

I-300

FIELD INSTALLATION HANDBOOK

AWWA Products

- GASKET INFORMATION
- PIPE PREPARATION
- PRODUCT INSTALLATION
- PRODUCT DATA

A WARNING



- Read and understand all instructions before attempting to install, remove, adjust, or maintain any Victaulic products.
- Depressurize and drain piping systems before attempting to install, remove, adjust, or maintain any Victaulic products.
- Wear safety glasses, hardhat, foot protection, and hearing protection.

Failure to follow instructions and warnings could cause system failure, resulting in serious personal injury and/or property damage.

If you need additional copies of any instructions, or if you have questions about the safe and proper installation or operation of Victaulic products, contact Victaulic.

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Where to Find Instructions

The following table provides a listing of products and installation information. If you need additional copies of any installation information, contact Victaulic at 1-800-PICK VIC. **NOTE:** If two sources of instructions are referenced in this index, Victaulic recommends the use of both to ensure proper installation.

Product

Product	Where to Find Instructions
Depend-O-Lok Couplings	Instructions Shipped with Coupling
FireLock Automatic Sprinkler Products	1-40
FireLock CPVC Piping Products	I-800
FireLock Fire Protection Valves and Accessories	Manual Shipped with Valve or Accessory
FIT Products	I-FIT and I-100
Pipe Preparation Tools	Manual Shipped with Pipe Preparation Tool
Pressfit Products	I-500
Series 317 AWWA Check Valve	I-317
Series 365 AWWA Vic-Plug Valve (3 – 12"/80 – 300 mm)	I-365/366/377.3-12
Series 365 AWWA Vic-Plug Valve (14 – 18"/350 – 450 mm)	I-365.14-18
Series 366 AWWA Vic-Plug Valve	I-365/366/377.3-12
Series 377 Vic-Plug Balancing Valve	I-365/366/377.3-12
Series 608 Copper Connection Butterfly Valve	I-600
Series 700 Butterfly Valve	I-100
Series 705W FireLock Butterfly Valve	I-705W/708W
Series 706 Butterfly Valve	I-100
Series 708W FireLock Butterfly Valve	I-705W/708W
Series 709 Butterfly Valve	I-100
Series 712 Swinger Check Valve	I-100
Series 713 Swinger Check Valve	I-100
Series 716 Vic-Check Valve	I-100
Series 717 FireLock Check Valve	I-100
Series 717R FireLock Riser Check Valve	I-100
Series 723 Diverter Ball Valve	I-100
Series 726 Ball Valve	I-100
Series 728 FireLock Ball Valve	I-728
Series 763 Butterfly Valve	I-100
Series 779 Venturi Check Valve	I-100

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Product	Where to Find Instructions		
Series 782 TA Bypass	Instructions Shipped with Valve		
Series 785 TA TBVS Sweated-End Mini Circuit Balancing Valve	Instructions Shipped with Valve		
Series 786 TA STAS Soldered-End Circuit Balancing Valve	Instructions Shipped with Valve		
Series 787 TA STAD NPT Female Threaded Circuit Balancing Valve	Instructions Shipped with Valve		
Series 788 TA STAF Flanged-End Circuit Balancing Valve	Instructions Shipped with Valve		
Series 789 TA STAG Grooved-End Circuit Balancing Valve	Instructions Shipped with Valve		
Series 793 Knife Gate Valve	1-793/797		
Series 797 Knife Gate Valve	1-793/797		
Vic-300 Butterfly Valve	I-100		
Style 005 FireLock Rigid Coupling	I-100		
Style 07 Zero-Flex Rigid Coupling (1 – 12"/25 – 300 mm)	I-100		
Style 07 Zero-Flex Rigid Coupling (14 – 24"/350 – 600 mm)	I-100 and IT-07		
Style 22 Coupling for Vic-Ring Adapters and Shouldered-end Pipe	I-6000		
Style 31 Coupling for AWWA Ductile Iron	I-300		
Style 31 Coupling for Vic-Ring Adapters and Shouldered-end Pipe	I-6000		
Style 41 Coupling for Vic-Ring Adapters and Shouldered-end Pipe	I-6000		
Style 44 Coupling for Vic-Ring Adapters and Shouldered-end Pipe	I-6000		
Style 72 Outlet Coupling	I-100		
Style 74 OD Flexible Coupling	I-100		
Style 75 Flexible Coupling	I-100		
Style 77 Flexible Coupling	I-100		
Style 78 Snap-Joint Coupling	I-100		
Style 89 Rigid Coupling for Stainless Steel	I-100 and IT-89		
Style 99 Roust-A-Bout Coupling for Plain-end Steel	I-100 and IT-99		
Style 150 Mover Expansion Joint	I-100		
Style 155 Expansion Joint	I-100		
Style 307 Coupling for Grooved IPS Steel to Grooved AWWA Ductile Iron	I-300		
Style 341 Vic-Flange Adapter for AWWA Ductile Iron	I-300		
Style 397 V-Grip Coupling for Plain X Grooved Ductile Iron	I-300 and I-397		

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Product	Where to Find Instructions
Style 399 V-Grip Coupling for Plain-end Ductile Iron	I-300 and I-399
Style 441 Vic-Flange for Stainless Steel	I-100 and I-441
Style 475 Lightweight, Flexible Stainless Steel Coupling	I-100
Style 489 Rigid Coupling for Stainless Steel (11/4 – 4"/40 – 100 mm)	I-100 and IT-489.2-4
Style 489 Rigid Coupling for Stainless Steel (6 – 12" and 139,7 – 318,5 Metric and JIS Sizes)	I-100 and IT-489
Style 606 Rigid Coupling for Copper Tubing	I-600
Style 641 Vic-Flange Adapter for Copper Tubing	I-600
Style 707-IJ Transition Coupling for NPS to JIS	I-100
Style 720 TestMaster II Alarm Test Module	I-720
Style 720 TestMaster II Alarm Test Module with Pressure Relief Option	I-720PR
Style 730 Vic-Strainer Tee-Type	1-730/732
Style 731-G Suction Diffuser	I-731G
Style 732 Wye-Type Vic-Strainer	I-730/732
Style 733 Venturi Flow Metering Sensor	I-100
Style 734/734S Orifice/Indicator Flow Metering System	I-100
Style 735 Fire Pump Test Meter	I-100
Style 738 TA Portable Differential Meter	Instructions Shipped with Meter
Style 739 Portable Master Meter	Instructions Shipped with Meter
Style 740 TA CBI Meter	Instructions Shipped with Meter
Style 741 IPS and Metric Vic-Flange Adapter	I-100
Style 743 Vic-Flange Adapter	I-100
Style 744 FireLock Flange Adapter	I-100
Style 750 Reducing Coupling	I-100
Style 770 Large-diameter Coupling	I-100 and IT-770
Style 775 Coupling for PVC	I-100
Style 791 Vic-Boltless Coupling	I-100
Style 808 Duo-Lock Coupling	I-32
Style 920 and 920N Mechanical-T Outlets	I-100 and I-920N
Style 922 FireLock Outlet-T	I-100 and I-922
Style 923 Vic-Let Strapless Outlet	I-100 and I-923
Style 924 Vic-O-Well Strapless Thermometer Outlet	I-100
Style 926 Mechanical-T Spigot Assembly	I-100 and I-926
Style 931 Vic-Tap II Mechanical-T	VT-II

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Product	Where to Find Instructions
Style 994 Vic-Flange Adapter for HDPE	I-900 and IT-994
Style 995 Coupling for Plain-end IPS and Metric HDPE	I-900 and IT-995
Style 997 Transition Coupling for HDPE to Steel	I-900 and IT-997
Style 2970 Aquamine Coupling for Plain-end IPS PVC	IT-2970
Style 2971 Aquamine Transition Coupling for Plain- End IPS PVC to Plain-End HDPE	IT-2971
Style 2972 Aquamine Transition Coupling for Plain- End IPS PVC to Grooved IPS Steel	IT-2972
Style HP-70 Rigid Coupling (2 – 12"/50 – 300 mm)	I-100
Style HP-70 Rigid Coupling (14 – 16"/350 – 400 mm)	I-100 and IT-70
Style HP-70ES Rigid Coupling with EndSeal or Fire-R Gaskets (2 – 12"/50 – 300 mm)	I-100

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HAZARD IDENTIFICATION

Definitions for identifying various hazard levels are provided below.



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

A 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.

A 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.

INTRODUCTION

This field assembly and installation handbook is a basic field reference guide for Victaulic mechanical piping products for AWWA sized pipe. This handbook provides easy reference to proper installation information. In addition to this handbook, Victaulic offers the following handbooks for other products/materials:

- I-100 Installation Instructions for IPS and Metric Carbon Steel, Stainless Steel, and Aluminum Products
- I-500 Installation Instructions for Pressfit Products
- I-600 Installation Instructions for Copper Connection Products
- I-800 Installation Instructions for FireLock CPVC Sprinkler System Products
- I-900 Installation Instructions for HDPE Products

Additional copies of installation information are available from Victaulic, or Victaulic stocking distributors, upon request.

Always follow good piping practices. Specified pressures, temperatures, external loads, internal loads, performance standards, and tolerances must never be exceeded.

Many applications require recognition of special conditions, code requirements, and the use of safety factors. Qualified engineers should reference Section 26 of the Victaulic General Catalog (G-100) and Victaulic publication 05.01, "Gasket Selection Guide," when determining requirements for special applications.

NOTICE

- Victaulic Company maintains a continual policy of product improvement. Therefore, Victaulic reserves the right to change product specifications, designs, and standard equipment without notice and without incurring obligation.
- VICTAULIC COMPANY 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 assistance, which
 is a prerequisite for any product application.
- 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 assembly handbook contains trademarks, copyrights, and products with patented features that are the exclusive property of Victaulic Company.
- WHILE EVERY EFFORT HAS BEEN MADE TO ENSURE ITS ACCURACY, VICTAULIC, ITS SUBSIDIARIES, AND ITS AFFILIATED COMPANIES MAKE NO EXPRESSED 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.

IMPORTANT INFORMATION

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

Victaulic AWWA plain-end pipe couplings are designed for use only with plainend ductile iron pipe. Victaulic AWWA size plain-end pipe couplings must not be used with grooved-end pipe and/or fittings, threaded-end pipe and/or fittings, or IPS size pipe.

Gaskets for Victaulic AWWA size grooved and plain-end pipe couplings must be lubricated for proper assembly. Lubrication prevents gasket pinching and assists installation. A thin coat of Vic-Lube™ or another compatible material, such as silicone or soap based lubricants, is required.

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. Victaulic publication 05.01, "Gasket Selection Guide," must be referenced to determine gasket grade recommendations for each application.

OPERATOR SAFETY GUIDELINES FOR TOOLS

NOTICE

- Although Victaulic pipe preparation tools are manufactured for safe, dependable operation, it is
 impossible to anticipate the combinations of circumstances that could result in an accident. The
 following instructions are recommended for safe operation of Victaulic pipe preparation tools. Always refer to the specific operating and maintenance instructions manual for complete safety
 quidelines.
- **1.** Read and understand the operating and maintenance instruction manual for the tool. Read the supplied manual carefully before operating or performing maintenance on any tool. Become familiar with the tool's features, operations, applications, and limitations. Be particularly aware of its specific hazards. Store the operator's manual in a readily available location. If you require additional copies of any literature, contact Victaulic.
- **2. Secure the tool, power drive, and equipment.** Make sure that the tool and power drive are fastened securely to the floor.
- **3. Prevent accidental start-ups.** Place any power switches in the "OFF" position before plugging the tool into the electrical system. Always use a foot pedal control for the power source.
- **4. Ground the power source.** Make sure the power source is connected to an internally grounded electrical system.
- **5. Operating environment.** Do not operate tools in damp locations. Wear hearing protection in noisy shop operations. Ensure that the work area is well lit.
- **6. Wear proper clothing.** Do not wear unbuttoned jackets, loose sleeve cuffs, neckties, or anything else that can become tangled in moving parts. Always wear safety glasses and foot protection.
- **7. Stay alert.** Do not operate tools if you are drowsy from medication or fatigue. Avoid horseplay around the equipment, and keep bystanders a safe distance away from the equipment.
- **8. Inspect the equipment.** Before starting the tool, check all moveable parts for any obstructions. Make sure the guards and tool parts are installed and secured properly.
- **9. Keep work areas clean.** Keep the work area around the tool clear of obstructions that could limit the movement of the operator. Clean up all oil and coolant spills. Remove shavings from the tool to maintain proper operation.
- **10.** Use pipe supports. For long sections of pipe and heavier work, use floormounted pipe stands. Make sure that the work is secured properly in a pipe vise that is fastened securely to the floor.
- **11. Operate the tool on the switch side only.** Operate tools with a foot pedal control located at an easily accessible area. Never reach across moving parts or material being worked on. The switch must always be accessible to the operator.
- **12. Do not misuse tools.** Perform only the functions for which the tool was designed. Do not force the tool. Do not operate the tool at speeds exceeding those specified in the operating and maintenance instructions manual.

- **13.** Disconnect the power cord before servicing tool. Only authorized personnel should attempt to service tools. Always disconnect the power source before servicing or making any adjustments.
- **14.** Always maintain tools. Keep tools clean and cutting tools sharp for safe, dependable operation. Follow all lubricating instructions. Report any unsafe conditions to authorized personnel for immediate correction.

PIPE PREPARATION

The grooved piping method is based upon the proper preparation of grooves to receive the housings' keys. The groove serves as a recess in the pipe, which allows ample depth for secure engagement of the housings, yet ample wall thickness for full pressure rating.

A WARNING



- Before setting up and operating any Victaulic pipe preparation tools, read and understand the operating and maintenance instructions manual for the tool.
- Learn the operation, applications, and potential hazards peculiar to the tool.
 Failure to follow these instructions could result in serious personal injury, property damage, product damage, and improper product installation.

Ductile iron pipe must be prepared to Victaulic specifications outlined for each product style. Preparation may vary according to pipe wall thickness, outside dimensions, and other factors. Victaulic recommends square-cut pipe for use with grooved-end AWWA products.

The outside surface of the pipe, between the groove and the pipe end, must be smooth and free from deep pits and swells to provide a leak-tight seal for the gasket. All rust, loose scale, oil, grease, dirt, and cutting particles must be removed. Peened surfaces may require rework to provide a leak-tight seal for the gasket (refer to ANSI/AWWA C-606 or CSA B242).

TOOL RATINGS

The following table contains general information about tool ratings. Certain tools are designed for high use shop fabrication, while others are designed for field fabrication. For detailed information on tools, refer to Victaulic publication 24.01. For information about maintenance and operation of tools, refer to the applicable operating and maintenance instructions manual for the tool. Victaulic cut grooving tools are designed for use on AWWA ductile iron pipe as well as IPS steel and other IPS materials. Requirements for AWWA size ductile iron pipe must be specified at the time of order. In addition, Victaulic tools cut either rigid-radius or flexible-radius grooves. This requirement must be specified at the time of order.

	Dis.					Р	ipe Siz	ze				
Tool Model	Pipe Material	3	4	6	8	10	12	14	16	18	20	24
VG28GD	Ductile Iron	Cla	ss 53 -	- 56								
Vic- Groover	Ductile Iron	(Class 5	53 – 56	5							
VG824	Ductile Iron					Class 53 – 56						
VG412	Ductile Iron			Cla	ss 53 -	- 56						

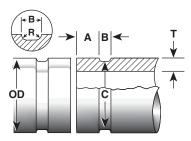
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EXPLANATION OF CRITICAL RADIUS CUT GROOVE DIMENSIONS

A WARNING

 AWWA pipe dimensions and groove dimensions must be within the tolerances specified in the charts on the following pages to ensure proper joint performance.

Failure to follow these specifications could result in serious personal injury, property damage, joint leakage, and/or joint failure.



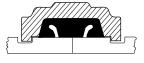
(Exaggerated for clarity)

Radius Cut Groove

- "A" Dimension The "A" dimension, or the distance from the pipe end to the groove, identifies the gasket seating area. This area must be free from indentations, projections, deep pits, and swells from the pipe end to the groove to provide a leak-tight seal for the gasket.
- **"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 housings' "key" width.
- **"C" Dimension** The "C" dimension is the proper diameter at the base of the groove. This dimension must be within the diameter's tolerance and concentric with the OD for proper coupling fit. The groove must be of uniform depth for the entire pipe circumference.
- "R" Dimension The "R" dimension is the radius necessary at the bottom of the groove to eliminate a point of stress concentration for cast pipe (gray and ductile).
- **"T" Dimension** The "T" dimension is the minimum wall thickness that can be cut grooved. The tolerances must conform to Class 53 ANSI/AWWA C151/A21.51. Class 53 ductile iron pipe in sizes 18 36 inches (450 900 mm) can be cut grooved. Contact Victaulic for details.

NOTICE

- Coatings that are applied to the interior surfaces of Victaulic grooved and plain-end pipe couplings must not exceed 0.010 inch (0,25 mm). This includes the bolt pad mating surfaces.
- In addition, the coating thickness applied to the gasket-sealing surface and within the groove on the pipe exterior must not exceed 0.010 inch (0,25 mm).





Rigid Radius Cut Groove

Flexible Radius Cut Groove

Exaggerated for Clarity

Victaulic groove specifications for cast pipe (gray and ductile) conform to the requirements of ANSI/AWWA Standard C-606 and CSA B242.

For cast pipe, the groove is cut with a radius ("R" dimension) at the corners of the groove base to reduce stress concentration. Grooving dimensions are the same for any pipe OD, regardless of pipe class and pressure.

Standard preparation is with a rigid radius groove. Flexible radius groove dimensions may be used to provide expansion/contraction or angular movement allowance at the joint.

GROOVE DIMENSIONS

Rigid Radius-Cut Groove Specifications - Ductile Iron Pipe

ia. Actual Diameter Gasket Seat "A" Groove Width "B". S Outside Diameter Gasket Seat "A" Groove Width "B". S inches (mm) Max. Min. Max. Min. Basic Max. 3.960 4.005 3.915 0.840 0.820 0.375 0.406 (10.06) (101.7) (99.4) (21.3) (20.8) (9.5) (10.3) (12.19) (123.1) (120.8) (21.3) (20.8) (9.5) (10.3) (175.3) (175.7) (173.7) (21.3) (20.8) (9.5) (10.3) (229.9) (231.4) (228.3) (24.1) (23.8) (12.7) (13.5) (13.200 (335.8) (334.8) (25.8) (25.3) (12.7) (13.5) (13.200 (336.8) (333.8) (25.8) (25.3) (12.7) (13.5) (14.20) (15.350 (333.8) (25.8) (12.7) (15.9) (16.7) (14.42.0) (14.43.2) (34.9) (34.0) (33.5) (15.9) (16.7) (14.500 (548.6) (EIO	DIMENSIONS – INCHES (MINIMETERS)	וופופוס)				
Outside Dia. Max. inches (mm) Min. max. min. Max. min. max. min. Min. max. min. min. max. min. min. max. min. min. max. min.		roove Width "B"	Groove Diameter "C"	neter "C"		Minimum Allowable Wall Thickness "T"	Allowable ness "T"
inches (mm) Max. Min. Max. Min. Basic Max. 3.960 4.005 3.915 0.840 0.820 0.375 0.406 (100.6) (101.7) (99.4) (21.3) (20.8) (3.5) (10.3) (100.6) (101.7) (99.4) (21.3) (20.8) 0.375 0.406 (142.9) (123.1) (120.8) (21.3) (20.8) 0.375 0.406 (175.3) (176.7) (173.7) (21.3) (20.8) 0.375 0.406 (175.3) (176.7) (173.7) (21.3) (20.8) 0.375 0.406 (175.3) (176.7) (21.3) (20.8) 0.350 0.406 0.406 (280.9) (25.8) (24.1) (20.8) (3.5) (10.3) 0.406 (281.9) (221.4) (22.8) (24.1) (23.8) (3.5) (10.3) (281.9) (221.4) (22.8) (22.8) (22.8) (12.7) (13.8) <					Radius		Ductile
3.960 4,005 3.915 0,840 0,820 0,375 0,406 (100,6) (101,7) (99,4) (21,3) (20,8) (3,5) (10,3) (121,9) (122,1) (120,8) (21,3) (20,8) (3,5) (10,3) (121,9) (122,1) (120,8) (21,3) (20,8) (3,5) (10,3) (175,3) (176,7) (173,7) (21,3) (20,8) (3,5) (10,3) 9,60 (9,10 (228,9) (28,9) 0,80 0,50 0,50 (1229,9) (231,4) (228,9) (24,1) (20,8) (3,5) (10,3) 9,60 (231,4) (228,9) (24,1) (23,8) (12,7) (13,5) 11,100 11,160 11,040 1,015 (28,9) 0,500 0,500 (281,9) (238,1) (288,6) (23,3) (12,7) (13,5) (281,9) (238,8) (238,8) (25,8) (25,3) (12,7) (13,5)	Min.	Max. Min.	Мах.	Min.	" R "	Cast Iron	Iron
(100,6) (101,7) (194,4) (21,3) (20,8) (19,5) (103) (102,19) (101,7) (194,4) (21,3) (20,8) (19,5) (103) (123,14) (120,8) (21,3) (20,8) (19,5) (103) (175,3) (176,7) (173,7) (21,3) (20,8) (12,7) (10,3) (175,3) (176,7) (173,7) (21,3) (20,8) (12,7) (10,3) (229,9) (221,4) (228,3) (24,1) (23,6) (12,7) (13,5) (229,9) (221,4) (228,3) (24,1) (23,6) (12,7) (13,5) (221,9) (228,3) (228,3) (24,1) (25,8) (25,3) (12,7) (13,5) (221,9) (228,3) (228,3) (22,4) (25,8) (25,3) (12,7) (13,5) (221,9) (228,3) (228,4) (25,8) (25,8) (12,7) (13,5) (221,9) (228,3) (228,4) (25,8) (25,8) (12,7) (13,5) (221,9) (228,3) (228,4) (25,8) (25,3) (12,7) (13,5) (221,9) (228,3) (228,4) (25,8) (25,3) (12,7) (13,5) (221,9) (228,3) (228,4) (25,8) (25,3) (12,7) (13,5) (221,9) (228,3) (228,4) (25,8) (25,3) (15,3) (16,7) (221,9) (228,3) (229,4) (23,4) (23,5) (15,9) (16,7) (221,9) (228,3) (238,6) (23,4) (23,5) (15,9) (16,7) (221,9) (228,3) (228,4) (23,4) (23,5) (15,9) (16,7) (221,9) (228,3) (228,4) (23,4) (23,5) (15,9) (16,7) (221,9) (228,3) (221,20) (221,20) (221,20) (221,20) (221,20) (221,60) (221,60) (231,20) (231,2) (15,9) (16,7) (221,9) (221,60) (221,60) (221,20)	0.820		3.723	3.703	0.120	0.320	0.310
4.800 4.845 4.755 0.840 0.820 0.375 0.406 (12.1) (12.3) (12.3) (20.8) (9.5) (10.3) (175.3) (176.7) (173.7) (21.3) (20.8) (9.5) (10.3) (175.3) (176.7) (173.7) (21.3) (20.8) (9.5) (10.3) (175.3) (176.7) (173.7) (21.3) (20.8) (9.5) (10.3) (175.3) (176.7) (173.4) (228.3) (24.1) (20.8) (9.5) (10.3) (281.9) (283.4) (280.4) (25.8) (25.3) (12.7) (13.5) (281.9) (283.5) (280.4) (25.8) (25.3) (12.7) (13.5) (281.9) (280.4) (25.8) (25.3) (12.7) (13.5) (281.0) (382.8) (382.8) (382.8) (382.8) (45.8) (45.9) (388.6) (388.6) (388.6) (25.8) (25.3) (15.9) (16.7)	(20,8)		(94,6)	(94,1)	(3,1)	(8,1)	(7,9)
(175.3) (176,7) (173,7) (21,3) (20,8) (9,5) (10,3) (10,3) (175,3) (176,7) (173,7) (21,3) (20,8) (9,5) (10,3) (10,3) (10,3) (229,9) (221,4) (228,3) (24,1) (23,6) (12,7) (13,5) (13,5) (221,9) (221,9) (228,3) (24,1) (25,8) (25,3) (12,7) (13,5) (13,5) (221,9) (235,3) (236,8) (238,8) (25,8) (25,8) (12,7) (13,5) (13,5) (236,8) (25,8) (12,7) (13,5) (13,5) (25,8) (25,8) (12,7) (13,5) (15,2) (15,20) (15,	0.820 (20,8)	0.406 0.359 (10,3) (9,1)	4.563 (115,9)	4.543 (115,4)	0.120	0.350 (8,9)	0.320 (8,1)
(175.3) (175.4) (175.7	0.820		6.656	6.636	0.120	0.380	0.340
11.00	(20,02)		(103,1)	(0,001)	(3, 1)	(3,7)	(0,0)
11.100	0.930	(13.5) (12.3)	8.781	8.756	0.145	0.410	0.360
(281.9) (283.5) (280.4) (25.8) (25.3) (12.7) (13.5) (13.5) (13.2)	0 995		10.813	10 788	0.145	0.440	0.380
13.200 13.260 13.140 1.015 0.995 0.500 0.531 (385,3) (386,8) (383,8) (25,8) (25,3) (12,7) (13,5) (15.300 (15.350 (15.20) (10,5) (16,7) (13,5) (15.30) (15.30) (15,3) (15,3) (16,7) (15.30) (15,3) (15,3) (16,7) (17.400) 17.450 17.320 1.340 1.320 0.625 0.666 (442.0) (443.2) (499.9) (34.0) (33.5) (15,9) (16,7) (16.50) (496.6) (499.3) (34.0) (33.5) (15.9) (16,7) (548.6) (549.9) (546.6) (34.0) (33.5) (15.9) (16,7) (548.6) (549.9) (546.6) (34.0) (33.5) (15.9) (16,7) (568.6) (569.9) (546.6) (34.0) (33.5) (15.9) (16,7) (568.3) (569.9) (546.6) (34.0)	(25,3)		(274,7)	(274,0)	(3,7)	(11,2)	(9,7)
(335.3) (336.8) (333.8) (25.8) (25.3) (12.7) (13.5) (13.5) (13.50 (15.20 (1.6.22) (1.6.3) (16.9) (16	0.995		12.906	12.876	0.145	0.480	0.400
15,300 15,300 15,200 10,105 0,955 0,656 0,656 0,656 0,656 0,550,30	(25,3)		(327,8)	(327,1)	(3,7)	(12,2)	(10,2)
17,400 17,450 17,320 1,340 1,320 0,625 0,656 (442,0) (443,2) (439,9) (34,0) (33,5) (15,9) (16,7) 19,500 19,550 19,420 1,320 0,625 0,656 (495,3) (496,6) (34,0) (33,5) (15,9) (16,7) 21,600 21,520 1,340 1,320 0,625 0,656 (548,6) (549,9) (546,6) (34,0) (33,5) (15,9) (16,7) 25,800 25,850 25,720 1,340 1,320 0,625 0,656 (65,3) (65,6) (65,6) (65,4) (34,0) (33,5) (15,9) (16,7) 32,000 32,080 31,940 1,625 1,605 0,781 (762,0) (814,8) (811,3) (41,3) (40,8) (19,1) (19,8)	0.995	0.656 0.609	14.969 (380.2)	14.939 (379.5)	0.165	0.550 (14.0)	0.420 (10.7)
(447.0) (443.2) (449.9) (34.0) (35.5) (15.3) (16.7)	1 320		17.063	17.033	0 165	0.580	0.430
19,500 19,550 19,550 19,550 19,550 19,550 19,550 19,550 19,550 10,656 0,666	(33,5)		(433,4)	(432,6)	(4.2)	(14,7)	(10,9)
(485.3) (486.6) (483.3) (34.0) (35.5) (15.9) (16.7) (16.7) (246.6) (246.6) (246.6) (246.6) (246.6) (34.0) (33.5) (15.9) (16.7) (16.7) (25.800 25.86.6) (26.6) (34.0) (34.0) (33.5) (16.9) (16.7) (25.800 25.86.6) (2	1.320		19.125	19.095	0.185	0.630	0.440
21600 21.650 21.520 1.340 1.320 0.625 0.656 (548.6) (548.6) (548.6) (546.6) (34.0) (33.5) (15.9) (16.7) (16.7) (16.7) (16.5) (16.5) (16.5) (16.5) (16.5) (16.5) (16.5) (16.7)	(33,5)		(485,8)	(485,0)	(4,7)	(16,0)	(2,11)
(19.5) (19.3) (19.4) (19.4) (19.5) (1	1.320		21.219	21.189	0.185	0.670	0.450
(55.3) (55.30) (55.30) (1.340) (1.350 (15.9) (16.7) (16.5)	(0,00)		(0,800)	(330,2)	(4,7)	(17,0)	(11,4)
32.000 32.080 31.940 1.625 1.605 0.750 0.781 (762.0) (814.8) (811.3) (41.3) (41.3) (40.8) (19.1) (19.8)	(33,5)		(645,3)	(644,6)	(4,7)	(18,5)	(11,9)
	1.605 (40,8)	0.781 0.734 (19,8) (18,6)	31.550 (801,4)	31.515 (800,5)	0.215 (5,5)	0.920 (23,4)	0.510 (13,0)
38.380 38.240 1.625 1.605 0.750 0.781 (974.9) (971.3) (41.3) (40.8) (19.1) (19.8)	1.605 (40,8)	0.781 0.734 (19,8) (18,6)	37.850 (961,4)	37.815 (960,5)	0.215 (5,5)	1.020 (25,9)	0.580 (14,7)

Flexible Radius-Cut Groove Specifications - Ductile Iron Pipe

						Dime	nsions – inc	Dimensions – inches (millimeters)	eters)				
Nom. Dia.	Actual	Pipe Outsid Diameter	Pipe Outside Diameter	Gasket S	Gasket Seat "A"	670	Groove Width "B"	.8,	Groove Dia	Groove Diameter "C"		Minimum Allowable Wall Thickness "T"	Allowable ness "T"
inches (mm)	Outside Dia. inches (mm)	Мах.	Min.	Мах.	Min.	Basic	Мах.	Min.	Мах.	Min.	Radius "R"	Cast	Ductile Iron
3 (80)		4.005	3.915	0.750	0.730	0.375	0.406	0.359	3.723	3.703	0.120	0.320	0.310
(100)	4.800 (121,9)	4.845	4.755 (120,8)	0.750 (19,1)	0.730 (18,5)	0.375	0.406	0.359	4.563 (115,9)	4.543 (115,4)	0.120	0.350 (8,9)	0.320
6 (150)	6.900 (175,3)	6.960 (176,7)	6.840 (173,7)	0.750 (19,1)	0.730 (18,5)	0.375	0.406 (10,3)	0.359 (9,1)	6.656 (169,1)	6.636 (168,6)	0.120 (3,1)	0.380	0.340 (8,6)
8 (200)	9.050 (229,9)	9.110 (231,4)	8.990 (228,3)	0.875 (22,2)	0.855 (21,7)	0.500 (12,7)	0.531 (13,5)	0.484 (12,3)	8.781 (223,0)	8.756 (222,4)	0.145	0.410 (10,4)	0.360
10 (250)	11.100 (281,9)	11.160 (283,5)	11.040 (280,4)	0.938 (23,8)	0.918 (23,3)	0.500	0.531 (13,5)	0.484 (12,3)	10.813 (274,7)	10.788 (274,0)	0.145	0.440 (11,2)	0.380
12 (300)	13.200 (335,3)	13.260 (336,8)	13.140 (333,8)	0.938 (23,8)	0.918 (23,3)	0.500	0.531 (13,5)	0.484 (12,3)	12.906 (327,8)	12.876 (327,1)	0.145	0.480 (12,2)	0.400 (10,2)
14 (350)	15.300 (388,6)	15.350 (389,9)	15.220 (386,6)	0.938 (23,8)	0.918 (23,3)	0.625	0.656 (16,7)	0.609 (15,5)	14.969 (380,2)	14.939 (379,5)	0.165 (4,2)	0.550 (14,0)	0.420 (10,7)
16 (400)	17.400 (442,0)	17.450 (443,2)	17.320 (439,9)	1.188 (30,2)	1.168 (29,7)	0.625	0.656 (16,7)	0.609 (15,5)	17.063 (433,4)	17.033 (432,6)	0.165 (4.2)	0.580 (14,7)	0.430 (10,9)
18 (450)	19.500 (495,3)	19.550 (496,6)	19.420 (493,3)	1.188 (30,2)	1.168 (29,7)	0.625 (15,9)	0.656 (16,7)	0.609 (15,5)	19.125 (485,8)	19.095 (485,0)	0.185 (4,7)	0.630 (16,0)	0.440 (11,2)
20 (500)	21.600 (548,6)	21.650 (549,9)	21.520 (546,6)	1.188 (30,2)	1.168 (29,7)	0.625 (15,9)	0.656 (16,7)	0.609 (15,5)	21.219 (539,0)	21.189 (538,2)	0.185 (4,7)	0.670 (17,0)	0.450 (11,4)
24 (600)	25.800 (655,3)	25.850 (656,6)	25.720 (653,3)	1.188 (30,2)	1.168 (29,7)	0.625	0.656 (16,7)	0.609 (15,5)	25.406 (645,3)	25.376 (644,6)	0.185 (4,7)	0.730 (18,5)	0.470 (11,9)
30 (750)	32.000 (762,0)	32.080 (814,8)	31.940 (811,3)	1.375 (34,9)	1.355 (34,4)	0.750 (19,1)	0.781 (19,8)	0.734 (18,6)	31.550 (801,4)	31.515 (800,5)	0.215 (5,5)	0.920 (23,4)	0.510 (13,0)
36 (900)	38.300 (914,4)	38.380 (974,9)	38.240 (971,3)	1.375 (34,9)	1.355 (34,4)	0.750 (19,1)	0.781 (19,8)	0.734 (18,6)	37.850 (961,4)	37.815 (960,5)	0.215 (5,5)	1.020 (25,9)	0.580 (14,7)

GASKET SELECTION

! CAUTION

 To ensure maximum gasket performance, always specify the proper gasket grade for the intended service.

Failure to select the proper gasket for the service may cause joint failure, resulting in property damage.

Many factors must be considered for optimum gasket performance. Do not subject gaskets to temperatures beyond the recommended limits, since excessive temperatures will degrade gasket life and performance.

The services listed below are general service recommendations, and they apply only to Victaulic gaskets. Recommendations for a particular service do not necessarily imply compatibility of the coupling housings, related fittings, or other components for the same service. Always refer to the latest Victaulic Gasket Selection Guide (05.01) for gasket service recommendations.

NOTE: These recommendations do not apply to rubber-lined valves or other rubber-lined products. Refer to the applicable product literature, or contact Victaulic for recommendations

Standard Gaskets for AWWA Size Products

Grade	Temp. Range	Compound	Color Code	General Service Recommendations
S	-20°F (-29°C) to +180°F (+82°C)	Nitrile	Red Stripe	Specially compounded to conform to ductile iron pipe surfaces. Recommended for petroleum products, air with oil vapors, vegetable oil, and mineral oil, within the specified temperature range. Not recommended for HOT WATER services OVER +150°F (+66°C) OR HOT, DRY AIR OVER +140°F (+60°C).
М	-20°F (-29°C) to +200°F (+93°C)	Haloge- nated Butyl	Brow n Stripe	Recommended for water service, within the specified temperature range, plus a variety of dilute acids, oil-free air, and many chemical services. Readily conforms to ductile iron pipe surfaces. UL classified in accordance with ANSI/NSF 61 for cold +86°F (+30°C) potable water service. NOT RECOMMENDED FOR PETROLEUM SERVICES.

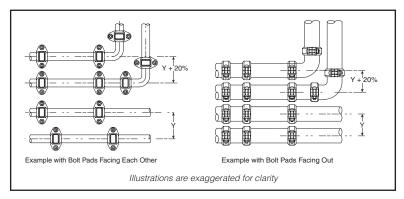
LUBRICATION

Lubrication of the gasket exterior/gasket sealing lips or the housings' interiors/ pipe ends is essential to prevent gasket pinching. Lubrication also eases installation of the gasket onto the pipe end. Use Vic-Lube™ or another compatible material, such as silicone or a soap-based lubricant. Refer to Victaulic publication 05.02 for the Vic-Lube MSDS sheet.

SPACING REQUIREMENTS FOR GROOVED PIPING SYSTEMS

Since the grooved piping method incorporates externally mounted housings, consideration must be given to external dimensions beyond the pipe OD. **NOTE:** Allowance for insulation, when necessary, is not included in the following examples.

Recommended Minimum Pipe Spacing



To allow for easy installation, insulation, and maintenance, consideration must be given to proper spacing between pipelines. Since Victaulic grooved pipe couplings are externally mounted housings that contain bolt pads, allow enough access space to tighten the nuts. In addition, provide enough space to prevent interference between piping and adjacent couplings.

The pipe centerline must be spaced with the width of the coupling housings ("Y" dimension) for systems where couplings are staggered. Add an additional 20% to the width (Y) when couplings are inline, as shown above.



NOTE: The "Y" dimension is the maximum dimension across the coupling. Bolt pads can be positioned in any orientation to provide adequate clearance if the orientation shown causes interference with other system components.

External Clearance Allowance

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 must be given to the external clearance of the housings. This clearance must be slightly greater than the "Y" dimension of the widest point. The necessary clearance will vary depending upon installation procedures, the proximity of other pipes, and other factors.

INSTALLATION TO ACHIEVE MAXIMUM LINEAR MOVEMENT CAPABILITIES OF FLEXIBLE SYSTEMS

To achieve maximum expansion/contraction allowance, flexible pipe joints must be created by cutting flexible radius grooves into the ductile iron pipe. Pipe joints must be installed with proper spacing between the pipe ends. The following is a brief overview of methods to accommodate expansion/contraction. Refer to Section 26, Design Data, of the G-100 General Catalog for complete details.

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

- **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.
- **2.** 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.
- **3.** Install the joints using a "come-along" to pull the pipe for full end separation, then secure the pipe to maintain the opening.

For maximum contraction, pipe ends must be butted within the coupling.

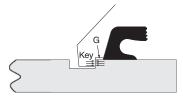
- **1.** In vertical systems, stack the pipe by using the weight to butt the pipe ends, then anchor the pipe to maintain the position.
- 2. In horizontal systems, install the joints with the pipe ends butted by using a "come-along" to draw the pipe ends together, if necessary, then secure the pipe in 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 at either side of the coupling (between the housings and the rear edge of the groove) can be used to ensure proper installation of most couplings for maximum movement. These gaps are approximately equal to half the linear movement capability.



PROPER INSTALLATION (Exaggerated for clarity)

For pipe contraction, virtually no gaps should be visible at the outside of the couplings. The pipe must be secured to maintain these positions.

PIPING SUPPORT FOR RIGID AND FLEXIBLE SYSTEMS

Similar to other piping systems, aboveground ductile iron piping that is joined with grooved pipe mechanical couplings requires support to carry the weight of pipes and equipment. The support or hanging method must eliminate stress on joints, piping, and other components. In addition, the method of support must allow pipeline movement, where required, along with other design requirements, such as drainage. The designer must also consider the special requirements of flexible systems while designing a support system.

The tables below list the suggested maximum span between pipe supports for horizontal, straight runs of grooved AWWA ductile iron pipe that carries water or similar liquids.

NOTICE

- These values 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.
- Victaulic Company is not responsible for system design, nor does the Company assume any responsibility for systems that are designed improperly.

Rigid Systems

Style 31 Couplings on ductile iron pipe that is rigid-radius grooved use the same support spacing as flanged, ductile-iron piping systems installed in accordance with standard industry practice (i.e. MSS SP-69).

Ductile iron pipe that conveys water or similar liquids may have supports spaced up to 15 feet (4,6 m) maximum between supports for 3 – 4 inch (80 – 100 mm) sizes. For 6 – 36 inch (150 – 900 mm) sizes, supports can be spaced up to 20 feet (6,1 m) maximum between supports.

NOTE: Piping systems must have at least one support per pipe length.

The spacing mentioned above is not intended as a specification for all installations, and it does not apply where critical calculations are made or where concentrated loads between supports exist.

Flexible Systems

For Victaulic Style 31 Couplings on ductile iron pipe that is flexible-radius grooved, refer to the chart below for maximum support spacing.

Pipe Size	Suggested Maximum Span
Nominal Diameter inches (mm)	Between Supports* feet (meters)
3 – 4	12
(80 – 100)	(3,7)
6 – 8	14
(150 – 200)	(4,3)
10 – 12	16
(250 – 300)	(4,9)
14 – 16	18
(350 – 400)	(5,5)
18 – 36	20
(450 – 900)	(6,1)

^{*} Must have at least one support per pipe length

GROOVED PRODUCT INSTALLATION GUIDELINES

A WARNING



 Depressurize and drain the piping system before attempting to install, remove, or adjust any Victaulic piping products.

Failure to follow this instruction could result in serious personal injury, property damage, product damage, joint leakage, and/or joint failure.

The following instructions are a general guideline for the installation of Victaulic piping products. These instructions must be followed to ensure proper joint assembly.

- **1.** Always check the supplied gasket to ensure it is suitable for the intended service. Refer to page 13 for details.
- **2.** Valve bodies, discs, and other wetted components must be compatible with the material flowing through the system. Refer to the most current Victaulic literature, or contact Victaulic for details.
- **3.** Always read the operating and maintenance instructions manuals for the pipe preparation tools.
- **4.** The outside diameter and grooving dimensions of pipe must be within published tolerances; these tolerances are subject to specific standards for acceptability. Refer to pipe preparation specifications on pages 7 12 for details.
- **5.** Rigid, angle-pad couplings must have nuts tightened evenly by alternating sides until metal-to-metal contact at the bolt pads is achieved. In addition, there must be equal offset at the bolt pads.
- **6.** Couplings with flat bolt pads must have nuts tightened evenly by alternating sides until metal-to-metal contact occurs at the bolt pads.
- **7.** Couplings that contain a tongue-and-recess feature must be mated properly, tongue-to-recess.
- **8.** When a torque value is specified for coupling installation, this torque **MUST** be applied to the nuts in order to achieve proper installation. However, torque beyond specified values will not improve sealing. Exceeding the specified torque by more than 25% may cause damage to the product, resulting in pipe-joint failure.
- **9.** 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 away from pumps, elbows, expanders, reducers, or other similar devices. Piping practices dictate a minimum distance 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 of less than three diameters are not recommended.
- **10.** Victaulic female threaded products are designed to accommodate standard ANSI male pipe threads only. Use of male threaded products with special features, such as probes, dry-pendent sprinkler heads, etc., must be checked for suitability with the Victaulic piping product being installed. Failure to verify suitability in advance may result in difficult installation or joint failure.

INSTALLATION INSPECTION

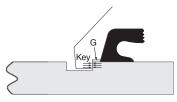
A WARNING



- Always inspect each joint to ensure that the product was properly installed.
- Undersized or oversized AWWA pipe/fittings, shallow grooves, eccentric grooves, bolt pad gaps, etc. are unacceptable. Any of these conditions must be corrected before attempting to pressurize the system.

Failure to follow these instructions could result in serious personal injury, property damage, joint leakage, and/or joint failure.

Proper Installation



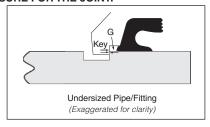
PROPER INSTALLATION (Exaggerated for clarity)

Proper pipe preparation and coupling installation is essential for maximum joint performance. THE FOLLOWING CONDITIONS MUST BE PRESENT TO ENSURE PROPER JOINT ASSEMBLY.

- **1.** The pipe OD and groove dimensions must be within the tolerance published in current Victaulic grooving specifications.
- **2.** Unless stated otherwise in specific product instructions, Victaulic grooved pipe couplings **MUST** be properly assembled with the bolts pads in firm, metal-to-metal contact.
- **3.** The housings' keys must not rest on or grip the bottom of the groove (with the exception of Victaulic rigid couplings).
- **4.** The housings' keys must be fully engaged against the face of the groove.
- 5. The gasket must be slightly compressed, which adds to the strength of the seal.

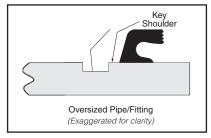
Installations with Undersized Pipes/Fittings – NOT ACCEPTABLE

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



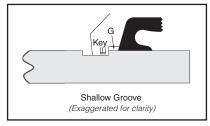
Additionally, there is little or no added compression of the gasket. The increased gap "G" between the pipe and the housing may also result in gasket extrusion. These factors can contribute to reduced gasket life and joint leakage.

Installations with Oversized Pipes/Fittings – NOT ACCEPTABLE



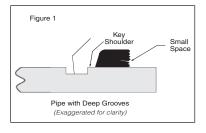
When the OD of the pipe or fitting exceeds the allowable tolerance, engagement of the housings' key sections is increased to the point that the shoulder can grip onto the pipe. This can result in reduced linear or angular movement. Under these conditions, the bolt pads cannot join with metal-to-metal contact, the gasket can possibly extrude, the working pressure of the joint can be reduced, and the life of the gasket can be reduced.

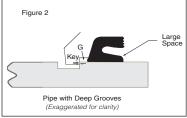
Installations on Pipe with Shallow Grooves – NOT ACCEPTABLE



A groove that is not deep enough will have the same effect as the conditions described in the previous "Installations with Undersized Pipes/Fittings" section.

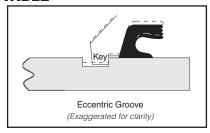
Installations on Pipe with Deep Grooves – NOT ACCEPTABLE





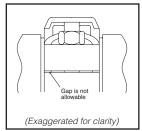
A groove that is too deep will allow the coupling to shift so that one housing will have full key engagement (Figure 1 above) and the other housing will have significantly reduced key engagement (Figure 2 above). This will have the same effect as the conditions described in the previous "Installations with Undersized Pipe/Fittings" section. Additionally, cut grooving pipe to an undersized dimension will result in insufficient wall thickness under the groove.

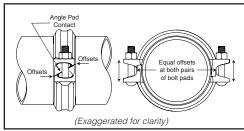
Installations on Pipe with Eccentric Grooves – NOT ACCEPTABLE



Eccentric grooves generally occur because of out-of-round pipe that is grooved with a stationary tool bit (such as a lathe). Tools that rotate the pipe, rather than rotate around the pipe, may affect this condition. An eccentric groove means that the groove is too shallow on one side and too deep on the other. This may lead to a combination of the conditions outlined in the previous "Installations with Oversized Pipes/Fittings" section and the "Installations on Pipes with Shallow Grooves" section.

Bolt Pad Gaps - NOT ACCEPTABLE





Unless stated otherwise in specific product instructions, Victaulic grooved pipe couplings **MUST** be properly assembled with the bolt pads in firm, metal-to-

metal contact. The only exceptions are couplings that have torque values specified. These torque values must be achieved, but it does not necessarily mean that the bolt pads will have full metal-to-metal contact. If you have any questions concerning an installation, contact Victaulic.

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

- **1.** Make sure coupling keys are engaged in the grooves. Coupling keys must not rest on the outside surface of the pipe.
- 2. Make sure the bolts have been tightened fully.
- **3.** Make sure the gasket is not pinched. If the gasket is pinched, replace it immediately.
- **4.** Make sure an oversized pipe or fitting was not used.
- **5.** Make sure the groove conforms to Victaulic specifications. If the groove is shallow, groove the pipe to Victaulic specifications. If the groove is too deep, discard that section of pipe, and groove another section to Victaulic specifications.

Always re-inspect joints before and after the field test to identify points of possible failure. Look for gaps at the bolt pads and/or keys that ride up on the shoulders. If any of these conditions exist, depressurize 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 Victaulic Company's 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.

Couplings for Grooved and Plain-End Ductile Iron Pipe

Installation Instructions



Style 31 Coupling



Style 307 Transition Coupling



Style 397 and 399 V-Grip Couplings

A WARNING











- Read and understand all instructions before attempting to install any Victaulic piping products.
- Depressurize and drain the piping system before attempting to install, remove, or adjust any Victaulic piping products.
- Wear safety glasses, hardhat, and foot protection.

Failure to follow these instructions could result in serious personal injury, improper product installation, and/or property damage.



1. CHECK PIPE ENDS: The outside surface of the pipe, between the groove and the pipe end, must be smooth and free from deep pits and swells to provide a leak-tight seal for the gasket. All rust, loose scale, oil, grease, dirt, and cutting particles must be removed. Peened surfaces may require rework to provide a leak-tight seal for the gasket (refer to ANSI/AWWA C-606 or CSA B242).



2. CHECK GASKET AND LUBRICATE: Check the gasket to make sure it is suitable for the intended service. Apply a thin coat of Victaulic

Lubricant or silicone lubricant to the gasket lips and exterior.

! CAUTION

 Always use a compatible lubricant to prevent the gasket from pinching/tearing during installation.

Failure to follow this instruction could result in joint leakage.



3. INSTALL GASKET: Install the gasket over the pipe end. Make sure the gasket does not overhang the pipe end.



4. JOIN PIPE ENDS: Align and bring the two pipe ends together. Slide the gasket into position, and make sure it is centered between the grooves. Make sure no portion of the gasket extends into the groove on either pipe.



5. INSTALL HOUSINGS: Install the housings over the gasket. Make sure the housings' keys engage the grooves properly on both pipes.

! CAUTION

 Make sure the gasket does not become rolled or pinched while installing the housings.

Failure to follow this instruction could cause damage to the gasket, resulting in joint leakage.



6. INSTALL BOLTS AND NUTS: Insert the bolts, and thread the nuts finger-tight onto the bolts. Make sure the oval neck of the bolts seat properly in the bolt holes.



7. TIGHTEN NUTS: Tighten all nuts evenly by alternating sides until metal-to-metal contact occurs at the flat bolt pads. **NOTE:** It is important to tighten all nuts evenly to prevent gasket pinching.

Allowable Pipe-End Separation and Joint Deflection for Style 31 Couplings Flexible, Radius-Cut Grooved, Cast (Gray/Ductile) Iron Pipe

Pipe Size	Allowable	Deflection	From Centerline
Nominal Diameter inches (mm)	Pipe-End Separation * inches (mm)	Degrees Per Coupling *	inches/one foot of Pipe (mm/one meter of Pipe) *
3	0 - 0.094	1° - 21'	0.280
80	0 - 2,4		7,1
4	0 - 0.094	1° - 8'	0.210
100	0 - 2,4		5,3
6	0 - 0.094	0° - 47'	0.140
150	0 - 2,4		3,6
8	0 - 0.094	0° - 36'	0.110
200	0 - 2,4		2,8
10	0 – 0.156	0° - 48'	0.150
250	0 – 4,0		3,8
12	0 – 0.156	0° - 41'	0.130
300	0 – 4,0		3,3

^{*} Standard, rigid radius-cut grooves provide no deflection or movement.

Style 31 Helpful Information

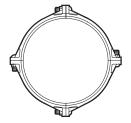
Pipe Size	
Nominal Diameter inches (mm)	Socket Size inches
3 (80)	7/8
4 (100)	11/16
6 (150)	11/16
8 (200)	11/4
10 (250)	11/4
12 (300)	17/ ₁₆



- Read and understand all instructions before attempting to install any Victaulic piping products.
- Depressurize and drain the piping system before attempting to install, remove, or adjust any Victaulic piping products.
- · Wear safety glasses, hardhat, and foot protection.

Failure to follow these instructions could result in serious personal injury, improper product installation, and/or property damage.

Style 31 Couplings, in sizes 14 – 36 inches (388,6 – 972,8 mm), are cast in segments to ease handling and ensure coupling concentricity.



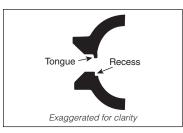
14 - 20 inch (388,6 - 548,6 mm) Sizes



24 - 36 inch (655,3 - 972,8 mm) Sizes;

1. CHECK PIPE ENDS: The outside surface of the pipe, between the groove and the pipe end, must be smooth and free from deep pits and swells to provide a leak-tight seal for the gasket. All rust, loose scale, oil, grease, dirt, and cutting particles must be removed. Peened surfaces may require rework to provide a leak-tight seal for the gasket (refer to ANSI/AWWA C-606 or CSA B242).





2. ASSEMBLE SEGMENTS:

Assemble the segments loosely into two equal halves, as shown above. Make sure the tongue and recess features mate properly (tongue-to-recess). Allow slight clearance between the segments to ease assembly onto the pipe.

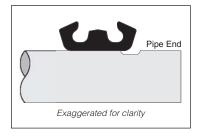


3. CHECK GASKET AND LUBRICATE: Check the gasket to make sure it is suitable for the intended service. Apply a thin coat of Victaulic Lubricant or silicone lubricant to the gasket lips and exterior.

! CAUTION

 Always use a compatible lubricant to prevent the gasket from pinching/tearing during installation.

Failure to follow this instruction could result in joint leakage.



4. INSTALL GASKET: For larger-size couplings, it may be easier to turn the gasket inside out, then slide it over the pipe end. Make sure the gasket does not overhang the pipe end.



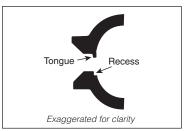
5. JOIN PIPE ENDS: Align and bring the two pipe ends together. If the gasket was turned inside out in step 4, roll the gasket into position, and make sure it is centered between the grooves. Make sure no portion of the gasket extends into the groove on either pipe.

! CAUTION

 Make sure the gasket does not become rolled or pinched while installing the housings.

Failure to follow this instruction could cause damage to the gasket, resulting in joint leakage.





6. INSTALL FIRST SEGMENT ASSEMBLY: Install one of the preassembled halves over the gasket.

Make sure the housings' keys engage the grooves properly on both pipes.

6a. INSTALL REMAINING SEG- MENT ASSEMBLY: Install the second segment assembly over the gasket, making sure the tongue and recess features mate properly (tongue-to-recess). Make sure the housings' keys engage the grooves properly on both pipes. While supporting the weight of the assemblies, insert the remaining bolts, and thread the nuts finger-tight onto the bolts. **NOTE:** Make sure the oval neck of all bolts seat properly in the bolt holes.



7. TIGHTEN NUTS: Tighten all nuts evenly by alternating sides until metal-to-metal contact occurs at the bolt pads. Make sure the housings' keys completely engage the grooves. NOTE: It is important to tighten all nuts evenly to prevent gasket pinching.

Allowable Pipe-End Separation and Joint Deflection for Style 31 Couplings; Flexible, Radius-Cut Grooved, Cast (Gray/Ductile) Iron Pipe

Pipe Size **Deflection From Centerline** Allowable Pipe-End inches/one foot of **Nominal Diameter** Separation* Degrees Per Pipe (mm/one meter inches (mm) inches (mm) Coupling* of Pipe) * 14 0 - 0.1560.110 0° - 35' 350 0 - 4.02,8 16 0 - 0.2500.160 0° - 49' 400 0 - 6.44,1 0 - 0.25018 0.140 0° - 44' 450 0 - 6,43,6 20 0 - 0.2500.120 0° - 40' 500 0 - 6.43,0 24 0 - 0.2500.110 0° - 33' 600 0 - 6.42,8 30 0 - 0.4690.170 0° - 51' 750 0 - 11.94,3 36 0 - 0.4690.150 0° - 47' 0 - 11.93,8

^{*} Standard, rigid radius-cut grooves provide no deflection or movement.

Style 31 Helpful Information

otyle o'i licipiai illioilliatioli	
Pipe Size	
Nominal Diameter inches (mm)	Socket Size inches
14 (350)	1 ⁵ / ₈
16 (400)	1 ⁵ / ₈
18 (450)	1 ⁵ / ₈
20 (500)	1 ¹³ / ₁₆
24 (600)	113/16
30 (750)	1 ¹³ / ₁₆
36 (900)	1 ¹³ / ₁₆

Style 307

Coupling for Transitions from Grooved IPS Steel to Grooved AWWA Ductile Iron Pipe 3 – 12 inch (80 – 300 mm) Sizes



- Read and understand all instructions before attempting to install any Victaulic piping products.
- Depressurize and drain the piping system before attempting to install, remove, or adjust any Victaulic piping products.
- · Wear safety glasses, hardhat, and foot protection.

Failure to follow these instructions could result in serious personal injury, improper product installation, and/or property damage.



1. CHECK PIPE ENDS: The outside surface of the pipe, between the groove and the pipe end, must be smooth and free from deep pits and swells to provide a leak-tight seal for the gasket. All rust, loose scale, oil, grease, dirt, and cutting particles must be removed. Peened surfaces may require rework to provide a leak-tight seal for the gasket (refer to ANSI/AWWA C-606 or CSA B242).



2. CHECK GASKET AND LUBRICATE: Check the gasket to make sure it is suitable for the intended service. Apply a thin coat of Victaulic

Lubricant or silicone lubricant to the gasket lips and exterior.

! CAUTION

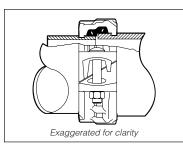
 Always use a compatible lubricant to prevent the gasket from pinching/tearing during installation.

Failure to follow this instruction could result in joint leakage.



3. INSTALL GASKET: Install the larger side of the gasket onto the AWWA pipe end (refer to markings on gasket) until the inner, FlushSeal™ portion of the gasket contacts the pipe end.





4. JOIN PIPE ENDS: Align and bring the AWWA and IPS steel pipe ends together. **NOTE:** Make sure no portion of the gasket extends into the groove on either pipe.



The Style 307 Transition Coupling is designed with assembly lugs to aid in proper installation. The assembly lug must engage with the side of the other housing that does not contain a lug. Refer to the markings on the housings to make sure the AWWA side faces the AWWA pipe and the IPS steel side faces the IPS steel pipe.



5. INSTALL HOUSINGS: Install the housings over the gasket. Make sure the AWWA markings on the housings face the AWWA pipe. Make sure the housings' keys engage the grooves properly on both pipes.

! CAUTION

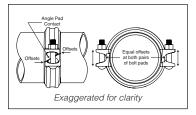
 Make sure the gasket does not become rolled or pinched while installing the housings.

Failure to follow this instruction could cause damage to the gasket, resulting in joint leakage.



6. INSTALL BOLTS AND NUTS: Insert the bolts, and thread the nuts finger-tight onto the bolts. Make sure the oval neck of the bolts seat properly in the bolt holes.





7. TIGHTEN NUTS: Tighten all nuts evenly by alternating sides until metal-to-metal contact occurs at the angle bolt pads. NOTE: It is important to tighten all nuts evenly to prevent gasket pinching. Make sure there is equal offset at each bolt pad, as shown above.

A WARNING

 Victaulic rigid, angle-pad couplings must have the nuts tightened evenly to obtain metal-to-metal contact at the bolt pads with equal offset at each housing segment.

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

Fixed Pipe-End Separation for Style 307 Transition Couplings

Dina Cina	
Pipe Size	
Nominal Diameter inches (mm)	Fixed Pipe-End Separation inches (mm)
3	0.031
80	0,8
4	0.063
100	1,6
6	0.063
150	1,6
8	0.031
200	0,8
10	0.031
250	0,8
12	0.031
300	0,8

^{*} For field installation only. Style 307 Transition Couplings are essentially rigid and do not permit expansion/contraction.

Style 307 Helpful Information

Pipe Size	
Nominal Diameter inches (mm)	Socket Size inches
3 (80)	7/8
4 (100)	7/8
6 (150)	11/16
8 (200)	11/4
10 (250)	17/16
12 (300)	17/16

Style 397

VGrip[™] Coupling for Plain-End by Grooved-End Ductile Iron Pipe 4-8 inch (100 – 200 mm) Sizes



- Read and understand all instructions before attempting to install any Victaulic piping products.
- Depressurize and drain the piping system before attempting to install, remove, or adjust any Victaulic piping products.
- · Wear safety glasses, hardhat, and foot protection.

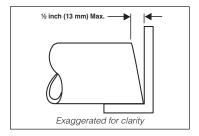
Failure to follow these instructions could result in serious personal injury, improper product installation, and/or property damage.

The Style 397 VGrip[™] Coupling is designed for use on plain-end x groovedend ductile iron pipe. DO NOT use this style coupling on plain-end cast iron, C900 PVC, HDPE, or cement pipe.



1. PREPARE GROOVED-END

PIPE: Pipe must be prepared in accordance with the specifications on pages 9 - 12. The outside surface of the grooved pipe, between the groove and the pipe end, must be smooth and free from deep pits and swells to provide a leak-tight seal for the gasket. All rust, loose scale, oil, grease, dirt, and cutting particles must be removed. Peened surfaces may require rework to provide a leak-tight seal for the gasket (refer to ANSI/AWWA C-606 or CSA B242).



2. PREPARE PLAIN-END PIPE:

Plain-end pipe must be square cut within a 1/2 inch (13 mm), as shown above. The outside surface of the plain-end pipe must be smooth and free from deep pits and swells within 11/4 inches (32 mm) from the ends to ensure a leak-tight seal for the gasket. All rust, loose scale, oil, grease, dirt, and cutting particles must be removed. Peened surfaces may require rework to provide a leak-tight seal for the gasket (refer to ANSI/AWWA C-606 or CSA B242).



3. MARK PLAIN-END PIPE:

Using a measuring tape and a brightcolored marker or paint stick, place a mark 2¹/₈ inches (54 mm) from the pipe end. Make at least four of these marks equally-spaced around the circumference of each pipe.



4. CHECK GASKET AND LUBRI- CATE: Check the gasket to make

sure it is suitable for the intended service. Apply a thin coat of Victaulic Lubricant or silicone lubricant to the gasket lips and exterior.

! CAUTION

 Always use a compatible lubricant to prevent the gasket from pinching/tearing during installation.

Failure to follow this instruction could result in joint leakage.



5. INSTALL GASKET: Install the gasket onto the plain-end pipe until the pipe end contacts the center leg of the gasket. Insert the grooved pipe end into the gasket until the leading edge of the groove aligns with the outside edge of the gasket.

A WARNING



 Wear protective gloves when handling the coupling housings. These housings contain sharp teeth on the interior surfaces.

Failure to follow this instruction could result in personal injury.

A WARNING



- Victaulic Style 397 Couplings have a tongue and recess feature that must be mated properly (tongue-to-recess).
- Avoid damage to the housings' teeth. Teeth must be free from dirt and debris for proper installation.

Failure to follow these instructions could result in joint failure, serious personal injury, and/or property damage.



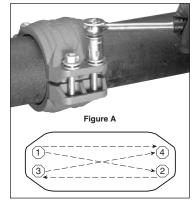
6. INSTALL HOUSINGS: Install the housings over the gasket. **NOTE:** The housings are clearly marked "Grooved End" and "Plain End." Make sure the housings' keys engage the groove and that the plain end aligns with the pipe marks. Make sure the gasket remains in position and that the tongue and recess features of the housings mate properly (tongue-to-recess).

A WARNING

- Make sure the gasket does not become rolled or pinched while installing the housings.
- Collapsible washers MUST be used for assembly of all Style 397 Couplings.

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

7. LUBRICATE BOLT THREADS, NUTS, AND WASHERS: When using new collapsible washers, lubricant can be used on the bolt threads, nuts, and washers to reduce the torque required to fully collapse the washers.



8. Install the bolts and collapsible washers. Thread the nuts finger-tight onto the bolts. To ensure an even gap between the housings and to prevent gasket pinching, tighten the nuts evenly by alternating sides, as shown in "Figure A" above. Tighten the nuts until the collapsible washers are fully collapsed. Refer to "Figure B" below for examples of non-collapsed and fully collapsed washers.

Figure B — COLLAPSIBLE WASHERS



Collapsible washers are supplied to ensure proper penetration of the teeth into the pipe. The collapsible washer is designed to collapse under a predetermined load, which provides the required compression for full joint performance. The collapsible washer provides a visual check for proper tightening of nuts.

Allowable Pipe-End Separation for Style 397 VGrip Couplings

Pipe Size	
Nominal Diameter	Allowable Pipe-End Separation *
inches (mm)	inches (mm)
4	0.660 - 0.800
100	16,8 – 20,3
6	0.720 - 0.800
150	18,3 – 20,3
8	0.550 - 0.680
200	14,0 – 17,3

^{*} AWWA plain-end couplings, when pressurized, will allow the pipe to separate slightly as the grips set into the pipe. For properly assembled and torqued couplings, this separation should not exceed 1/4 inch (6,4 mm). This should be considered for installations in tightly confined areas.

Style 397 VGrip Couplings are not designed to provide linear or angular movement.

Style 397 Helpful Information

Pipe Size Nominal Diameter inches (mm)	Socket Size inches	
4 (100)	7/8	
6 (150)	11/16	
8 (200)	11/4	

Re-Use Instructions for Style 397 VGrip Couplings

A WARNING

- Depressurize and drain the piping system before attempting to disassemble and reuse Victaulic Style 397 VGrip Couplings.
- Victaulic Style 397 Couplings may be disassembled and reused only one time after the original installation. Additional assemblies of couplings will dull and deform teeth and cause a loss of gripping strength.

Failure to follow this instruction could result in joint failure, serious personal injury, and/or property damage.

- 1. Check the condition of the teeth. The teeth must be in good condition for proper assembly. Teeth must be sharp. DO NOT use couplings that have bent, loose, or deformed teeth. Couplings may be disassembled and reused only one time after the original installation.
- **2.** Follow steps 1 6 of the instructions starting on page 33.
- **3.** New collapsible washers are recommended for ease of installation. Previously installed collapsible washers can be used, provided the nuts are torqued to the specifications shown in the "Style 397 Torque Requirements for Re-Use" table below. **DO NOT use lubricant on bolt threads, nuts, or washers when using previously installed collapsible washers.**
- **4.** Follow the nut tightening sequence in step 8 on page 35.

Style 397 Torque Requirements for Re-Use

Pipe Size	
Nominal Diameter inches (mm)	Required Torque ft-Ibs (N•m)
4	100 – 110
(100)	(136 – 149)
6	175 – 195
(150)	(237 – 264)
8	250 – 275
(200)	(339 – 373)

Style 399

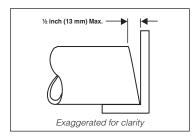
VGrip[™] Coupling for Plain-End by Plain-End Ductile Iron Pipe 4 – 8 inch (100 – 200 mm) Sizes



- Read and understand all instructions before attempting to install any Victaulic piping products.
- Depressurize and drain the piping system before attempting to install, remove, or adjust any Victaulic piping products.
- · Wear safety glasses, hardhat, and foot protection.

Failure to follow these instructions could result in serious personal injury, improper product installation, and/or property damage.

The Style 399 VGrip[™] Coupling is designed for use on plain-end x plain-end ductile iron pipe. DO NOT use this style coupling on plain-end cast iron, C900 PVC, HDPE, and cement pipe.



1. PREPARE PLAIN-END PIPE:

Plain-end pipe must be square cut within a ½ inch (13 mm), as shown above. The outside surface of the plain-end pipe must be smooth and free from deep pits and swells within ½ inches (32 mm) from the ends to ensure a leak-tight seal for the gasket. All rust, loose scale, oil, grease, dirt, and cutting particles must be removed. Peened surfaces may require rework to provide a leak-tight seal for the gasket (refer to ANSI/AWWA C-606 or CSA B242).



2. MARK PLAIN-END PIPE:

Using a measuring tape and a bright-colored marker or paint stick, place a mark $2^1/_{\rm B}$ inches (54 mm) from the pipe end. Make at least four of these marks equally-spaced around the circumference of each pipe.



3. CHECK GASKET AND LUBRICATE: Check the gasket to make sure it is suitable for the intended service. Apply a thin coat of Victaulic

Lubricant or silicone lubricant to the gasket lips and exterior.

! CAUTION

 Always use a compatible lubricant to prevent the gasket from pinching/tearing during installation.

Failure to follow this instruction could result in joint leakage.



4. INSTALL GASKET: Install the gasket onto the pipe until the pipe end contacts the center leg of the gasket. Insert the other pipe into the gasket until the pipe end contacts the center leg of the gasket.

A WARNING



 Wear protective gloves when handling the coupling housings. These housings contain sharp teeth on the interior surfaces.

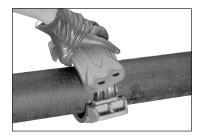
Failure to follow this instruction could result in personal injury.

A WARNING



- Victaulic Style 399 Couplings have a tongue and recess feature that must be mated properly (tongue-to-recess).
- Avoid damage to the housings' teeth. Teeth must be free from dirt and debris for proper installation.

Failure to follow these instructions could result in joint failure, serious personal injury, and/or property damage.



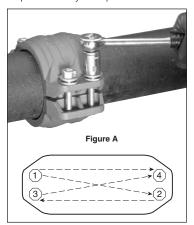
5. INSTALL HOUSINGS: Install the housings over the gasket. The housings must align with the depth markings on the pipe. Make sure the gasket remains in position and that the tongue and recess features of the housings mate properly (tongue-to-recess).

A WARNING

- Make sure the gasket does not become rolled or pinched while installing the housings.
- Collapsible washers MUST be used for assembly of all Style 399 Couplings.

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

LUBRICATE BOLT THREADS, 6. **NUTS, AND WASHERS:** When using new collapsible washers, lubricant can be used on the bolt threads, nuts, and washers to reduce the torque required to fully collapse the washers.



Install the bolts and collapsible washers. Thread the nuts finger-tight onto the bolts. To ensure an even gap between the housings and to prevent gasket pinching, tighten the nuts evenly by alternating sides, as shown in "Figure A" above. Tighten the nuts until the collapsible washers are fully collapsed. Refer to "Figure B" for examples of non-collapsed and fully collapsed washers.

Figure B — COLLAPSIBLE WASHERS





Collapsible washers are supplied to ensure proper penetration of the teeth into the pipe. The collapsible washer is designed to collapse under a predetermined load, which provides the required compression for full joint performance. The collapsible washer provides a visual check for proper tightening of nuts.

Allowable Pipe-End **Separation for Style 399 VGrip Couplings**

Pipe Size	Allowable Pipe-End Separation* inches (mm)	
Nominal Diameter inches (mm)		
4 100	0.190 - 0.250 4,8 - 6,4	
6 150	0.190 - 0.250 4,8 - 6,4	
8 200	0.190 - 0.250 4,8 - 6,4	

^{*} AWWA plain-end couplings, when pressurized, will allow the pipe to separate slightly as the grips set into the pipe. For properly assembled and torqued couplings, this separation should not exceed 1/4 inch (6,4 mm). This should be considered for installations in tightly confined areas.

Style 399 VGrip Couplings are not designed to provide linear or angular movement.

Style 399 Helpful Information

Pipe Size			
Nominal Diameter inches (mm)	Socket Size inches		
4 (100)	7/8		
6 (150)	11/16		
8 (200)	11/4		

Re-Use Instructions for Style 399 VGrip Couplings

A WARNING

- Depressurize and drain the piping system before attempting to disassemble and reuse Victaulic Style 399 VGrip Couplings.
- Victaulic Style 399 Couplings may be disassembled and reused only one time after the original installation. Additional assemblies of couplings will dull and deform teeth and cause a loss of gripping strength.

Failure to follow this instruction could result in joint failure, serious personal injury, and/or property damage.

- 1. Check the condition of the teeth. The teeth must be in good condition for proper assembly. Teeth must be sharp. DO NOT use couplings that have bent, loose, or deformed teeth. Couplings may be disassembled and reused only one time after the original installation.
- **2.** Follow steps 1 6 of the instructions starting on page 38.
- 3. New collapsible washers are recommended for ease of installation. Previously installed collapsible washers can be used, provided the nuts are torqued to the specifications shown in the "Style 399 Torque Requirements for Re-Use" chart below. DO NOT use lubricant on bolt threads, nuts, or washers when using previously installed collapsible washers.
- **4.** Follow the nut tightening sequence in step 7 on page 40.

Style 399 Torque Requirements for Re-Use

Pipe Size	
Nominal Diameter inches (mm)	Required Torque ft-lbs (N•m)
4	100 – 110
(100)	(136 – 149)
6	175 – 195
(150)	(237 – 264)
8	250 – 275
(200)	(339 – 373)

Flange Adapters for Grooved-End Ductile Iron Pipe

Installation Instructions



Style 341 Vic-Flange Adapter

FLANGE WASHER NOTES FOR 3 – 24 INCH (80 – 600 MM) SIZES

Style 341 Vic-Flange Adapter

Style 341 Vic-Flange Adapters require a smooth, hard surface at the mating flange face for proper sealing. Some applications, for which the Vic-Flange Adapter is otherwise well suited, do not provide an adequate mating surface. In such cases, it is recommended that a metal Vic-Flange washer be inserted between the Vic-Flange Adapter and the mating flange to provide the necessary sealing surface.

- **A.** When mating to a serrated flange a flange gasket should be used against the serrated flange. The Vic-Flange washer should then be inserted between the Vic-Flange Adapter and the flange gasket.
- **B.** When mating to a rubber-faced, wafer-type valve the Vic-Flange washer should be placed between the valve and the Vic-Flange Adapter.
- **C.** When mating to a rubber-faced flange the Vic-Flange washer should be placed between the Vic-Flange Adapter and the rubber-faced flange.
- **D.** When mating AWWA cast flanges to IPS flanges the Vic-Flange washer should be placed between two Vic-Flange Adapters. If one flange is not a Vic-Flange Adapter (i.e. flanged valve), a flange gasket must be placed against that flange. The Vic-Flange washer must then be inserted between the flange gasket and the Vic-Flange Adapter.
- Transition rings, rather than Vic-Flange washers, must be used when mating Style 741 to Style 341 Vic-Flange Adapters in sizes 14 – 24 inches (350 – 600 mm). The lap joints of the Style 341 must be staggered to the lap joints of the Style 741 when mating these larger sizes.
- **E.** When mating to components (valves, strainers, etc.) where the component flange face has an insert follow the same arrangement as if the Vic-Flange Adapter was being mated to a serrated flange. Refer to application "A" above.

Style 341

Vic-Flange Adapter 3 – 12 inch (80 – 300 mm) Sizes

A WARNING











- Read and understand all instructions before attempting to install any Victaulic piping products.
- Depressurize and drain the piping system before attempting to install, remove, or adjust any Victaulic piping products.
- Wear safety glasses, hardhat, and foot protection.

Failure to follow these instructions could result in serious personal injury, improper product installation, and/or property damage.



1. CHECK PIPE ENDS: The outside surface of the pipe, between the groove and the pipe end, must be smooth and free from deep pits and swells to provide a leak-tight seal for the gasket. All rust, loose scale, oil, grease, dirt, and cutting particles must be removed. Peened surfaces may require rework to provide a leak-tight seal for the gasket (refer to ANSI/AWWA C-606 or CSA B242).

NOTICE

 Make sure there is sufficient clearance behind the pipe groove to permit proper assembly of the Vic-Flange Adapter.



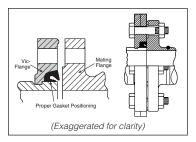
2. CHECK GASKET AND LUBRICATE: Check the gasket to make sure it is suitable for the intended service. Apply a thin coat of Victaulic Lubricant or silicone lubricant to the gasket lips and exterior. NOTE: This gasket is designed to provide the primary seal. Refer to page 43 for special applications.

! CAUTION

 Always use a compatible lubricant to prevent the gasket from pinching/tearing during installation.

Failure to follow this instruction could result in joint leakage.





3. INSTALL GASKET: Install the gasket over the pipe end. Make sure the gasket is positioned properly, as shown above. **NOTE:** The lettering on the outside of the gasket must face the gasket pocket of the Style 341 Vic-Flange Adapter. When installed correctly, the lettering on the gasket will not be visible.



4. INSTALL VIC-FLANGE ADAPTER: Open the hinged Vic-Flange Adapter fully, and install the flange over the gasket. Make sure the key section of the flange adapter engages the pipe groove properly.



Closure lugs are provided for ease of installation. If necessary, use an adjustable wrench to align the mating holes.



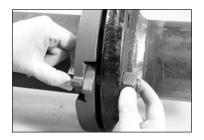
5. While squeezing the closure lugs together, insert a standard flange bolt through each of the two mating holes in the Vic-Flange Adapter; this will maintain the position of the flange in the groove.

5a. Make sure the gasket is still seated properly in the flange adapter.

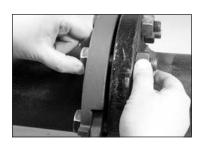
⚠ WARNING

 Bolt sizes specified in this section must be used to ensure proper assembly of Vic-Flange Adapters.

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



6. MATE VIC-FLANGE ADAPTER AND MATING FLANGE: Join the Vic-Flange Adapter with the mating flange by aligning the bolt holes. Thread standard flange nuts fingertight onto the two mating bolts.



7. INSTALL REMAINING BOLTS/ NUTS: Insert a standard flange bolt

through each remaining hole in the Vic-Flange Adapter/mating flange. Thread a standard flange nut fingertight onto all bolts.



8. TIGHTEN NUTS: Tighten the nuts evenly, as with a regular flange assembly. Continue tightening until the flange faces come into metal-tometal contact or the bolts reach the standard flange-joint torque requirement.

Allowable Pipe-End Separation and Joint Deflection for Style 341 Vic-Flange Adapters Flexible, Radius-Cut Grooved, Cast (Gray/Ductile) Iron Pipe

Pipe Size	Allowable Pipe-End	Deflection From Centerline		
Nominal Diameter inches (mm)	Separation * inches (mm)	Degrees Per Coupling *	Inches/one foot of Pipe (mm/one meter of Pipe) *	
3 (80)	0 - 3/32	1° - 21'	0.280 7,1	
4 (100)	0 - 3/32	1° - 8'	0.210 5,3	
6 (150)	0 - 3/32	0° - 47'	0.140 3,6	
8 (200)	0 - 3/32	0° - 36'	0.110 2,8	
10 (250)	0 - 5/32	0° - 48'	0.150 3,8	
12 (300)	0 - 5/32	0° - 41'	0.130 3,3	

^{*} Pipe movement is accommodated with flexible radius-cut grooves only. Standard, rigid-radius cut grooves provide no deflection or movement.

Style 341 Helpful Information

Pipe Size			Required Mating Face Sealing Surface inches/millimeters	
Nominal Diameter inches (mm)	Number of Bolts Required †	Bolt Size inches	"A" Maximum	"B" Minimum
3 (80)	4	⁵ / ₈ × 3	3.960 (100,6)	4.940 (125,5)
4 (100)	8	⁵ / ₈ × 3	4.800 (121,9)	5.880 (149,4)
6 (150)	8	³ / ₄ x 3 ¹ / ₂	6.900 (175,3)	8.000 (203,2)
8 (200)	8	³ / ₄ x 3 ¹ / ₂	9.050 (229,9)	10.130 (257,3)
10 (250)	12	⁷ / ₈ x 4	11.100 (281,9)	12.500 (317,5)
12 (300)	12	⁷ / ₈ × 4	13.200 (335,3)	14.750 (374,7)

[†] Total bolts required are to be supplied by the installer. Bolt sizes are for conventional flange-to-flange connections. Longer bolts are required when Vic-Flange Adapters are used with wafer-type valves.

NOTE: Style 341 Vic-Flange Adapters for AWWA ductile iron pipe provide rigid joints when used on ductile iron pipe that is grooved to Victaulic specifications. Consequently, no linear or angular movement is allowed at the joint.

The shaded area of the mating face (shown at right) must be free from gouges, undulations, or deformities of any type for proper sealing.



Vic-Flange Adapter 14 – 24 inch (350 – 600 mm) Sizes

A WARNING











- Read and understand all instructions before attempting to install any Victaulic piping products.
- Depressurize and drain the piping system before attempting to install, remove, or adjust any Victaulic piping products.
- · Wear safety glasses, hardhat, and foot protection.

Failure to follow these instructions could result in serious personal injury, improper product installation, and/or property damage.

1. CHECK PIPE ENDS: The outside surface of the pipe, between the groove and the pipe end, must be smooth and free from deep pits and swells to provide a leak-tight seal for the gasket. All rust, loose scale, oil, grease, dirt, and cutting particles must be removed. Peened surfaces may require rework to provide a leak-tight seal for the gasket (refer to ANSI/AWWA C-606 or CSA B242).



NOTICE

Make sure there is sufficient clearance behind the pipe groove to permit proper assembly of the Vic-Flange Adapter.

MENTS: Add each segment by inserting the draw bolts (provided) into the flange adapter with the nuts (provided) loosely and uniformly tightened. This will permit the flange adapter to be rotated for bolt hole alignment in later steps.



2. ADD FIRST SEGMENT: Place the first segment onto the pipe, making sure the key engages in the groove properly. NOTE: On vertical pipe, the segments must be held in place until all segments are fastened together. For horizontal pipe, the segments can be balanced on top of the pipe, as shown.



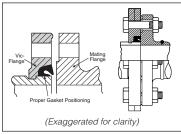
4. CHECK GASKET AND LUBRICATE: Check the gasket to make sure it is suitable for the intended service. Apply a thin coat of Victaulic Lubricant or silicone lubricant to the gasket lips and exterior. NOTE: This gasket is designed to provide the primary seal. Refer to page 43 for special applications.

! CAUTION

 Always use a compatible lubricant to prevent the gasket from pinching/tearing during installation.

Failure to follow this instruction could result in joint leakage.





5. INSTALL GASKET: Install the gasket into the cavity between the pipe OD and the flange recess. Make sure the gasket is positioned properly, as shown above. **NOTE:** The lettering on the outside of the gasket must face the gasket pocket of the Style 341 Vic-Flange Adapter. When installed correctly, the lettering on the gasket will not be visible.



6. ALIGN VIC-FLANGE AND MATING FLANGE: Rotate the Vic-Flange on the pipe end, as required, to align the holes with the mating flange.



7. INSERT FLANGE BOLTS AT LAP JOINTS: Insert a standard flange bolt into each of the four lap joint holes. NOTE: It may be necessary to tighten the draw bolts to line up the lap joint bolt holes for insertion of the bolts.

A WARNING

 Bolt sizes specified in this section must be used to ensure proper assembly of Vic-Flance Adapters.

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



8. TIGHTEN DRAW BOLTS: After all four bolts are inserted into the lapjoint bolt holes, torque the draw bolts to approximately 150 ft-lbs (203 N•m). **NOTE:** It is normal to have a small amount of shift as these bolts are being torqued.



9. JOIN VIC-FLANGE ADAPTER AND MATING FLANGE: Guide the four flange bolts, installed in step 7, into the mating flange holes. To prevent the bolts from pulling out, thread a nut finger-tight onto each of the four flange bolts.



11. TORQUE FLANGE BOLTS: Tighten all flange bolts evenly until the required torque value is achieved. Refer to the "Style 341 Torque Requirements" table below for the required torque value.



10. ADD REMAINING BOLTS/ NUTS: Add the remaining standardflange bolts. Thread nuts finger-tight onto the bolts.

Style 341 Torque Requirements

Pipe Size	Torque Requirement ft-lbs (N•m)	
Nominal Diameter inches (mm)		
14	250 - 300	
(350)	(339 - 407)	
16	250 - 300	
(400)	(339 - 407)	
18	300 – 350	
(450)	(407 – 475)	
20	300 – 350	
(500)	(407 – 475)	
24	350 – 400	
(600)	(475 – 542)	

Allowable Pipe-End Separation and Joint Deflection for Style 341 Vic-Flange Adapters

Flexible, Radius-Cut Grooved, Cast (Gray/Ductile) Iron Pipe

Pipe Size		Deflection From Centerline		
Nominal Diameter inches (mm)	Allowable Pipe- End Separation * inches (mm)	Degrees Per Coupling *	Inches/one foot of Pipe (mm/one meter of Pipe) *	
14 350	0 – 5/32	0° - 35'	0.110 2,8	
16 400	$0 - \frac{1}{4}$	0° - 49'	0.160 4,1	
18 450	$0 - \frac{1}{4}$	0° - 44'	0.140 3,6	
20 500	0 - 1/4	0° - 40'	0.120 3,0	
24 600	0 - 1/4	0° - 33'	0.110 2,8	

^{*} Pipe movement is accommodated with flexible radius-cut grooves only. Standard, rigid-radius cut grooves provide no deflection or movement.

Style 341 Helpful Information

otyle of the plan information									
Pipe Size	Assembly Bolts		Draw Bolts		Required Mating Face Sealing Surface inches/mm				
Nominal Diameter inches (mm)	Number of Bolts Required Bolt Size inches		Number of Bolts Required	Bolt Size inches	"A" Maximum	"B" Minimum			
14 (350)	12	1 x 4 ¹ / ₄	4	5/8 x 3 ¹ / ₂	15.300 (388,6)	16.380 (416,1)			
16 (400)	16	1 x 4 ³ / ₄	4	5/8 x 3 ¹ / ₂	17.400 (442,0)	18.380 (466,9)			
18 (450)	16	1-1/8 x 5 ¹ / ₂	4	³ / ₄ × 4 ¹ / ₄	19.500 (495,3)	20.000 (508,0)			
20 (500)	16	1-1/8 x 5 ³ / ₄	4	³ / ₄ × 4 ¹ / ₄	21.600 (548,6)	22.500 (571,5)			
24 (600)	20	1 ¹ / ₄ × 6 ¹ / ₄	4	³ / ₄ x 5	25.800 (655,3)	27.750 (704,9)			

[†] Total bolts required are to be supplied by the installer. Bolt sizes are for conventional flange-to-flange connections. Longer bolts are required when Vic-Flange Adapters are used with wafer-type valves.

NOTE: Style 341 Vic-Flange Adapters for AWWA ductile iron pipe provide rigid joints when used on ductile iron pipe that is grooved to Victaulic specifications. Consequently, no linear or angular movement is allowed at the joint.

The shaded area of the mating face (shown at right) must be free from gouges, undulations, or deformities of any type for proper sealing.



Valve Installation and Operation

Check Valves Plug Valves



Series 317 Check Valve



Series 365 Vic-Plug Valve



Series 366 Vic-Plug Valve

CHECK VALVE INSTALLATION AND OPERATION

Series 317 Check Valve

- The Series 317 Check Valve is a grooved-end valve that conforms to AWWA C-508 requirements for water and wastewater treatment services.
- Style 31 Couplings can directly connect the Series 317 Check Valve to pipe that is grooved to ANSI/AWWA C-606 rigid or flexible radius groove specifications.
- Style 341 Vic-Flange Adapters can be used to connect the Series 317 Check Valve to pipe that is grooved to ANSI/AWWA C-606 rigid or flexible radius groove specifications.
- Style 307 Transition Couplings can be used only when connecting a Series 317 Check Valve to IPS pipe.
- For installing Series 317 Check Valves into a piping system using Style 31 Couplings, Style 341 Vic-Flange Adapters, or Style 307 Transition Couplings, follow the instructions supplied with the product.
- Refer to the "Series 317 AWWA Check Valve Installation and Maintenance Instructions" (I-317) manual for information regarding valve adjustment, cleaning, accessory kit installation, etc.

PLUG VALVE INSTALLATION AND OPERATION

When directly connecting an end cap to a ball valve, use only a tapped end cap for pressure relief. If the ball valve is opened then closed unknowingly while the end cap is attached, the space between the ball 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 MUST BE VENTED THROUGH THE TAP BEFORE ATTEMPTING TO REMOVE THE CAP.**

A DANGER



- When directly connecting an end cap to a ball valve, use only a tapped end cap for pressure relief.
- Pressure must be vented through the tap before attempting to remove the cap.

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

Series 365 Vic-Plug Valve (Ductile Iron Ends)

- The Series 365 Vic-Plug Valve is an eccentric plug valve designed to ANSI/ AWWA standards and is used primarily for water and wastewater treatment services.
- Style 31 Couplings can directly connect the Series 365 Vic-Plug Valve to pipe that is grooved to ANSI/AWWA C-606 rigid or flexible radius groove specifications.
- Style 341 Vic-Flange Adapters can be used to connect the Series 365 Vic-Plug Valve to pipe that is grooved to ANSI/AWWA C-606 rigid or flexible radius groove specifications.
- Style 307 Transition Couplings can be used only when connecting a Series 365 Vic-Plug Valve to IPS pipe.
- For installing a Series 365 Vic-Plug Valve into a piping system using Style 31 Couplings, Style 341 Vic-Flange Adapters, or Style 307 Transition Couplings, follow the instructions supplied with the product.
- Refer to the "Series 365, 366, and 377 Vic-Plug Valves Operation and Maintenance Manual" for information regarding valve adjustment, cleaning, accessory kit installation, etc.

Series 366 Vic-Plug Valve (IPS Ends)

- The Series 366 Vic-Plug Valve is a grooved-end, eccentric plug valve designed to ANSI/AWWA standards and is used primarily for water and wastewater treatment services.
- The 14 18 inch (350 450 mm) Series 366 Vic-Plug Valve has IPS ends that
 are suitable for use with Victaulic Style 07 Zero-Flex couplings, Style 77 flexible
 couplings, and Style 741 Vic-Flange Adapters. For installing these sizes of VicPlug valves into a piping system, follow the instructions supplied with the coupling or Vic-Flange Adapter.
- Refer to the "Series 365, 366, and 377 Vic-Plug Valves Operation and Maintenance Manual" for information regarding valve adjustment, cleaning, accessory kit installation, etc.

Product Data

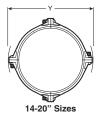
The following information contains center-to-end, end-to-end, take-out, and similar overall dimensions for couplings, flange adapters, and fittings. Refer to the current Victaulic publication for complete dimensional information and for products not shown.

GROOVED AND PLAIN-END PIPE COUPLINGS

Style 31 Coupling

Pipe S	Size	
Nominal Diameter inches (mm)	Actual Outside Diameter inches (mm)	"Y" Dimension inches (mm)
3	3.960	7.63
80	100,6	193,8
4	4.800	9.20
100	121,9	233,7
6	6.900	11.19
150	175,3	284,2
8	9.050	14.33
200	229,9	364,0
10	11.100	16.44
250	281,9	417,6
12	13.200	19.16
300	335,3	486,7
14	15.300	21.96
350	388,6	557,8
16	17.400	23.96
400	442,0	608,6
18	19.500	26.33
450	495,3	668,8
20	21.600	28.69
500	548,6	728,7
24	25.800	33.06
600	655,3	839,7
30	32.000	39.39
750	762,0	1000,5
36	38.300	46.04
900	914,4	1169,4







Style 31-BS Coupling

Pipe S	Pipe Size				
Nominal Diameter mm (inches)	Actual Outside Diameter mm (inches)	"Y" Dimension mm (inches)			
80	98	187,5			
3	3.860	7.38			
100	118 4.640	225,6 8.88			
150	170	289,1			
6	6.690	11.38			



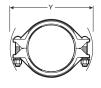
Style 307 Transition Coupling

P	ipe Size	
Nominal Diameter inches	Actual Outside Diameter inches (mm)	"Y" Dimension inches (mm)
3	3.960	7.38
80	100,6	187,5
4	4.800	9.00
100	121,9	228,6
6	6.900	11.13
150	175,3	282,7
8	9.050	11.13
200	229,9	352,6
10	11.100	16.50
250	281,9	419,1
12	13.200	18.94
300	335.3	481,1



Style 397 Grooved-End x Plain-End Coupling Style 399 Plain-End x Plain-End Coupling

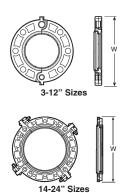
Pipe	Size	
Nominal Diameter inches	Actual Outside Diameter inches (mm)	"Y" Dimension inches (mm)
4 100	4.800 121,9	9.67 245,6
6 150	6.900 175,3	12.44 316,0
8 200	9.050 229,9	15.10 383,5



VIC-FLANGE ADAPTERS

Style 341 Vic-Flange Adapter

Р	ipe Size	
Nominal Diameter inches	Actual Outside Diameter inches (mm)	"A" Dimension inches (mm)
3	3.960	8.44
80	100,6	214,4
4	4.800	9.94
100	121,9	252,5
6	6.900	12.00
150	175,3	304,8
8	9.050	14.63
200	229,9	371,6
10	11.100	17.13
250	281,9	435,1
12	13.200	20.13
300	335,3	511,3
14	15.300	24.63
350	388,6	625,6
16	17.400	27.25
400	442,0	692,2
18	19.500	29.13
450	495,3	739,9
20	21.600	31.63
500	548,6	803,4
24	25.800	36.13
600	655,3	917,7



FITTINGS

No. 100-C - 90° Long Radius Elbow

No. 10-C - 90° Elbow No. 11-C - 45° Elbow No. 12-C - 22 1 /₂° Elbow No. 13-C - 11 1 /₄° Elbow

Pip	No. 100-C 90° Long Radius Elbow	No. 10-C 90° Elbow	No. 11-C 45° Elbow	No. 12-C 22 ¹ / ₂ ° Elbow	No. 13-C 11 ¹ / ₄ ° Elbow	
Nominal Dia. inches (mm)	Actual Outside Dia. inches (mm)	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	3.960	7.75	5.50	3.00	3.00	3.00
80	100,6	196,9	139,7	76,2	76,2	76,2
4	4.800	9.00	6.50	4.00	4.00	4.00
100	121,9	228,6	165,1	101,6	101,6	101,6
6	6.900	11.50	8.00	5.00	5.00	5.00
150	175,3	292,1	203,2	127,0	127,0	127,0
8	9.050	14.00	9.00	5.50	5.50	5.50
200	229,9	355,6	228,6	139,7	139,7	139,7
10	11.100	16.50	11.00	6.50	6.50	6.50
250	281,9	419,1	279,4	165,1	165,1	165,1
12	13.200	19.00	12.00	7.50	7.50	7.50
300	335,3	482,6	304,8	190,5	190,5	190,5
14	15.300	21.50	14.00	7.50	7.50	7.50
350	388,6	546,1	355,6	190,5	190,5	190,5
16	17.400	24.00	15.00	8.00	8.00	8.00
400	442,0	609,6	381,0	203,2	203,2	203,2
18	19.500	26.50	16.50	8.50	8.50	8.50
450 20 500	495,3 21.600 548,6	673,1 29.00 736,6	419,1 18.00 457,2	9.50 241,3	215,9 9.50 241,3	9.50 241,3
24	25.800	34.00	22.00	11.00	11.00	11.00
600	655,3	863,6	558,8	279,4	279,4	279,4
30	32.000	41.50	25.00	15.00	15.00	15.00
750	762,0	1054,1	635,0	381,0	381,0	381,0
36	38.300	49.00	28.00	18.00	18.00	18.00
900	914,4	1244,6	711,2	457,2	457,2	457,2





⊮_ No. 10-C



No. 11-C





No. 10-BS - 90° Elbow No. 11-BS - 45° Elbow No. 20-BS - Tee

	Pipe Size	No. 10-BS 90° Elbow	No. 11-BS 45° Elbow	No. 20-BS Tee
Nominal Dia. mm (inches)	Actual OutsideDia. mm (inches)	C to E mm (inches)	C to E mm (inches)	C to E mm (inches)
80	98	165,1	130,0	165,1
3	3.860	6.50	5.12	6.50
100	118	179,8	140,0	179,8
4	4.640	7.08	5.51	7.08
150	170	220,0	160,0	220,0
6	6.690	8.66	6.30	8.66



No. 10-BS



No. 11-BS



No. 20-BS





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







Pipe	Size	No. 20-C Tee	No. 33	-C Wye	No. 35-C Cross	No. 30-C 45° Lateral		No. 60-C Cap †
Nominal Dia. inches (mm)	Actual Outside Dia. inches (mm)	C to E inches (mm)	C to LE inches (mm)	C to SE inches (mm)	C to E inches (mm)	C to LE inches (mm)	C to SE inches (mm)	Thickness "T" inches (mm)
3	3.960	5.50	5.50	5.50	5.50	10.00	3.00	1.23
80	100,6	139,7	139,7	139,7	139,7	254,0	76,2	31,2
4	4.800	6.50	6.50	3.00	6.50	12.00	3.00	1.16
100	121,9	165,1	165,1	76,2	165,1	304,8	76,2	29,5
6	6.900	8.00	8.00	3.50	8.00	14.50	3.50	1.16
150	175,3	203,2	203,2	88,9	203,2	368,3	88,9	29,5
8	9.050	9.00	9.00	4.50	9.00	17.50	4.50	1.34
200	229,9	228,6	228,6	114,3	228,6	444,5	114,3	34,0
10	11.100	11.00	11.00	5.00	11.00	20.50	5.00	1.53
250	281,9	279,4	279,4	127,0	279,4	520,7	127,0	38,9
12	13.200	12.00	12.00	5.50	12.00	24.50	5.50	1.53
300	335,3	304,8	304,8	139,7	304,8	622,3	139,7	38,9
14	15.300	14.00	14.00	6.00	14.00	27.00	6.00	3.32*
350	388,6	355,6	355,6	152,4	355,6	685,8	152,4	84,3
16	17.400	15.00	15.00	6.50	15.00	30.00	6.50	3.35*
400	442,0	381,0	381,0	165,1	381,0	762,0	165,1	85,1
18	19.500	16.50	16.50	7.00	16.50	32.00	7.00	3.39*
450	495,3	419,1	419,1	177,8	419,1	812,8	177,8	86,1
20	21.600	18.00	18.00	8.00	18.00	35.00	8.00	3.45*
500	548,6	457,2	457,2	203,2	457,2	889,0	203,2	87,6
24	25.800	22.00	22.00	9.00	22.00	40.50	9.00	3.57*
600	655,3	558,8	558,8	228,6	558,8	1028,7	228,6	90,7
30	32.000	25.00	25.00	10.00	25.00	49.00	10.00	4.00*
750	762,0	635,0	635,0	254,0	635,0	1244,6	254,0	101,6
36	38.300	28.00	28.00	15.25	28.00	56.00	15.25	4.00*
900	914,4	711,2	711,2	387,4	711,2	1422,4	387,4	101,6

^{*} Dish Caps

 $[\]dagger$ Caps available for 1 - 4 inch (25,4 - 101,6 mm) tap sizes

No. 21-C - Bullhead Tee

SIZE	SIZE Nominal Diameter inches (mm)				C to EOR inches (mm)	C to EOB inches (mm)
4	Χ	4	Χ	6	+	+
100	Χ	100	Χ	150	+	+
6	Χ	6	Χ	8	8.00	8.00
150	Χ	150	Χ	200	203,2	203,2
8	Χ	8	Χ	10	11.00	11.00
200	Χ	200	Χ	250	279,4	279,4
10	Χ	10	Χ	12	+	+
250	Χ	250	Χ	300	+	+



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







. 25-C	No. 30-CR	No. 35-Ci

			No. 25-C		1	0-CR	No. 35-CR		
			Red	. Tee	45° Re	d. Lat.	Red.	Cross	
	Size Nominal Diameter inches (mm)		C to EOR inches (mm)	C to EOB inches (mm)	C to LE inches (mm)	C to SE inches (mm)	H inches (mm)	J inches (mm)	
4	Χ	3	6.50	6.50	12.00	3.00	6.50	6.50	
100	Χ	80	165,1	165,1	304,8	76,2	165,1	165,1	
6 150	X	3 80	8.00 203,2	8.00 203,2	14.50 368,3	3.50 88,9	8.00 203,2	8.00 203,2	
	X	4 100	8.00 203,2	8.00 203,2	14.50 368,3	3.50 88,9	8.00 203,2	8.00 203,2	
8 200	X	3 80	9.00 228,6	9.00 228,6	-	-	-	-	
	X	4 100	9.00 228,6	9.00 228,6	17.50 444,5	4.50 114,3	9.00 228,6	9.00 228,6	
	X	6 150	9.00 228,6	9.00 228,6	17.50 444,5	4.50 114,3	9.00 228,6	9.00 228,6	
10	Χ	4	11.00	11.00	20.50	5.00	11.00	11.00	
250	Χ	100	279,4	279,4	520,7	127,0	279,4	279,4	
	X	6 150	11.00 279,4	11.00 279,4	20.50 520,7	5.00 127,0	11.00 279,4	11.00 279,4	
	X	8 200	11.00 279,4	11.00 279,4	20.50 520,7	5.00 127,0	11.00 279,4	11.00 279,4	
12 300	X	4 100	12.00 304,8	12.00 304,8	24.50 622,3	5.50 139,7	12.00 304,8	12.00 304,8	
	X	6 150	12.00 304,8	12.00 304,8	24.50 622,3	5.50 139,7	12.00 304,8	12.00 304,8	
	X	8 200	12.00 304,8	12.00 304,8	24.50 622,3	5.50 139,7	12.00 304,8	12.00 304,8	
	X	10 250	12.00 304,8	12.00 304,8	24.50 622,3	5.50 139,7	12.00 304,8	12.00 304,8	
14 350	X	6 150	14.00 355,6	14.00 355,6	27.00 685,8	6.00 152,4	14.00 355,6	14.00 355,6	
	X	8 200	14.00 355,6	14.00 355,6	27.00 685,8	6.00 152,4	14.00 355,6	14.00 355,6	
	X	10 250	14.00 355,6	14.00 355,6	27.00 685,8	6.00 152,4	14.00 355,6	14.00 355,6	
	X	12 300	14.00 355,6	14.00 355,6	27.00 685,8	6.00 152,4	14.00 355,6	14.00 355,6	

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







No. 25-C

No. 30-CR

			No. 25-C Red. Tee		No. 30-CR 45° Red. Lat.		No. 35-CR Red. Cross	
Size Nominal Diameter			C to EOR inches	C to EOB inches	C to LE inches	C to SE inches	H inches	J inches
inches (mm)		(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	
16	Χ	6	15.00	15.00	30.00	6.50	15.00	15.00
400	X	150	381,0	381,0	762,0	165,1	381,0	381,0
	X	8 200	15.00 381,0	15.00 381,0	30.00 762,0	6.50 165,1	15.00 381,0	15.00 381,0
	X	10	15.00	15.00	30.00	6.50	15.00	15.00
	X	250	381,0	381,0	762,0	165,1	381,0	381,0
	Χ	12	15.00	15.00	30.00	6.50	15.00	15.00
	Χ	300	381,0	381,0	762,0	165,1	381,0	381,0
	Χ	14	15.00	15.00	30.00	6.50	15.00	15.00
	Χ	350	381,0	381,0	762,0	165,1	381,0	381,0
18	X	8	13.00	15.50	+	+	15.50	13.00
450	X	200	330,2	393,7	+	+ 7.00	393,7	330,2
	X	10 250	13.00 330,2	15.50 393,7	32.00 812,8	7.00 177,8	15.50 393,7	13.00 330,2
	X	12	13.00	15.50	32.00	7.00	15.50	13.00
	X	300	330,2	393,7	812,8	177,8	393,7	330,2
	Χ	14	16.50	16.50	32.00	7.00	16.50	16.50
	Χ	350	419,1	419,1	812,8	177,8	419,1	419,1
	Χ	16	16.50	16.50	32.00	7.00	16.50	16.50
	Х	400	419,1	419,1	812,8	177,8	419,1	419,1
20	X	6	14.00	17.00	-	-	-	-
500	X	150	355,6	431,8	-	-	17.00	- 14.00
	X	8 200	14.00 355,6	17.00 431,8	-	-	17.00 431,8	14.00 355,6
	X	10	14.00	17.00	+	+	17.00	14.00
	X	250	355,6	431,8	+	+	431,8	355,6
	Χ	12	14.00	17.00	35.00	8.00	17.00	14.00
	Χ	300	355,6	431,8	889,0	203,2	431,8	355,6
	Χ	14	14.00	17.00	35.00	8.00	17.00	14.00
	Χ	350	355,6	431,8	889,0	203,2	431,8	355,6
	X	16	18.00	18.00	35.00	8.00	18.00	18.00
	X	400	457,2	457,2	889,0	203,2	457,2	457,2
	X	18 450	18.00 457,2	18.00 457,2	35.00 889,0	8.00 203,2	18.00 457,2	18.00 457,2
24	X	6	15.00	19.00	-	-	-	-
600	X	150	381,0	482,6	-	-	-	-
	Χ	8	15.00	19.00	+	+	+	+
	Χ	200	381,0	482,6	+	+	+	+
	Χ	10	15.00	19.00	+	+	+	+
	X	250	381,0	482,6	+	+	+	+
24	X	12	15.00	19.00	+	+	15.00	19.00
600	X	300 14	381,0	482,6	40.50	+	381,0	482,6
	X	14 350	15.00 381,0	19.00 482,6	40.50 1028,7	9.00 228,6	15.00 381,0	19.00 482,6
	X	16	15.00	19.00	40.50	9.00	15.00	19.00
	X	400	381,0	482,6	1028,7	228,6	381,0	482,6
	Χ	18	22.00	22.00	40.50	9.00	22.00	22.00
	Χ	450	558,8	558,8	1028,7	228,6	558,8	558,8
	Χ	20	22.00	22.00	40.50	9.00	22.00	22.00
	Χ	500	558,8	558,8	1028,7	228,6	558,8	558,8

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







No. 25-C

No. 30-CR No. 35-CR

		No. 25-C Red. Tee		No. 30-CR 45° Red. Lat.		No. 35-CR Red. Cross		
Size			C to EOR	C to EOB	C to LE	C to SE	Н	J
Nominal Diameter			inches	inches	inches	inches	inches	inches
incl	hes (r	nm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
30	Χ	6	18.00	23.00	-	-	-	-
750	Χ	150	457,2	584,2	-	-	-	-
	X	8	18.00	23.00	+	+	+	+
	Χ	200	457,2	584,2	+	+	+	+
	X	10	18.00	23.00	+	+	+	+
	X	250	457,2	584,2	+	+	+	+
	X	12	18.00	23.00	49.00	10.00	18.00	23.00
	Χ	300	457,2	584,2	1244,6	254,0	457,2	584,2
	X	14	18.00	23.00	49.00	10.00	18.00	23.00
	Χ	350	457,2	584,2	1244,6	254,0	457,2	584,2
	Χ	16	18.00	23.00	49.00	10.00	18.00	23.00
	Х	400	457,2	584,2	1244,6	254,0	457,2	584,2
	X	18	18.00	23.00	49.00	10.00	18.00	23.00
	X	450	457,2	584,2	1244,6	254,0	457,2	584,2
	X	20	18.00	23.00	49.00	10.00	18.00	23.00
		500	457,2	584,2	1244,6	254,0	457,2	584,2
	X	24 600	25.00 635,0	25.00 635,0	49.00 1244,6	10.00 254,0	25.00 635,0	25.00 635,0
36	X	8	20.00	26.00	+	-	+	
900	X	200	508,0	660,4	+	+ +	+	+
300	X	10	20.00	26.00	+	+	+	+
	X	250	508,0	660,4	+	+	+	+
	X	12	20.00	26.00	+	+	20.00	26.00
	X	300	508,0	660,4	+	+	508,0	660,4
	Χ	14	20.00	26.00	54.00	15.25	20.00	26.00
	Χ	350	508,0	660,4	1371,6	387,4	508,0	660,4
	Χ	16	20.00	26.00	54.00	15.25	20.00	26.00
	Χ	400	508,0	660,4	1371,6	387,4	508,0	660,4
	Χ	18	20.00	26.00	54.00	15.25	20.00	26.00
	Χ	450	508,0	660,4	1371,6	387,4	508,0	660,4
	Χ	20	20.00	26.00	54.00	15.25	20.00	26.00
	Χ	500	508,0	660,4	1371,6	387,4	508,0	660,4
	Χ	24	20.00	26.00	54.00	15.25	20.00	26.00
	Χ	600	508,0	660,4	1371,6	387,4	508,0	660,4
	X	30	28.00	28.00	56.00	15.25	28.00	28.00
	Χ	750	711,2	711,2	1422,4	387,4	711,2	711,2

⁺ Contact Victaulic for details.







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





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			No. 50-C Conc. Red.	No. 51-C Ecc. Red.	No. 10-CR 90° Red. El.	No. 100-CR 90° Long Radius Red. Elbow
1	Size al Dia hes (n	ameter nm)	E to E inches (mm)	E to E inches (mm)	C to E inches (mm)	C to E inches (mm)
4	Χ	3	7.00	7.00	6.50	9.00
100	X	80	177,8	177,8	165,1	228,6
6 150	X	3 80	9.00 228,6	9.00 228,6	8.00 203,2	11.50 292,1
	X	4 100	9.00 228,6	9.00 228,6	8.00 203,2	11.50 292,1
8 200	X	3 80	11.00 279,4	11.00 279,4	-	-
	X	4 100	11.00 279,4	11.00 279,4	9.00 228,6	14.00 355,6
	X	6 150	11.00 279,4	11.00 279,4	9.00 228,6	14.00 355,6
10 250	X	4 100	12.00 304,8	12.00 304,8	11.00 279,4	16.50 419,1
	X	6 150	12.00 304,8	12.00 304,8	11.00 279,4	16.50 419,1
	X	8 200	12.00 304,8	12.00 304,8	11.00 279,4	16.50 419,1
12 300	X	4 100	14.00 355,6	14.00 355,6	12.00 304,8	+ +
	X	6 150	14.00 355,6	14.00 355,6	12.00 304,8	19.00 482,6
	X	8 200	14.00 355,6	14.00 355,6	12.00 304,8	19.00 482,6
	X	10 250	14.00 355,6	14.00 355,6	12.00 304,8	19.00 482,6
14 350	X	6 150	16.00 406,4	16.00 406,4	14.00 355,6	+ +
	X	8 200	16.00 406,4	16.00 406,4	14.00 355,6	21.50 546,1
	X	10 250	16.00 406,4	16.00 406,4	14.00 355,6	21.50 546,1
	X	12 300	16.00 406,4	16.00 406,4	14.00 355,6	21.50 546,1
16 400	X	6 150	18.00 457,2	18.00 457,2		+
	X	8 200	18.00 457,2	18.00 457,2	15.00 381,0	24.00 609,6
	X	10 250	18.00 457,2	18.00 457,2	15.00 381,0	24.00 609,6
	X	12 300	18.00 457,2	18.00 457,2	15.00 381,0	24.00 609,6
	X	14 350	18.00 457,2	18.00 457,2	15.00 381,0	24.00 609,6

No. 51-CR

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. 10-CR

No. 100-CR

			No. 50-C	No E1 C	No. 10 CD	No. 100-CR
			Conc. Red.	No. 51-C Ecc. Red.	No. 10-CR 90° Red. El.	90° Long Radius Red. Elbow
	Size		E to E	E to E	C to E	C to E
Nomin	al Dia	ameter	inches	inches	inches	inches
incl	hes (r	nm)	(mm)	(mm)	(mm)	(mm)
18	Χ	8	19.00	19.00	16.50	-
450	Χ	200	482,6	482,6	419,1	-
	Χ	10	19.00	19.00	16.50	26.50
	Χ	250	482,6	482,6	419,1	673,1
	Χ	12	19.00	19.00	16.50	26.50
	Χ	300	482,6	482,6	419,1	673,1
	Χ	14	19.00	19.00	16.50	26.50
	X	350	482,6	482,6	419,1	673,1
	X	16	19.00	19.00	16.50	26.50
	Х	400	482,6	482,6	419,1	673,1
20	X	8	20.00	20.00	-	-
500	X	200	508,0	508,0	-	-
	X	10	20.00	20.00	18.00	29.00
		250	508,0	508,0	457,2	736,6
	X	12 300	20.00 508,0	20.00 508,0	18.00 457,2	29.00 736,6
	X	14	20.00	20.00	18.00	29.00
	X	350	508,0	20.00 508,0	457,2	736,6
	X	16	20.00	20.00	18.00	29.00
	X	400	508,0	508,0	457,2	736,6
	X	18	20.00	20.00	18.00	29.00
	X	450	508,0	508,0	457,2	736,6
24	Х	8	+	+	+	+
600	Χ	200	+	+	+	+
	Χ	10	+	+	+	+
	Χ	250	+	+	+	+
	Χ	12	24.00	24.00	22.00	34.00
	Χ	300	609,6	609,6	558,8	863,6
	Χ	14	24.00	24.00	22.00	34.00
	Χ	350	609,6	609,6	558,8	863,6
	Χ	16	24.00	24.00	22.00	34.00
	Χ	400	609,6	609,6	558,8	863,6
	X	18	24.00	24.00	22.00	34.00
	X	450	609,6	609,6	558,8	863,6
	X	20	24.00	24.00	22.00	34.00
	Χ	500	609,6	609,6	558,8	863,6

E to E



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. 10-CR No. 100-CR

			No. 50-C Conc. Red.	No. 51-C Ecc. Red.	No. 10-CR 90° Red. El.	No. 100-CR 90° Long Radius Red. Elbow
_	Size nal Dia hes (r	ameter nm)	E to E inches (mm)	E to E inches (mm)	C to E inches (mm)	C to E inches (mm)
30 750	X	6 150	-	-	-	-
	X	8	+	+	+	_
	Χ	200	+	+	+	-
	Χ	10	+	+	+	-
	Χ	250	+	+	+	-
	X	12 300	+	+	+ +	-
	X	14	+	+	25.00	-
	X	350	+	+	635,0	-
	Χ	16	+	30.00	25.00	41.50
	Χ	400	+	762,0	635,0	1054,1
	Χ	18	+	30.00	25.00	41.50
	X	450	+	762,0	635,0	1054,1
	X	20 500	30.00 762,0	30.00 762,0	25.00 635,0	41.50 1054,1
	X	24	30.00	30.00	25.00	41.50
	X	600	762,0	762,0	635,0	1054,1
36	Χ	8	+	+	+	-
900	Χ	200	+	+	+	-
	X	10	+	+	+	-
	X	250 12	+	+	+	-
	X	300	+	+ +	+ +	-
	Х	14	+	+	+	_
	Χ	350	+	+	+	-
	Χ	16	+	+	+	-
	X	400	+	+	+	-
	X	18 450	+ +	+ +	+	-
	X	20	36.00	36.00	+ +	49.00
	X	500	914,4	914,4	+	1244,6
	Χ	24	36.00	36.00	+	49.00
	Χ	600	914,4	914,4	+	1244,6
	X	30	36.00	36.00	+	49.00
	Χ	750	914,4	914,4	+	1244,6

⁺ Contact Victaulic for details.







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







	
10-08	No 20-09

NU. 20-0	o ice siu	e Ouliei	No. 43-CF			-CF	No. 10-CS	No. 20-CS
Pipe	Size	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
Nominal Dia. inches (mm)	Actual Outside Dia. inches (mm)	C to E inches (mm)	C to F inches (mm)	C to E inches (mm)	C to F inches (mm)	E to E inches (mm)	C to E inches (mm)	C to E inches (mm)
3	3.960	5.50	9.00	7.75	11.25	8.00	5.50	5.50
80	100,6	139,7	228,6	196,9	285,8	203,2	139,7	139,7
4	4.800	6.50	10.00	9.00	12.50	8.00	6.50	6.50
100	121,9	165,1	254,0	228,6	317,5	203,2	165,1	165,1
6 150	6.900 175,3	8.00 203,2	11.50 292,1	11.50 292,1	15.00 381,0	8.00 203,2	8.00 203,2	8.00 203,2
8	9.050	9.00	13.50	14.00	18.50	10.00	9.00	9.00
200	229,9	228,6	342,9	355,6	469,9	254,0	228,6	228,6
10	11.100	11.00	16.50	16.50	22.50	10.00	11.00	11.00
250	281,9	279,4	419,1	419,1	571,5	254,0	279,4	279,4
12	13.200	12.00	18.50	19.00	25.50	12.00	12.00	12.00
300	335,3	304,8	469,9	482,6	647,7	304,8	304,8	304,8
14 350	15.300 388,6	14.00 355,6	21.50 546,1	21.50 546,1	29.00 736,6	12.00 304,8	14.00 355,6	14.00 355,6
16 400	17.400 442,0	15.00 381,0	23.00 584,2	24.00 609,6	32.00 812,8	16.00 406,4	15.00 381,0	15.00 381,0
18 450	19.500 495,3	16.50 419,1	25.00 635,0	26.50 673,1	35.00 889,0	16.00 406,4	16.50 419,1	16.50 419,1
20	21.600	18.00	27.00	29.00	38.00	18.00	18.00	18.00
500	548,6	457,2	685,8	736,6	965,2	457,2	457,2	457,2
24 600	25.800 655,3	22.00 558,8	32.50 825,5	34.00 863,6	44.50 1130,3	18.00 457,2	22.00 558,8	22.00 558,8
30 750	32.000 762,0	+ +	+ +	+ +	+ +	24.00 609,6	+ +	+ +
36 900	38.300 914,4	+ +	+ +	+	+ +	24.00	+ +	+ +
300	314,4	_ +		_ +		0,600	т —	

⁺ Contact Victaulic for details.

^{*} Reducing side outlet 90° elbows, tees, and crosses are available. Contact Victaulic for details.

No. 10-CB - Base Elbow No. 20-CB - Base Tee

No. 100-CB - Long Radius Base Elbow

No. 25-CB - Reducing Base tee

Pipe	Base Dimensions inches (mm)					
Nominal Dia. inches (mm)	Actual Outside Dia. inches (mm)	R	U	Т	S	w
3	3.960	4.88	0.50	0.56	5.00	3.88
80	100,6	124,0	12,7	14,2	12,7	98,6
4	4.800	5.50	0.50	0.62	6.00	4.75
100	121,9	139,7	12,7	15,7	152,4	120,7
6	6.900	7.00	0.62	0.69	7.00	5.50
150	175,3	177,8	15,7	17,5	177,8	139,7
8	9.050	8.38	0.88	0.94	9.00	7.50
200	229,9	212,9	22,4	23,9	228,6	190,5
10	11.100	9.75	0.88	0.94	9.00	7.50
250	281,9	247,7	22,4	23,9	228,6	190,5
12	13.200	11.25	1.00	1.00	11.00	9.50
300	335,3	285,8	25,4	25,4	279,4	241,3
14	15.300	12.50	1.00	1.00	11.00	9.50
350	388,6	317,5	25,4	25,4	279,4	241,3
16	17.400	13.75	1.00	1.00	11.00	9.50
400	442,0	349,3	25,4	25,4	279,4	241,3
18	19.500	15.00	1.12	1.12	13.50	11.75
450	495,3	381,0	28,4	28,4	342,9	298,5
20	21.600	16.00	1.12	1.12	13.50	11.75
500	548,6	406,4	28,4	28,4	342,9	298,5
24	25.800	18.50	1.12	1.12	13.50	11.75
600	655,3	469,9	28,4	28,4	342,9	298,5

The bolt hole template, shown for the round base, is the same for the flange of the supporting pipe size. The only exception is that the round base contains only four holes that are placed to straddle the centerline. The bases of these fittings are intended for support in compression. The bases of these fittings must not be used as anchors or supports in tension or shear conditions.



No. 10-CB



No. 20-CB



Round Base



No. 25-CB



GROOVED PIPE VALVES

Series 317 Check Valve

F	Pipe Size					
Nominal Diameter inches	Diameter inches					
3	3.960	9.50				
80	100,6	241,3				
4	4.800	11.50				
100	121,9	292,1				
6	6.900	14.00				
150	175,3	355,6				
8	9.050	19.50				
200	229,9	495,3				
10	11.100	22.00				
250	281,9	558,8				
12	13.200	26.00				
300	335,3	660,4				



Series 365 Vic-Plug Valve (DI Ends) Series 366 Vic-Plug Valve (IPS Ends)

	o i lug valve (ii o			
		"!	Α"	
	•	End-to-End Dimension		
Pi	pe Size	inches (mm)		
Nominal	Actual Outside			
Diameter	Diameter			
inches	inches (mm)	Series 365	Series 366	
3	3.960	8.00	-	
80	100,6	203,2	-	
4	4.800	9.00	-	
100	121,9	228,6	-	
6	6.900	10.50	-	
150	175,3	266,7	-	
8	9.050	11.50	-	
200	229,9	292,1	-	
10	11.100	13.00	-	
250	281,9	330,2	-	
12	13.200	14.00	-	
300	335,3	355,6	-	
14	15.300	17.00	19.00	
350	388,6	431,8	482,6	
16	17.400	17.75	19.75	
400	442,0	450,9	501,7	
18	19.500	21.50	23.50	
450	495,3	546,1	596,9	



Helpful Information

English and Metric Conversion Chart

Commercial AWWA Pipe Sizes & Wall Thicknesses (ANSI/AWWA C-150)

Approximate Weights of Commercial AWWA Pipe (ANSI/AWWA C-150)

Decimal Equivalents of Fractions

Minutes Converted to Decimals of a Degree

Water Pressure to Feet-of-Head

Feet-of-Head of Water to Pressure

ENGLISH AND METRIC CONVERSION CHART

	Convert US to Metric			Convert Metric to US				
25.4	Χ	inches (in)	=	millimeters (mm)	Χ	0.03937		
0.3048	Χ	feet (ft)	=	meters (m)	Χ	3.281		
0.4536	Χ	pounds (lbs)	=	kilograms (kg)	Χ	2.205		
28.35	Χ	ounces (oz)	=	grams (g)	Χ	0.03527		
6.894	Χ	pressure (psi)	=	kilopascals (kPa)	Χ	0.145		
.069	Χ	pressure	=	Bar	Χ	14.5		
4.45	Χ	end load (lbs)	=	Newtons (N)	Χ	0.2248		
1.356	Χ	torque (ft-lbs)	=	Newton meters (N•m)	Χ	0.738		
F – 32 ÷ 1.8		temperature (°F)	=	Celsius (°C)		C ÷ 17.78 X 1.8		
745.7	Χ	horsepower (hp)	=	watts (W)	Χ	1.341 X 10 ⁻³		
3.785	Χ	gallons per minute (gpm)	=	liters per minute (I/m)	Χ	0.2642		
3.7865	Χ	10 ⁻³ gallons per minute (gpm)	=	cubic meters per minute (m³/m)	Χ	264.2		

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

Pipe											
Nominal Diameter			Thickness Class inches (millimeters)								
inches (mm)	inches (mm)	50	51	52	53	54	55	56			
3	3.96	-	0.25	0.28	0.31	0.34	0.37	0.40			
(80)	(100,6)		(6,4)	(7,1)	(7,9)	(8,6)	(9,4)	(10,2)			
4 (100)	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	0.25	0.28	0.31	0.34	0.37	0.40	0.43 (10,9)			
(150)	(175,3)	(6,4)	(7,1)	(7,9)	(8,6)	(9,4)	(10,2)				
8 (200)	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	0.29	0.32	0.35	0.38	0.41	0.44	0.47			
(250)	(281,9)	(7,4)	(8,1)	(8,9)	(9,7)	(10,4)	(11,2)	(11,9)			
12	13.20	0.31	0.34	0.37	0.40	0.43	0.46	0.49			
(300)	(335,3)	(7,9)	(8,6)	(9,4)	(10,2)	(10,9)	(11,7)	(12,4)			
14 (350)	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	0.34	0.37	0.40	0.43	0.46	0.49	0.52			
(400)	(442,0)	(8,6)	(9,4)	(10,2)	(10,9)	(11,7)	(12,4)	(13,2)			
18	19.50	0.35	0.38	0.41 (10,4)	0.44	0.47	0.50	0.53			
(450)	(495,3)	(8,9)	(9,7)		(11,2)	(11,9)	(12,7)	(13,5)			
20 (500)	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	0.38	0.41	0.44	0.47	0.50	0.53	0.56			
(600)	(655,3)	(9,7)	(10,4)	(11,2)	(11,9)	(12,7)	(13,5)	(14,2)			
30 (750)	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	0.43 (10,9)	0.48	0.53	0.58	0.63	0.68	0.73			
(900)	(914,4)		(12,2)	(13,5)	(14,7)	(16,0)	(17,3)	(18,5)			
42*	44.50	0.47	0.53	0.59	0.65	0.71	0.77	0.83			
(1000)	(1130,3)	(11,9)	(13,5)	(15,0)	(16,5)	(18,0)	(19,6)	(21,1)			
48*	50.80	0.51	0.58	0.65	0.72	0.79	0.86	0.93			
(1200)	(1290,3)	(13,0)	(14,7)	(16,5)	(18,3)	(20,1)	(21,8)	(23,6)			
54*	57.56	0.57	0.65	0.73	0.81	0.89	0.97	1.05			
(1350)	(1462,0)	(14,5)	(16,5)	(18,5)	(20,6)	(22,6)	(24,6)	(26,7)			

Shaded areas denote thickness classes that are too thin to be grooved.

^{*} Pipe in sizes 42 inches (1000 mm) and larger cannot be directly grooved for use with Victaulic couplings. These dimensions are for information only.

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

Pipe	Pipe Size		Weight of Pipe Per Foot Pounds/kg					Weight of Pipe Per Foot with Standard Thickness Cement Lining* pounds/kg				
Nominal Dia. inches (mm)	Actual Outside Dia. inches (mm)	CL. 53	CL. 54	CL. 55	CL. 56		CL. 53	CL. 54	CL. 55	CL. 56		
3 (11,9)	3.960 (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 (100) 6	4.800 (121,9) 6.900	13.8 (6,3) 21.4	15.0 (6,8) 23.2	16.1 (7,3) 25.0	17.3 (7,8) 26.7		14.7 (6,7) 23.6	15.9 (7,2) 24.5	17.0 (7,7) 26.3	18.2 (8,3) 28.0		
(150)	(175,3) 9.050	(9,7)	(10,5)	(11,3)	(12,1)		(10,7)	(11,1)	(11,9)	(12,7)		
(200)	(229,9) 11.100	(13,7)	(14,7) 42.1	(15,8) 45.1	(16,9) 48.0		(15,0) 41.4	(15,5) 44.3	(16,6) 47.3	(17,6) 50.2		
(250) 12 (300)	(281,9) 13.200 (335,3)	(17,8) 49.2 (22,3)	(19,1) 52.8 (24,0)	(20,5) 56.3 (25,5)	(21,8) 59.9 (27,2)		(18,8) 51.8 (23,5)	(20,1) 55.4 (25,1)	(21,5) 58.9 (26,7)	(22,8) 62.5 (28,4)		
14 (350)	15.300 (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 (400)	17.400 (442,0)	70.1 (31,8)	74.9 (34,0)	79.7 (36,2)	84.4 (38,3)		75.2 (34,1)	80.0 (26,3)	84.8 (38,5)	89.5 (40,6)		
18 (450)	19.500 (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)		
(500)	21.600 (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)		
(600)	25.800 (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 (750)	32.000 (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 (900)	38.300 (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	Fraction in Inches	Decimal Equivalent inches	E m
1/64	0.016	0,397	33/64	0.516	
1/32	0.031	0,794	17/32	0.531	
3/64	0.047	1,191	35/64	0.547	
1/16	0.063	1,588	9/16	0.563	
5/64	0.781	1,984	37/64	0.578	
3/32	0.094	2,381	19/32	0.594	
7/64	0.109	2,778	39/64	0.609	
1/8	0.125	3,175	5/8	0.625	
9/64	0.141	3,572	41/64	0.641	
⁵ / ₃₂	0.156	3,969	21/32	0.656	
11/64	0.172	4,366	43/64	0.672	
³ / ₁₆	0.188	4,763	11/16	0.688	
13/64	0.203	5,159	⁴⁵ / ₆₄	0.703	
⁷ / ₃₂	0.219	5,556	23/32	0.719	
15/64	0.234	5,953	47/64	0.734	
1/4	0.250	6,350	3/4	0.750	
¹⁷ / ₆₄	0.266	6,747	49/64	0.766	
9/32	0.281	7,144	²⁵ / ₃₂	0.781	
19/64	0.297	7,541	51/64	0.797	
⁵ / ₁₆	0.313	7,938	13/16	0.813	
21/64	0.328	8,334	53/64	0.828	
1/3	0.333	8,467	²⁷ / ₃₂	0.844	
11/32	0.344	8,731	55/64	0.859	
²³ / ₆₄	0.359	9,128	7/8	0.875	
3/8	0.375	9,525	57/64	0.891	
²⁵ / ₆₄	0.391	9,922	²⁹ / ₃₂	0.906	
13/32	0.406	10,319	59/64	0.922	
²⁷ / ₆₄	0.422	10,716	¹⁵ / ₁₆	0.938	
⁷ / ₁₆	0.438	11,113	61/64	0.953	
²⁹ / ₆₄	0.453	11,509	31/32	0.969	
15/32	0.469	11,906	63/64	0.984	
1/2	0.500	12,700	1	1.000	

Fraction in Inches	Decimal Equivalent inches	Decimal Equivalent millimeters
33/64	0.516	13,097
17/32	0.531	13,494
35/64	0.547	13,891
9/16	0.563	14,288
37/64	0.578	14,684
19/32	0.594	15,081
39/64	0.609	15,478
5/8	0.625	15,875
41/64	0.641	16,272
21/32	0.656	16,669
43/64	0.672	17,066
11/16	0.688	17,463
⁴⁵ / ₆₄	0.703	17,859
23/32	0.719	18,256
47/64	0.734	18,653
3/4	0.750	19,050
49/64	0.766	19,447
²⁵ / ₃₂	0.781	19,844
51/64	0.797	20,241
¹³ / ₁₆	0.813	20,638
53/64	0.828	21,034
27/32	0.844	21,431
55/64	0.859	21,828
7/8	0.875	22,225
57/64	0.891	22,622
²⁹ / ₃₂	0.906	23,019
⁵⁹ / ₆₄	0.922	23,416
¹⁵ / ₁₆	0.938	23,813
61/64	0.953	24,209
31/32	0.969	24,606
63/64	0.984	25,003
1	1.000	25,400

MINUTES CONVERTED TO DECIMALS OF A DEGREE

MINUTES CONVI		E
Min.	Deg.	
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	
16	.2666	
17	.2833	
18	.3000	
19	.3166	
20	.3333	
		ı

Min.	Deg.
21	.3500
22	.3666
23	.3833
24	.4000
25	.4166
26	.4333
27	.4500
28	.4666
29	.4833
30	.5000
31	.5166
32	.5333
33	.5500
34	.5666
35	.5833
36	.6000
37	.6166
38	.6333
39	.6500
40	.6666

OF A DEGREE		
Min.	Deg.	
41	.6833	
42	.7000	
43	.7166	
44	.7333	
45	.7500	
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	

WATER PRESSURE TO FEET-OF-HEAD

WATER PRESSURE	
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

FEET-OF-HEAD	
Feet of Head	
230.90	
253.93	
277.07	
300.16	
323.25	
346.34	
369.43	
392.52	
415.61	
461.78	
577.24	
692.69	
808.13	
922.58	
1154.48	
1385.39	
1616.30	
1847.20	
2078.10	
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	38.98

IEN IU PNESSUNE	
Pounds Per Square Inch	
43.31	
47.64	
51.97	
56.30	
60.63	
64.96	
69.29	
73.63	
77.96	
86.62	
108.27	
129.93	
151.58	
173.24	
216.55	
259.85	
303.16	
346.47	
389.78	
433.00	

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