inches	Pipe Outside Diameter "OD"			Gasket Seat	Groove Width	Groove Diameter		Radius	Minimum Wall Thickness		Squareness	Groove Depth "D"	
	Actual inches mm	Tolerance + inches mm	Tolerance - inches mm			"A" +0.016 -0.047 inches mm	"B" +0.031 -0.016 inches mm		"C" Actual inches mm	Tolerance +0.000 inches mm		"R" inches mm	Ductile Iron Nominal "T" inches mm
3	3.96 100.6	0.045 1.14	0.045 1.14	0.750 19.05	0.375 9.53	3.723 94.56	-0.020 -0.51	0.120 3.05	0.310 7.87	0.260 6.60	0.063 1.60	0.096 2.44	0.151 3.84
4	4.80 121.9	0.045 1.14	0.045 1.14	0.750 19.05	0.375 9.53	4.563 115.90	-0.020 -0.51	0.120 3.05	0.320 8.13	0.270 6.86	0.063 1.60	0.096 2.44	0.151 3.84
6	6.90 175.3	0.060 1.52	0.060 1.52	0.750 19.05	0.375 9.53	6.656 169.06	-0.020 -0.51	0.120 3.05	0.340 8.64	0.290 7.37	0.063 1.60	0.100 2.54	0.154 3.91
8	9.05 229.9	0.060 1.52	0.060 1.52	0.875 22.23	0.500 12.70	8.781 223.04	-0.025 -0.64	0.145 3.68	0.360 9.14	0.310 7.87	0.063 1.60	0.104 2.64	0.177 4.50
10	11.10 281.9	0.060 1.52	0.060 1.52	0.938 23.83	0.500 12.70	10.813 274.65	-0.025 -0.64	0.145 3.68	0.380 9.65	0.320 8.13	0.063 1.60	0.114 2.90	0.186 4.72
12	13.20 335.3	0.060 1.52	0.060 1.52	0.938 23.83	0.500 12.70	12.906 327.81	-0.030 -0.76	0.145 3.68	0.400 10.16	0.340 8.64	0.063 1.60	0.117 2.97	0.192 4.88
14	15.30 388.6	0.050 1.27	0.080 2.03	0.938 23.83	0.625 15.88	14.969 380.21	-0.030 -0.76	0.165 4.19	0.420 10.67	0.350 8.89	0.063 1.60	0.126 3.20	0.206 5.23
16	17.40 442	0.050 1.27	0.080 2.03	1.188 30.18	0.625 15.88	17.063 433.40	-0.030 -0.76	0.165 4.19	0.430 10.92	0.360 9.14	0.063 1.60	0.128 3.25	0.208 5.28

GROOVE DIMENSIONS

Flexible Radius-Cut Groove Specifications

Nominal Pipe Size inches	Pipe Outside Diameter "OD"			Gasket Seat	Groove Width	Groove Diameter		Radius	Minimum Wall Thickness		Squareness	Groove Depth "D"	
	Actual inches mm	Tolerance + inches mm	Tolerance - inches mm	"A" +0.016 -0.047 inches mm	"B" +0.031 -0.016 inches mm	"C" Actual inches mm	Tolerance +0.000 inches mm	"R" inches mm	Ductile Iron Nominal "T" inches mm	Ductile Iron Minimum inches mm	"S" Max. inches mm	Min. inches mm	Max. inches mm
18	19.50 495.3	0.050 1.27	0.080 2.03	1.188 30.18	0.625 15.88	19.125 485.78	-0.030 -0.76	0.185 4.70	0.440 11.18	0.370 9.40	0.063 1.60	0.148 3.76	0.228 5.79
20	21.60 548.6	0.050 1.27	0.080 2.03	1.188 30.18	0.625 15.88	21.219 538.96	-0.030 -0.76	0.185 4.70	0.450 11.43	0.380 9.65	0.063 1.60	0.150 3.81	0.230 5.84
24	25.80 655.3	0.050 1.27	0.080 2.03	1.188 30.18	0.625 15.88	25.406 645.31	-0.030 -0.76	0.185 4.70	0.470 11.94	0.400 10.16	0.063 1.60	0.157 3.99	0.237 6.02
30	32.00 812.8	0.080 2.03	0.060 1.52	1.375 34.93	0.750 19.05	31.550 801.37	-0.035 -0.89	0.215 5.46	0.510 12.95	0.440 11.18	0.063 1.60	0.195 4.95	0.282 7.16
36	38.30 972.8	0.080 2.03	0.060 1.52	1.375 34.93	0.750 19.05	37.850 961.39	-0.035 -0.89	0.215 5.46	0.580 14.73	0.510 12.95	0.063 1.60	0.195 4.95	0.282 7.16

Important Gasket and Lubricant Information

GASKET SELECTION AND LUBRICANT REQUIREMENTS

⚠ CAUTION

- To ensure gasket performance, always specify the material grade that is suitable for the intended service.
- Failure to select the proper material grade for the service may result in joint leakage and property damage.

During selection and verification of gasket material grades, always refer to Victaulic publications 05.01 and GSG-100 for gasket material compatibility. For rubber-lined valves or other rubber-lined products, always reference the applicable Victaulic product publication for specific requirements.

Do not subject gaskets to temperatures beyond the specified limits. Excessive temperatures will degrade gasket performance. Always reference the applicable Victaulic product publication for allowable working temperatures.

Victaulic product publications, including 05.01 and GSG-100, can be downloaded at victaulic.com.

Gasket Color Code Reference

Grade	Compound	Color Code
M	Halogenated Butyl	Brown Stripe
S	Nitrile	Orange Stripe

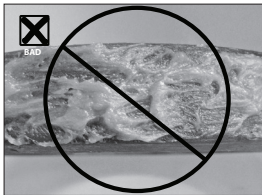
Lubrication of Gaskets

⚠ CAUTION

- When specified, a thin coat of a compatible lubricant shall be applied to the gasket sealing lips and exterior to help prevent the gasket from pinching, rolling, or tearing during installation.
 - DO NOT use excessive lubricant on the gasket sealing lips and exterior.
- Failure to use a compatible lubricant may cause gasket damage, resulting in joint leakage and property damage.



Properly Lubricated Gasket
with Thin Coating of Lubricant



Improperly Lubricated Gasket
with Too Much Lubricant

A thin coating of a compatible lubricant is required to help prevent gasket pinching and to facilitate product installation. Always follow the specific product instructions featured in this handbook, and refer to the “Lubricant Compatibility for Gaskets” table on the following page. Victaulic Lubricant Safety Data Sheets (SDS) can be downloaded at victaulic.com.

NOTICE

- Victaulic Lubricant shall not be mixed with Poly Olester (POE) Oil during installation.
- Prior to assembly, Victaulic recommends maintaining lubricant and gaskets at temperatures above 0° C/32° F to prevent the lubricant from freezing and to ease installation onto the pipe ends.

Storage of Gaskets

Until the time of installation, Victaulic products with exposed elastomeric components shall be stored in typical warehouse conditions, where components are protected from outside environmental factors such as: sun exposure, ozone exposure, extreme temperatures, and extreme relative humidity (or as specified by national and local codes and standards for the jobsite).



Lubricant Compatibility for Gaskets

The following recommendations are for the gasket materials listed. Commercial lubricants may contain multiple ingredients. Always refer to the lubricant manufacturer's recommendations for material compatibility.

	Victaulic Lubricant*	Soap-Based Solutions	Glycerin	Silicone Grease	Silicone Spray	Corn Oil	Soybean Oil	Hydrocarbon-Based Oils	Petroleum-Based Greases
Compatible with Halogenated Butyl Gaskets?	Yes*	Yes	NO	NO	NO	NO	NO	NO	NO
Compatible with Nitrile Gaskets?	Yes*	Yes	Yes	Yes	NO	Yes	Yes	Yes	Yes

*Victaulic Lubricant shall not be mixed with Poly Olester (POE) Oil during installation.

Victaulic Lubricant Usage Guide

The following table provides the **approximate** number of common-size **standard** gaskets that can be lubricated with a 4.5-ounce/127.5-gram tube or a 1-quart/32-ounce/907-gram container of Victaulic Lubricant (lubricant applied to gasket sealing lips and exterior). These values have been calculated using a thin coating of Victaulic Lubricant, as described in this section, and do not take into account any overuse or spillage.

Approximate shelf life of Victaulic Lubricant is 1 year beyond the manufacture date stamped on the container.

Nominal Pipe Size inches	Actual Pipe Outside Diameter inches/mm	Approximate Number of Standard Gaskets	
		Per Tube	Per Quart
3	3.96 100.6	107	753
4	4.80 121.9	52	364
6	6.90 175.3	34	238
8	9.05 229.9	25	176
10	11.10 281.9	19	139
12	13.20 335.3	16	115
14	15.30 388.6	13	97
16	17.40 442.0	12	85
18	19.50 495.3	10	75
20	21.60 548.6	9	67
24	25.80 655.3	7	55
30	32.00 812.8	6	44
36	38.30 972.8	5	36

NOTICE
• Victaulic Lubricant is certified to NSF/ANSI 61.



Spacing Requirements for Grooved Piping Systems

RECOMMENDED MINIMUM PIPE SPACING

Since Victaulic grooved pipe couplings are externally-mounted housings that contain bolt pads, consideration shall be given to external dimensions beyond the pipe outside diameter to allow for ease of installation, inspection, and insulation. **Always allow enough spacing between adjacent piping and couplings to provide access for tightening hardware and for bolt pad inspection. Bolt pads can be positioned in any orientation to prevent interference with other system components. NOTE:** Allowance for insulation, when necessary, is not included in the following examples.

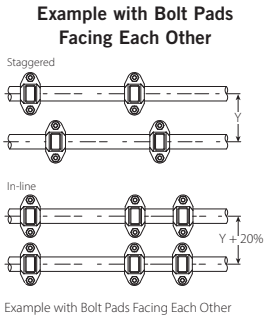
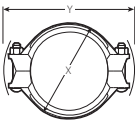


Illustration is exaggerated for clarity



For the example above, where the bolt pads are facing each other and the couplings are staggered, the pipe centerline shall be spaced with the “Y” dimension of the coupling housings. **NOTE:** The “Y” dimension is the widest point across the coupling housings (bolt pad to bolt pad).

For the example above, where the bolt pads are facing each other and the couplings are in-line with each other, add an additional 20% to the “Y” dimension.

When installing grooved piping systems in confined areas, such as a pipe shaft, a tunnel, a narrow trench, or when joining riser pipe and dropping it through riser holes, consideration shall be given to the external clearance of the housings. This clearance shall be greater than the “Y” dimension (widest point). The necessary clearance will vary depending upon installation procedures, the proximity of other piping, and other factors.

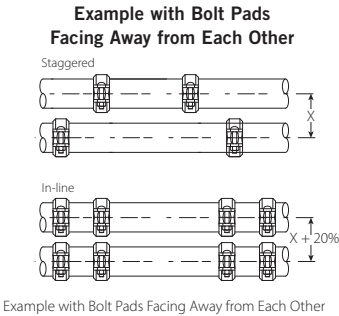
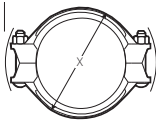


Illustration is exaggerated for clarity



For the example above, where the bolt pads are facing away from each other and the couplings are staggered, the pipe centerline shall be spaced with the “X” dimension of the coupling housings. **NOTE:** The “X” dimension is the narrowest point across the coupling housings (crown to crown).

For the example above, where the bolt pads are facing away from each other and the couplings are in-line with each other, add an additional 20% to the “X” dimension.

Rigid Systems

Piping Support

Pipe Support Spacing

Nominal Pipe-End Separation

PIPING SUPPORT FOR RIGID SYSTEMS

⚠ WARNING

- The values in the following tables are not intended to be used as specifications for all installations, and they **DO NOT** apply where critical calculations are made or where there are concentrated loads between supports. The installer shall adhere to the design engineer’s calculations for each project.
- **DO NOT** attach supports directly to couplings or flanges. Attach supports only to adjoining pipe and equipment.
- **DO NOT** use piping joined with Victaulic grooved pipe products as a lift point. **DO NOT** climb or hang on pipe joined with these products.
- Victaulic is not responsible for system design, nor does the Company assume any responsibility for systems that are designed improperly.
- Piping support/design shall comply with any local code requirements and shall be verified by a system designer/engineer.

Failure to follow these instructions could cause joint failure, resulting in death or serious personal injury and property damage.

Piping that is joined with grooved pipe couplings, like all other piping systems, requires support to carry the weight of piping, equipment, and fluid. The support or hanging method shall minimize stress on joints and allow pipeline movement, where required, along with other design requirements, such as drainage or venting. **NOTE:** Valves with unbalanced loads, particularly ones installed in horizontal pipelines within areas of high vibration, require support to resist external rotation.

RIGID SYSTEMS – PIPE SUPPORT SPACING

Ductile iron pipe that is rigid radius-cut grooved has the same support spacing requirements as flanged ductile iron piping systems. In accordance with MSS SP-58, ductile iron pipe that conveys water or similar liquids shall have a minimum of one support per length of pipe located immediately behind the pipe bell and at changes in direction and branch connections. Maximum support spacing is 20 feet/6.1 meters.

NOMINAL PIPE-END SEPARATION FOR STYLE 307 TRANSITION COUPLINGS

The nominal pipe-end separation dimensions, shown in the table below, are provided for system layout and installation purposes. The Style 307 Transition Coupling is considered a rigid connection and will not accommodate expansion or contraction of the piping system.

Nominal Pipe Size inches	Actual Pipe Outside Diameter inches/mm	Nominal Pipe-End Separation inches/mm
3	3.96 100.6	0.03 1
4 – 6	4.80 – 6.90 121.9 – 175.3	0.06 2
8 – 12	9.05 – 13.20 229.9 – 335.3	0.03 1



Flexible Systems

Piping Support

Pipe Support Spacing

**Nominal Pipe-End Separation
and Deflection from Centerline**

PIPING SUPPORT FOR FLEXIBLE SYSTEMS

⚠ WARNING

- The values in the following tables are not intended to be used as specifications for all installations, and they **DO NOT** apply where critical calculations are made or where there are concentrated loads between supports. The installer shall adhere to the design engineer's calculations for each project.
 - **DO NOT** attach supports directly to couplings or flanges. Attach supports only to adjoining pipe and equipment.
 - **DO NOT** use piping joined with Victaulic grooved pipe products as a lift point. **DO NOT** climb or hang on pipe joined with these products.
 - Victaulic is not responsible for system design, nor does the Company assume any responsibility for systems that are designed improperly.
 - Piping support/design shall comply with any local code requirements and shall be verified by a system designer/engineer.
- Failure to follow these instructions could cause joint failure, resulting in death or serious personal injury and property damage.

Piping that is joined with grooved pipe couplings, like all other piping systems, requires support to carry the weight of piping, equipment, and fluid. The support or hanging method shall minimize stress on joints and allow pipeline movement, where required, along with other design requirements, such as drainage or venting. The system designer shall consider the special requirements of flexible couplings while designing a support system. **NOTE:** Valves with unbalanced loads, particularly ones installed in horizontal pipelines within areas of high vibration, require support to resist external rotation.

FLEXIBLE SYSTEMS – PIPE SUPPORT SPACING

For Victaulic Style 31 Couplings on ductile iron pipe that is flexible radius-cut grooved, the following table lists the suggested maximum span between pipe supports for straight runs without concentrated loads.

Nominal Pipe Size inches	Actual Pipe Outside Diameter inches/mm	Suggested Maximum Span Between Pipe Supports* feet/meters
3 – 4	3.96 – 4.80 100.6 – 121.9	12 3.7
6 – 8	6.90 – 9.05 175.3 – 229.9	14 4.3
10 – 12	11.10 – 13.20 281.9 – 335.3	16 4.9
14 – 16	15.30 – 17.40 388.6 – 442.0	18 5.5
18 – 36	19.50 – 38.30 495.3 – 972.8	20 6.1

*Pipe lengths shall not be left unsupported between any two couplings

NOMINAL PIPE-END SEPARATION AND DEFLECTION FROM CENTERLINE FOR STYLE 31 COUPLINGS

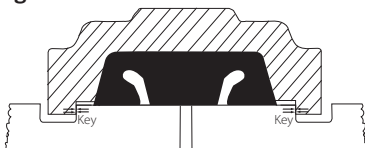
The nominal pipe-end separation and deflection values, shown in the table below, are the maximum nominal range of movement available at each joint for ductile iron pipe that is flexible radius-cut grooved and joined with Style 31 Couplings.

Nominal Pipe Size inches	Actual Pipe Outside Diameter inches/mm	Nominal Pipe-End Separation inches/mm	Nominal Deflection from Centerline	
			Degrees Per Coupling	inches Per One foot of Pipe/ mm Per One meter of Pipe
3	3.96 100.6	0 – 0.09 0 – 2.4	1.35	0.28 23
4	4.80 121.9	0 – 0.09 0 – 2.4	1.13	0.21 18
6	6.90 175.3	0 – 0.09 0 – 2.4	0.78	0.14 12
8	9.05 229.9	0 – 0.09 0 – 2.4	0.60	0.11 9
10	11.10 281.9	0 – 0.16 0 – 4.0	0.80	0.15 13
12	13.20 335.3	0 – 0.16 0 – 4.0	0.68	0.13 11
14	15.30 388.6	0 – 0.16 0 – 4.0	0.58	0.11 9
16	17.40 442.0	0 – 0.25 0 – 6.4	0.82	0.16 13
18	19.50 495.3	0 – 0.25 0 – 6.4	0.73	0.14 12
20	21.60 548.6	0 – 0.25 0 – 6.4	0.67	0.12 10
24	25.80 655.3	0 – 0.25 0 – 6.4	0.55	0.11 9
30	32.00 812.8	0 – 0.47 0 – 11.9	0.85	0.17 14
36	38.30 972.8	0 – 0.47 0 – 11.9	0.78	0.15 13

INSTALLATION TO ACHIEVE MAXIMUM LINEAR MOVEMENT CAPABILITIES OF FLEXIBLE SYSTEMS

To achieve maximum expansion/contraction allowance, ductile iron pipe shall be flexible radius-cut grooved, and the pipe joints shall be installed with proper spacing between the pipe ends. The following is an overview of methods to accommodate expansion/contraction. For complete information, refer to Victaulic Section 26 publications, which can be downloaded at victaulic.com.

For maximum expansion, pipe ends shall be at their maximum gap within the coupling.



PROPER INSTALLATION FOR EXPANSION

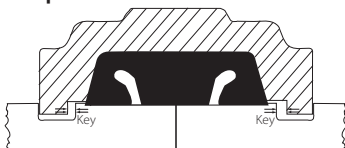
*Illustration is exaggerated for clarity
Pipe and groove are not shown to scale*

1. Vertical systems can be installed as the pipe is lowered by assembling the couplings and using the weight of the pipe to pull the pipe ends open.

For horizontal systems, select method 2a or 2b.

- 2a. Anchor the system at one end, and install the couplings and proper guides. Cap the system, pressurize it to fully open the pipe ends, then anchor the other end with the pipe ends fully gapped.
- 2b. Install the couplings. Use a “come-along,” if necessary, to pull the pipe for full end separation, then secure the pipe to maintain the opening.

For maximum contraction, pipe ends shall be installed at the minimum pipe-end separation.



PROPER INSTALLATION FOR CONTRACTION

*Illustration is exaggerated for clarity
Pipe and groove are not shown to scale*

1. In vertical systems, stack the pipe by using the weight to butt the pipe ends, then anchor the pipe to maintain the position.
2. In horizontal systems, assemble the joints with the pipe ends butted by using a “come-along,” if necessary, to draw the pipe ends together, then secure the pipe in position.

For Expansion and Contraction

1. Alternate the above procedures in proportion to the need for expansion and contraction.

Groove/Coupling Gapping

For expansion, visible gaps on either side of the coupling housings' key section (between the coupling housings' key section and the rear edge of the groove) can be used to verify proper installation of most couplings for maximum movement. These gaps are approximately equal to half the linear movement capability. Piping shall be secured to maintain the desired position.

For pipe contraction, virtually no gap should be visible between the coupling housings' key section and the rear edge of the groove. Piping shall be secured to maintain the desired position.



Installation Overview

Impact Tool Usage Guidelines

Impact Tool Selection

Torque Wrench Selection

Required Tools and Supplies for Installation

Important Installation Information

Installation Inspection

System Testing

Maintenance After Installation

Insulation

Buried Applications

IMPACT TOOL USAGE GUIDELINES

NOTICE

- These guidelines are for couplings that require metal-to-metal bolt pad contact without a specified assembly torque.
- These guidelines are for non-lubricated, zinc-electroplated carbon steel hardware only.
- These guidelines are for products used on metallic piping only.

Impact tools do not provide the installer with direct “wrench feel” to judge nut torque. Since some impact tools are capable of high output speed and torque, it is important to develop a familiarity with the impact tool to avoid over-shifting and/or over-torquing, which may damage or fracture the bolts or the coupling’s bolt pads during installation.

WARNING

- **DO NOT** exceed the “Maximum Allowable Bolt Torque” values specified in the applicable coupling instructions.
- Failure to follow these instructions could cause joint failure, resulting in property damage, serious personal injury, or death.

Assemble couplings per the applicable product installation instructions in this handbook.

Continue to tighten the nuts until the visual inspection requirements, listed in the applicable product installation instructions in this handbook, are achieved. Visual inspection of each joint is required for verification of proper assembly. **For angled-bolt-pad couplings:** Equal and positive or neutral offsets shall be present at the angled bolt pads.

During the installation process, the installation torque shall not exceed the “Maximum Allowable Bolt Torque” values specified in the applicable coupling instructions for the bolt/nut size. Conditions that may result in over-shifting and/or excessive bolt torque include, but are not limited to, the following:

- **Improperly-Sized Impact Tool** – Refer to the “Impact Tool Selection” section on page 24.
- **Uneven tightening of hardware** – Nuts shall be tightened evenly by alternating sides until the visual inspection requirements for the particular coupling are achieved.
- **Over-shifting of the angled bolt pad** – Over-shifting of an angled bolt pad results in an offset that prevents metal-to-metal contact and equal and positive or neutral offset at the opposite angled bolt pad. This occurs when the hardware is not tightened evenly by alternating sides. Attempting to tighten the hardware on one side while the other side is over-shifted is improper installation and will result in bolt torque that exceeds the “Maximum Allowable Bolt Torque” values specified in the applicable coupling instructions. Continuing to tighten the hardware in an attempt to achieve metal-to-metal bolt pad contact at the other bolt pad will cause joint failure, resulting in property damage, serious personal injury, or death. For over-shifted couplings, the hardware for the angled bolt pads shall be loosened and then re-tightened to achieve equal and positive or neutral offsets at both angled bolt pads.

- **Out-of-specification grooved pipe end dimensions (particularly large and out-of-specification “C” diameters)** – If proper visual assembly is not achieved, remove the coupling and confirm that all grooved pipe end dimensions are within Victaulic specifications. If grooved pipe end dimensions are not within Victaulic specifications, rework the pipe ends by following all instructions in the applicable pipe preparation tool’s operating and maintenance manual.
- **Continued tightening of nuts after the visual inspection requirements are achieved** – DO NOT continue to tighten the nuts after the visual inspection requirements are achieved. Continuing to tighten the hardware after proper visual inspection requirements are achieved will cause joint failure, resulting in property damage, serious personal injury, or death. In addition, continued tightening may cause excessive stresses that compromise the long-term integrity of the bolts and may cause joint failure, resulting in property damage, serious personal injury, or death. Additional bolt torque will not provide a better installation; bolt torque that exceeds the “Maximum Allowable Bolt Torque” values specified in the applicable coupling instructions could damage or fracture the bolts and/or the coupling’s bolt pads during installation.
- **Pinched gasket** – A pinched gasket could result in the inability to achieve proper visual inspection requirements. The coupling shall be disassembled and inspected to verify that the gasket is not pinched. If the gasket is pinched, a new coupling assembly shall be used.
- **Coupling was not assembled per the applicable Victaulic installation instructions** – Adherence to installation instructions will help to avoid the conditions covered in this section.

If you suspect that any hardware has been over-torqued, the entire coupling assembly shall be replaced immediately (as indicated by a bend in the bolt, bulging of the nut at the bolt pad interface, or damage to the bolt pad, etc.).

NOTICE

- **The maximum allowable bolt torques specified in the applicable coupling instructions are for non-lubricated, zinc-electroplated carbon steel hardware only. Contact Victaulic for maximum allowable bolt torques for hardware materials other than non-lubricated, zinc-electroplated carbon steel.**

Continued on the following page



IMPACT TOOL SELECTION

Appropriate selection of an impact tool is required to ensure proper installation in accordance with the applicable coupling installation instructions. Improper impact tool selection could cause coupling mis-assembly and damage, resulting in property damage, serious personal injury, or death.

To determine the suitability of an impact tool, perform trial installation assemblies with a standard socket wrench or a torque wrench. These trial coupling assemblies shall meet the visual installation requirements for the particular coupling. After visual installation requirements are achieved, measure the torque applied to each nut with a torque wrench. Using the torque value measured, select an impact tool with a torque output or torque output setting that conforms to the measured value but generally does not exceed the “Maximum Allowable Bolt Torque” values specified in the applicable coupling instructions.

Selection of an Impact Tool:

Impact Tools with Single Output Torque – Selection of an impact tool with an output torque considerably higher than the required installation torque could result in hardware and/or coupling damage due to the possibility of hardware over-torque. Under no circumstances shall an impact tool be selected for use that has a torque output setting that generally exceeds the “Maximum Allowable Bolt Torque” values specified in the applicable coupling instructions.

Impact Tools with Multiple Output Torque Settings – If an impact tool with multiple output torque settings is selected, the impact tool shall have at least one torque setting that satisfies the above requirements for an “Impact Tool with Single Output Torque.”

Use of impact tools with excessive output torques creates installation difficulties for the installer due to the tool’s unmanageable rotational speed and power. Using the same method above, periodically check nut torque on coupling assemblies throughout the system installation process.

For safe and proper use of impact tools, always refer to the impact tool manufacturer’s operating instructions. In addition, verify that proper impact grade sockets are being used for coupling installation.

WARNING

Failure to follow instructions for tightening hardware could result in:

- Bolt damage or fracture
- Damaged or broken bolt pads or fractures to housings
- Joint leakage and property damage
- A negative impact on system integrity
- Voiding of the Victaulic warranty
- Personal injury or death

TORQUE WRENCH SELECTION

For products that have a required assembly torque, a torque wrench shall be selected with a range that is in accordance with the required bolt torque specified in the respective instructions in this handbook. The selected torque wrench shall be certified and calibrated in accordance with a recognized national standard. Always refer to the instructions supplied with the torque wrench for proper usage and selection of desired torque value.

REQUIRED TOOLS AND SUPPLIES FOR INSTALLATION

Confirm that the correct quantity of applicable hardware and housings has been supplied for the connection being made. Inspect gasket size, gasket material grade, and hardware size to verify suitability for the intended service.

The following tools and supplies are required for all coupling and flange adapter installations.

- PPE Required by Jobsite (hardhat, leather gloves, safety glasses, steel-toe shoes)
- Victaulic Lubricant or Other Compatible Lubricant
- Brushes for Lubrication (Where Noted in Specific Product Instructions)
- Deep-Well Sockets
- Long-Handle Ratchet Wrench or Impact Tool
- Torque Wrench (Where Noted in Specific Product Instructions)
- Towels
- Water Bottle (for misting lubricated gaskets in hot environments, as needed)

IMPORTANT INSTALLATION INFORMATION

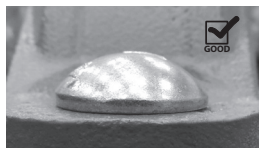
⚠ WARNING



- Always verify that the piping system has been completely depressurized and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.
- Confirm that any equipment, branch lines, or sections of piping that may have been isolated for/ during testing or due to valve closures/positioning are identified, depressurized, and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.

Failure to follow these instructions could result in death or serious personal injury and property damage.

- Always reference the operating and maintenance manual for the applicable pipe preparation tool and the specific product instructions in this handbook for complete safety and operating/installation requirements.
- **Always allow enough spacing between adjacent piping and couplings to provide access for tightening hardware and for bolt pad inspection.**
- **When joining pipe of the same size but different wall thicknesses, the joint rating will be based on the pressure rating of the thinner-wall pipe.**
- Always verify that the correct groove profile is being used.
- The mating components' outside diameter ("OD") and groove dimensions shall be within the tolerances published in current Victaulic groove specifications.
- Always check gasket material grade to verify that it is suitable for the intended service.
- When wafer or lug-type valves are used adjoining a Victaulic fitting, verify the disc dimensions to ensure that there is proper clearance.
- Couplings that contain a tongue-and-recess feature shall be mated properly, tongue-to-recess.
- When an assembly torque value is specified for product installation, the torque **SHALL** be applied to the nuts to achieve proper installation. Torque beyond the specified values will not improve sealing. Exceeding the specified torque by more than 10% may cause product damage, resulting in joint failure and property damage.
- Deep-well sockets are recommended for proper installation of products featured in this handbook. Deep-well sockets provide full nut engagement during tightening.
- During installation, if the coupling does not appear to be seated in the grooves properly, the hardware for the coupling shall be loosened and the installation process shall be attempted again. If installation difficulties persist, refer to the "Installation Inspection" section on the following pages.
- Verify that the oval neck of each bolt seats proper in the bolt hole, as shown below.



GOOD BOLT ENGAGEMENT
(OVAL NECK OF EACH BOLT IS SEATED PROPERLY IN THE BOLT HOLE)



BAD BOLT ENGAGEMENT
(OVAL NECK OF BOLT IS NOT SEATED PROPERLY IN THE BOLT HOLE)

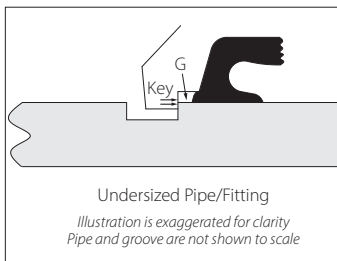
INSTALLATION INSPECTION

WARNING

- Always inspect each joint to verify proper product installation.
- Undersized or oversized pipes/fittings, shallow grooves, eccentric grooves, bolt pad gaps, etc. are unacceptable. Any of these conditions shall be corrected before attempting to pressurize the system.
- DO NOT impact/hit the coupling to force it to seat in the grooves.

Failure to follow these instructions could cause joint failure, resulting in death or serious personal injury and property damage.

Installations with Undersized Pipe/Fittings – NOT ACCEPTABLE

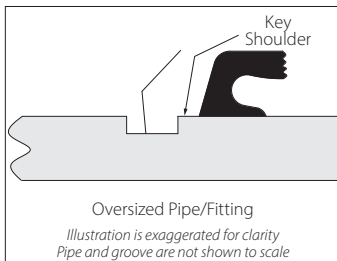


When the OD of the pipe or fitting is below the minimum tolerance, engagement of the housings' key sections is lowered considerably. THIS RESULTS IN REDUCED WORKING PRESSURE FOR THE JOINT.

Additionally, there is little or no added compression of the gasket. The increased gap "G" between the pipe and the housing may also result in gasket extrusion. These factors can contribute to reduced gasket life, joint leakage, and property damage.

When the OD of the pipe or fitting is below the minimum tolerance, discard the fitting or section of pipe and use a new fitting or section of pipe that conforms to Victaulic specifications.

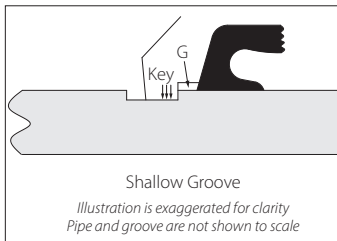
Installations with Oversized Pipe/Fittings – NOT ACCEPTABLE



When the OD of the pipe or fitting exceeds the maximum tolerance, engagement of the housings' key sections is increased to the point that the shoulder can grip onto the pipe and can result in reduced linear or angular movement. Under these conditions, metal-to-metal bolt pad contact may not be achieved, the gasket may become extruded, the working pressure of the joint may be reduced, and gasket life may be reduced.

When the OD of the pipe or fitting exceeds the maximum tolerance, discard the fitting or section of pipe and use a new fitting or section of pipe that conforms to Victaulic specifications.

Installations on Pipe with Shallow Grooves – NOT ACCEPTABLE

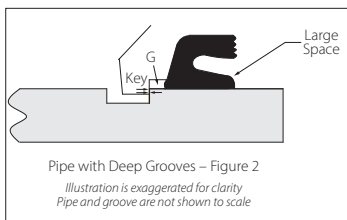
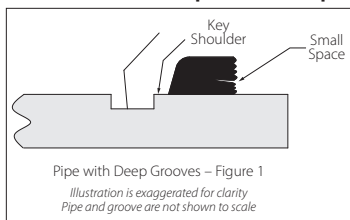


When the groove diameter exceeds the maximum tolerance, a shallow groove will occur. A groove that is shallow (not deep enough) will have the same effect as the conditions described in the "Installations with Undersized Pipes/Fittings" section above. In addition, this condition may prevent metal-to-metal bolt pad contact from being achieved, resulting in joint failure and property damage.

If the groove is shallow (not deep enough), re-groove the pipe to Victaulic specifications by following the instructions in the applicable pipe preparation tool's operating and maintenance manual.

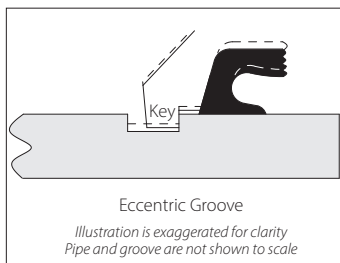


Installations on Pipe with Deep Grooves – NOT ACCEPTABLE



When the groove diameter is below the minimum tolerance, a deep groove will occur. A groove that is too deep will allow the coupling to shift so that one housing will have full key engagement (Figure 1 above) and the other housing will have significantly reduced key engagement (Figure 2 above). This will have the same effect as the conditions described in the “Installations with Undersized Pipe/Fittings” section. Additionally, cut grooving pipe to an undersized dimension will result in insufficient wall thickness under the groove. If the groove is too deep, discard that section of pipe and groove another section to Victaulic specifications.

Installations on Pipe with Eccentric Grooves – NOT ACCEPTABLE



An eccentric groove is a groove that is too shallow on one side and too deep on the other side. Generally, eccentric grooves occur when out-of-round pipe is grooved with a stationary tool bit, such as the case with a lathe. Eccentric grooves may lead to a combination of the conditions outlined in the “Installations with Oversized Pipes/Fittings” section and the “Installations on Pipes with Shallow Grooves” section.

Bolt Pad Gaps – NOT ACCEPTABLE

Always refer to the instructions in this handbook for the applicable product. Unless stated otherwise in the specific product’s installation instructions, Victaulic grooved pipe couplings **SHALL** be assembled with metal-to-metal bolt pad contact. For products with an assembly torque requirement, any specified torque values shall be achieved at each set of hardware; however, metal-to-metal bolt pad contact may not occur when the torque requirement is reached (this condition will be noted in the applicable product’s installation instructions). Any questions regarding an installation should be directed to Victaulic (scan the QR code on the back cover of this handbook for a listing of locations and contact information).

If the bolt pads are not in metal-to-metal contact:

- Verify that the hardware has been tightened evenly by alternating bolt pad locations, in accordance with the instructions in this handbook for the applicable product.
- Verify that the coupling keys are engaged with the grooves. Coupling keys shall not rest on the outside surface of the pipe.
- Verify that the gasket has not fallen/shifted into the grooves in the pipe.
- Verify that the gasket is not pinched at the bolt pad locations. Pinched gaskets shall be replaced immediately.
- Verify that oversized pipe or fittings were not used (reference the “Installation with Oversized Pipe/Fittings” section on the previous page).
- Verify that the grooves conform to Victaulic specifications (reference the “Installations on Pipe with Shallow Grooves, Installations on Pipe with Deep Grooves, and Installations on Pipe with Eccentric Grooves” sections above and on the previous page).

SYSTEM TESTING

System testing shall be in accordance with any jobsite requirements and any local or national codes and requirements.

Always re-inspect joints before and after the field test to identify points of improper installation. Look for gaps at the bolt pads and/or keys that ride up on the shoulders. If any of these conditions exist, depressurize and drain the system and replace any questionable joints.

NOTICE

- **A SUCCESSFUL INITIAL SYSTEM PRESSURE TEST DOES NOT VALIDATE PROPER INSTALLATION AND IS NOT A GUARANTEE OF LONG-TERM PERFORMANCE.**
- **Victaulic will not assume any liability for pipe joint leakage or failure that may result from an installer's failure to follow installation instructions.**
- **As with any pipe joining method, success is determined by close attention to details. Careful adherence to the instructions found in this handbook is critical to ensure maximum system reliability.**

MAINTENANCE AFTER INSTALLATION

When installed correctly in accordance with the instructions in this handbook, Victaulic grooved pipe products do not require maintenance after installation. Maintenance activities for certain valves will be specified within their respective "Installation and Maintenance" manual, which is provided with the valve.

WARNING

- **Any replacement parts, including coupling hardware, shall be authorized/supplied by Victaulic.**

Failure to follow this instruction could cause joint failure, resulting in death or serious personal injury and property damage.

INSULATION

Before installing insulation, verify that the piping system to be covered has been properly installed, tested, and approved by the engineer of record. Contact Victaulic for additional information regarding insulation products.

BURIED APPLICATIONS

When specifying products in this handbook for buried applications, the effects of soil conditions on buried systems shall be incorporated into system design to prevent corrosion. Reference the applicable product publication(s) for details regarding the materials and finishes available for assembly hardware. The system designer shall evaluate the effect of chemical composition and pH level on the assembly hardware to confirm that the materials and finishes used will resist corrosion and will be acceptable for the intended service. Special coatings and/or cathodic protection may be applied to ensure system longevity. Request Victaulic publication 26.15, "Grooved Piping Systems in Buried Applications" for additional information.

FOR BURIED APPLICATIONS, THE SYSTEM DESIGNER OR THEIR REPRESENTATIVE IS RESPONSIBLE FOR IDENTIFYING/SPECIFYING THE FOLLOWING:

- Appropriate pipe wall thickness for the application
- Hardware material requirements
- Maximum allowable working pressure
- Maximum allowable test pressure
- Soil backfill type, modulus, and density
- Distance of the piping system from structures (maximum shear loads)
- Effects of live loads on the piping system
- Effects of earth loads on pipe ovality

The trench bed shall be prepared to ensure that continuous support is provided under the pipe and couplings. Haunching material, which is found in the area between the bedding and the underside of the pipe, shall be worked in and compacted before continuing backfill. Haunching shall have no voids, and the backfill material shall not be contaminated with debris or other foreign materials that could damage the pipe or cause loss of support. **All backfill shall be consistent and meet application-site specifications. Protection shall be implemented to prevent aggregate from entering the grooves adjacent to the coupling keys.**

Couplings for Grooved-End Mating Components

**Style 31 Coupling
(3 – 12-inch Sizes)**

**Style 31 Coupling
(14 – 36-inch Sizes)**

**Style 307 Transition Coupling
(3 – 12-inch Sizes)**

Installation Instructions
Instructions for Reassembly

NOTICE
• Style 31 Coupling components ARE NOT interchangeable with Style 31R Coupling components.

PREPARATORY STEPS FOR INSTALLATION OF STYLE 31 COUPLINGS

WARNING

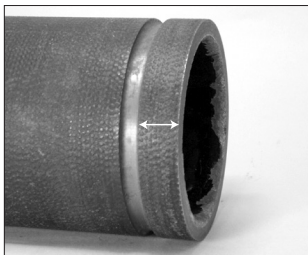


- Read and understand all instructions before attempting to install any Victaulic products.
- Always verify that the piping system has been completely depressurized and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.
- Confirm that any equipment, branch lines, or sections of piping that may have been isolated for/during testing or due to valve closures/positioning are identified, depressurized, and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.
- These installation instructions are intended for an experienced, trained installer. The installer shall understand the use of this product and why it was specified for the particular application.
- The installer shall understand common industry safety standards and potential consequences of improper product installation.
- Wear safety glasses, hardhat, and foot protection.

Failure to follow these instructions could result in death or serious personal injury and property damage.

NOTICE

- Style 31 Coupling components ARE NOT interchangeable with Style 31R Coupling components.



1. CHECK MATING COMPONENT ENDS: The outside surface of the mating components, between the groove and the mating component ends, shall be generally free from indentations, projections, deep pits, and swells to ensure a leak-tight seal. All oil, grease, loose paint, rust, scale, dirt, and cutting particles shall be removed. Peened surfaces may require corrective action to ensure a leak-tight seal (consult ANSI/AWWA Standard C606 and CSA B242 for requirements).

Always verify that the correct groove profile (rigid radius-cut groove or flexible radius-cut groove) is being used for the particular application.

The mating components' outside diameter ("OD") and groove dimensions shall be within the tolerances listed in this handbook.

2. CHECK GASKET: Check the gasket to verify that it is suitable for the intended service. The color code identifies the material grade. Refer to page 10 for the "Gasket Color Code Reference" table. For complete compatibility information, reference Victaulic publications 05.01 and GSG-100, which can be downloaded at victaulic.com.

CAUTION

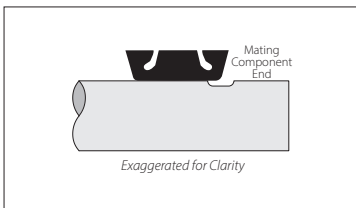
- A thin coat of a compatible lubricant shall be applied to the gasket sealing lips and exterior to help prevent the gasket from pinching, rolling, or tearing during installation.
- DO NOT use an incompatible lubricant.
- DO NOT use excessive lubricant on the gasket sealing lips and exterior.

Failure to use a compatible lubricant may cause gasket damage, resulting in joint leakage and property damage.

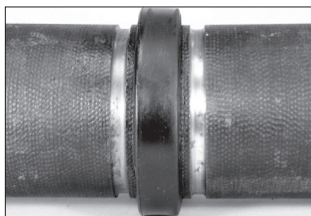




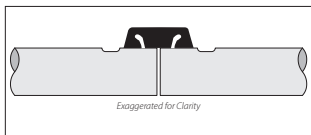
3. LUBRICATE GASKET: Apply a thin coat of a compatible lubricant to the gasket sealing lips and exterior. Refer to the “Lubricant Compatibility for Gaskets” table on page 11.



4. INSTALL GASKET: Install the gasket over the mating component end.
For 24-inch and larger coupling sizes: It may be easier to turn the gasket inside out to install it over the mating component end. **NOTE:** Verify that the gasket does not overhang the mating component end.



5. JOIN MATING COMPONENTS: Align the centerlines of the two grooved mating component ends and bring them to within the appropriate pipe-end separation dimension. Slide the gasket into position and center it between the groove of each mating component. **NOTE:** Verify that no portion of the gasket extends into the groove of either mating component.



6. If the gasket was turned inside out in step 4: Roll the gasket into position and center it between the groove of each mating component. **NOTE:** Verify that no portion of the gasket extends into the groove of either mating component.

IMPORTANT INFORMATION FOR USE OF STYLE 31 COUPLINGS WITH END CAPS:

WARNING

- Always read and follow the “Victaulic End Cap Installation Safety Instructions” section in this handbook.

Failure to follow the “Victaulic End Cap Installation Safety Instructions” section could result in death or serious personal injury and property damage.

- Always confirm that any equipment, branch lines, or sections of piping that may have been isolated for/during testing or due to valve closures/positioning are identified, depressurized, and drained immediately prior to working with an end cap.

! WARNING



- Read and understand all instructions before attempting to install any Victaulic products.
- Always verify that the piping system has been completely depressurized and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.
- Confirm that any equipment, branch lines, or sections of piping that may have been isolated for/during testing or due to valve closures/positioning are identified, depressurized, and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.
- These installation instructions are intended for an experienced, trained installer. The installer shall understand the use of this product and why it was specified for the particular application.
- The installer shall understand common industry safety standards and potential consequences of improper product installation.
- Wear safety glasses, hardhat, and foot protection.

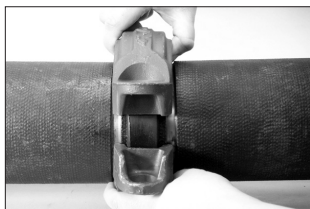
Failure to follow these instructions could result in death or serious personal injury and property damage.

1. Follow all instructions in the "Preparatory Steps" section on pages 32 – 33.

! CAUTION

- Verify that the gasket does not become rolled or pinched while installing the housings.

Failure to follow this instruction may cause gasket damage, resulting in joint leakage and property damage.



6. INSTALL HOUSINGS: Install the housings over the gasket. Verify that the housings' keys engage the grooves completely on both mating components.



7. INSTALL BOLTS/NUTS: Install the bolts, and thread a nut finger-tight onto each bolt. **NOTE:** Verify that the oval neck of each bolt seats properly in the bolt hole.

! WARNING

- Nuts shall be tightened evenly by alternating sides, maintaining nearly uniform bolt pad gaps, until metal-to-metal contact occurs at the bolt pads, as indicated in steps 8 and 9.
- Keep hands away from coupling openings during tightening.

Failure to tighten nuts as instructed will cause increased loading of the hardware, resulting in the following conditions:

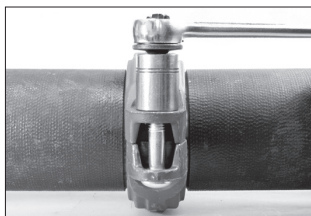
- Excessive bolt torque required to assemble the joint (incomplete assembly)
- Damage to the assembled joint (damaged or broken bolt pads or fractures to housings)
- Bolt damage or fracture
- Joint leakage and property damage
- A negative impact on system integrity
- Voiding of the Victaulic warranty
- Personal injury or death

DO NOT continue to tighten the nuts after the visual, metal-to-metal bolt pad inspection requirement is achieved.

- Failure to follow this instruction could result in the conditions listed above.

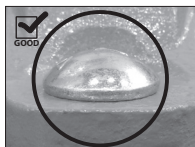
NOTICE

- It is important to tighten the nuts evenly by alternating sides to prevent gasket pinching.
- An impact tool or standard socket wrench with a deep-well socket can be used to tighten the hardware.
- Refer to the “Impact Tool Usage Guidelines” and “Impact Tool Selection” sections in this handbook. In addition, refer to the “Helpful Information” table on the following page.



8. TIGHTEN NUTS: Using an impact tool or a standard socket wrench with a deep-well socket, tighten the nuts evenly by alternating sides, maintaining nearly uniform bolt pad gaps, until metal-to-metal contact occurs at the bolt pads. Verify that the oval neck of each bolt seats properly in the bolt holes. **DO NOT** continue to tighten the nuts after the visual, metal-to-metal bolt pad inspection requirement is achieved.

If you suspect that any hardware has been over-tightened (as indicated by a bend in the bolt, bulging of the nut at the bolt pad interface, or damage to the bolt pad, etc.), the entire coupling assembly shall be replaced immediately. Refer to the “Impact Tool Usage Guidelines” and “Impact Tool Selection” sections in this handbook, along with the “Helpful Information” table on the following page.



OVAL NECK OF BOLT
SEATED PROPERLY

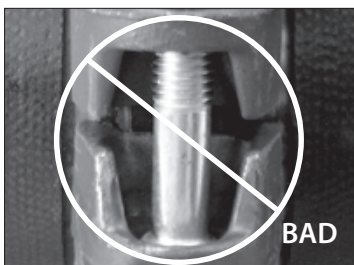
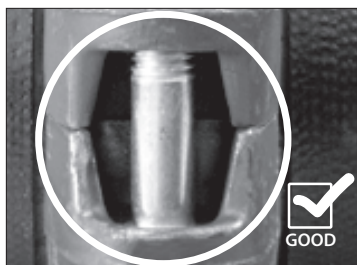


OVAL NECK OF BOLT
NOT SEATED PROPERLY

! WARNING

- Visual inspection of each joint is required.
- Improperly assembled joints shall be corrected before the system is filled, tested, or placed into service.
- Any components that exhibit physical damage due to improper assembly shall be replaced before the system is filled, tested, or placed into service.

Failure to follow these instructions could cause joint failure, resulting in death or serious personal injury and property damage.



9. Visually inspect each bolt pad location at every joint to verify that proper assembly is achieved.

Helpful Information

Nominal Pipe Size inches	Actual Pipe Outside Diameter inches/mm	Nut Size inches/Metric	Deep-Well Socket Size inches/mm	Maximum Allowable Bolt Torque*
3	3.96 100.6	$\frac{1}{2}$ M12	$\frac{7}{8}$ 22	135 ft-lbs 183 N•m
4	4.80 121.9	$\frac{5}{8}$ M16	$1\frac{1}{6}$ 27	235 ft-lbs 319 N•m
6	6.90 175.3	$\frac{5}{8}$ M16	$1\frac{1}{6}$ 27	235 ft-lbs 319 N•m
8	9.05 229.9	$\frac{3}{4}$ M20	$1\frac{1}{4}$ 32	425 ft-lbs 576 N•m
10	11.10 281.9	$\frac{3}{4}$ M20	$1\frac{1}{4}$ 32	425 ft-lbs 576 N•m
12	13.20 335.3	$\frac{7}{8}$ M22	$1\frac{7}{6}$ 36	675 ft-lbs 915 N•m

* Maximum allowable bolt torque values have been derived from actual test data.

NOTICE

- Style 31 Coupling components **ARE NOT** interchangeable with Style 31R Coupling components.

! WARNING



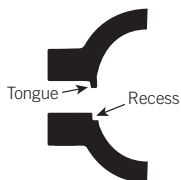
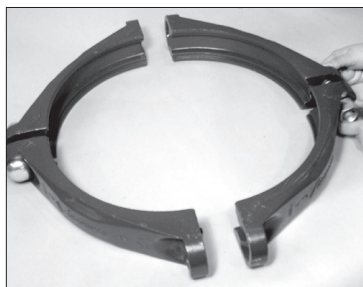
- Read and understand all instructions before attempting to install any Victaulic products.
- Always verify that the piping system has been completely depressurized and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.
- Confirm that any equipment, branch lines, or sections of piping that may have been isolated for/during testing or due to valve closures/positioning are identified, depressurized, and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.
- These installation instructions are intended for an experienced, trained installer. The installer shall understand the use of this product and why it was specified for the particular application.
- The installer shall understand common industry safety standards and potential consequences of improper product installation.
- Wear safety glasses, hardhat, and foot protection.

Failure to follow these instructions could result in death or serious personal injury and property damage.

1. Follow all instructions in the "Preparatory Steps" section on pages 32 – 33.

NOTICE

- Couplings are cast in multiple housings to ease handling.



Exaggerated for clarity

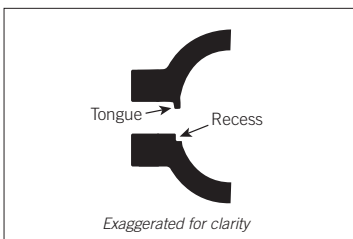
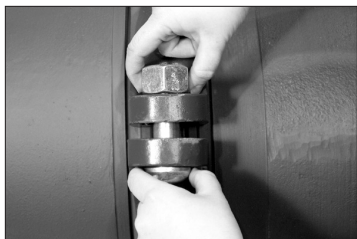
14 – 20-inch Sizes Contain
Tongue-and-Recess Features

2. ASSEMBLE HOUSINGS: Assemble the housings into two equal halves. **NOTE:** For 14 – 20-inch sizes, verify that the tongue-and-recess features are mated properly (tongue in recess). Install a bolt into each hole location at the bolt pads and thread a nut finger-tight onto each bolt. Verify that the oval neck of each bolt seats properly in the bolt hole. Tighten the nuts until metal-to-metal contact occurs at the bolt pads, then back the nuts off a full turn to provide spacing between the bolt pads.

! CAUTION

- Verify that the gasket does not become rolled or pinched while installing the housings.

Failure to follow this instruction may cause gasket damage, resulting in joint leakage and property damage.



7a. INSTALL FIRST PRE-ASSEMBLED HALF: Install the first pre-assembled half over the gasket. Verify that the housings' keys engage the grooves completely on both mating components.

7b. INSTALL REMAINING PRE-ASSEMBLED HALF: Install the remaining pre-assembled half over the gasket with the tongue-and-recess features mated properly (tongue in recess). Verify that the housings' keys engage the grooves completely on both mating components. While supporting the weight of the assembly, install the remaining bolts, and thread a nut finger-tight onto each bolt. **NOTE:** Verify that the oval neck of each bolt seats properly in the bolt hole.

! WARNING

- Nuts shall be tightened evenly by alternating bolt pad locations, maintaining nearly uniform bolt pad gaps, until metal-to-metal contact occurs at the bolt pads, as indicated in steps 8 and 9.

- Keep hands away from coupling openings during tightening.

Failure to tighten nuts as instructed will cause increased loading of the hardware, resulting in the following conditions:

- Excessive bolt torque required to assemble the joint (incomplete assembly)
- Damage to the assembled joint (damaged or broken bolt pads or fractures to housings)
- Bolt damage or fracture
- Joint leakage and property damage
- A negative impact on system integrity
- Voiding of the Victaulic warranty
- Personal injury or death

DO NOT continue to tighten the nuts after the visual, metal-to-metal bolt pad inspection requirement is achieved.

- Failure to follow this instruction could result in the conditions listed above.

NOTICE

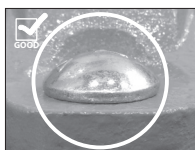
- It is important to tighten the nuts evenly by alternating bolt pad locations to prevent gasket pinching.
- An impact tool or standard socket wrench with a deep-well socket can be used to tighten the hardware.
- Refer to the "Impact Tool Usage Guidelines" and "Impact Tool Selection" sections in this handbook, along with the "Helpful Information" table on the following page.



8. TIGHTEN NUTS: Using an impact tool or a standard socket wrench with a deep-well socket, tighten all nuts evenly by alternating all bolt pad locations, maintaining nearly uniform bolt pad gaps, until metal-to-metal contact occurs at all bolt pads. Verify that the oval neck of each bolt seats properly in the bolt holes. This includes the bolt pads that were pre-assembled in step 2.

DO NOT continue to tighten the nuts after the visual, metal-to-metal bolt pad inspection requirement is achieved. Refer to the "Helpful Information" table below.

If you suspect that any hardware has been over-tightened (as indicated by a bend in the bolt, bulging of the nut at the bolt pad interface, or damage to the bolt pad, etc.), the entire coupling assembly shall be replaced immediately. Refer to the “Impact Tool Usage Guidelines” and “Impact Tool Selection” sections in this handbook.



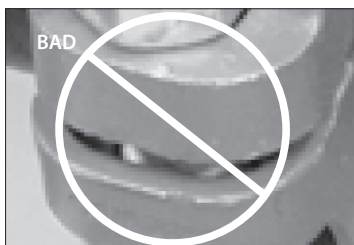
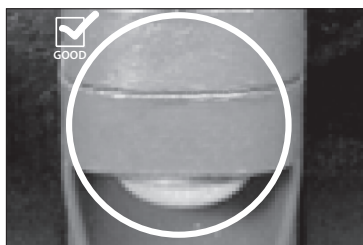
OVAL NECK OF BOLT
SEATED PROPERLY



OVAL NECK OF BOLT
NOT SEATED PROPERLY

! WARNING

- Visual inspection of each joint is required.
 - Improperly assembled joints shall be corrected before the system is filled, tested, or placed into service.
 - Any components that exhibit physical damage due to improper assembly shall be replaced before the system is filled, tested, or placed into service.
- Failure to follow these instructions could cause joint failure, resulting in death or serious personal injury and property damage.



9. Visually inspect each bolt pad location at every joint to verify that proper assembly is achieved.

Helpful Information

Nominal Pipe Size inches	Actual Pipe Outside Diameter inches/mm	Nut Size inches/ Metric	Deep-Well Socket Size inches/ mm	Maximum Allowable Bolt Torque*
14 – 18	15.30 – 19.50 388.6 – 495.3	1 M24	1 5/8 41	875 ft-lbs 1186 N•m
20 – 36	21.60 – 38.30 548.6 – 972.8	1 1/8 M27	1 13/16 46	1000 ft-lbs 1356 N•m

* Maximum allowable bolt torque values have been derived from actual test data.

NOTICE

- Style 31 Coupling components ARE NOT interchangeable with Style 31R Coupling components.

Style 307 - Transition Coupling (Transition from AWWA Ductile Iron with Rigid Radius-Cut Groove to NPS Steel with Original Groove System [OGS] Roll or Cut Groove)

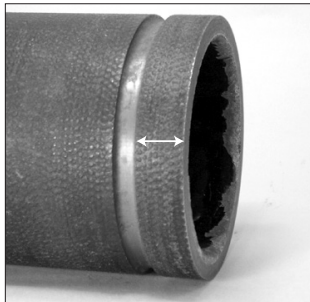
! WARNING



- Read and understand all instructions before attempting to install any Victaulic products.
- Always verify that the piping system has been completely depressurized and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.
- Confirm that any equipment, branch lines, or sections of piping that may have been isolated for/during testing or due to valve closures/positioning are identified, depressurized, and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.
- These installation instructions are intended for an experienced, trained installer. The installer shall understand the use of this product and why it was specified for the particular application.
- The installer shall understand common industry safety standards and potential consequences of improper product installation.
- Wear safety glasses, hardhat, and foot protection.

Failure to follow these instructions could result in death or serious personal injury and property damage.

1A. CHECK AWWA DUCTILE IRON MATING COMPONENT END:



The outside surface of the AWWA mating component, between the groove and the mating component end, shall be generally free from indentations, projections, deep pits, and swells to ensure a leak-tight seal. All oil, grease, loose paint, rust, scale, dirt, and cutting particles shall be removed. Peened surfaces may require corrective action to ensure a leak-tight seal (consult ANSI/AWWA Standard C606 and CSA B242 for requirements). Always verify that the rigid radius-cut groove profile is being used for installation of Style 307 Transition Couplings.

The AWWA mating component's outside diameter ("OD") and groove dimensions shall be within the tolerances listed in this handbook.

1B. CHECK NPS STEEL MATING COMPONENT END:

! WARNING

OGS Roll Groove Profile Shown

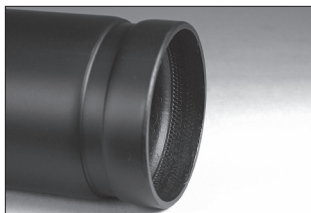


Pipe and groove are not shown to scale

- The NPS steel side of the Style 307 shall be used **ONLY** with mating components that are prepared to Victaulic OGS groove specifications.
- **DO NOT** attempt to install the NPS steel side of the Style 307 on mating components that are prepared to any other groove specification.

Failure to follow these instructions could cause joint failure, resulting in death or serious personal injury and property damage.





The outside surface of the NPS mating component, between the groove and the mating component end, shall be generally free from indentations, projections, weld seam anomalies, and roll marks to ensure a leak-tight seal. All oil, grease, loose paint, dirt, and cutting particles shall be removed. Always verify that the OGS groove profile is being used for installation of Style 307 Transition Couplings.

The NPS mating component's outside diameter ("OD"), groove dimensions, and maximum allowable flare diameter shall be within the tolerances listed in this handbook for Victaulic OGS groove specifications.

IMPORTANT INFORMATION FOR USE OF STYLE 307 COUPLINGS WITH END CAPS:

WARNING

- Always read and follow the "Victaulic End Cap Installation Safety Instructions" section in this handbook.

Failure to follow the "Victaulic End Cap Installation Safety Instructions" section could result in death or serious personal injury and property damage.

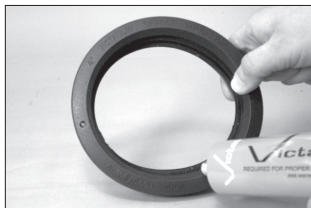
- Always confirm that any equipment, branch lines, or sections of piping that may have been isolated for/during testing or due to valve closures/positioning are identified, depressurized, and drained immediately prior to working with an end cap.

2. CHECK GASKET: Check the gasket to verify that it is suitable for the intended service. The color code identifies the material grade. **Refer to page 10 for the "Gasket Color Code Reference" table. For complete compatibility information, reference Victaulic publications 05.01 and GSG-100, which can be downloaded at victaulic.com.**

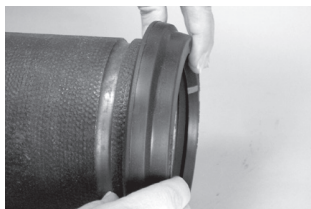
CAUTION

- A thin coat of a compatible lubricant shall be applied to the gasket sealing lips and exterior to help prevent the gasket from pinching, rolling, or tearing during installation.
- DO NOT use an incompatible lubricant.
- DO NOT use excessive lubricant on the gasket sealing lips and exterior.

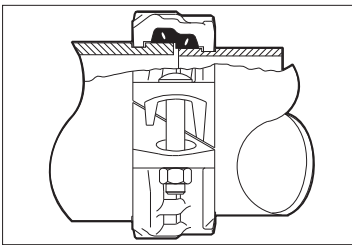
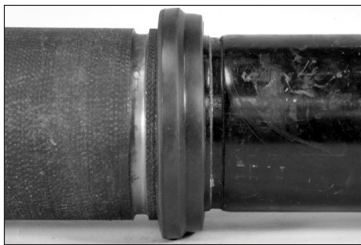
Failure to use a compatible lubricant may cause gasket damage, resulting in joint leakage and property damage.



3. LUBRICATE GASKET: Apply a thin coat of a compatible lubricant to the gasket sealing lips and exterior. Refer to the "Lubricant Compatibility for Gaskets" table on page 11.



4. INSTALL GASKET: Install the larger side of the gasket onto the AWWA mating component end (refer to markings on gasket). Verify that the AWWA mating component end contacts the inner, FlushSeal™ portion of the gasket.

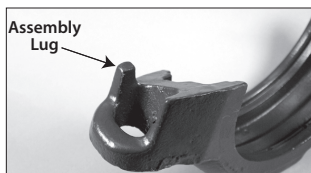


5. JOIN MATING COMPONENTS: Align the centerlines of the AWWA and NPS mating component ends and bring them to within the appropriate pipe-end separation dimension. **NOTE:** Verify that the gasket is centered between the groove of each mating component and that no portion of the gasket extends into the groove of either mating component.

CAUTION

- **Verify that the gasket does not become rolled or pinched while installing the housings.**

Failure to follow this instruction may cause gasket damage, resulting in joint leakage and property damage.



6a. The Style 307 Transition Coupling is designed with assembly lugs to aid in proper installation. The assembly lug shall engage with the side of the other housing that does not contain a lug.



6b. INSTALL HOUSINGS: Install the housings over the gasket. Refer to the markings on the housings to verify that the AWWA side faces the AWWA mating component and that the NPS side faces the NPS mating component. Verify that the housings' keys engage the grooves completely on both mating components.



7. INSTALL BOLTS/NUTS: Install the bolts, and thread a nut finger-tight onto each bolt. **NOTE:** Verify that the oval neck of each bolt seats properly in the bolt hole.

! WARNING

- Nuts shall be tightened evenly by alternating sides, maintaining nearly uniform bolt pad gaps, until metal-to-metal contact occurs at the angled bolt pads, as indicated in steps 8 and 9.
- Equal and positive or neutral offsets shall be present at the angled bolt pads, as indicated in steps 8 and 9.
- Keep hands away from coupling openings during tightening.

Failure to tighten nuts as instructed will cause increased loading of the hardware, resulting in the following conditions:

- Excessive bolt torque required to assemble the joint (incomplete assembly)
- Damage to the assembled joint (damaged or broken bolt pads or fractures to housings)
- Bolt damage or fracture
- Joint leakage and property damage
- A negative impact on system integrity
- Voiding of the Victaulic warranty
- Personal injury or death

DO NOT continue to tighten the nuts after the visual, metal-to-metal bolt pad inspection requirement is achieved.

- Failure to follow this instruction could result in the conditions listed above.

NOTICE

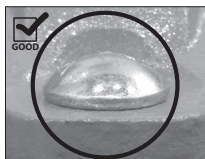
- It is important to tighten the nuts evenly by alternating sides to prevent gasket pinching.
- An impact tool or standard socket wrench with a deep-well socket can be used to bring the bolt pads into metal-to-metal contact.
- Refer to the “Impact Tool Usage Guidelines” and “Impact Tool Selection” sections in this handbook, along with the applicable “Helpful Information” table on the following page.



8. TIGHTEN NUTS: Using an impact tool or a standard socket wrench with a deep-well socket, tighten the nuts evenly by alternating sides, maintaining nearly uniform bolt pad gaps, until metal-to-metal contact occurs at the angled bolt pads. Equal and positive or neutral offsets shall be present at the bolt pads. Verify that the oval neck of each bolt seats properly in the bolt holes.

DO NOT continue to tighten the nuts after the visual, metal-to-metal bolt pad inspection requirement is achieved. **If you suspect that any hardware has been over-tightened (as indicated by a bend in the bolt, bulging of the nut at the bolt pad interface, or damage to the bolt pad, etc.), the entire coupling assembly shall be replaced immediately.**

Refer to the “Impact Tool Usage Guidelines” and “Impact Tool Selection” sections in this handbook, along with the applicable “Helpful Information” table on the following page.



**OVAL NECK OF BOLT
SEATED PROPERLY**



**OVAL NECK OF BOLT
NOT SEATED PROPERLY**

Helpful Information

Nominal Pipe Size inches	Actual Pipe Outside Diameter inches/mm	Nut Size inches/Metric	Deep-Well Socket Size inches/mm	Maximum Allowable Bolt Torque*
3	3.96 100.6	1/2 M12	7/8 22	135 ft-lbs 183 N·m
4	4.80 121.9	1/2 M12	7/8 22	135 ft-lbs 183 N·m
6	6.90 175.3	5/8 M16	1 1/16 27	235 ft-lbs 319 N·m
8	9.05 229.9	3/4 M20	1 1/4 32	425 ft-lbs 576 N·m
10	11.10 281.9	7/8 M22	1 7/16 36	675 ft-lbs 915 N·m
12	13.20 335.3	7/8 M22	1 7/16 36	675 ft-lbs 915 N·m

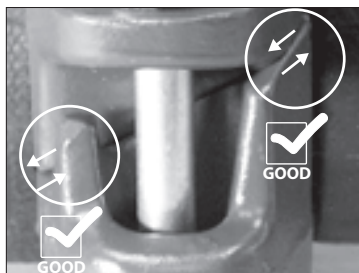
* Maximum allowable bolt torque values have been derived from actual test data.

WARNING

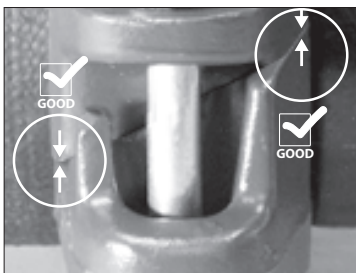
- Visual inspection of each joint is required.
- Improperly assembled joints shall be corrected before the system is filled, tested, or placed into service.
- Any components that exhibit physical damage due to improper assembly shall be replaced before the system is filled, tested, or placed into service.

Failure to follow these instructions could cause joint failure, resulting in death or serious personal injury and property damage.

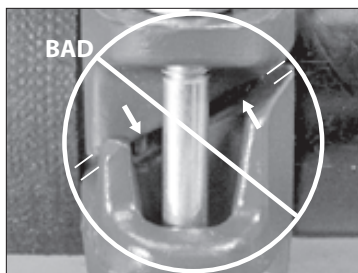
9. Visually inspect each bolt pad location at every joint to verify that metal-to-metal contact is achieved across the entire bolt pad section. Equal and positive or neutral offsets shall be present at each bolt pad location.



**PROPERLY ASSEMBLED JOINT
METAL-TO-METAL CONTACT AT ANGLED
BOLT PADS WITH EQUAL, POSITIVE
OFFSETS AT THE BOLT PADS**

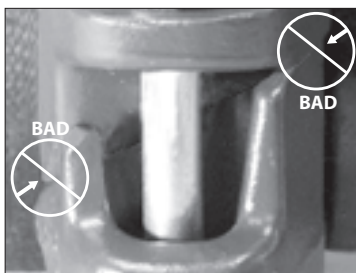


**PROPERLY ASSEMBLED JOINT
METAL-TO-METAL CONTACT AT ANGLED
BOLT PADS WITH EQUAL, NEUTRAL
OFFSETS AT THE BOLT PADS**



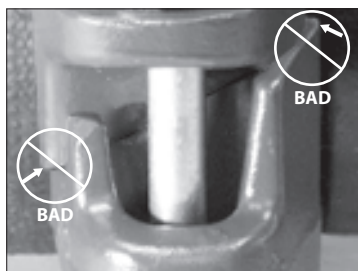
IMPROPERLY ASSEMBLED JOINT BOLT PAD GAP

Bolt pad gaps occur when the nuts are not tightened sufficiently or if the hardware is not tightened evenly by alternating sides. Refer to the “Improperly Assembled Joint – Over-Shifted” section below. In addition, refer to the “Impact Tool Usage Guidelines” and “Impact Tool Selection” sections in this handbook. This represents an improper assembly, which could result in joint failure, property damage, serious personal injury, or death.



IMPROPERLY ASSEMBLED JOINT NEGATIVE OFFSET

Negative bolt pad offsets occur when the nuts are not tightened evenly, which produces over-tightening of one side and under-tightening of the other side. In addition, negative offsets occur if both nuts are under-tightened. Refer to the “Impact Tool Usage Guidelines” and “Impact Tool Selection” sections in this handbook. This represents an improper assembly, which could result in joint failure, property damage, serious personal injury, or death.



IMPROPERLY ASSEMBLED JOINT OVER-SHIFTED

Over-shifting of an angled bolt pad results in an offset that prevents metal-to-metal contact and equal and positive or neutral offset at the opposite angled bolt pad. This occurs when the hardware is not tightened evenly by alternating sides. Attempting to tighten the hardware on one side while the other side is over-shifted will result in bolt torque that exceeds the “Maximum Allowable Bolt Torque” values specified in the “Helpful Information” table in this section. Refer to the “Impact Tool Usage Guidelines” and “Impact Tool Selection” sections in this handbook. This represents an improper assembly, which could result in joint failure, property damage, serious personal injury, or death.

INSTRUCTIONS FOR REASSEMBLY OF COUPLINGS FEATURED IN THIS SECTION

Couplings featured in this section can be reassembled by following the instructions below.

WARNING



- Always verify that the piping system has been completely depressurized and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.
- Confirm that any equipment, branch lines, or sections of piping that may have been isolated for/during testing or due to valve closures/positioning are identified, depressurized, and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.
- Always read and follow the “Victaulic End Cap Installation Safety Instructions” section in this handbook.

Failure to follow these instructions could result in death or serious personal injury and property damage.

1. Verify that the system is depressurized and drained completely before attempting to disassemble any couplings.
2. While supporting the housings, slowly loosen the nuts of the coupling assembly.
3. Remove the hardware and housings, then remove the gasket. Inspect all components for any damage or wear. If any damage or wear is present, use a new Victaulic-supplied coupling assembly.
4. Check mating component ends and lubricate gasket, as described in the applicable product's installation instructions.
5. Reassemble the coupling by following the applicable product's installation instructions.

NOTICE

- **Style 31 Coupling components ARE NOT interchangeable with Style 31R Coupling components.**

Couplings for Grooved-End Mating Components

**Style 31R Rigid Coupling
(14 – 20-inch Sizes)**

**Style 31R Rigid Coupling
(24 – 36-inch Sizes)**

Installation Instructions
Instructions for Reassembly

NOTICE
• Style 31R Coupling components ARE NOT interchangeable with Style 31 Coupling components.

PREPARATORY STEPS FOR INSTALLATION OF STYLE 31R COUPLINGS

WARNING

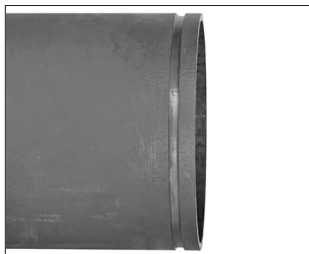


- Read and understand all instructions before attempting to install any Victaulic products.
- Always verify that the piping system has been completely depressurized and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.
- Confirm that any equipment, branch lines, or sections of piping that may have been isolated for/during testing or due to valve closures/positioning are identified, depressurized, and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.
- These installation instructions are intended for an experienced, trained installer. The installer shall understand the use of this product and why it was specified for the particular application.
- The installer shall understand common industry safety standards and potential consequences of improper product installation.
- Wear safety glasses, hardhat, and foot protection.

Failure to follow these instructions could result in death or serious personal injury and property damage.

NOTICE

- Style 31R Coupling components ARE NOT interchangeable with Style 31 Coupling components.



1. CHECK MATING COMPONENT ENDS: The outside surface of the mating components, between the groove and the mating component ends, shall be generally free from indentations, projections, deep pits, and swells to ensure a leak-tight seal. All oil, grease, loose paint, rust, scale, dirt, and cutting particles shall be removed. Peened surfaces may require corrective action to ensure a leak-tight seal (consult ANSI/AWWA Standard C606 and CSA B242 for requirements).

Always verify that the rigid radius-cut groove profile is being used for installations with Style 31R Rigid Couplings.

The mating components' outside diameter ("OD") and groove dimensions shall be within the tolerances listed in this handbook.

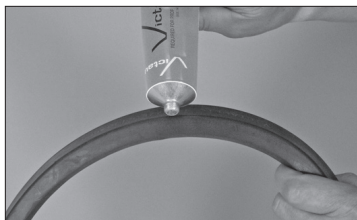
2. CHECK GASKET: Check the gasket to verify that it is suitable for the intended service. The color code identifies the material grade. Refer to page 10 for the "Gasket Color Code Reference" table. For complete compatibility information, reference Victaulic publications 05.01 and GSG-100, which can be downloaded at victaulic.com.

CAUTION

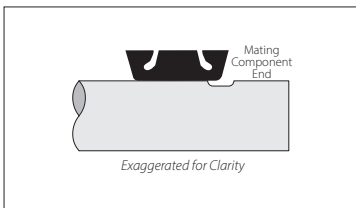
- A thin coat of a compatible lubricant shall be applied to the gasket sealing lips and exterior to help prevent the gasket from pinching, rolling, or tearing during installation.
- DO NOT use an incompatible lubricant.
- DO NOT use excessive lubricant on the gasket sealing lips and exterior.

Failure to use a compatible lubricant may cause gasket damage, resulting in joint leakage and property damage.



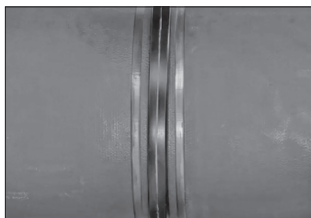


3. LUBRICATE GASKET: Apply a thin coat of a compatible lubricant to the gasket sealing lips and exterior. Refer to the “Lubricant Compatibility for Gaskets” table on page 11.

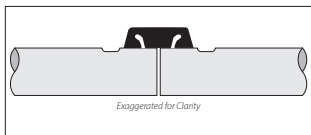


4. INSTALL GASKET: Install the gasket over the mating component end.

For 24-inch and larger coupling sizes: It may be easier to turn the gasket inside out to install it over the mating component end. **NOTE:** Verify that the gasket does not overhang the mating component end.



5. JOIN MATING COMPONENTS: Align the centerlines of the two grooved mating component ends and bring them together. Slide the gasket into position and center it between the groove of each mating component. **NOTE:** Verify that no portion of the gasket extends into the groove of either mating component.



6. If the gasket was turned inside out in step 4: Roll the gasket into position and center it between the groove of each mating component. **NOTE:** Verify that no portion of the gasket extends into the groove of either mating component.

IMPORTANT INFORMATION FOR USE OF STYLE 31R COUPLINGS WITH END CAPS:

WARNING

- Always read and follow the “Victaulic End Cap Installation Safety Instructions” section in this handbook.

Failure to follow the “Victaulic End Cap Installation Safety Instructions” section could result in death or serious personal injury and property damage.

- Always confirm that any equipment, branch lines, or sections of piping that may have been isolated for/during testing or due to valve closures/positioning are identified, depressurized, and drained immediately prior to working with an end cap.

WARNING



- Read and understand all instructions before attempting to install any Victaulic products.
- Always verify that the piping system has been completely depressurized and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.
- Confirm that any equipment, branch lines, or sections of piping that may have been isolated for/during testing or due to valve closures/positioning are identified, depressurized, and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.
- These installation instructions are intended for an experienced, trained installer. The installer shall understand the use of this product and why it was specified for the particular application.
- The installer shall understand common industry safety standards and potential consequences of improper product installation.
- Wear safety glasses, hardhat, and foot protection.

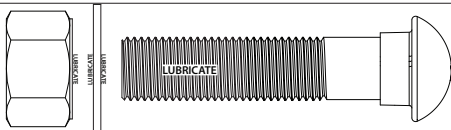
Failure to follow these instructions could result in death or serious personal injury and property damage.

1. Follow all instructions in the "Preparatory Steps" section on pages 48 – 49.

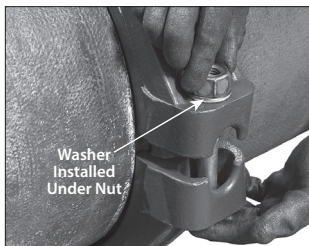
CAUTION

- Verify that the gasket does not become rolled or pinched while installing the housings.

Failure to follow this instruction may cause gasket damage, resulting in joint leakage and property damage.



2. LUBRICATE BOLT THREADS: At the time of hardware installation, apply a thin coat of Victaulic Lubricant or equivalent bolt thread lubricant to the bolt threads, as indicated above.



3. INSTALL HOUSINGS: Install the housings over the gasket. Verify that the housings' keys engage the grooves completely on both mating components.

4. INSTALL BOLTS/WASHERS/NUTS: While supporting the weight of the housings, install the lubricated bolts. Apply a washer to each bolt and then thread a nut finger-tight onto each bolt. **NOTE:** Verify that the oval neck of each bolt seats properly in the bolt hole.

WARNING

- Nuts shall be tightened evenly by alternating sides, maintaining nearly uniform bolt pad gaps, until the requirements in steps 5 and 6 are achieved.
- Keep hands away from coupling openings during tightening.

Failure to tighten nuts as instructed will cause increased loading of the hardware, resulting in the following conditions:

- Excessive bolt torque required to assemble the joint (incomplete assembly)
- Damage to the assembled joint (damaged or broken bolt pads or fractures to housings)
- Bolt damage or fracture
- Joint leakage and property damage
- A negative impact on system integrity
- Voiding of the Victaulic warranty
- Personal injury or death

DO NOT continue to tighten the nuts after the requirements in steps 5 and 6 are achieved.

- Failure to follow this instruction could result in the conditions listed above.

NOTICE

- It is important to tighten the nuts evenly by alternating bolt pad locations to prevent gasket pinching.
- An impact tool or standard socket wrench with a deep-well socket can be used to tighten the hardware.
- Refer to the "Impact Tool Usage Guidelines" and "Impact Tool Selection" sections in this handbook, along with the "Helpful Information" table below.

Helpful Information

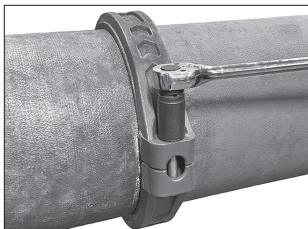
Nominal Pipe Size inches	Actual Pipe Outside Diameter inches/mm	Nut Size inches/Metric	Deep-Well Socket Size inches/mm	Required Torque ft-lbs N•m	Maximum Bolt Pad Gap inches/mm
14	15.300 388.6	$\frac{3}{4}$ M20	$1\frac{1}{4}$ 32	250 339	0.21 5.3
16	17.400 442.0	$\frac{3}{4}$ M20	$1\frac{1}{4}$ 32	250 339	0.13 3.3
18	19.500 495.3	$\frac{3}{4}$ M20	$1\frac{1}{4}$ 32	250 339	0.15 3.8
20	21.600 548.6	$\frac{7}{8}$ M22	$1\frac{7}{16}$ 36	375 508	0.15 3.8



**BOLT PADS SHOULD NOT COME INTO
METAL-TO-METAL CONTACT**

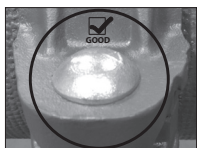
**REFER TO TABLE ABOVE OR
MARKINGS ON HOUSINGS FOR THE
TORQUE REQUIREMENT**





5. TIGHTEN NUTS: Using an impact tool or a standard socket wrench with a deep-well socket, tighten the nuts evenly by alternating sides. Maintain nearly uniform bolt pad gaps and verify that the oval neck of each bolt seats properly in the bolt holes. Continue tightening until the required torque value is achieved at each nut. **Bolt pads should not come into metal-to-metal contact.** DO NOT continue to tighten the nuts after the required torque value is achieved.

If you suspect that any hardware has been over-tightened (as indicated by a bend in the bolt, bulging of the nut at the bolt pad interface, or damage to the bolt pad, etc.), the entire coupling assembly shall be replaced immediately. Refer to the “Impact Tool Usage Guidelines” and “Impact Tool Selection” sections in this handbook, along with the “Helpful Information” table on the previous page.



OVAL NECK OF BOLT
SEATED PROPERLY

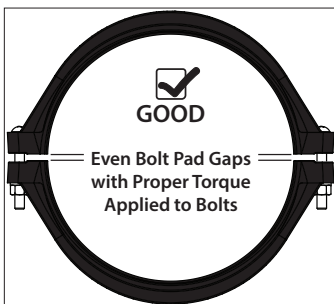


OVAL NECK OF BOLT
NOT SEATED PROPERLY

! WARNING

- Visual inspection of each joint is required.
- Improperly assembled joints shall be corrected before the system is filled, tested, or placed into service.
- Any components that exhibit physical damage due to improper assembly shall be replaced before the system is filled, tested, or placed into service.

Failure to follow these instructions could cause joint failure, resulting in death or serious personal injury and property damage.



6. Visually inspect each bolt pad location at every joint to verify that proper assembly is achieved.

NOTICE

- Style 31R Coupling components ARE NOT interchangeable with Style 31 Coupling components.

STANDARD INSTALLATION METHOD

WARNING



- Read and understand all instructions before attempting to install any Victaulic products.
- Always verify that the piping system has been completely depressurized and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.
- Confirm that any equipment, branch lines, or sections of piping that may have been isolated for/during testing or due to valve closures/positioning are identified, depressurized, and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.
- These installation instructions are intended for an experienced, trained installer. The installer shall understand the use of this product and why it was specified for the particular application.
- The installer shall understand common industry safety standards and potential consequences of improper product installation.
- Wear safety glasses, hardhat, and foot protection.

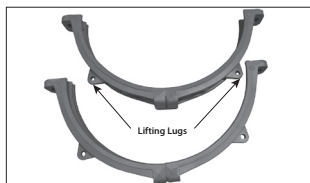
Failure to follow these instructions could result in death or serious personal injury and property damage.

WARNING

- Due to the weight of the coupling housings, mechanical lifting requirements set forth by the governing safety organization shall be followed. Refer to the "Helpful Information" table on page 54. Lifting lugs are provided and shall be used for handling and placement of the housings.

Failure to follow these instructions will cause improper assembly and joint failure, resulting in death or serious personal injury and property damage.

1. Follow all instructions in the "Preparatory Steps" section on pages 48 – 49.

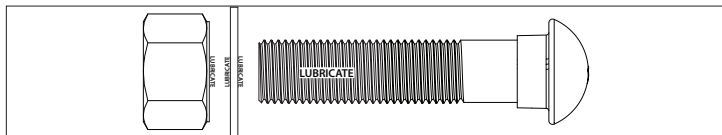


Lifting lugs are provided and shall be used for handling and placement of the housings.

CAUTION

- Verify that the gasket does not become rolled or pinched while installing the housings.

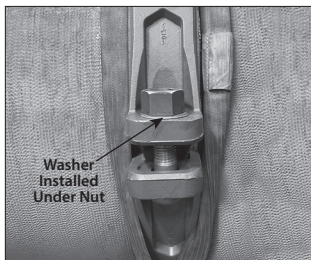
Failure to follow this instruction may cause gasket damage, resulting in joint leakage and property damage.



2. **LUBRICATE BOLT THREADS:** At the time of hardware installation, apply a thin coat of Victaulic Lubricant or equivalent bolt thread lubricant to the bolt threads, as indicated above.



3. INSTALL FIRST HOUSING: Install the first housing over the gasket. Verify that the housings' keys engage the grooves completely on both mating components. Remove shackles and install on lower housing lifting lugs.



4. INSTALL SECOND HOUSING: Lift the second housing up to the gasket. Verify that the housings' keys engage the grooves completely on both mating components.

5. INSTALL BOLTS/WASHERS/NUTS: While supporting the weight of the housings, install the lubricated bolts. Apply a washer to each bolt and then thread a nut finger-tight onto each bolt. **NOTE:** Verify that the oval neck of each bolt seats properly in the bolt hole. Remove shackles and lifting straps.

! WARNING

- Nuts shall be tightened evenly by alternating sides, maintaining nearly uniform bolt pad gaps, until the requirements in steps 6 and 7 are achieved.
- Keep hands away from coupling openings during tightening.

Failure to tighten nuts as instructed will cause increased loading of the hardware, resulting in the following conditions:

- Excessive bolt torque required to assemble the joint (incomplete assembly)
- Damage to the assembled joint (damaged or broken bolt pads or fractures to housings)
- Bolt damage or fracture
- Joint leakage and property damage
- A negative impact on system integrity
- Voiding of the Victaulic warranty
- Personal injury or death

DO NOT continue to tighten the nuts after the requirements in steps 6 and 7 are achieved.

- Failure to follow this instruction could result in the conditions listed above.

NOTICE

- It is important to tighten the nuts evenly by alternating bolt pad locations to prevent gasket pinching.
- An impact tool or standard socket wrench with a deep-well socket can be used to tighten the hardware.
- Refer to the "Impact Tool Usage Guidelines" and "Impact Tool Selection" sections in this handbook, along with the "Helpful Information" table below.

Helpful Information

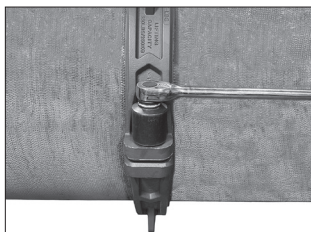
Nominal Pipe Size inches	Actual Pipe Outside Diameter inches/mm	Nut Size inches/Metric	Deep-Well Socket Size inches/mm	Required Torque ft-lbs N•m	Maximum Bolt Pad Gap inches/mm	Approx. Weight (Each) lb/kg
24	25.800 655.3	1 1/8 M27	1 13/16 46	425 576	0.30 7.6	130.0 59.0
30	32.000 812.8	1 1/4 M30	2 50	500 678	0.25 6.4	205.0 93.0
36	38.300 972.8	1 1/2 M36	2 3/8 60	725 983	0.24 6.1	250.0 113.5



STYLE 31R RIGID COUPLINGS FOR
GROOVED-END MATING COMPONENTS
INSTALLATION INSTRUCTIONS REV_E

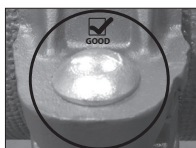


**BOLT PADS SHOULD NOT COME INTO
METAL-TO-METAL CONTACT**
**REFER TO TABLE ON PREVIOUS PAGE OR
MARKINGS ON HOUSINGS FOR THE
TORQUE REQUIREMENT**



6. TIGHTEN NUTS: Using an impact tool or a standard socket wrench with a deep-well socket, tighten the nuts evenly by alternating sides. Maintain nearly uniform bolt pad gaps and verify that the oval neck of each bolt seats properly in the bolt holes. Continue tightening until the required torque value is achieved at each nut.
Bolt pads should not come into metal-to-metal contact. DO NOT continue to tighten the nuts after the required torque value is achieved.

If you suspect that any hardware has been over-tightened (as indicated by a bend in the bolt, bulging of the nut at the bolt pad interface, or damage to the bolt pad, etc.), the entire coupling assembly shall be replaced immediately. Refer to the “Impact Tool Usage Guidelines” and “Impact Tool Selection” sections in this handbook.



**OVAL NECK OF BOLT
SEATED PROPERLY**



**OVAL NECK OF BOLT
NOT SEATED PROPERLY**

! WARNING

- Visual inspection of each joint is required.
- Improperly assembled joints shall be corrected before the system is filled, tested, or placed into service.
- Any components that exhibit physical damage due to improper assembly shall be replaced before the system is filled, tested, or placed into service.

Failure to follow these instructions could cause joint failure, resulting in death or serious personal injury and property damage.



7. Visually inspect each bolt pad location at every joint to verify that proper assembly is achieved.

NOTICE

- Style 31R Coupling components **ARE NOT** interchangeable with Style 31 Coupling components.

ALTERNATIVE INSTALLATION METHOD

WARNING



- Read and understand all instructions before attempting to install any Victaulic products.
- Always verify that the piping system has been completely depressurized and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.
- Confirm that any equipment, branch lines, or sections of piping that may have been isolated for/during testing or due to valve closures/positioning are identified, depressurized, and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.
- These installation instructions are intended for an experienced, trained installer. The installer shall understand the use of this product and why it was specified for the particular application.
- The installer shall understand common industry safety standards and potential consequences of improper product installation.
- Wear safety glasses, hardhat, and foot protection.

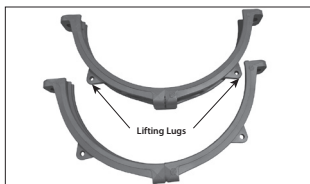
Failure to follow these instructions could result in death or serious personal injury and property damage.

WARNING

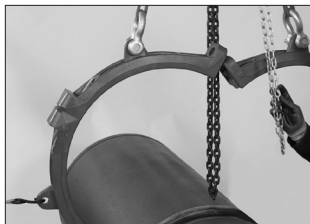
- Due to the weight of the coupling housings, mechanical lifting requirements set forth by the governing safety organization shall be followed. Refer to the "Helpful Information" table on page 54. Lifting lugs are provided and shall be used for handling and placement of the housings.
- Care shall be taken during mechanical lifting to prevent uncontrolled movement of the housings.

Failure to follow these instructions will cause improper assembly and joint failure, resulting in death or serious personal injury and property damage.

1. Follow all instructions in the "Preparatory Steps" section on pages 48 – 49.



Lifting lugs are provided and shall be used for handling and placement of the housings.



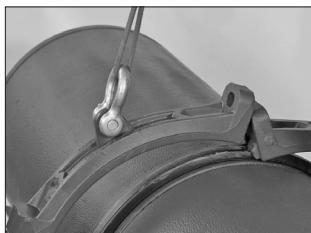
2. Install shackles on upper lifting lugs. Upper bolt pads shall remain in contact. Lower lifting lugs to have guide ropes during installation to guide housings over the pipe, as shown.

CAUTION

- Verify that the gasket does not become rolled or pinched while installing the housings.

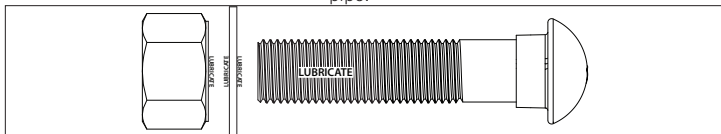
Failure to follow this instruction may cause gasket damage, resulting in joint leakage and property damage.





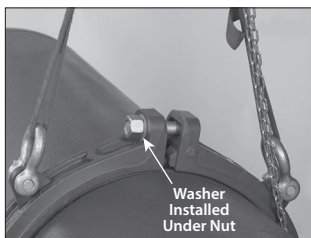
3a. Begin lowering the two housings slowly over the pipe joint. As the assembly is being lowered, one person on each side of the assembly should use the guide ropes to carefully pull the housings apart to clear the pipe.

3b. Continue to maintain distance between the housings and pipe as the assembly is being lowered. Use caution to prevent the housings from swinging and colliding with gasket and pipe.



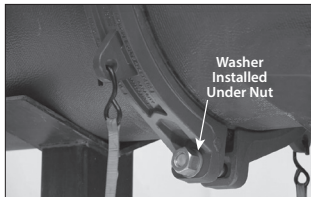
4. LUBRICATE BOLT THREADS: At the time of hardware installation, apply a thin coat of Victaulic Lubricant or equivalent bolt thread lubricant to the bolt threads, as indicated above.

5a. As the coupling is lowered onto the pipe, verify that the housings' keys completely engage the groove in each pipe end.



5b. INSTALL BOLT/WASHER/NUT AT TOP BOLT PAD LOCATION: While continuing to support the weight of the housings, install a lubricated bolt at the top bolt pad location. Apply a washer to the bolt and then thread a nut finger-tight onto the bolt. **NOTE:** Verify that the oval neck of the bolt seats properly in the bolt hole.

5c. Slowly release tension on the two lifting slings.



6. INSTALL BOLT/WASHER/NUT AT BOTTOM BOLT PAD LOCATION: Install a lubricated bolt at the bottom bolt pad location. Apply a washer to the bolt and then thread a nut finger-tight onto the bolt. **NOTE:** Verify that the oval neck of the bolt seats properly in the bolt hole.

6. Install a lubricated bolt at the bottom bolt pad location. Apply a washer to the bolt and then thread a nut finger-tight onto the bolt. **NOTE:** Verify that the oval neck of the bolt seats properly in the bolt hole.



7. Remove the shackles and guide ropes from the housings.



8. Rotate the coupling so that the bolt pads are in the desired position.

9. Follow all instructions on pages 54 - 55 for tightening the hardware and inspecting the final assembly.

INSTRUCTIONS FOR REASSEMBLY OF COUPLINGS FEATURED IN THIS SECTION

Couplings featured in this section can be reassembled by following the instructions below.



 **WARNING**

- Always verify that the piping system has been completely depressurized and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.
- Confirm that any equipment, branch lines, or sections of piping that may have been isolated for/during testing or due to valve closures/positioning are identified, depressurized, and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.
- Always read and follow the “Victaulic End Cap Installation Safety Instructions” section in this handbook.

Failure to follow these instructions could result in death or serious personal injury and property damage.

1. Verify that the system is depressurized and drained completely before attempting to disassemble any couplings.
2. While supporting the housings, slowly loosen the nuts of the coupling assembly.
3. Remove the hardware and housings, then remove the gasket. Inspect all components for any damage or wear. If any damage or wear is present, use a new Victaulic-supplied coupling assembly.
4. Check mating component ends and lubricate gasket, as described in the applicable product's installation instructions.
5. Reassemble the coupling by following the applicable product's installation instructions.

NOTICE

- **Style 31R Coupling components ARE NOT interchangeable with Style 31 Coupling components.**

Flange Adapters for Grooved-End Ductile Iron Pipe

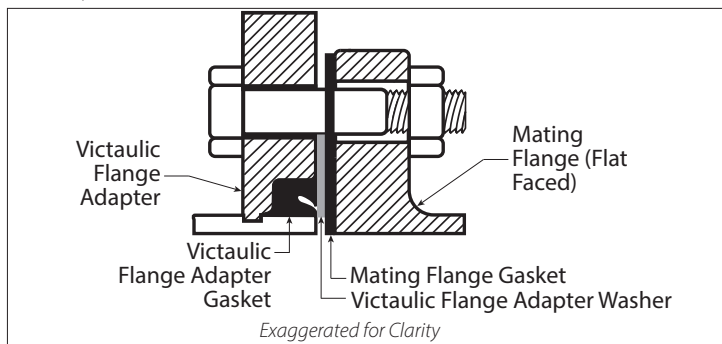
Installation Instructions

VICTAULIC FLANGE ADAPTER NOTES

- The Style 341 provides a direct connection to flat-faced (with or without serrated sealing surfaces) flanged components with an ANSI B16.1 Class 125 bolt hole pattern. **THE STYLE 341 IS NOT DESIGNED FOR USE WITH RAISED-FACE STYLE FLANGE CONNECTIONS.**
- The Style 341 shall not be used as anchor points for tie rods across non-restrained joints.
- If the Style 341 will be used on more than one outlet of a ductile iron grooved fitting, verify that there will not be interference between the flanges prior to installation.
- The Style 341 Flange Adapter Gasket shall always be assembled with the color-coded lip on the pipe and the other lip facing the flat-faced mating flange. When installed correctly, the lettering on the Flange Adapter Gasket will not be visible when viewing the face of the Style 341 prior to attaching the flat-faced mating flange.
- Refer to the “Victaulic Flange Adapter Washer Notes” section on the following page for details regarding applications that require a Victaulic Flange Adapter Washer.
- **STANDARD FULL-SHANK DIAMETER ASSEMBLY BOLTS (NOT SUPPLIED) ARE REQUIRED FOR PROPER INSTALLATION OF THE STYLE 341. FULLY-THREADED BOLTS SHALL NOT BE USED.**
- **A COMPATIBLE FLAT-FACED MATING FLANGE OR FLANGE ADAPTER SHALL HAVE THE SAME NUMBER AND DIAMETER OF BOLTS AND THE SAME BOLT CIRCLE AS THE STYLE 341.**

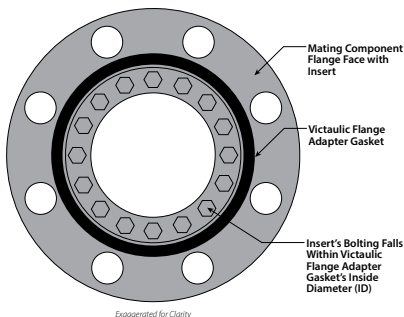
VICTAULIC FLANGE ADAPTER WASHER NOTES

Style 341 Flange Adapters require a smooth, hard surface at the flat-faced mating flange for effective sealing. Some applications listed below, for which these Flange Adapters are otherwise well suited, do not provide an adequate mating surface. In such cases, a standard metallic Victaulic Flange Adapter Washer shall be inserted between the Style 341 and the flat-faced mating flange to provide the necessary sealing surface. Refer to the example below.



Examples of Applications Requiring a Flange Adapter Washer to be Installed:

- When mating with a flat-faced flanged component containing a serrated sealing surface, the Victaulic Flange Adapter Washer shall be placed between the Style 341 and the flange gasket of the flat-faced flanged component. **NOTE:** Flat-faced flanged components containing a smooth (not serrated) sealing surface do not require a Victaulic Flange Adapter Washer or a mating flange gasket.
- When mating a Style 341 to a rubber-faced or partially rubber-faced (smooth or not) piping component, a standard metallic Victaulic Flange Adapter Washer shall be placed between the Style 341 and the rubber-faced component.
- When mating a Style 341 to piping components (valves, strainers, etc.) where the component flange face has an insert, perform a trial fit with the Victaulic Flange Adapter Gasket to determine if the insert's bolting falls within the Flange Adapter Gasket's inside diameter (ID), as shown to the right. If the insert's bolting does not fall within the Flange Adapter Gasket's ID, a standard metallic Victaulic Flange Adapter Washer and appropriate gasket for the flat-faced mating flange are recommended.
- When mating two compatible *Vic-Flange* Adapters, the Victaulic Flange Adapter Washer shall be placed between the two Victaulic Flange Adapters with the draw bolt locations staggered.



NOTICE

- When a Victaulic flange solution is needed to connect components made from dissimilar metals, the system shall be reviewed for the potential of galvanic corrosion. If warranted, a bolt isolation kit shall be used on the flanged connection, along with a phenolic flange adapter washer (instead of a standard metallic Victaulic Flange Adapter Washer).
- Always reference the bolt isolation kit manufacturer's installation instructions. A qualified engineer or system designer shall ultimately review and approve any solution for galvanic protection of a system.

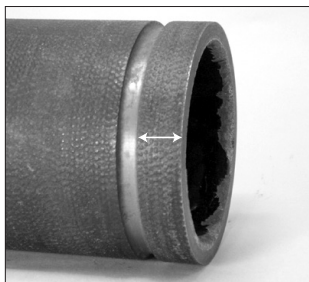
Style 341 - Vic-Flange Adapter (3 – 12-inch Sizes)

WARNING



- Read and understand all instructions before attempting to install any Victaulic products.
- Always verify that the piping system has been completely depressurized and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.
- Confirm that any equipment, branch lines, or sections of piping that may have been isolated for/during testing or due to valve closures/positioning are identified, depressurized, and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.
- These installation instructions are intended for an experienced, trained installer. The installer shall understand the use of this product and why it was specified for the particular application.
- The installer shall understand common industry safety standards and potential consequences of improper product installation.
- Wear safety glasses, hardhat, and foot protection.

Failure to follow these instructions could result in death or serious personal injury and property damage.



1a. CHECK PIPE END: Uncoated pipe is not permitted. The outside surface of the pipe, between the groove and the pipe end, shall contain 1-mil minimum of shop primer or other coating. Additionally, this area shall be generally free from indentations, projections, deep pits, and swells to ensure a leak-tight seal. All oil, grease, loose paint, rust, scale, dirt, and cutting particles shall be removed. Peened surfaces may require corrective action to ensure a leak-tight seal (consult ANSI/AWWA Standard C606 and CSA B242 for requirements).

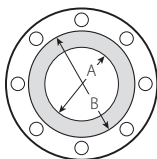
Always verify that the rigid radius-cut groove used for installation of the Style 341.

The mating components' outside diameter ("OD") and groove dimensions shall be within the tolerances listed in this handbook.

NOTICE

- Verify that there is sufficient clearance behind the groove to permit proper assembly of the Style 341.





1b. CHECK FLAT-FACED MATING FLANGE: The gray area of the flat-faced mating flange (shown to the left) shall be generally free from gouges, undulations, and deformities of any type for proper sealing. Refer to table below for the required flat-faced mating flange sealing surface.

Nominal Pipe Size inches	Actual Pipe Outside Diameter inches/mm	Required Flat-Faced Mating Flange Sealing Surface inches/mm	
		"A" Maximum	"B" Minimum
3	3.96 100.6	3.96 101	4.94 125
4	4.80 121.9	4.80 122	5.88 149
6	6.90 175.3	6.90 175	8.00 203
8	9.05 229.9	9.05 230	10.13 257
10	11.10 281.9	11.10 282	12.50 318
12	13.20 335.5	13.20 336	14.75 375

2. CHECK STYLE 341 FLANGE ADAPTER GASKET: Check the Flange Adapter Gasket to verify that it is suitable for the intended service. The color code identifies the material grade. Refer to page 10 for the "Gasket Color Code Reference" table. For complete compatibility information, reference Victaulic publications 05.01 and GSG-100, which can be downloaded at victaulic.com.



CAUTION

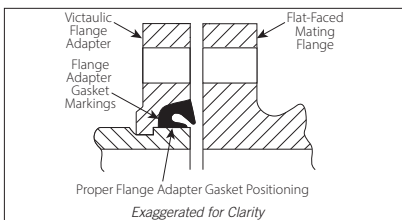
- A thin coat of a compatible lubricant shall be applied to the Flange Adapter Gasket's sealing lips and exterior to help prevent the Flange Adapter Gasket from pinching, rolling, or tearing during installation.
- DO NOT use an incompatible lubricant.
- DO NOT use excessive lubricant on the Flange Adapter Gasket's sealing lips and exterior.

Failure to use a compatible lubricant may cause Flange Adapter Gasket damage, resulting in joint leakage and property damage.

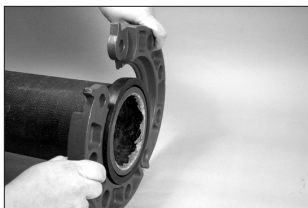


3. LUBRICATE FLANGE ADAPTER GASKET:

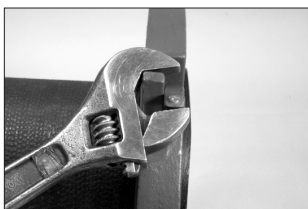
Apply a thin coat of a compatible lubricant to the Flange Adapter Gasket's sealing lips and exterior. Refer to the "Lubricant Compatibility for Gaskets" table on page 11. **NOTE:** This Flange Adapter Gasket is designed to provide the sole seal. However, reference shall be made to the "Victaulic Flange Adapter Washer Notes" section on page 61 for special applications.



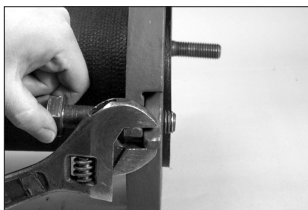
4. POSITION AND INSTALL FLANGE ADAPTER GASKET: Verify that the Flange Adapter Gasket is positioned properly, then install the Flange Adapter Gasket onto the pipe end. The Flange Adapter Gasket shall always be assembled with the color-coded lip on the pipe and the other lip facing the flat-faced mating flange. When installed correctly, the lettering on the Flange Adapter Gasket will not be visible when viewing the face of the Style 341. Verify that no portion of the Flange Adapter Gasket extends into the groove of the pipe end.



5. INSTALL STYLE 341: Install the hinged Style 341 around the grooved pipe end. Verify that the key section of the housings engages with the groove in the pipe end.

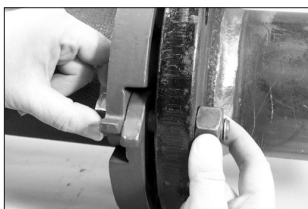


6a. Closure lugs are provided for ease of installation. Clamp both lugs with a wrench or pliers to bring the lap-joint bolt holes into alignment.

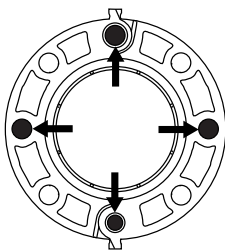


6b. Insert a standard full-shank-diameter assembly bolt through the two lap-joint bolt hole locations, as shown. Refer to the "Helpful Information" table on the following page for the required assembly bolt size and length. **NOTE:** Victaulic does not supply these assembly bolts.

6c. Verify that the Flange Adapter Gasket is still seated properly within the gasket pocket of the Style 341 and that the lettering on the Flange Adapter Gasket is not visible when viewing the face of the Style 341.



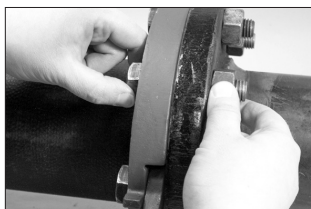
7. JOIN STYLE 341 AND FLAT-FACED MATING FLANGE: Insert the assembly bolts, installed in step 6b, into the flat-faced mating flange's holes. Finger-tighten a nut onto each bolt to prevent the bolts from pulling out.



8a. INSTALL TWO ADDITIONAL SETS OF STANDARD FULL-SHANK-DIAMETER ASSEMBLY BOLTS/NUTS 90° APART FROM THE HARDWARE INSTALLED IN STEP 7.

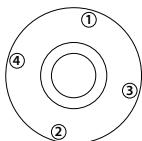
8b. TIGHTEN FOUR SETS OF HARDWARE:

Evenly tighten the four sets of hardware in a crossing pattern to bring the flange surfaces together as parallel as possible. When complete metal-to-metal contact is achieved at the outside diameter of the flange faces, proceed to step 9. For the 3-inch flange size, proceed to step 10.

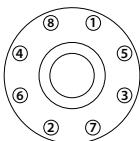


9. INSTALL REMAINING STANDARD FULL-SHANK-DIAMETER ASSEMBLY BOLTS/NUTS:

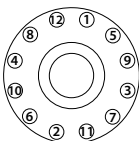
Insert a standard full-shank diameter assembly bolt through each remaining hole in the Style 341 and flat-faced mating flange. Finger-tighten a nut onto each bolt.



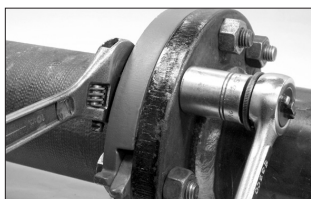
4-Bolt Tightening Pattern



8-Bolt Tightening Pattern



12-Bolt Tightening Pattern



10. TORQUE ALL HARDWARE: Tighten all nuts evenly in the applicable pattern shown above until the “Recommended Installation Torque” listed in the table below is achieved. **NOTE:** If using a Victaulic Flange Adapter Washer and sheet gasket (supplied by others) in the installation, use the torque recommended by the sheet gasket manufacturer.

Helpful Information

Nominal Pipe Size inches	Actual Pipe Outside Diameter inches/mm	Standard Full-Shank-Diameter Assembly Bolts/Nuts †		Deep-Well Socket Size inches	Recommended Installation Torque
		Number of Bolts/Nuts Required	Bolt/Nut Size x Length inches		
3	3.96 100.6	4	5/8 x 3	1 1/16	90 – 120 ft-lbs 122 – 163 N•m
4	4.80 121.9	8	5/8 x 3	1 1/16	90 – 120 ft-lbs 122 – 163 N•m
6	6.90 175.3	8	3/4 x 3 1/2	1 1/4	120 – 150 ft-lbs 163 – 203 N•m
8	9.05 229.9	8	3/4 x 3 1/2	1 1/4	120 – 150 ft-lbs 163 – 203 N•m
10	11.10 281.9	12	7/8 x 4	1 7/16	200 – 250 ft-lbs 271 – 339 N•m
12	13.20 335.5	12	7/8 x 4	1 7/16	200 – 250 ft-lbs 271 – 339 N•m

† Victaulic does not supply the standard full-shank-diameter assembly bolts and nuts. Standard full-shank-diameter assembly bolts are required for proper installation of Style 341 Vic-Flange Adapters. **Fully-threaded bolts shall not be used.** The assembly bolt sizes listed above are for conventional flange-to-flange connections.

! WARNING



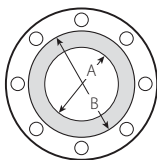
- Read and understand all instructions before attempting to install any Victaulic products.
 - Always verify that the piping system has been completely depressurized and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.
 - Confirm that any equipment, branch lines, or sections of piping that may have been isolated for/during testing or due to valve closures/positioning are identified, depressurized, and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.
 - These installation instructions are intended for an experienced, trained installer. The installer shall understand the use of this product and why it was specified for the particular application.
 - The installer shall understand common industry safety standards and potential consequences of improper product installation.
 - Wear safety glasses, hardhat, and foot protection.
- Failure to follow these instructions could result in death or serious personal injury and property damage.**

1a. CHECK PIPE END: Uncoated pipe is not permitted. The outside surface of the pipe, between the groove and the pipe end, shall contain 1-mil minimum of shop primer or other coating. Additionally, this area shall be generally free from indentations, projections, deep pits, and swells to ensure a leak-tight seal. All oil, grease, loose paint, rust, scale, dirt, and cutting particles shall be removed. Peened surfaces may require corrective action to ensure a leak-tight seal (consult ANSI/AWWA Standard C606 and CSA B242 for requirements).

Always verify that the rigid radius-cut groove used for installation of the Style 341.

The mating components' outside diameter ("OD") and groove dimensions shall be within the tolerances listed in this handbook.

THE STYLE 341 ASSEMBLY HAS A TORQUE REQUIREMENT. REFER TO THE INSTRUCTIONS ON THE FOLLOWING PAGES FOR THE TORQUE REQUIREMENT.



1b. CHECK FLAT-FACED MATING FLANGE: The gray area of the flat-faced mating flange (shown to the left) shall be generally free from gouges, undulations, and deformities of any type for proper sealing. Refer to the table below for the required flat-faced mating flange sealing surface.

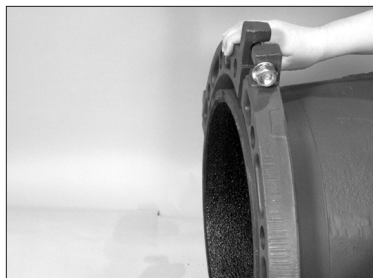
Nominal Pipe Size inches	Actual Pipe Outside Diameter inches/mm	Required Flat-Faced Mating Flange Sealing Surface inches/mm	
		"A" Maximum	"B" Minimum
14	15.30 388.6	15.30 389	16.38 416
16	17.40 442.0	17.40 442	18.38 467
18	19.50 495.3	19.50 495	20.00 508
20	21.60 548.6	21.60 549	22.50 572
24	25.80 655.3	25.80 655	27.75 705
30	32.00 812.8	32.00 813	33.88 861
36	38.30 972.8	38.30 973	40.18 1021

NOTICE

- Verify that there is sufficient clearance behind the groove to permit proper assembly of the Style 341.
- Pipe support shall be maintained throughout the entire installation procedure.



2. INSTALL FIRST SEGMENT: Install the first segment onto the pipe. Verify that the segment's key section completely engages the groove. **NOTE:** On vertical pipe, the segments shall be supported in place until all segments are installed and fastened together. For horizontal pipe, the first segment can be balanced on top of the pipe, as shown to the left.



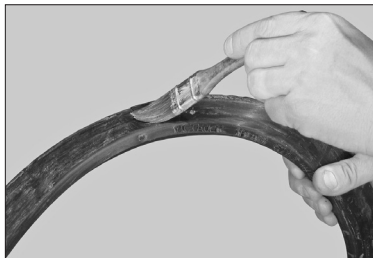
3. INSTALL ADDITIONAL SEGMENTS: Install each segment onto the pipe. Install the provided draw bolts into the Style 341, as shown to the left. Thread a provided nut loosely onto each draw bolt. **NOTE:** The nut should be installed at least flush with the end of the draw bolt but loose enough to permit rotation of the Style 341 for bolt hole alignment in later steps. Verify that the key section of all segments completely engages the groove.

4a. CHECK FLANGE ADAPTER GASKET: Check the Flange Adapter Gasket to verify that it is suitable for the intended service. The color code identifies the material grade. **Refer to page 10 for the “Gasket Color Code Reference” table. For complete compatibility information, reference Victaulic publications 05.01 and GSG-100, which can be downloaded at victaulic.com.**

CAUTION

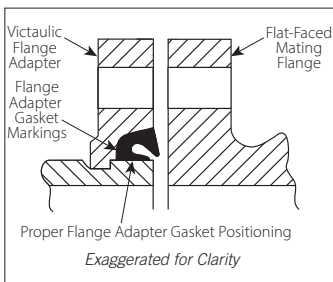
- A thin coat of a compatible lubricant shall be applied to the Flange Adapter Gasket's sealing lips and exterior to help prevent the Flange Adapter Gasket from pinching, rolling, or tearing during installation.
- DO NOT use an incompatible lubricant.
- DO NOT use excessive lubricant on the Flange Adapter Gasket's sealing lips and exterior.

Failure to use a compatible lubricant may cause Flange Adapter Gasket damage, resulting in joint leakage and property damage.



4b. LUBRICATE FLANGE ADAPTER GASKET AND GASKET POCKET (CAVITY BETWEEN PIPE OD AND FLANGE RECESS): Apply a thin coat of a compatible lubricant to the Flange Adapter Gasket's sealing lips and exterior, along with the gasket pocket of the Style 341 (cavity between pipe OD and Style 341 recess). Refer to the “Lubricant Compatibility for Gaskets” table on page 11.

NOTE: This Flange Adapter Gasket is designed to provide the sole seal. However, reference shall be made to the “Victaulic Flange Adapter Washer Notes” section for special applications.



5. POSITION AND INSTALL FLANGE ADAPTER GASKET: Verify that the Flange Adapter Gasket is positioned properly, then install the Flange Adapter Gasket into the gasket pocket. The Flange Adapter Gasket shall always be assembled with the color-coded lip on the pipe and the other lip facing the flat-faced mating flange. When installed correctly, the lettering on the Flange Adapter Gasket will not be visible when viewing the face of the Style 341.



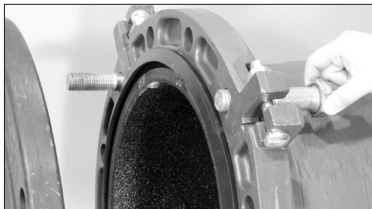
6. ALIGN 341 AND FLAT-FACED MATING FLANGE: Rotate the Style 341 on the pipe end, as required, to align the holes with the flat-faced mating flange.



7. TIGHTEN DRAW BOLT NUTS:

Tighten the draw bolt nuts evenly by alternating draw bolt locations, maintaining nearly uniform bolt pad gaps during tightening. **Continue to tighten the draw bolt nuts evenly by alternating draw bolt locations until metal-to-metal contact occurs in the area indicated AND a torque of 150 ft-lbs/203 N•m are achieved.**

Refer to the “Helpful Information” table on the following page for the draw bolt/nut sizes and socket sizes. **NOTE:** Deep-well sockets are required for proper installation due to the longer draw bolt lengths associated with the Style 341.



8. INSTALL STANDARD FULL-SHANK-DIAMETER ASSEMBLY BOLTS AT LAP JOINTS:

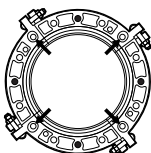
Install a standard full-shank-diameter assembly bolt into each of the lap-joint bolt holes. Refer to the “Helpful Information” table on the following page for the required assembly bolt size and length. **NOTE:** Victaulic does not supply these assembly bolts.

If experiencing difficulty inserting assembly bolts at lap joints, loosen each draw bolt nut no more than two full rotations to allow for insertion of the assembly bolts. Re-tighten and torque the draw bolt nuts in accordance with Step 7.



9. JOIN 341 AND FLAT-FACED MATING FLANGE:

Insert the assembly bolts, installed at the lap joints in step 8, into the flat-faced mating flange's holes. Finger-tighten a nut onto each bolt to prevent the bolts from pulling out.



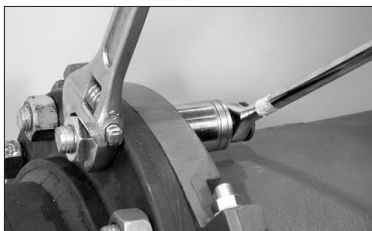
10. TIGHTEN HARDWARE AT FOUR LAP JOINT LOCATIONS:

Evenly tighten the hardware at each lap joint location in a crossing pattern to bring the flange surfaces together as parallel as possible. When complete metal-to-metal contact is achieved at the outside diameter of the flange faces, proceed to step 11.

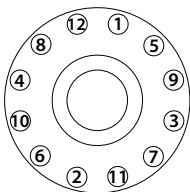


11. INSTALL REMAINING STANDARD FULL-SHANK-DIAMETER ASSEMBLY BOLTS/NUTS:

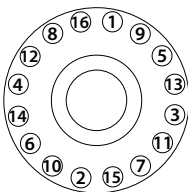
Insert a standard full-shank diameter assembly bolt through each remaining hole in the Style 341 and flat-faced mating flange. Finger-tighten a nut onto each bolt.



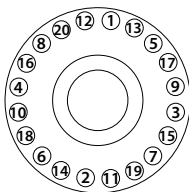
12. TORQUE ALL HARDWARE: Tighten all nuts evenly in the applicable pattern shown on the following page until the “Required Installation Torque” listed in the table on the following page is achieved. **NOTE:** If using a Victaulic Flange Adapter Washer and sheet gasket (supplied by others) in the installation, use the torque recommended by the sheet gasket manufacturer.



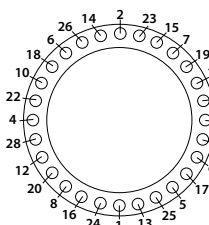
12-Bolt Tightening Pattern



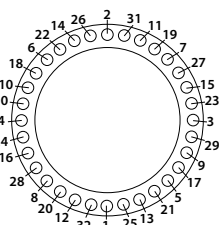
16-Bolt Tightening Pattern



20-Bolt Tightening Pattern



28-Bolt Tightening Pattern



32-Bolt Tightening Pattern

Required Torque

Nom. Pipe Size inches	Actual Pipe Outside Diameter inches/mm	Required Installation Torque	Nom. Pipe Size inches	Actual Pipe Outside Diameter inches/mm	Required Installation Torque
14 – 16	15.30 – 17.40 388.6 – 442.0	250 – 300 ft-lbs 339 – 407 N•m	24 – 30	25.80 – 32.00 655.3 – 812.8	350 – 400 ft-lbs 475 – 542 N•m
18 – 20	19.50 – 21.60 495.3 – 548.6	300 – 350 ft-lbs 407 – 475 N•m	36	38.30 972.8	400 – 450 ft-lbs 542 – 610 N•m

Helpful Information

Nominal Pipe Size inches	Actual Pipe Outside Diameter inches/mm	Standard Full-Shank-Diameter Assembly Bolts/Nuts †			Draw Bolts/Nuts §		
		Number of Bolts/ Nuts Required	Bolt/Nut Size x Length inches	Deep-Well Socket Size inches	Number of Bolts/ Nuts Required	Bolt/Nut Size x Length inches	Deep-Well Socket Size inches
14	15.30 388.6	12	1 x 4 1/4	1 1/2	4	5/8 x 3 1/2	1 5/16
16	17.40 442.0	16	1 x 4 3/4	1 1/2	4	5/8 x 3 1/2	1 5/16
18	19.50 495.3	16	1 1/8 x 5 1/2	1 11/16	4	3/4 x 5	1 1/8
20	21.60 548.6	20	1 1/8 x 5 3/4	1 11/16	4	3/4 x 5	1 1/8
24	25.80 655.3	20	1 1/4 x 6 1/4	1 7/8	4	3/4 x 5	1 1/8
30	32.00 812.8	28	1 1/4 x 7	1 7/8	4	3/4 x 5	1 1/8
36	38.30 972.8	32	1 1/2 x 11	2 1/4	4	3/4 x 5	1 1/8

† Victaulic does not supply the standard full-shank-diameter assembly bolts and nuts. Standard full-shank-diameter assembly bolts are required for proper installation of Style 341 *Vic-Flange* Adapters. **Fully-threaded bolts shall not be used.** The assembly bolt sizes listed above are for conventional flange-to-flange connections. Longer bolts are required when the Style 341 is used with wafer-type valves.

§ Draw bolts/nuts are supplied with all Style 341 sizes listed in this table.



FLANGE ADAPTERS FOR
GROOVED-END DUCTILE IRON PIPE
INSTALLATION INSTRUCTIONS REV_E

End Caps and Test Cap Kit

VICTAULIC END CAP INSTALLATION SAFETY INSTRUCTIONS

⚠ WARNING



- Read and understand all instructions before attempting to install, remove, adjust, or maintain the coupling/end cap, any end cap connections, and any other Victaulic piping products.
- Always depressurize and drain the piping system completely before attempting to install, remove, adjust, or maintain the coupling/end cap, any end cap connections, and any other Victaulic piping products.
- Always verify that the piping system has been completely depressurized and drained immediately prior to installation, removal, adjustment, or maintenance of the coupling/end cap, any end cap connections, and any other Victaulic piping products.
- Under no circumstances should coupling hardware or any other system component be loosened to check if the system is pressurized or to depressurize the system.
- Wear safety glasses, hardhat, and foot protection.

Failure to follow these instructions could result in death or serious personal injury and property damage.

This section provides safety instructions for the installation, use, and removal of Victaulic-manufactured end caps with Victaulic-manufactured couplings in all size ranges and groove profiles, along with other important information that is critical for proper use of Victaulic end caps.

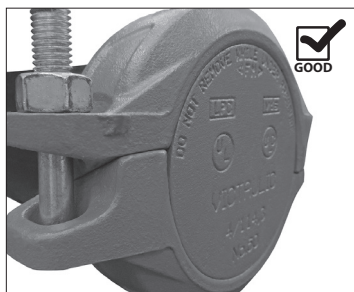
For Installation-Ready™ Couplings, refer to the “NOTICE” on page 74 for important Victaulic end cap marking information.

Always verify that the Victaulic end cap being used is designed for the specific groove profile. For example, the Victaulic No. W60 End Cap shall be used only with Victaulic Advanced Groove System (AGS) products. Refer to the I-W100 Field Installation Handbook for additional information regarding AGS end caps.

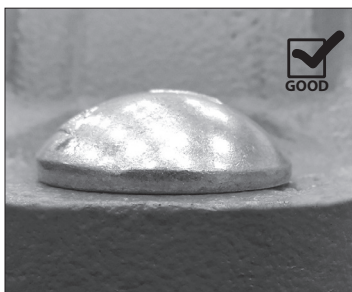
When installing, using, or removing a Victaulic end cap, always reference the specific installation instructions in this handbook for the Victaulic coupling that is being used with the Victaulic end cap. For the Victaulic No. T-60 Test Caps, always refer to the additional instructions provided with the kit and that are included on page 76 of this handbook.



After installation, always inspect the assembly to verify proper installation.

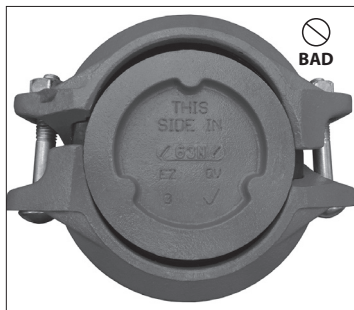


GOOD ASSEMBLY
(END CAP IS SEATED WITHIN THE COUPLING WITH THE CORRECT SIDE FACING OUT AND COUPLING BOLT PADS ARE IN METAL-TO-METAL CONTACT)

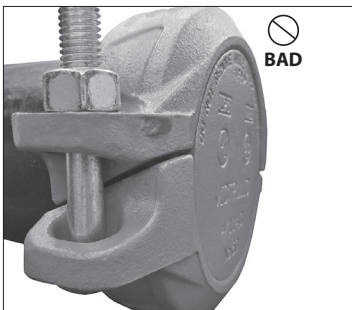


GOOD BOLT ENGAGEMENT
(OVAL NECK OF EACH BOLT IS SEATED PROPERLY IN THE BOLT HOLE)

The following conditions are not acceptable and shall be corrected before any system pressure testing occurs.



BAD ASSEMBLY
(INCORRECT SIDE OF END CAP IS FACING OUT – HARDWARE WILL NOT BE ABLE TO BE TIGHTENED TO BRING THE BOLT PADS INTO METAL-TO-METAL CONTACT)



BAD ASSEMBLY
(BOLT PADS ARE NOT IN METAL-TO-METAL CONTACT)



BAD BOLT ENGAGEMENT
(OVAL NECK IS NOT SEATED PROPERLY IN THE BOLT HOLE)

NOTICE

For Installation of Victaulic End Caps with Victaulic Installation-Ready Couplings:

- Victaulic Installation-Ready couplings shall be used with specific types of Victaulic end caps. These end caps are identified by markings that are listed below. Always verify that the proper Victaulic end cap is being used.
- When assembling a Victaulic Installation-Ready coupling onto a Victaulic end cap, verify that the end cap is seated fully against the center leg of the gasket. For full installation requirements, always refer to the specific instructions in this handbook for the Victaulic coupling.

For Victaulic Style 009N Couplings

- Use only Victaulic FireLock™ No. 006 End Caps containing the “EZ” marking on the inside face or Victaulic No. 60 End Caps containing the “EZ QV” marking on the inside face.

For Victaulic Style 607 Couplings

- Use only Victaulic No. 660 End Caps with the “QV” marking on the inside face.

For All Other Styles of Victaulic Installation-Ready Couplings for the Original Groove System (OGS)

- Use only Victaulic No. 60 End Caps containing the “EZ QV” marking on the inside face.

SAFETY INSTRUCTIONS FOR NO. T-60 TEST CAPS OR END CAPS INSTALLED FOR SYSTEM PRESSURE TESTING

- Victaulic end caps that are installed for system pressure testing shall be equipped with a ball valve that can be opened to verify if the system is depressurized.
- The Victaulic No. T-60 Test Cap should be used whenever possible for purposes of system pressure testing. If a Victaulic No. T-60 Test Cap is not available in the applicable size, contact Victaulic about ordering a tapped end cap that the customer can fit with an appropriately-rated ball valve for the system conditions.
Under no circumstances should coupling hardware or any other system component be loosened to check if the system is pressurized or to depressurize the system.
- Before system pressure testing, verify that no valves within the tested system (or portion of the system being tested) are closed in order to prevent pressure from being trapped inadvertently.
- Immediately after completing the system pressure test, the system pressure shall be relieved through an appropriate valve.

NOTICE

- A pressure gauge alone is not an acceptable method of verifying system pressure. Always use a secondary means of verification, such as a second pressure gauge or valve, to confirm that the system is depressurized in accordance with national and local codes and standards for the jobsite.



VICTAULIC END CAP REMOVAL SAFETY INSTRUCTIONS

WARNING



- **COUPLING/END CAP MAY BE PRESSURIZED.**
- Always depressurize and drain the piping system completely before attempting to install, remove, adjust, or maintain the coupling/end cap, any end cap connections, and any other Victaulic piping products.
- Always verify that the piping system has been completely depressurized and drained immediately prior to installation, removal, adjustment, or maintenance of the coupling/end cap, any end cap connections, and any other Victaulic piping products.
- Under no circumstances should coupling hardware or any other system component be loosened to check if the system is pressurized or to depressurize the system.
- Wear safety glasses, hardhat, and foot protection.

Failure to follow these instructions could result in death or serious personal injury and property damage.

1. Depressurize and drain the piping system completely, and verify that there is no residual pressure.
2. Loosen the nuts of the coupling slowly and, depending on the orientation of the coupling and end cap, be prepared to support the end cap as it releases from the coupling.

VICTAULIC RECOMMENDS:

- Hydrostatic (water) testing instead of pneumatic (air) testing whenever possible
- Use of a tapped end cap with a pressure-relieving device at each test point location (the No. T-60 Test Cap Kit and made-to-order tapped end caps are available for order through Victaulic)
- Removal of pressure immediately after completing a test (follow all applicable national and local codes and standards for the specific jobsite)
- Lockout/tagout procedures approved by the installing contractor
- Following the testing procedures recommended by technical experts, such as those found in the "Guide to Pressure Testing Safety" published by the Mechanical Contractors Association of America, Inc. (MCAA)



NO. T-60 TEST CAP KIT INSTALLATION AND USE INSTRUCTIONS

WARNING



- **COUPLING/TEST CAP ASSEMBLY MAY BE PRESSURIZED.**

- Always depressurize and drain the piping system completely before attempting to loosen the coupling/test cap assembly.
- Use caution when opening the ball valve.
- Keep face and other body parts away from the ball valve's outlet when attempting to test the system.
- **DO NOT tamper with the ball valve. The user is responsible for verifying that the test cap assembly is not damaged and is in proper working condition prior to use.**

Failure to follow these instructions could result in death or serious personal injury and property damage.

1. Victaulic recommends installing this test cap assembly with a Style 107V QuickVic™ Installation-Ready™ Rigid Coupling or Style 07 Zero-Flex™ Rigid Coupling. Follow the instructions in this handbook for the applicable coupling.
2. Verify that the ball valve is in the CLOSED position before attempting to pressurize the system.
3. After testing is complete, or before attempting to adjust or remove any couplings, slowly open the ball valve to determine if the line is still pressurized. If a continuous stream of fluid or air occurs from the ball valve while it is being opened, the line **MUST** be depressurized (atmospheric pressure) and drained completely of test media contents before proceeding with removal or adjustment of any couplings.



DO NOT INSTALL A PIPE PLUG IN THE OUTLET OF THE BALL VALVE.



Test cap assemblies are intended only for temporary use during system testing activities and shall not be installed permanently.



The user is responsible for inspecting and verifying that all test cap assemblies are suitable for service prior to each use. Inspect the assembly for deformation or cracks in the test cap casting and connecting coupling. Inspect the ball valve for damage, and verify that the threaded connection to the cap is secure. Any damaged components must be replaced immediately.



Verify that the grooved pipe end does not contain indentations, projections, or roll marks that will interfere with proper coupling/ test cap installation. Any pipe end deformities must be corrected.



The test cap assembly can be used repeatedly within the maximum rated test pressure of 250 psi/1700 kPa/17 Bar. Test pressure shall not exceed joint rating at point of attachment.

Valve Installation Instructions

Check Valves
Plug Valves
Gate Valves

WARNING

- ALWAYS VERIFY THAT MATING COMPONENTS WITH THE CORRECT GROOVE PROFILE ARE BEING USED WITH THE VALVE.
- DO NOT LOOSEN OR TIGHTEN HARDWARE WHEN A VALVE IS PRESSURIZED.
- The system designer is responsible for verifying suitability of mating component materials with the intended fluid media. Valve bodies, discs, and other wetted components shall be compatible with the material flowing through the piping system. Refer to the current Victaulic product publication for the applicable valve, or contact Victaulic for details.
- The effect of chemical composition, pH level, operating temperature, chloride level, oxygen level, and flow rate on mating component materials shall be evaluated to confirm system life will be acceptable for the intended service.

Failure to follow these instructions will cause improper assembly and joint failure, resulting in death or serious personal injury and property damage.

CHECK VALVES

NOTICE

- To prevent a Victaulic Series 317 Check Valve from rotating in the system, Victaulic recommends installing the valve with Style 31 Couplings and AWWA ductile iron pipe that is rigid radius-cut grooved. Additional support may be required to prevent valve rotation if flexible radius-cut grooved AWWA ductile iron pipe is used.

- When installing a Victaulic Check Valve into the piping system, follow the instructions in this handbook for the applicable coupling.
- DO NOT use a Victaulic Check Valve as a support for the piping system.
- Placement of check valves too close to sources of unstable flow will shorten the life of the valve and may potentially damage the system. To extend valve life, valves should be installed a reasonable distance downstream from pumps, elbows, expanders, reducers, or other similar devices. Sound piping practices dictate a minimum of five times the pipe diameter for general use. Distances between three and five diameters are allowable, provided the flow velocity is less than 8 feet per second/2.4 meters per second. Distances less than three diameters are not recommended and will violate the Victaulic product warranty. **NOTE:** These distances do not apply to fire protection installations.

Series 317 Check Valve

- Series 317 Check Valves can be installed either vertically (flow up) or horizontally with the arrow on the body pointing in the correct direction of flow through the pipeline. For additional information, always refer to the I-317 Installation and Maintenance Instructions Manual, which can be downloaded at victaulic.com.
- Series 317 Check Valves CAN be connected directly to flanged components with Style 341 Flange Adapters.
- The Style 307 Transition Coupling CAN directly connect the Series 317 Check Valve to grooved-end steel and other NPS pipe. Follow the instructions for the Style 307 Transition Coupling contained in this handbook.



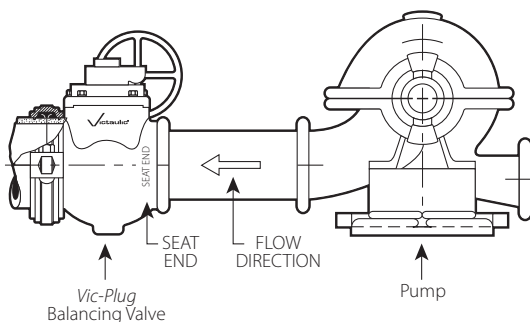
PLUG VALVES

Series 365 Vic-Plug AWWA Plug Valve

- Refer to the operation and maintenance manual supplied with the Series 365 Plug Valve for detailed information regarding valve installation, accessory installation, and maintenance requirements.
- For 3 – 12-inch sizes, the Victaulic Style 307 Transition Coupling is available to directly connect the Series 365 to grooved-end steel and other NPS pipe. For installing these sizes of *Vic-Plug* valves into a piping system, follow the instructions for the Style 307 Transition Coupling contained in this handbook.
- DO NOT use a Series 365 as a support for the piping system.

Series 377 Vic-Plug Balancing Valve

- The Series 377 *Vic-Plug* Balancing Valve is an eccentric, grooved-end plug valve designed specifically for throttling services.
- Refer to the operation and maintenance manual supplied with the Series 377 *Vic-Plug* Balancing Valve for detailed information regarding valve installation, accessory installation, and maintenance requirements.
- For 3 – 12-inch sizes, the Victaulic Style 307 Transition Coupling is available to directly connect the Series 377 to grooved-end steel and other NPS pipe. For installing these sizes of *Vic-Plug* valves into a piping system, follow the instructions for the Style 307 Transition Coupling contained in this handbook.



Series 377 Vic-Plug Balancing Valves shall be installed with the seat upstream (closest to the pump discharge)

- DO NOT use a Series 377 as a support for the piping system.
- When directly connecting a Victaulic End Cap to a Victaulic Plug Valve, use only a tapped end cap with a ball valve that can be opened to verify if the system is depressurized. If the plug valve is opened and then closed unknowingly while the end cap is attached, the space between the plug and end cap will be filled and pressurized. A sudden release of energy can occur if the end cap is removed while the space behind it is pressurized. **PRESSURE SHALL BE VENTED THROUGH THE END CAP'S BALL VALVE BEFORE ATTEMPTING TO REMOVE THE CAP.**

⚠ DANGER



- When directly connecting a Victaulic End Cap to a Victaulic Plug Valve, use only a tapped end cap with a ball valve that can be opened to verify if the system is depressurized.
- Pressure shall be vented through the end cap's ball valve before attempting to remove the cap.

Failure to follow these instructions could result in death or serious personal injury and property damage.

GATE VALVES

Series 371 Open Stem and Yoke (OS&Y) Gate Valve

Series 372 Non-Rising Stem (NRS) Gate Valve

Series W371 Advanced Groove System (AGS) OS&Y Gate Valve

Series W372 Advanced Groove System (AGS) NRS Gate Valve

- **VICTAULIC GATE VALVES ARE NOT DESIGNED FOR THROTTLING SERVICES.**
- Verify that there is adequate clearance around the valve for operating and maintenance activities.
- The valve can be mounted in vertical and horizontal runs. For horizontal pipe, the valve shall be installed with the stem in the vertical “UP” position (handwheel pointing upward).
- Verify that proper pipe supports are in place to prevent strain on the valve. The piping shall be laid out so that no thrust or bending forces act on the valve body during operation.
- DO NOT use a Victaulic Gate Valve as a support for the piping system.
- Verify that the piping is aligned and supported properly before attempting to install the valve.
- When painting a piping system, DO NOT apply paint to the stem and bolts/nuts.
- DO NOT stand on or use the handwheel as a support point.
- DO NOT over-torque the handwheel to force the valve into the “OPEN” or “CLOSED” position. Refer to the “Torque Limitations” table on the following page.
- When directly connecting a Victaulic End Cap to a Victaulic Gate Valve, use only a tapped end cap with a ball valve that can be opened to verify if the system is depressurized. If the gate valve is opened and then closed unknowingly while the end cap is attached, the space between the gate and end cap will be filled and pressurized. A sudden release of energy can occur if the end cap is removed while the space behind it is pressurized. **PRESSURE SHALL BE VENTED THROUGH THE END CAP'S BALL VALVE BEFORE ATTEMPTING TO REMOVE THE CAP.**

DANGER



- **When directly connecting a Victaulic End Cap to a Victaulic Gate Valve, use only a tapped end cap with a ball valve that can be opened to verify if the system is depressurized.**
 - **Pressure shall be vented through the end cap's ball valve before attempting to remove the cap.**
- Failure to follow these instructions could result in death or serious personal injury and property damage.**

Handling

- The valve shall remain in the “CLOSED” position during handling.
- To prevent damage to the seats and sealing surfaces of the valve body, the plastic shipping caps shall remain in place until the time of installation.
- Verify that proper lifting equipment is available for handling larger, heavier valve sizes. Lift the valve by placing straps around the body. **DO NOT lift or suspend the valve by the handwheel.**

Storage

- Victaulic strongly recommends indoor storage of the valve. If outdoor storage is required, the valve shall be stored in the original shipping container and then covered completely with a weatherproof tarp.
- The shipping caps shall remain in place to prevent debris from entering the valve body during storage.
- The valve shall remain in the “CLOSED” position during storage.



GATE VALVES (CONTINUED)

Installation

NOTICE

- To prevent a Victaulic Gate Valve from rotating in the system, Victaulic recommends installing the valve with at least one Victaulic Rigid Coupling. If two Victaulic Flexible Couplings are used, additional support may be required to prevent valve rotation.

1. Prior to installation, check the valve for any damage. DO NOT use the valve if any damage is present.
2. Remove the plastic shipping caps from the valve body. To prevent damage to the sealing surfaces of the valve body, DO NOT use any sharp instruments to remove the shipping caps.
3. Verify that the valve is in the "CLOSED" position.
4. Follow the instructions in this handbook for the applicable coupling.
5. Place the system into service after all installation requirements have been met.

Operation

1. Operate the valve by turning the handwheel in the counter-clockwise direction (top view) to the "OPEN" position, then by turning the handwheel in the clockwise direction (top view) to the "CLOSED" position. Repeat this process several times to verify proper operation. **NOTE:** When the valve is in the fully "OPEN" position, turn the handwheel a quarter turn in the clockwise direction to prevent the stem/threads from locking up due to thermal expansion.

Torque Limitations

Nominal Pipe Size inches	Actual Pipe Outside Diameter inches/mm	Maximum Torque to Reach Fully "OPEN" Position or Fully "CLOSED" Position
2 1/2	2.875 73.0	38 ft-lbs 52 N•m
3	3.500 88.9	38 ft-lbs 52 N•m
4	4.500 114.3	65 ft-lbs 88 N•m
6	6.625 168.3	106 ft-lbs 144 N•m
8	8.625 219.1	180 ft-lbs 244 N•m
10 – 12	10.750 – 12.750 273.0 – 323.9	300 ft-lbs 407 N•m
14 – 16*	14.000 – 16.000 355.6 – 406.4	400 ft-lbs 545 N•m

* These sizes indicate the Series W371 and W372 AGS versions. For detailed AGS product instructions, always reference the I-W100 Field Installation Handbook, which can be downloaded at victaulic.com.

Inspection

Inspect the valve on a frequency required by the building owner or their representative.

1. Verify that there is no leakage from the gland. If necessary, tighten the nuts at the gland flange evenly by alternating sides. Tighten the nuts ONLY to the point where leakage stops. Overtightening the packing can make the valve difficult to operate.
2. If the handwheel becomes loose, open the valve by turning the handwheel one to two turns in the counterclockwise direction, then tighten the handwheel nut.

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Resources

English and Metric Conversion Chart

Convert Imperial (U.S.) to Metric				Convert Metric to Imperial (U.S.)		
25.4	×	inch (in)	⇔	millimeter (mm)	×	0.03937
0.3048	×	feet (ft)	⇔	meter (m)	×	3.281
0.4536	×	pound mass (lb)	⇔	kilogram (kg)	×	2.205
28.35	×	ounce (oz)	⇔	gram (g)	×	0.03527
6.894	×	pound per square inch (psi)	⇔	kilopascal (kPa)	×	0.145
.069	×	pound per square inch (psi)	⇔	Bar (bar)	×	14.5
4.45	×	pound force (lbf)	⇔	newton (N)	×	0.2248
1.356	×	pound-foot (lbf-ft)	⇔	Newton-meter (N-m)	×	0.738
$(F - 32) \div 1.8$		Fahrenheit (°F)	⇔	Celsius (°C)		$(C + 17.78) \times 1.8$
745.7	×	Horsepower (hp)	⇔	Watts (W)	×	1.341×10^{-3}
3.785	×	Gal. per Min. (GPM)	⇔	Liters per min. (L/min)	×	0.2642
0.0038	×	Gal. per Min. (GPM)	⇔	Cubic Meters per min. (m³/min)	×	264.2

Minutes Converted to Decimals of a Degree

Minutes	Degrees
1	.0166
2	.0333
3	.0500
4	.0666
5	.0833
6	.1000
7	.1166
8	.1333
9	.1500
10	.1666
11	.1833
12	.2000
13	.2166
14	.2333
15	.2500

Minutes	Degrees
16	.2666
17	.2833
18	.3000
19	.3166
20	.3333
21	.3500
22	.3666
23	.3833
24	.4000
25	.4166
26	.4333
27	.4500
28	.4666
29	.4833
30	.5000

Minutes	Degrees
31	.5166
32	.5333
33	.5500
34	.5666
35	.5833
36	.6000
37	.6166
38	.6333
39	.6500
40	.6666
41	.6833
42	.7000
43	.7166
44	.7333
45	.7500

Minutes	Degrees
46	.7666
47	.7833
48	.8000
49	.8166
50	.8333
51	.8500
52	.8666
53	.8833
54	.9000
55	.9166
56	.9333
57	.9500
58	.9666
59	.9833
60	1.0000

COMMERCIAL AWWA PIPE SIZES AND WALL THICKNESSES (ANSI/AWWA C-150)

The following dimensions are for general information only. Shaded areas denote thickness classes that are too thin to be cut grooved to Victaulic specifications.

Pipe Size		Thickness Class inches/mm						
Nominal Diameter inches	Actual Pipe Outside Diameter inches/mm	50	51	52	53	54	55	56
3	3.96 100.6	– –	0.25 6.4	0.28 7.1	0.31 7.9	0.34 8.6	0.37 9.4	0.40 10.2
4	4.80 121.9	– –	0.26 6.6	0.29 7.4	0.32 8.1	0.35 8.9	0.38 9.7	0.41 10.4
6	6.90 175.3	0.25 6.4	0.28 7.1	0.31 7.9	0.34 8.6	0.37 9.4	0.40 10.2	0.43 10.9
8	9.05 229.9	0.27 6.9	0.30 7.6	0.33 8.4	0.36 9.1	0.39 9.9	0.42 10.7	0.45 11.4
10	11.10 281.9	0.29 7.4	0.32 8.1	0.35 8.9	0.38 9.7	0.41 10.4	0.44 11.2	0.47 11.9
12	13.20 335.3	0.31 7.9	0.34 8.6	0.37 9.4	0.40 10.2	0.43 10.9	0.46 11.7	0.49 12.4
14	15.30 388.6	0.33 8.4	0.36 9.1	0.39 9.9	0.42 10.7	0.45 11.4	0.48 12.2	0.51 13.0
16	17.40 442.0	0.34 8.6	0.37 9.4	0.40 10.2	0.43 10.9	0.46 11.7	0.49 12.4	0.52 13.2
18	19.50 495.3	0.35 8.9	0.38 9.7	0.41 10.4	0.44 11.2	0.47 11.9	0.50 12.7	0.53 13.5
20	21.60 548.6	0.36 9.1	0.39 9.9	0.42 10.7	0.45 11.4	0.48 12.2	0.51 13.0	0.54 13.7
24	25.80 655.3	0.38 9.7	0.41 10.4	0.44 11.2	0.47 11.9	0.50 12.7	0.53 13.5	0.56 14.2
30	32.00 762.0	0.39 9.9	0.43 10.9	0.47 11.9	0.51 13.0	0.55 14.0	0.59 15.0	0.63 16.0
36	38.30 914.4	0.43 10.9	0.48 12.2	0.53 13.5	0.58 14.7	0.63 16.0	0.68 17.3	0.73 18.5
42*	44.50 1130.3	0.47 11.9	0.53 13.5	0.59 15.0	0.65 16.5	0.71 18.0	0.77 19.6	0.83 21.1
48*	50.80 1290.3	0.51 13.0	0.58 14.7	0.65 16.5	0.72 18.3	0.79 20.1	0.86 21.8	0.93 23.6
54*	57.56 1462.0	0.57 14.5	0.65 16.5	0.73 18.5	0.81 20.6	0.89 22.6	0.97 24.6	1.05 26.7

* Pipe sizes 42 inch/1130.3 mm and larger cannot be grooved directly for use with Victaulic couplings.



APPROXIMATE WEIGHTS OF COMMERCIAL AWWA PIPE (ANSI/AWWA C-150)

The following weights are for general information only.

Pipe Size		Weight of Pipe Per Foot pounds/kg				Weight of Pipe Per Foot with Standard Thickness Cement Lining* pounds/kg			
Nom. Dia. inches	Actual Pipe Out. Dia. inches/ mm	CL. 53	CL. 54	CL. 55	CL. 56	CL. 53	CL. 54	CL. 55	CL. 56
3	3.96 100.6	10.9 4.9	11.8 5.4	12.8 5.8	13.7 6.2	11.5 5.2	12.4 5.6	13.4 6.1	14.3 6.5
4	4.80 121.9	13.8 6.3	15.0 6.8	16.1 7.3	17.3 7.8	14.7 6.7	15.9 7.2	17.0 7.7	18.2 8.3
6	6.90 175.3	21.4 9.7	23.2 10.5	25.0 11.3	26.7 12.1	23.6 10.7	24.5 11.1	26.3 11.9	28.0 12.7
8	9.05 229.9	30.1 13.7	32.5 14.7	34.8 15.8	37.2 16.9	33.1 15.0	34.2 15.5	36.5 16.6	38.9 17.6
10	11.10 281.9	39.2 17.8	42.1 19.1	45.1 20.5	48.0 21.8	41.4 18.8	44.3 20.1	47.3 21.5	50.2 22.8
12	13.20 335.3	49.2 22.3	52.8 24.0	56.3 25.5	59.9 27.2	51.8 23.5	55.4 25.1	58.9 26.7	62.5 28.4
14	15.30 388.6	60.1 27.3	64.2 29.1	68.4 31.0	72.5 32.9	64.6 29.3	68.7 31.2	72.9 33.1	77.0 34.9
16	17.40 442.0	70.1 31.8	74.9 34.0	79.7 36.2	84.4 38.3	75.2 34.1	80.0 36.3	84.8 38.5	89.5 40.6
18	19.50 495.3	80.8 36.7	86.0 39.0	91.3 41.4	96.7 43.9	86.6 39.3	91.8 41.6	97.1 44.0	102.5 46.5
20	21.60 548.6	91.5 41.5	97.5 44.2	103.4 46.9	109.3 49.6	97.9 44.4	103.9 47.1	109.8 49.8	115.7 52.5
24	25.80 655.3	114.4 51.9	121.6 55.2	128.8 58.4	135.9 61.6	122.1 55.4	129.3 58.7	136.5 61.9	143.6 65.1
30	32.00 762.0	154.4 70.0	166.3 75.4	178.2 80.8	190.0 86.2	167.2 75.8	179.1 81.2	191.0 86.6	202.8 92.0
36	38.30 914.4	210.3 95.4	228.1 103.5	245.9 111.5	263.7 119.6	225.6 102.3	243.4 110.4	261.2 118.5	279.0 126.6

*Standard cement lining thickness, per ANSI/AWWA C-104.



Decimal Equivalents of Fractions

Fraction in inches	Decimal Equivalent inches	Decimal Equivalent millimeters
$\frac{1}{64}$	0.016	0.397
$\frac{1}{32}$	0.031	0.794
$\frac{3}{64}$	0.047	1.191
$\frac{1}{16}$	0.063	1.588
$\frac{5}{64}$	0.781	1.984
$\frac{3}{32}$	0.094	2.381
$\frac{7}{64}$	0.109	2.778
$\frac{1}{8}$	0.125	3.175
$\frac{9}{64}$	0.141	3.572
$\frac{5}{32}$	0.156	3.969
$\frac{11}{64}$	0.172	4.366
$\frac{3}{16}$	0.188	4.763
$\frac{13}{64}$	0.203	5.159
$\frac{7}{32}$	0.219	5.556
$\frac{15}{64}$	0.234	5.953
$\frac{1}{4}$	0.250	6.350
$\frac{17}{64}$	0.266	6.747
$\frac{9}{32}$	0.281	7.144
$\frac{19}{64}$	0.297	7.541
$\frac{5}{16}$	0.313	7.938
$\frac{21}{64}$	0.328	8.334
$\frac{1}{3}$	0.333	8.467
$\frac{11}{32}$	0.344	8.731
$\frac{23}{64}$	0.359	9.128
$\frac{3}{8}$	0.375	9.525
$\frac{25}{64}$	0.391	9.922
$\frac{13}{32}$	0.406	10.319
$\frac{27}{64}$	0.422	10.716
$\frac{7}{16}$	0.438	11.113
$\frac{29}{64}$	0.453	11.509
$\frac{15}{32}$	0.469	11.906
$\frac{1}{2}$	0.500	12.700

Fraction in inches	Decimal Equivalent inches	Decimal Equivalent millimeters
$\frac{33}{64}$	0.516	13.097
$\frac{17}{32}$	0.531	13.494
$\frac{35}{64}$	0.547	13.891
$\frac{9}{16}$	0.563	14.288
$\frac{37}{64}$	0.578	14.684
$\frac{19}{32}$	0.594	15.081
$\frac{39}{64}$	0.609	15.478
$\frac{5}{8}$	0.625	15.875
$\frac{41}{64}$	0.641	16.272
$\frac{21}{32}$	0.656	16.669
$\frac{43}{64}$	0.672	17.066
$\frac{11}{16}$	0.688	17.463
$\frac{45}{64}$	0.703	17.859
$\frac{23}{32}$	0.719	18.256
$\frac{47}{64}$	0.734	18.653
$\frac{3}{4}$	0.750	19.050
$\frac{49}{64}$	0.766	19.447
$\frac{25}{32}$	0.781	19.844
$\frac{51}{64}$	0.797	20.241
$\frac{13}{16}$	0.813	20.638
$\frac{53}{64}$	0.828	21.034
$\frac{27}{32}$	0.844	21.431
$\frac{55}{64}$	0.859	21.828
$\frac{7}{8}$	0.875	22.225
$\frac{57}{64}$	0.891	22.622
$\frac{29}{32}$	0.906	23.019
$\frac{59}{64}$	0.922	23.416
$\frac{15}{16}$	0.938	23.813
$\frac{61}{64}$	0.953	24.209
$\frac{31}{32}$	0.969	24.606
$\frac{63}{64}$	0.984	25.003
1	1.000	25.400

Pressure to Feet-of-Head of Water

Pounds Per Square Inch	Feet of Head
1	2.31
2	4.62
3	6.93
4	9.24
5	11.54
6	13.85
7	16.16
8	18.47
9	20.78
10	23.09
15	34.63
20	46.18
25	57.72
30	69.27
40	92.36
50	115.45
60	138.54
70	161.63
80	184.72
90	207.81

Pounds Per Square Inch	Feet of Head
100	230.90
110	253.93
120	277.07
130	300.16
140	323.25
150	346.34
160	369.43
170	392.52
180	415.61
200	461.78
250	577.24
300	692.69
350	808.13
400	922.58
500	1154.48
600	1385.39
700	1616.30
800	1847.20
900	2078.10
1000	2309.00

Feet-of-Head of Water to Pressure

Feet of Head	Pounds Per Square Inch
1	0.43
2	0.87
3	1.30
4	1.73
5	2.17
6	2.60
7	3.03
8	3.46
9	3.90
10	4.33
15	6.50
20	8.66
25	10.83
30	12.99
40	17.32
50	21.65
60	25.99
70	30.32
80	34.65
90	39.98

Feet of Head	Pounds Per Square Inch
100	43.31
110	47.64
120	51.97
130	56.30
140	60.63
150	64.96
160	69.29
170	73.63
180	77.96
200	86.62
250	108.27
300	129.93
350	151.58
400	173.24
500	216.55
600	259.85
700	303.16
800	346.47
900	389.78
1000	433.00

Pressure to Meter Water Column

kPa	Meter Water Column
10	1.02
15	1.53
20	2.04
25	2.55
30	3.06
40	4.08
50	5.10
60	6.12
70	7.14
80	8.16
90	9.18
100	10.20
110	11.22
120	12.24
130	13.26
140	14.28
150	15.30
160	16.32
170	17.34
180	18.36

kPa	Meter Water Column
180	18.36
190	19.38
200	20.40
250	25.50
300	30.60
400	40.80
500	51.00
600	61.20
700	71.40
800	81.60
900	91.80
1000	102.00
1500	153.00
2000	204.00
2500	255.00
3000	306.00
4000	408.00
5000	510.00
6000	612.00
7000	714.00

Meter Water Column to Pressure

Meter Water Column	kPa
1	9.8
2	19.6
3	29.4
4	39.2
5	49.0
6	58.8
7	68.6
8	78.4
9	88.2
10	98.0
11	108.0
12	118.0
13	127.0
14	137.0
15	147.0
20	196.0
25	245.0
30	194.0
35	343.0
40	392.0

Meter Water Column	kPa
45	441.0
50	490.0
55	539.0
60	588.0
70	686.0
80	784.0
90	882.0
100	980.0
150	1470.0
200	1960.0
250	2450.0
300	2940.0
350	3430.0
400	3920.0
450	4410.0
500	4900.0
550	5390.0
600	5880.0
650	6370.0
700	6860.0

Where to Find Installation Instructions for Additional Products



The following table provides a general listing of products and their respective installation instructions. Scan the QR code to the left to search for and download the applicable product instructions. **NOTE:** If two sources of instructions are referenced in this index, Victaulic recommends the use of both to ensure proper product installation. Contact Victaulic with any questions regarding this list (scan QR code on back cover for Victaulic locations).

Product	Where to Find Instructions on victaulic.com
Victaulic® End Caps	Search I-ENDCAP
VicFlex™ Products	Search I-VICFLEX
Aquamine™ Spline Couplings	Search I-Aquamine
Victaulic® Bolted Split-Sleeve Couplings	Instructions Shipped with Coupling (or search for specific coupling)
FireLock® Automatic Sprinkler Products	Search I-40
FireLock™ Fire Protection Valves and Accessories	Manual Shipped with Valve or Accessory (or search for specific valve or accessory)
Pipe Preparation Tools	Manual and Repair Parts List Shipped with Tool (or search for specific tool)
Vic-Press Schedule 10S System Products	Search I-P500
Series 76G Automatic Balancing Valve	Search I-76G
Series 76B/76K/76S/76T/76V Automatic Balancing Valves	Search I-76T
Series 121, 122, 124, and E125 Installation-Ready™ Butterfly Valves Installation and Gear Operator Conversion Instructions	Search I-120
Series 247 FireLock Residential Zone Control Riser Module Assembly	Search I-247
Series 317 AWWA Check Valve	Search I-317
Series 365 AWWA Vic-Plug® Valve (3 – 12-inch/88.9 – 323.9-mm Sizes)	Search I-365sm and I-300
Series 377 Vic-Plug Balancing Valve	Search I-365sm and I-100
Series 608N Copper Connection Butterfly Valve	Search I-600
Series 700 Butterfly Valve	Search I-100
Series 705 FireLock™ Butterfly Valve	Search I-765-705, I-BFV_KIT, and I-100
Series 707C FireLock™ Butterfly Valve with Supervised-Closed Switches	Search I-766_707C, I-BFV_KIT, and I-100
Series 712/712S Swinger® Check Valve	Search I-100
Series 713 Swinger Check Valve	Search I-100
Series W715 AGS™ Dual-Disc Vic-Check Valve	Search I-W100
Series 716H/716 Check Valves	Search I-100
Series 717H/717 FireLock™ Check Valves	Search I-100



Product	Where to Find Instructions on victaulic.com
Series 717HR/717R FireLock™ Check Valves	Search I-100
Series 722 Brass Body Ball Valve	Search I-100
Series 723/723S Diverter Ball Valve	Search I-100
Series 726/726S Ball Valve	Search I-726-726S and I-100
Series 728 FireLock™ Ball Valve	Search I-728 and I-100
Series 730 <i>Vic-Strainer</i> Tee Type	Search I-730_732AGS
Series W730 AGS™ <i>Vic-Strainer</i> Tee Type	Search I-730_732AGS
Series 731-D Suction Diffuser	Search I-731-D_W731-D
Series W731-D AGS™ Suction Diffuser	Search I-731-D_W731-D
Series 732 <i>Vic-Strainer</i> Wye Type	Search I-730_732AGS
Series W732 AGS <i>Vic-Strainer</i> Wye Type	Search I-730_732AGS
Series 733 Venturi Indicator	Search I-100
Series 747M FireLock™ Zone Control Riser Module Assembly	Search I-747M
Series 761 Vic-300 MasterSeal™ Butterfly Valve	Search I-VIC300MS and I-100
Series W761 AGS™ Vic-300 Butterfly Valve	Search I-AGS.GO and I-W100
Series 765 FireLock™ Butterfly Valve	Search I-765-705 and I-100
Series 766 FireLock™ Butterfly Valve with Supervised-Closed Switches	Search I-766_707C, I-BFV_KIT, and I-100
Series 779 Venturi Check Valve and Flow Measuring Kit	Search I-100
TA Series Valves and Meters	Instructions Shipped with Valve or Meter
Series 795 Knife Gate Valve	Search I-795 and I-900
Series 871 Gate Valve	Search I-871
Series 906 Knife Gate Valve	Search I-795 and I-900
Style 004N FireLock™ Installation-Ready™ Flexible Coupling	Search I-100
Style 005 FireLock™ Rigid Coupling	Search I-100
Style 009N FireLock EZ™ Installation-Ready™ Rigid Coupling	Search I-100
Style 07 Zero-Flex® Rigid Coupling (1 – 12-inch/33.7 – 323.9-mm Sizes)	Search I-100
Style 07 Zero-Flex Rigid Coupling (14 – 24-inch/355.6 – 610-mm Sizes)	Search I-100
Style W07 AGS™ Rigid Coupling	Search I-W100
Style W77/W77B/W77N AGS™ Flexible Couplings	Search I-W100
Style 22, 26, 28, 31, 41, and 44 Couplings for <i>Vic-Ring</i> Applications and Shouldered-End Pipe	Search I-6000
Style 31 Coupling for Grooved AWWA Ductile Iron Pipe	Search I-300



Product	Where to Find Instructions on victaulic.com
Style 71 Composite Coupling for PVC and Stainless Steel Pipe (Regional Availability Only)	Search I-100
Style 72 Outlet Coupling	Search I-100
Style 75 Flexible Coupling	Search I-100
Style 77/77A/77S Flexible Coupling	Search I-100
Style 77DX Duplex Stainless Steel Flexible Coupling	Search I-100
Style 78/78A Snap-Joint™ Coupling	Search I-100
Style 89 Rigid Coupling for Stainless Steel	Search I-100
Style W89 AGS™ Rigid Coupling for Stainless Steel or Carbon Steel Pipe	Search I-W100
Style 99 <i>Roust-A-Bout</i> Coupling for Plain-End Steel Pipe	Search I-100
No. 101 (90° Elbow) FireLock™ Installation-Ready™ Fitting	Search I-100
No. 103 (45° Elbow) FireLock™ Installation-Ready™ Fitting	Search I-100
No. 102 Straight Tee FireLock™ Installation-Ready™ Fitting	Search I-100
No. 104 Bullhead Tee FireLock™ Installation-Ready™ Fitting	Search I-100
Style 107N QuickVic™ Installation-Ready™ Rigid Coupling	Search I-100
Style 107V QuickVic™ Installation-Ready™ Rigid Coupling	Search I-100
Style 108 FireLock™ IGS™ Installation-Ready™ Rigid Coupling	Search I-100
Style 109 FireLock™ Installation-Ready™ Rigid Coupling	Search I-100
Style 115 FireLock EZ™ Installation-Ready™ Reducing Coupling	Search I-100
No. 142 Welded Outlet	Search I-142 and I-100
No. 142F Welded Outlet	Search I-142F and I-100
Style 150 <i>Mover</i> Expansion Joint	Search 09.06
Style 152A Expansion Joint Coupling	Search I-152A
Style 155 Expansion Joint	Search 09.06
Style W155 AGS™ Expansion Joint	Search 09.06
Series 159 Flexible Loop	Search I-159
Style 171 Installation-Ready Composite Flexible Coupling	Search I-100
Style 177N QuickVic™ Flexible Coupling	Search I-100
Style 307 AWWA Transition Coupling	Search I-300
Style 341 <i>Vic-Flange</i> Adapter	Search I-300

Product	Where to Find Instructions on victaulic.com
Style 441 <i>Vic-Flange</i> Adapter	Search I-100
Style 475 Lightweight, Flexible Stainless Steel Coupling	Search I-100
Style 475DX Duplex Stainless Steel Flexible Coupling	Search I-100
Style 489 Rigid Coupling for Stainless Steel Pipe	Search I-100
Style 489DX Duplex Stainless Steel Rigid Coupling	Search I-100
Style 606-EN and 606-AS Rigid Coupling for Copper Tubing	Search I-600
Style 607 QuickVic™ Rigid Coupling for Copper Tubing	Search I-600
Style 622 <i>Mechanical-T</i> Bolted Branch Outlet for Copper Tubing	Search I-600
Style 641 <i>Vic-Flange</i> Adapter for Copper Tubing	Search I-600
Style 707-IJ NPS-to-JIS Transition Coupling	Search I-100
Style 720 TestMaster™ II Alarm Test Module	Search I-720
Style 720 TestMaster™ II Alarm Test Module with Pressure Relief Option	Search I-720PR
Style 735 Fire Pump Test Meter	Search I-100
Style 741 <i>Vic-Flange</i> Adapter	Search I-100
Style W741 AGS™ <i>Vic-Flange</i> Adapter	Search I-W100
Style 743 <i>Vic-Flange</i> Adapter	Search I-100
Style 744 FireLock™ Flange Adapter	Search I-100
Style 750 Reducing Coupling	Search I-100
Style 791 <i>Vic-Boltless</i> Coupling	Search I-100
Style 808 High-Pressure Coupling	Search I-808
Style 870 High-Performance Rigid Coupling	Search I-870
Style 904 Flange Adapter for HDPE-to-Flanged Pipe	Search I-900
Style 905 Coupling for Plain-End HDPE Pipe	Search I-900
Style 907 Transition Coupling for HDPE to Steel Pipe	Search I-900
Style 908 Coupling for Double-Grooved HDPE Pipe	Search I-900
Style 912 FireLock™ Low-Profile Sprinkler-Tee (Regional Availability Only)	Search I-100
Style 920 and 920N <i>Mechanical-T</i> Outlets	Search I-100
Style 922 FireLock™ Outlet-T	Search I-100
Style 923 Strapless Outlet	Search I-100



Product	Where to Find Instructions on victaulic.com
Style 924 Strapless Thermometer Outlet	Search I-100
Style 926 <i>Mechanical-T</i> Spigot Assembly	Search I-100
Style 994 <i>Vic-Flange</i> Adapter for HDPE Pipe	Search I-900
Style 995N Coupling for Plain-End HDPE Pipe	Search I-900
Style 997 Transition Coupling for Plain-End HDPE Pipe to Grooved-End Steel Pipe	Search I-900
Style 2970 Aquamine™ Plain-End Pipe Coupling	Search IT-2970
Style 2971 Aquamine™ Transition Coupling for Plain-End PVC Pipe to Plain-End HDPE Pipe	Search IT-2971
Style 2972 Aquamine™ Transition Coupling for Plain-End PVC Pipe to Grooved Steel Pipe	Search IT-2972
Style HP-70 Rigid Coupling	Search I-100
Style HP-70ES Rigid Coupling with EndSeal® Gasket	Search I-100
Style XL77 Flexible Coupling for Joining “XL” Elbows to NPS Carbon Steel Pipe	Search IT-XL77
Style XL79 Flexible Coupling for Joining “XL” Elbows to “XL” Elbows	Search IT-XL79

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Product Data

NOTICE

- This "Product Data" section contains center-to-end, end-to-end, take-out, and similar overall dimensions for select Victaulic products.
- This section is not a complete listing of all products/dimensions and is for general reference only. Always refer to the current Victaulic product publication to verify the most up-to-date dimensional information; to find dimensional information for products not listed in this section; and for important notes regarding applications, pressure ratings, operating temperatures, etc. Product publications can be downloaded at victaulic.com.

Scan QR code for listing of fitting publications on victaulic.com.



DUCTILE IRON AWWA (CAST) FITTINGS

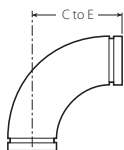
No. 100-C – 90° Long Radius Elbow

No. 10-C – 90° Elbow

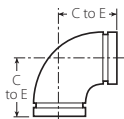
No. 11-C – 45° Elbow

No. 12-C – 22½° Elbow

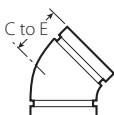
No. 13-C – 11¼° Elbow



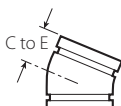
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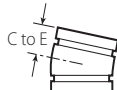
No. 10-C



No. 11-C



No. 12-C



No. 13-C

Nominal Size inches	Actual Pipe Outside Diameter inches/ mm	No. 100-C	No. 10-C	No. 11-C	No. 12-C	No. 13-C
		C to E inches/ mm	C to E inches/ mm	C to E inches/ mm	C to E inches/ mm	C to E inches/ mm
3	3.96 100.6	7.75 197	5.50 140	3.00 76	3.00 76	3.00 76
4	4.80 121.9	9.00 229	6.50 165	4.00 102	4.00 102	4.00 102
6	6.90 175.3	11.50 292	8.00 203	5.00 127	5.00 127	5.00 127
8	9.05 229.9	14.00 356	9.00 229	5.50 140	5.50 140	5.50 140
10	11.10 281.9	16.50 419	11.00 279	6.50 165	6.50 165	6.50 165
12	13.20 335.3	19.00 483	12.00 305	7.50 191	7.50 191	7.50 191
14	15.30 388.6	21.50 546	14.00 356	7.50 191	7.50 191	7.50 191
16	17.40 442.0	24.00 610	15.00 381	8.00 203	8.00 203	8.00 203
18	19.50 495.3	26.50 673	16.50 419	8.50 216	8.50 216	8.50 216
20	21.60 548.6	29.00 737	18.00 457	9.50 241	9.50 241	9.50 241
24	25.80 655.3	34.00 864	22.00 559	11.00 279	11.00 279	11.00 279
30	32.00 762.0	41.50 1054	25.00 635	15.00 381	15.00 381	15.00 381
36	38.30 914.4	49.00 1245	28.00 711	18.00 457	18.00 457	18.00 457

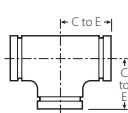


For the most up-to-date dimensional information, always refer to the current Victaulic product publication, which can be downloaded at victaulic.com.

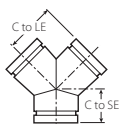


DUCTILE IRON AWWA (CAST) FITTINGS

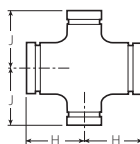
No. 20-C – Tee
 No. 33-C – True Wye
 No. 35-C – Cross
 No. 30-C – 45° Lateral
 No. 60-C – Cap



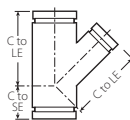
No. 20-C



No. 33-C



No. 35-C



No. 30-C



No. 60-C

Nominal Size inches	Actual Pipe Outside Diameter inches/ mm	No. 20-C	No. 33-C		No. 35-C	No. 30-C	No. 60-C*
		C to E inches/ mm	C to LE inches/ mm	C to SE inches/ mm	C to LE inches/ mm	C to SE inches/ mm	T Thickness inches/ mm
3	3.96 100.6	5.50 140	5.50 140	3.00 76	5.50 140	3.00 76	1.22 31
4	4.80 121.9	6.50 165	6.50 165	3.00 76	6.50 165	3.00 76	1.16 29
6	6.90 175.3	8.00 203	8.00 203	3.50 89	8.00 203	3.50 89	1.16 29
8	9.05 229.9	9.00 229	9.00 229	4.50 114	9.00 229	4.50 114	1.34 34
10	11.10 281.9	11.00 279	11.00 279	5.00 127	11.00 279	5.00 127	1.53 39
12	13.20 335.3	12.00 305	12.00 305	5.50 140	12.00 305	5.50 140	1.53 39
14	15.30 388.6	14.00 356	14.00 356	6.00 152	14.00 356	6.00 152	2.75# 70
16	17.40 442.0	15.00 381	15.00 381	6.50 165	15.00 381	6.50 165	2.75# 70
18	19.50 495.3	16.50 419	16.50 419	7.00 178	16.50 419	7.00 178	2.75# 70
20	21.60 548.6	18.00 457	18.00 457	8.00 203	18.00 457	8.00 203	2.75# 70
24	25.80 655.3	22.00 559	22.00 559	9.00 229	22.00 559	9.00 229	2.75# 70
30	32.00 762.0	25.00 635	25.00 635	10.00 254	25.00 635	10.00 254	4.00# 102
36	38.30 914.4	28.00 711	28.00 711	15.00 381	28.00 711	15.25 387	4.00# 102

* Caps from ½ - 3"/15 - 80 mm tap sizes

Dish Caps

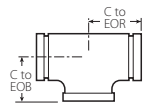


For the most up-to-date dimensional information, always refer to the current Victaulic product publication, which can be downloaded at victaulic.com.



DUCTILE IRON AWWA (CAST) FITTINGS

No. 21-C – Bullhead Tee



No. 21-C

Nominal Size inches					C to EOR inches/mm	C to EOB inches/mm
4	x	4	x	6	*	*
6	x	6	x	8	8.00 203	8.00 203
8	x	8	x	10	11.00 279	11.00 279
10	x	10	x	12	*	*

* Contact Victaulic for details

 For the most up-to-date dimensional information, always refer to the current Victaulic product publication, which can be downloaded at victaulic.com.

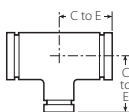


REDUCING FITTINGS

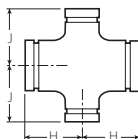
No. 25-C – Reducing Tee

No. 35-CR – Reducing Cross

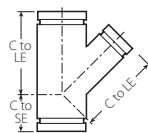
No. 30-CR – 45° Reducing Lateral



No. 25-C
Reducing Tee



No. 35-CR
Reducing Cross



No. 30-CR
45° Reducing Lateral

Nominal Size inches	No. 25-C		No. 35-CR		No. 30-CR	
	C to EOR inches/ mm	C to EOB inches/ mm	H inches/ mm	J inches/ mm	C to LE inches/ mm	C to SE inches/ mm
4 x 3	6.50 165	6.50 165	6.50 165	6.50 165	12.00 305	3.00 76
6 x 3	8.00 203	8.00 203	8.00 203	8.00 203	14.50 368	3.50 89
	4	8.00 203	8.00 203	8.00 203	14.50 368	3.50 89
8 x 3	9.00 229	9.00 229	—	—	—	—
	4	9.00 229	9.00 229	9.00 229	17.50 445	4.50 114
	6	9.00 229	9.00 229	9.00 229	17.50 445	4.50 114
10 x 4	11.00 279	11.00 279	11.00 279	11.00 279	20.50 521	5.00 127
	6	11.00 279	11.00 279	11.00 279	20.50 521	5.00 127
	8	11.00 279	11.00 279	11.00 279	20.50 521	5.00 127
12 x 4	12.00 305	12.00 305	12.00 305	12.00 305	24.50 622	5.50 140
	6	12.00 305	12.00 305	12.00 305	24.50 622	5.50 140
	8	12.00 305	12.00 305	12.00 305	24.50 622	5.50 140
	10	12.00 305	12.00 305	12.00 305	24.50 622	24.50 622
14 x 6	14.00 356	14.00 356	14.00 356	14.00 356	27.00 686	6.00 152
	8	14.00 356	14.00 356	14.00 356	27.00 686	6.00 152
	10	14.00 356	14.00 356	14.00 356	27.00 686	6.00 152
	12	14.00 356	14.00 356	14.00 356	27.00 686	6.00 152

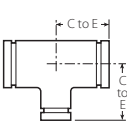


For the most up-to-date dimensional information, always refer to the current Victaulic product publication, which can be downloaded at victaulic.com.

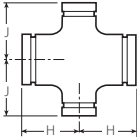


REDUCING FITTINGS

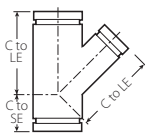
- No. 25-C – Reducing Tee
- No. 35-CR – Reducing Cross
- No. 30-CR – 45° Reducing Lateral



No. 25-C
Reducing Tee



No. 35-CR
Reducing Cross



No. 30-CR
45° Reducing Lateral

Nominal Size inches	No. 25-C		No. 35-CR		No. 30-CR	
	C to EOR inches/ mm	C to EOB inches/ mm	H inches/ mm	J inches/ mm	C to LE inches/ mm	C to SE inches/ mm
16 x 6	15.00 381	15.00 381	15.00 381	15.00 381	30.00 762	6.50 165
	15.00 381	15.00 381	15.00 381	15.00 381	30.00 762	6.50 165
	15.00 381	15.00 381	15.00 381	15.00 381	30.00 762	6.50 165
	15.00 381	15.00 381	15.00 381	15.00 381	30.00 762	6.50 165
	15.00 381	15.00 381	15.00 381	15.00 381	30.00 762	6.50 165
18 x 8	13.00 330	15.50 394	13.00 330	15.50 394	*	*
	13.00 330	15.50 394	13.00 330	15.50 394	32.00 813	7.00 178
	13.00 330	15.50 394	13.00 330	15.50 394	32.00 813	7.00 178
	16.50 419	16.50 419	16.50 419	16.50 419	32.00 813	7.00 178
	16.50 419	16.50 419	16.50 419	16.50 419	32.00 813	7.00 178
20 x 6	14.00 356	17.00 432	—	—	—	—
	14.00 356	17.00 432	14.00 356	17.00 432	—	—
	14.00 356	17.00 432	14.00 356	17.00 432	*	*
	14.00 356	17.00 432	14.00 356	17.00 432	35.00 889	8.00 203
	14.00 356	17.00 432	14.00 356	17.00 432	35.00 889	8.00 203
	18.00 457	18.00 457	18.00 457	18.00 457	35.00 889	8.00 203
	18.00 457	18.00 457	18.00 457	18.00 457	35.00 889	8.00 203

* Contact Victaulic for details.

! For the most up-to-date dimensional information, always refer to the current Victaulic product publication, which can be downloaded at victaulic.com.

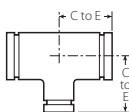


REDUCING FITTINGS

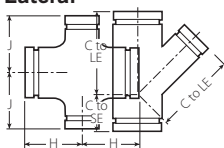
No. 25-C – Reducing Tee

No. 35-CR – Reducing Cross

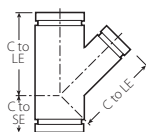
No. 30-CR – 45° Reducing Lateral



**No. 25-C
Reducing Tee**



**No. 35-CR
Reducing Cross**



**No. 30-CR
45° Reducing Lateral**

Nominal Size inches	No. 25-C		No. 35-CR		No. 30-CR	
	C to EOR inches/ mm	C to EOB inches/ mm	H inches/ mm	J inches/ mm	C to LE inches/ mm	C to SE inches/ mm
24 x 6	15.00 381	19.00 483	—	—	—	—
	8	15.00 381	19.00 483	*	*	*
	10	15.00 381	19.00 483	*	*	*
	12	15.00 381	19.00 483	15.00 381	19.00 483	*
	14	15.00 381	19.00 483	15.00 381	19.00 483	40.50 1029
	16	15.00 381	19.00 483	15.00 381	19.00 483	40.50 1029
	18	22.00 559	22.00 559	22.00 559	22.00 559	40.50 1029
	20	22.00 559	22.00 559	22.00 559	22.00 559	40.50 1029
30 x 6	18.00 457	23.00 584	18.00 457	23.00 584	—	—
	8	18.00 457	23.00 584	18.00 457	23.00 584	*
	10	18.00 457	23.00 584	18.00 457	23.00 584	*
	12	18.00 457	23.00 584	18.00 457	23.00 584	49.00 1245
	14	18.00 457	23.00 584	18.00 457	23.00 584	49.00 1245
	16	18.00 457	23.00 584	18.00 457	23.00 584	49.00 1245
	18	18.00 457	23.00 584	18.00 457	23.00 584	49.00 1245
	20	18.00 457	23.00 584	18.00 457	23.00 584	49.00 1245
	24	25.00 635	25.00 635	25.00 635	25.00 635	49.00 1245

* Contact Victaulic for details.

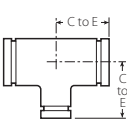


For the most up-to-date dimensional information, always refer to the current Victaulic product publication, which can be downloaded at victaulic.com.

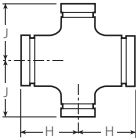


REDUCING FITTINGS

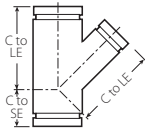
- No. 25-C – Reducing Tee
- No. 35-CR – Reducing Cross
- No. 30-CR – 45° Reducing Lateral



No. 25-C
Reducing Tee



No. 35-CR
Reducing Cross



No. 30-CR
45° Reducing Lateral

Nominal Size inches	No. 25-C		No. 35-CR		No. 30-CR	
	C to EOR inches/ mm	C to EOB inches/ mm	H inches/ mm	J inches/ mm	C to LE inches/ mm	C to SE inches/ mm
36 x 8	20.00 508	26.00 660	20.00 508	26.00 660	*	*
	10 20.00 508	26.00 660	20.00 508	26.00 660	*	*
	12 20.00 508	26.00 660	20.00 508	26.00 660	*	*
	14 20.00 508	26.00 660	20.00 508	26.00 660	54.00 1372	15.25 387
	16 20.00 508	26.00 660	20.00 508	26.00 660	54.00 1372	15.25 387
	18 20.00 508	26.00 660	20.00 508	26.00 660	54.00 1372	15.25 387
	20 20.00 508	26.00 660	20.00 508	26.00 660	54.00 1372	15.25 387
	24 20.00 508	26.00 660	20.00 508	26.00 660	54.00 1372	15.25 387
	30 28.00 711	28.00 711	28.00 711	28.00 711	56.00 1422	15.25 387

* Contact Victaulic for details.

 For the most up-to-date dimensional information, always refer to the current Victaulic product publication, which can be downloaded at victaulic.com.



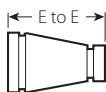
REDUCING FITTINGS

No. 50-C – Concentric Reducer

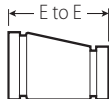
No. 51-C – Eccentric Reducer

No. 10-CR – 90° Reducing Elbow

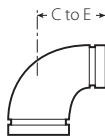
No. 100-CR – 90° Long Radius Reducing Elbow



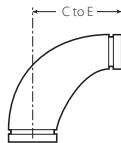
No. 50-C
Concentric
Reducer



No. 51-C
Eccentric
Reducer



No. 10-CR
Reducing
Elbow



No. 100-CR 90°
Long Radius
Reducing Elbow

Nominal Size inches	No. 50-C		No. 51-CR	No. 10-CR	No. 100-CR
	E to E inches/mm		E to E inches/mm	C to E inches/mm	C to E inches/mm
4 x 3	7.00 178		7.00 178	6.50 165	9.00 229
6 x 3	9.00 229		9.00 229	8.00 203	11.50 292
	4	9.00 229	9.00 229	8.00 203	11.50 292
8 x 3	11.00 279		11.00 279	—	—
	4	11.00 279	11.00 279	9.00 229	14.00 356
	6	11.00 279	11.00 279	9.00 229	14.00 356
10 x 4	12.00 305		12.00 305	11.00 279	16.50 419
	6	12.00 305	12.00 305	11.00 279	16.50 419
	8	12.00 305	12.00 305	11.00 279	16.50 419
12 x 4	14.00 356		14.00 356	12.00 305	*
	6	14.00 356	14.00 356	12.00 305	19.00 483
	8	14.00 356	14.00 356	12.00 305	19.00 483
	10	14.00 356	14.00 356	12.00 305	19.00 483
14 x 6	16.00 406		16.00 406	14.00 356	*
	8	16.00 406	16.00 406	14.00 356	21.50 546
	10	16.00 406	16.00 406	14.00 356	21.50 546
	12	16.00 406	16.00 406	14.00 356	21.50 546

* Contact Victaulic for details.

NOTE: Non-standard reducing cross sizes are available. Contact Victaulic for details.



For the most up-to-date dimensional information, always refer to the current Victaulic product publication, which can be downloaded at victaulic.com.



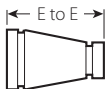
REDUCING FITTINGS

No. 50-C – Concentric Reducer

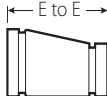
No. 51-C – Eccentric Reducer

No. 10-CR – 90° Reducing Elbow

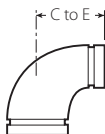
No. 100-CR – 90° Long Radius Reducing Elbow



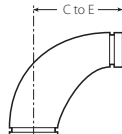
No. 50-C
Concentric
Reducer



No. 51-C
Eccentric
Reducer



No. 10-CR
Reducing
Elbow



No. 100-CR 90°
Long Radius
Reducing Elbow

Nominal Size inches		No. 50-C	No. 51-CR	No. 10-CR	No. 100-CR
		E to E inches/mm	E to E inches/mm	C to E inches/mm	C to E inches/mm
16	x 6	18.00 457	18.00 457	—	*
	8	18.00 457	18.00 457	15.00 381	24.00 610
	10	18.00 457	18.00 457	15.00 381	24.00 610
	12	18.00 457	18.00 457	15.00 381	24.00 610
	14	18.00 457	18.00 457	15.00 381	24.00 610
18	x 8	19.00 483	19.00 483	16.50 419	—
	10	19.00 483	19.00 483	16.50 419	26.50 673
	12	19.00 483	19.00 483	16.50 419	26.50 673
	14	19.00 483	19.00 483	16.50 419	26.50 673
	16	19.00 483	19.00 483	16.50 419	26.50 673
20	x 8	20.00 508	20.00 508	—	—
	10	20.00 508	20.00 508	18.00 457	29.00 737
	12	20.00 508	20.00 508	18.00 457	29.00 737
	14	20.00 508	20.00 508	18.00 457	29.00 737
		20.00 508	20.00 508	18.00 457	29.00 737
	18	20.00 508	20.00 508	18.00 457	29.00 737

* Contact Victaulic for details.

NOTE: Non-standard reducing cross sizes are available. Contact Victaulic for details.



For the most up-to-date dimensional information, always refer to the current Victaulic product publication, which can be downloaded at victaulic.com.



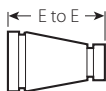
REDUCING FITTINGS

No. 50-C – Concentric Reducer

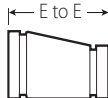
No. 51-C – Eccentric Reducer

No. 10-CR – 90° Reducing Elbow

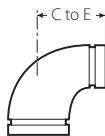
No. 100-CR – 90° Long Radius Reducing Elbow



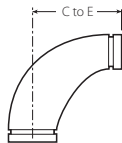
No. 50-C
Concentric
Reducer



No. 51-C
Eccentric
Reducer



No. 10-CR
Reducing
Elbow



No. 100-CR 90°
Long Radius
Reducing Elbow

Nominal Size inches			No. 50-C	No. 51-CR	No. 10-CR	No. 100-CR
			E to E inches/mm	E to E inches/mm	C to E inches/mm	C to E inches/mm
24	x	8	24.00 610	24.00 610	*	*
		10	24.00 610	24.00 610	*	*
		12	24.00 610	24.00 610	22.00 559	34.00 864
		14	24.00 610	24.00 610	22.00 559	34.00 864
		16	24.00 610	24.00 610	22.00 559	34.00 864
		18	24.00 610	24.00 610	22.00 559	34.00 864
		20	24.00 610	24.00 610	22.00 559	34.00 864
30	x	8	*	*	*	—
		10	*	*	*	—
		12	*	*	*	—
		14	36.00 914	36.00 914	*	—
		16	36.00 914	36.00 914	*	—
		18	36.00 914	36.00 914	*	49.00 1245
		20	36.00 914	36.00 914	*	49.00 1245
		24	36.00 914	36.00 914	*	49.00 1245

* Contact Victaulic for details.

NOTE: Non-standard reducing cross sizes are available. Contact Victaulic for details.

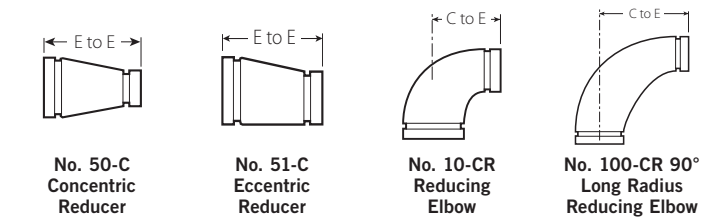


For the most up-to-date dimensional information, always refer to the current Victaulic product publication, which can be downloaded at victaulic.com.



REDUCING FITTINGS

- No. 50-C – Concentric Reducer
- No. 51-C – Eccentric Reducer
- No. 10-CR – 90° Reducing Elbow
- No. 100-CR – 90° Long Radius Reducing Elbow



Nominal Size inches	No. 50-C		No. 51-CR		No. 10-CR		No. 100-CR	
	E to E inches/mm		E to E inches/mm		C to E inches/mm		C to E inches/mm	
36 x 8	*		*		*		—	
	10		*		*		—	
	12		*		*		—	
	14		36.00 914		*		—	
	16		36.00 914		*		—	
	18		36.00 914		*		—	
	20		36.00 914		*		49.00 1245	
	24		36.00 914		*		49.00 1245	
	30		36.00 914		*		49.00 1245	

* Contact Victaulic for details.

NOTE: Non-standard reducing cross sizes are available. Contact Victaulic for details.

 For the most up-to-date dimensional information, always refer to the current Victaulic product publication, which can be downloaded at victaulic.com.



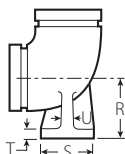
REDUCING FITTINGS

No. 10-CB – Base Elbow

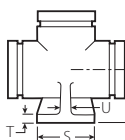
No. 20-CB – Base Tee

No. 25-CB – Reducing Base Tee

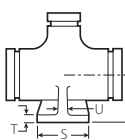
No. 100-CB – Long Radius Base Elbow



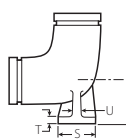
No. 10-CB



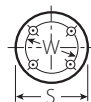
No. 20-CB



No. 25-CB



No. 100-CB



Round Base

Nominal Size inches	Actual Pipe Outside Diameter inches/mm	Dimensions – inches/mm				
		R	U	T	S	W
3	3.96 100.6	4.88 124	0.50 13	0.56 14	5.00 127	3.88 99
4	4.80 121.9	5.50 140	0.50 13	0.62 16	6.00 152	4.75 121
6	6.90 175.3	7.00 178	0.62 16	0.69 18	7.00 178	5.50 140
8	9.05 229.9	8.38 213	0.88 22	0.94 24	9.00 229	7.50 191
10	11.10 281.9	9.75 248	0.88 22	0.94 24	9.00 229	7.50 191
12	13.20 335.3	11.25 286	1.00 25	1.00 25	11.00 279	9.50 241
14	15.30 388.6	12.50 318	1.00 25	1.00 25	11.00 279	9.50 241
16	17.40 442.0	13.75 349	1.00 25	1.00 25	11.00 279	9.50 241
18	19.50 495.3	15.00 381	1.12 29	1.12 29	13.50 343	11.75 299
20	21.60 548.6	16.00 406	1.12 29	1.12 29	13.50 343	11.75 299
24	25.80 655.3	18.50 470	1.12 29	1.12 29	13.50 343	11.75 299

NOTES

- Bolt hole template shown for round base is the same as for the flange of the supporting pipe size. The only exception is that the round base contains four holes that are placed to straddle the centerlines.
- The bases of these fitting are intended for support in compression and shall not be used as anchors or supports in tension or shear conditions.
- Grooved end base 90° elbows (#X-90 CDI) and base tees (#X-CDI) are available with dimensions to ANSI B16.1.
- Side base fittings are available. Contact Victaulic for details.
- For Center-to-End dimensions, refer to corresponding fitting without the base.
- For information regarding 90° reducing elbows with a base, contact Victaulic.



For the most up-to-date dimensional information, always refer to the current Victaulic product publication, which can be downloaded at victaulic.com.



REDUCING FITTINGS

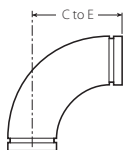
No. 10-CF – 90° Flare

No. 100-CF – 90° Long Radius Flare

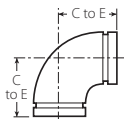
No. 43-CF – Straight Flare

No. 10-CS – 90° Side Outlet

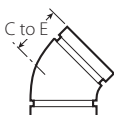
No. 20-CS – Tee Side Outlet



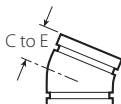
No. 10-CF



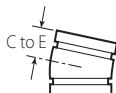
No. 100-CF



No. 43-CF



No. 10-CS



No. 20-CS

Nominal Size inches	Actual Pipe Outside Diameter inches/ mm	No. 10-CF		No. 100-CF		No. 43-CF	No. 10-CS	No. 20-CS1
		C to E inches/ mm	C to F inches/ mm	C to E inches/ mm	C to F inches/ mm	C to E inches/ mm	C to E inches/ mm	C to E inches/ mm
3	3.96 100.6	5.50 140	9.00 229	7.95 197	11.25 286	8.00 203	5.50 140	5.50 140
4	4.80 121.9	6.50 165	9.50 241	9.00 229	12.50 318	8.00 203	6.50 165	6.50 165
6	6.90 175.3	8.00 203	11.50 292	11.50 292	15.00 381	8.00 203	8.00 203	8.00 203
8	9.05 229.9	9.00 229	13.50 343	14.00 356	18.50 470	10.00 254	9.00 229	9.00 229
10	11.10 281.9	11.00 279	16.50 419	16.50 419	22.50 572	10.00 254	11.00 279	11.00 279
12	13.20 335.3	12.00 305	18.50 470	19.00 483	25.50 648	12.00 305	12.00 305	12.00 305
14	15.30 388.6	14.00 356	21.50 546	21.50 546	29.00 737	12.00 305	14.00 356	*
16	17.40 442.0	15.00 381	23.00 584	24.00 610	32.00 813	16.00 406	15.00 381	*
18	19.50 495.3	16.50 419	25.00 635	26.50 673	35.00 889	16.00 406	16.50 419	*
20	21.60 548.6	18.00 457	27.00 686	29.00 737	38.00 965	18.00 457	18.00 457	*
24	25.80 655.3	22.00 559	32.50 826	34.00 864	44.50 1130	18.00 457	22.00 559	*
30	32.00 762.0	*	*	*	*	24.00 610	*	*
36	38.30 914.4	*	*	*	*	24.00 610	*	*

* Contact Victaulic for details.

1 Reducing side outlet 90° Elbows, Tees, and Crosses are available. Contact Victaulic for details.

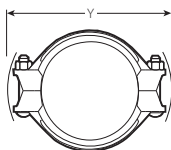


For the most up-to-date dimensional information, always refer to the current Victaulic product publication, which can be downloaded at victaulic.com.

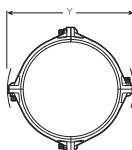


COUPLINGS

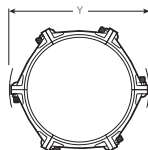
Style 31 Coupling



3 - 12" Sizes



14 - 20" Sizes



24 - 36" Sizes

Nominal Size inches	Actual Pipe Outside Diameter inches/mm	Dimensions – inches/mm
		Y
3	3.96 100.6	7.63 194
4	4.80 121.9	9.20 234
6	6.90 175.3	11.19 284
8	9.05 229.9	14.33 364
10	11.10 281.9	16.44 418
12	13.20 335.3	19.16 487
14	15.30 388.6	21.96 558
16	17.40 442.0	23.96 609
18	19.50 495.3	26.33 669
20	21.60 548.6	28.69 729
24	25.80 655.3	33.06 840
30	32.00 762.0	39.39 1001
36	38.30 972.8	46.04 1169

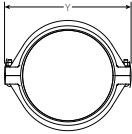


For the most up-to-date dimensional information, always refer to the current Victaulic product publication, which can be downloaded at victaulic.com.

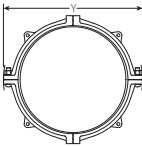


COUPLINGS

Style 31R Coupling



14 - 20" Sizes



24 - 36" Sizes

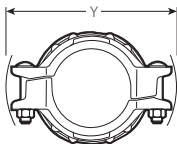
Nominal Size inches	Actual Pipe Outside Diameter inches/mm	Dimensions – inches/mm
		Y
14	15.30 388.6	21.75 552
16	17.40 442.0	24.13 612
18	19.50 495.3	26.50 674
20	21.60 548.6	28.75 730
24	25.80 655.3	35.25 896
30	32.00 812.8	42.25 1074
36	38.30 972.8	49.00 1244



For the most up-to-date dimensional information, always refer to the current Victaulic product publication, which can be downloaded at victaulic.com.

COUPLINGS

Style 307 Transition Coupling



Style 307

Nominal Size inches	Actual Pipe Outside Diameter inches/mm	Dimensions – inches/mm
		Y
3	3.96 100.6	7.38 188
4	4.80 121.9	9.00 229
6	6.90 175.3	11.13 283
8	9.05 229.9	13.88 353
10	11.10 281.9	16.50 419
12	13.20 335.3	18.94 481

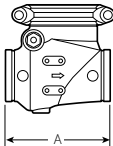


For the most up-to-date dimensional information, always refer to the current Victaulic product publication, which can be downloaded at victaulic.com.



CHECK VALVE

Series 317 AWWA Check Valve



Series 317

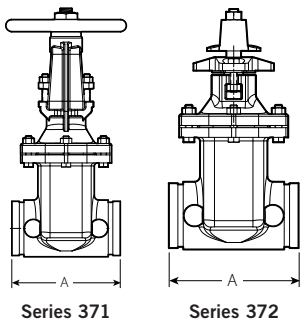
Nominal Size inches	Actual Pipe Outside Diameter inches/mm	Dimensions – inches/mm
		A
3	3.96	9.50
	100.6	241
4	4.80	11.50
	121.9	292
6	6.90	14.00
	175.3	356
8	9.05	19.50
	229.9	495
10	11.10	22.00
	281.9	559
12	13.20	26.00
	335.3	660



For the most up-to-date dimensional information, always refer to the current Victaulic product publication, which can be downloaded at victaulic.com.

GATE VALVES

Series 371 Open Stem & Yoke (OS&Y) Gate Valve
Series 372 Non Rising Stem (NRS) Gate Valve



Nominal Size inches	Actual Pipe Outside Diameter inches/mm	Dimensions – inches/mm
		A
2 ½	2.875 73.0	7.500 190.5
3	3.500 88.9	7.992 203
4	4.500 114.3	9.016 229
6	6.625 168.3	10.512 267
8	8.625 219.1	11.496 292
10	10.750 273.0	12.992 330
12	12.750 323.9	14.016 356

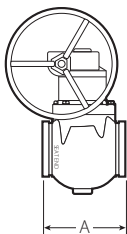


For the most up-to-date dimensional information, always refer to the current Victaulic product publication, which can be downloaded at victaulic.com.



PLUG VALVE

Series 365 AWWA Plug Valve



Style 365

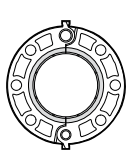
Nominal Size inches	Actual Pipe Outside Diameter inches/mm	Dimensions – inches/mm
		A
3	3.96	8.00
	100.6	203
4	4.80	9.00
	121.9	229
6	6.90	10.50
	175.3	267
8	9.05	11.50
	229.9	292
10	11.10	13.00
	281.9	330
12	13.20	14.00
	335.3	356



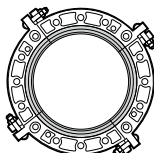
For the most up-to-date dimensional information, always refer to the current Victaulic product publication, which can be downloaded at victaulic.com.

FLANGE ADAPTERS

Style 341



3 - 12" Sizes



14 - 36" Sizes



Nominal Size inches	Actual Pipe Outside Diameter inches/mm	Dimensions – inches/mm
		W
3	3.96 100.6	8.38 213
4	4.80 121.9	10.00 254
6	6.90 175.3	12.00 305
8	9.05 229.9	14.50 368
10	11.10 281.9	17.38 442
12	13.20 335.3	20.25 514
14	15.30 388.6	24.50 622
16	17.40 442.0	27.13 689
18	19.50 495.3	29.00 737
20	21.60 548.6	31.50 800
24	25.80 655.3	36.00 914
30	32.00 812.8	43.00 1092
36	38.30 972.8	50.00 1270



For the most up-to-date dimensional information, always refer to the current Victaulic product publication, which can be downloaded at victaulic.com.



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