HYDROFLOW
DISTRIBUTORS (AUST) PTY LTD

WaterMark® Welded 316 Stainless Steel Pipe

SCHEDULE 10 - FOR ALL YOUR STAINLESS STEEL WATER PROJECTS

APPLICATIONS

- Process Water
- Drinking Water (Potable)
- Recycled and Re-Used Water Systems
- Fire Service Systems
- Marine Applications

MATERIAL AND APPROVALS

- 316L Stainless Steel
- Approved for AS 3500 Parts 1, 4 & 5.
- Approved for AS 2419 and AS 2118

PROCESS WATER

Covering many applications including industrial, building services, mining and irrigation. Generally, these water applications cover air-conditioning systems – wash down lines, condenser water lines, factory feed water lines and many other non-drinking water applications. NOTE: Stainless pipes, valves and fitting products for process water, do not require the material to be certified in accordance with the plumbing industry drinking water criteria. They may, however, specify ASTM, grade and/or wall thickness relevant to the specific service applications.

DRINKING WATER (POTABLE)

Schedule 10 Stainless steel is approved for use with potable water. Materials used for drinking water applications are tested in accordance with AS 3500 Parts 1, 4 & 5. The code also specifies stainless materials used for consumption, have a minimum pitting resistance equivalent number (PREN) of 22.

RECYCLED AND RE-USED WATER SYSTEMS

Due to there strength, long-life, and corrosion resistance, stainless pipes and fittings are ideal for use with recycled and re-used water systems. Grade 316/316L with roll grooved pipe fittings meet the requirements of the Plumbing Code of Australia (PCA).

Hydroflow Distributors (Aust) Pty Ltd

Unit 1 No 11 Salmon Street Port Melbourne, Victoria 3207 P: +613 9676 8900 F: +613 9676 9268

HYDROFLOW
DISTRIBUTORS (AUST) PTY LTD

WaterMark® Welded 316 Stainless Steel Pipe

SCHEDULE 10 - FOR ALL YOUR STAINLESS STEEL WATER PROJECTS

FIRE SERVICE SYSTEMS

Approved for fire hydrants and fire sprinkler system applications, in accordance with AS 2419 and AS 2118. Recommended for systems that are regularly tested and new water is introduced. The advantage of using stainless piping systems is that they can be used for supply to fire fighting services and/or ablution, through one (1) single pipeline.

MARINE APPLICATIONS

Stainless Steel is recognised as the premium material for marine applications, with excellent corrosion resistance, strength and hardness. Because 316L stainless resists rusting, it makes an excellent choice for architectural applications in aggressive environments such as industrial and sea-front buildings, wharves and piers.

CERTIFICATION MARKS

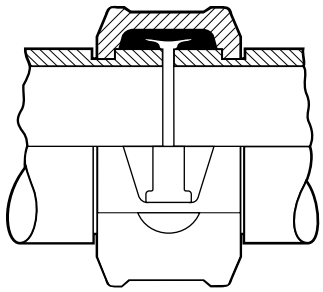
Pipes are marked identifying the manufacturer's name, specification number, material grade, licence number, heat trace number and carry the WaterMark® logo.

Hydroflow Distributors (Aust) Pty Ltd

Unit 1 No 11 Salmon Street Port Melbourne, Victoria 3207 P: +613 9676 8900 F: +613 9676 9268

Rigid Coupling

STYLE 89
(FOR STAINLESS STEEL PIPE)



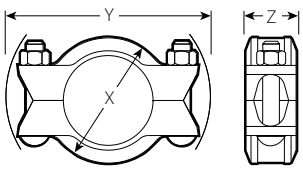
Exaggerated for clarity

Style 89 is constructed with heavy ductile iron housings, designed for use on stainless steel pipe only. The housing key is wider than standard and the coupling housing is designed to clamp the bottom of the groove, thus providing an essentially rigid joint. To achieve this rigidity, it is necessary to torque the nuts to the values shown in the table below. For pressure ratings, see page 2 for pressure ratings based on ANSI wall thicknesses and page 3 for those based on ISO wall thicknesses.

Style 89 will greatly reduce linear or angular movement and is useful for valve connections and other points where rigidity is required. The coupling is provided with plated bolts and nuts and pressure responsive gaskets for a variety of services (please specify gasket grade when ordering. Request publication 05.01 for gasket service ratings).

Style 89 couplings are suitable for use on stainless steel piping where the corrosion resistant properties of stainless are not required for the external environment.

DIMENSIONS



TYPICAL FOR ALL SIZES

Size		Allow. Pipe End Sep. #	@ Bolts/Nuts No. - Size	Nut Torque	Dimensions Inches/millimeters			Approx. Weight Each
Nominal Size Inches mm	Actual Outside Diameter Inches mm	Inches mm	Inches mm	ft-lbs N•m	X	Y	Z	Lbs. kg
2 50	2.375 60.3	0.14 3.6	2 – ⅝ x 2¾	60 – 90 80 – 120	3.50 89	6.68 168	2.00 51	3.1 1.4
2½ 65	2.875 73.0	0.14 3.6	2 – ⅝ x 3½	60 – 90 80 – 120	4.13 105	7.13 181	2.00 51	4.0 1.8
76.1 mm	3.000 76.1	0.14 3.6	2 – ⅝ x 3½	60 – 90 80 – 120	4.13 105	7.25 184	2.00 51	4.1 1.9
3 80	3.500 88.9	0.14 3.6	2 – ⅝ x 3½	60 – 90 80 – 120	4.75 121	7.75 197	2.00 51	4.3 2.0
4 100	4.500 114.3	0.25 6.4	2 – ¾ x 4¼	85 – 125 115 – 170	6.00 152	9.63 245	2.13 54	7.5 3.4
139.7 mm	5.500 139.7	0.25 6.4	2 – ¾ x 4¼	85 – 125 115 – 170	7.13 181	10.63 270	2.38 60	12.5 5.7
5 125	5.563 141.3	0.25 6.4	2 – ¾ x 4¼	85 –125 115 –170	7.13 181	10.63 270	2.38 60	12.5 5.7
165.1 mm	6.500 165.1	0.25 6.4	2 – ⅞ x 5½	175 – 250 237 – 339	8.63 219	12.38 314	2.38 60	15.8 7.2
6 150	6.625 168.3	0.25 6.4	2 – ⅞ x 5½	175 – 250 237 – 339	8.63 219	12.68 321	2.50 64	16.0 7.3
216.3 mm	8.515 216.3	0.25 6.4	2 – 1 x 5½	200 – 300 271 – 407	11.00 279	15.25 387	2.63 67	25.2 11.4
8 200	8.625 219.1	0.25 6.4	2 – 1 x 5½	200 – 300 271 – 407	11.00 279	15.25 387	2.75 70	26.1 11.8
267.4 mm	10.528 267.4	0.25 6.4	2 – 1 x 6½	250 – 350 339 – 475	13.38 340	17.00 432	2.75 70	32.5 14.7
10 250	10.750 273.0	0.25 6.4	2 – 1 x 6½	250 – 350 339 – 475	13.50 343	17.25 438	2.75 70	32.8 14.9
318.5 mm	12.539 318.5	0.25 6.4	2 – 1 x 6½	250 – 350 339 – 475	15.63 397	19.63 499	2.88 73	42.0 19.1
12 300	12.750 323.9	0.25 6.4	2 – 1 x 6½	250 – 350 339 – 475	15.63 397	19.63 499	2.88 73	46.0 20.9

For field installation only. Style 89 couplings when sufficiently pressurized, will allow pipe ends to separate to maximum point shown before joint acts in a fully restrained manner.

@ Metric thread size bolts are available (color coded gold) for all coupling sizes upon request. Contact Victaulic for details.

JOB/OWNER

System No. _____

Location _____

CONTRACTOR

Submitted By _____

Date _____

ENGINEER

Spec Sect _____ Para _____

Approved _____

Date _____

Rigid Coupling

STYLE 89
(FOR STAINLESS STEEL PIPE)

PERFORMANCE ON ANSI WALL THICKNESSES

Pipe Diameter		Style 89				
Nominal Pipe Size	Actual Outside Diameter	Pipe Wall Thickness		Grooving Method	Maximum Working Pressure	Maximum End Load
Inches mm	Inches mm	Inches mm	ANSI Schedule Number	St = Standard Roll Set RX = SS Roll Set C = Cut Groove	PSI kPa	Lbs N
2 50	2.375 60.3	0.217 5.5	80S	C	750 5171	3323 14780
		0.154 3.9	Duplex/Super Duplex 40S	C	1200 8273	5320 23676
		0.154 3.9	40S	St/C	750 5171	3323 14780
		0.110 2.8	10S	RX	500 3447	2215 9853
		0.067 1.7	5S	RX	325 2241	1440 6405
2½ 65	2.875 73.0	0.276 7.0	80S	C	750 5171	4869 21658
		0.203 5.2	Duplex/Super Duplex 40S	C	1200 8273	7800 34712
		0.205 5.2	40S	St/C	750 5171	4869 21658
		0.122 3.1	10S	RX	500 3447	3246 14438
		0.083 2.1	5S	RX	325 2241	2110 9386
3 80	3.500 88.9	0.299 7.6	80S	C	750 5171	7216 32098
		0.216 5.5	Duplex/Super Duplex 40S	C	1200 8273	11560 51444
		0.217 5.5	40S	St/C	750 5171	7216 32098
		0.122 3.1	10S	RX	500 3447	4814 21415
		0.083 2.1	5S	RX	325 2241	3127 13910
4 100	4.500 114.3	0.339 8.6	80S	C	750 5171	11928 53059
		0.237 6.0	Duplex/Super Duplex 40S	C	1200 8273	19100 84996
		0.236 6.0	40S	St/C	750 5171	11928 53059
		0.122 3.1	10S	RX	400 2758	6362 28298
		0.083 2.1	5S	RX	250 1725	3979 17700
5 125	5.500 139.7	0.237 6.0	Duplex/Super Duplex 40S	C	1200 8273	28520 126916
		0.258 6.6	40S	St/C	750 5171	18229 81087
		0.134 3.4	10S	RX	300 2065	7280 32381
		0.109 2.8	5S	RX	275 1896	6684 29732

Pipe Diameter		Style 89				
Nominal Pipe Size	Actual Outside Diameter	Pipe Wall Thickness		Grooving Method	Maximum Working Pressure	Maximum End Load
Inches mm	Inches mm	Inches mm	ANSI Schedule Number	St = Standard Roll Set RX = SS Roll Set C = Cut Groove	PSI kPa	Lbs N
6 150	6.625 168.3	0.237 6.0	Duplex/Super Duplex 40S	C	1200 8273	41360 184060
		0.280 7.1	40S	St/C	750 5171	25854 115003
		0.134 3.4	10S	RX	300 2068	10324 45925
		0.110 2.8	5S	RX	250 1724	8618 38334
8 200	8.625 219.1	0.323 8.2	Duplex/Super Duplex 40S	C	1200 8273	70100 311940
		0.323 8.2	40S	St/C	600 4136	35049 155903
		0.150 3.8	10S	RX	300 2068	17499 77838
		0.110 2.8	5S	RX	200 1379	11686 51980
10 250	10.750 273.0	0.366 9.3	Duplex/Super Duplex 40S	C	1200 8273	108900 484600
		0.366 9.3	40S	St/C	600 4136	54446 242188
		0.165 4.2	10S	RX	300 2068	27184 120918
		0.134 3.4	5S	RX	250 1724	22691 100933
12 300	12.750 323.9	0.374 9.5	Duplex/Super Duplex 40S	C	1200 8273	153200 681740
		0.374 9.5	40S	St/C	600 4136	76590 340687
		0.181 4.6	10S	RX	300 2068	38239 170097
		0.156 4.0	5S	RX	200 1379	25536 113590

Rigid Coupling

STYLE 89
(FOR STAINLESS STEEL PIPE)

PERFORMANCE ON ISO WALL THICKNESSES

Pipe Diameter		Style 89			
				Maximum	
Nominal Pipe Size	Actual Outside Diameter	Pipe Wall Thickness	Grooving Method	Working Pressure	End Load
Inches mm	Inches mm	Inches mm	St = Standard Roll Set RX = SS Roll Set C = Cut Groove	PSI kPa	Lbs N
2 50	2.375 60.3	0.220 5.6	C	750 5171	3323 14780
		0.157 4.0	St/C	750 5171	3323 14780
		0.142 3.6	St	675 4654	2990 13302
		0.126 3.2	St	600 4137	2658 11824
		0.114 2.9	St	525 3620	2326 10346
		0.102 2.6	RX	475 3275	2104 9360
		0.091 2.3	RX	425 2930	1883 8375
		0.079 2.0	RX	375 2586	1661 7390
		0.063 1.6	RX	325 2241	1440 6405
76.1mm	3.00 76.1	0.280 7.1	C	750 5171	5301 23582
		0.252 6.4	C	750 5171	5301 23582
		0.197 5.0	St/C	650 4482	4595 20438
		0.157 4.0	St	575 3964	4064 18079
		0.142 3.6	St	550 3792	3888 17293
		0.122 3.1	St	500 3450	3537 15733
		0.114 2.9	RX	475 3275	3358 14935
		0.102 2.6	RX	400 2758	2827 12577
		0.091 2.3	RX	350 2413	2474 11005
		0.083 2.1	RX	325 2241	2297 10220
		0.079 2.0	RX	325 2241	2297 10220
3 80	3.500 88.9	0.315 8.0	C	750 5171	7216 32098
		0.220 5.6	St/C	750 5171	7216 32098
		0.157 4.0	St	600 4137	5773 25678
		0.142 3.6	St	550 3792	5292 23538
		0.126 3.2	RX	500 3450	4811 21398
		0.114 2.9	RX	475 2758	4570 20328
		0.102 2.6	RX	400 2930	3848 17119
		0.091 2.3	RX	350 2413	3367 14979
		0.079 2.0	RX	325 2241	3127 13910

Pipe Diameter		Style 89			
				Maximum	
Nominal Pipe Size	Actual Outside Diameter	Pipe Wall Thickness	Grooving Method	Working Pressure	End Load
Inches mm	Inches mm	Inches mm	St = Standard Roll Set RX = SS Roll Set C = Cut Groove	PSI kPa	Lbs N
4 100	4.500 114.3	0.346 8.8	C	750 5171	11928 53059
		0.248 6.3	C	750 5171	11928 53059
		0.177 4.5	St	575 3964	9145 40679
		0.142 3.6	St	650 4482	10338 45985
		0.114 2.9	RX	375 2586	5964 26530
		0.102 2.6	RX	325 2238	5161 22958
		0.079 2.0	RX	232 1600	3691 16417
139.7mm	5.500 139.7	0.394 10.0	C	750 5171	17819 79261
		0.280 7.1	C	750 5171	17819 79261
		0.260 6.6	St	750 5171	17819 79261
		0.260 6.6	C	750 5171	17819 79261
		0.248 6.3	St/C	700 4826	16631 73977
		0.220 5.6	St/C	600 4137	14255 63409
		0.197 5.0	St	525 3620	12474 55487
		0.157 4.0	St	375 2586	8909 39631
		0.134 3.4	RX	300 2068	7116 31652
		0.126 3.2	RX	300 2068	7127 31704
		0.118 3.0	RX	275 1896	6534 29062
		0.110 2.8	RX	275 1896	6534 29062
		0.102 2.6	RX	250 1724	5940 26420
		0.079 2.0	RX	232 1600	5513 24525

Rigid Coupling

STYLE 89
(FOR STAINLESS STEEL PIPE)

PERFORMANCE ON ISO WALL THICKNESSES

Pipe Diameter		Style 89			
				Maximum	
Nominal Pipe Size	Actual Outside Diameter	Pipe Wall Thickness	Grooving Method	Working Pressure	End Load
Inches mm	Inches mm	Inches mm	St = Standard Roll Set RX = SS Roll Set C = Cut Groove	PSI kPa	Lbs N
6 150	6.625 168.3	0.433 11.0	C	750 5171	25854 115003
		0.280 7.1	St	750 5171	25854 115003
		0.280 7.1	C	750 5171	25854 115003
		0.197 5.0	St	500 3447	17236 76668
		0.177 4.5	St	450 3103	15512 69002
		0.157 4.0	St	375 2586	12927 57501
		0.126 3.2	RX	275 1896	9480 42168
		0.118 3.0	RX	275 1896	9480 42168
		0.102 2.6	RX	232 1600	7999 35583
		0.079 2.0	RX	232 1600	7997 35574
8 200	8.625 219.1	0.492 12.5	C	600 4136	35049 155903
		0.315 8.0	St/C	575 3964	33595 149438
		0.256 6.5	St/C	475 3275	27752 123449
		0.248 6.3	St/C	450 3103	26292 116951
		0.197 5.0	St	375 2586	21910 97459
		0.157 4.0	St	325 2241	18989 84465
		0.142 3.6	RX	275 1896	16067 71470
		0.126 3.2	RX	250 1724	14607 64973
		0.118 3.0	RX	225 1551	13146 58476
		0.102 2.6	RX	175 1207	10225 45481
		0.079 2.0	RX	150 1034	8746 38984

Pipe Diameter		Style 89			
				Maximum	
Nominal Pipe Size	Actual Outside Diameter	Pipe Wall Thickness	Grooving Method	Working Pressure	End Load
Inches mm	Inches mm	Inches mm	St = Standard Roll Set RX = SS Roll Set C = Cut Groove	PSI kPa	Lbs N
10 250	10.750 273.0	0.559 14.2	C	600 4136	54446 242188
		0.492 12.5	C	600 4136	54446 242188
		0.394 10.0	C	600 4136	54446 242188
		0.248 6.3	St/C	425 2930	38574 171585
		0.157 4.0	RX	300 2068	27229 121119
		0.142 3.6	RX	250 1724	22691 100933
		0.126 3.2	RX	232 1600	21062 93690
		0.102 2.6	RX	N/R	
		0.079 2.0	RX		
12 300	12.750 323.9	0.492 12.5	C	600 4136	76590 340687
		0.394 10.0	C	600 4136	76590 340687
		0.280 7.1	St/C	450 3103	57454 255568
		0.197 5.0	RX	325 2241	41495 184577
		0.177 4.5	RX	300 2068	38303 170379
		0.157 4.0	RX	200 1379	25536 113590
		0.126 3.2	RX	N/R	
		0.102 2.6	RX		

N/R Not rated. Contact Victaulic for more information.

Rigid Coupling

STYLE 89
(FOR STAINLESS STEEL PIPE)

MATERIAL SPECIFICATIONS

Housing: Ductile iron conforming to ASTM A-536, grade 65-45-12. Ductile iron conforming to ASTM A-395, grade 65-45-15, is available upon special request.

Housing Coating: Hot dipped galvanized

Gaskets:

* Services listed are General Service Recommendations only. It should be noted that there are services for which these gaskets are not recommended. Reference should always be made to the latest Victaulic Gasket Selection Guide (05.01) for specific gasket service recommendations and for a listing of services which are not recommended.

- **Grade "E" EPDM**
  EPDM (Green color code). Temperature range –30°F to +230°F/–34°C to +110°C. Recommended for cold and hot water service within the specified temperature range plus a variety of dilute acids, oil-free air and many chemical services. UL Classified to ANSI/NSF 61 for cold +86°F/+30°C and hot +180°F/+82°C potable water service. NOT RECOMMENDED FOR PETROLEUM SERVICES.

- **Grade "T" nitrile**
  Nitrile (Orange color code). Temperature range –20°F to +180°F/–29°C to +82°C. Recommended for petroleum products, air with oil vapors, vegetable and mineral oils within the specified temperature range. Not recommended for hot water services over +150°F/+66°C or for hot dry air over +140°F/+60°C.

- **Grade "O" fluoroelastomer**
  Fluoroelastomer (Blue color code). Temperature range +20°F to + 300°F/–7°C to +149°C. Recommended for many oxidizing acids, petroleum oils, halogenated hydrocarbons, lubricants, hydraulic fluids, organic liquids and air with hydrocarbons.

- **Grade "A" white nitrile**
  White nitrile (White gasket). Temperature range +20°F to +180°F/–7°C to +82 °C. No carbon black content. May be used for food services. Meets FDA requirements and conforms to CFR Title 21 Part 177.2600.

Other gaskets are available. Please refer to 05.01.

Bolts/Nuts: Heat-treated plated carbon steel, trackhead meeting the physical and chemical requirements of ASTM A-449 and physical requirements of ASTM A-183.

Rigid Coupling

STYLE 89
(FOR STAINLESS STEEL PIPE)

INSTALLATION

Reference should always be made to the I-100 Victaulic Field Installation Handbook for the product you are installing. Handbooks are included with each shipment of Victaulic products for complete installation and assembly data, and are available in PDF format on our website at www.victaulic.com.

WARRANTY

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

GENERAL NOTES

Working Pressure and **End Load** are total, from all internal and external loads, based on stainless steel pipe, roll grooved with Victaulic rolls in accordance with Victaulic specifications. "RX" rolls must be used for Schedules 5S, 10S and 10. Standard rolls should be used for Schedule 40S and Standard Weight pipe. Contact Victaulic for performance on other pipe or cut grooved pipe. See submittal publication 24.01 for more information pertaining to tools.

WARNING: FOR ONE TIME FIELD TEST ONLY, the Maximum Joint Working Pressure may be increased to 1 ½ times the figures shown.

Metric thread size bolts are available for all coupling sizes upon request. Contact Victaulic for details.

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

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

Victaulic® Stainless Steel Fittings

Approvals/Listings:

See Victaulic Publication 10.01 for Regulatory Approval Reference Guide.

See Victaulic Publication 02.06 for potable water approvals if applicable

Product Description:

Victaulic offers a variety of stainless steel fittings in Types 304L and 316L stainless steel, ranging in size from ¾ to 12"/20 to 300mm. Standard offerings in stainless steel fittings include Schedule 10S and 40S wall thicknesses, with Schedule 5S fittings also available by contacting Victaulic. See section 1 starting on page 2 for Schedule 10S fitting information and section 2 starting on page 11 for Schedule 40S fitting information. Schedule 5S dimensions are equal to those of Schedule 10S, though weights are different. Please contact Victaulic for more information about Schedule 5S weights.

Pressure ratings for stainless steel fittings are equivalent to the pressure rating of the coupling when installed on stainless steel pipe of equal wall thickness. Pressure ratings for ductile iron couplings approved for use on stainless steel pipe can be found in publication 17.09.

In order to achieve Victaulic specified product performance, the proper Victaulic roll grooving tool and corresponding Victaulic roll set must be selected. When roll grooving ANSI Schedule 5S or 10S Type 304L or 316L stainless steel, a Victaulic manufactured RX roll set is required. Review publication 17.01 for more details.

UL Classified in accordance with ANSI/NSF 61 for cold +73°F/+23°C and hot +180°F/+82°C potable water service and ANSI/NSF 372.

WARNING

- **Victaulic RX roll sets must be used when grooving light-wall/thin-wall stainless steel pipe for use with Victaulic Couplings.**

Failure to use Victaulic RX roll sets when grooving light-wall/thin-wall stainless steel pipe may cause joint failure, resulting in serious personal injury and/or property damage.

NOTICE

- **Victaulic RX grooving rolls must be ordered separately. They are identified by a silver color and the designation RX on the front of the roll sets.**

Job/Owner

System No.	
Location	

Contractor

Submitted By	
Date	

Engineer

Spec Section	
Paragraph	
Approved	
Date	

17.16 2810 Rev O Updated 06/2014

SECTION 1: ANSI Schedule 10S Stainless Steel Fittings

Schedule 10S Material Specifications:

Note: Fittings are optionally available in Sch. 5S for 3 – 12"/80 - 300mm.

90° & 45° Elbows:

1 – 2 ½"/25 – 65 mm and 76.1 mm:

Schedule 10S, Grade CF8M (Type 316 stainless steel) conforming to ASTM A 351/A 351M, A 743/A 743M and A 744/A 744M.

3 – 12"/80 – 300 mm:

Schedule 10S, Type 304L or 316L stainless steel roll grooved from material conforming to ASTM A 403/ A 403M.

22 ½° & 11 ¼° Elbows:

¾ – 12"/20 – 300 mm:

Schedule 10S, Type 304L or 316L stainless steel roll grooved from material conforming to ASTM A 403/A 403M, or pipe conforming to ASTM A 312/A 312M, or sheet conforming to ASTM A 240/A 240M.

Tees:

1 – 1 ¼"/25 – 32 mm:

Schedule 10S, Type 304L or 316L stainless steel roll grooved from material conforming to ASTM A 312/ A 312M, or sheet conforming to A 240/A 240M.

1 ½ – 2 ½"/40 – 65 mm and 76.1 mm:

Schedule 10S, Grade CF8M (Type 316 stainless steel) conforming to ASTM A 351/A 351M, A 743/A 743M and A 744/A 744M.

3 – 12"/80 – 300 mm:

Schedule 10S, Type 304L or 316L stainless steel roll grooved from material conforming to ASTM A 403/ A 403M.

Reducing Tees:

1 ½ x 1 ½ x ¾ – 2 ½ x 2 ½ x 2"/40 x 40 x 20 – 65 x 65 x 50 mm and 76.1 x 76.1 x 60.3 mm:

Schedule 10S, Type 304L or 316L segmentally welded stainless steel from ASTM A 312/A 312M pipe.

3 x 3 x ¾ – 12 x 12 x 10"/80 x 80 x 20 – 300 x 300 x 250 mm:

Schedule 10S, Type 304L or 316L stainless steel roll grooved from material conforming to ASTM A 403/ A 403M, or pipe conforming to ASTM A 312/A 312M, or sheet conforming to ASTM A 240/A 240M.

Laterals, True Wyes, Crosses:

¾ – 12"/20 – 300 mm:

Schedule 10S, Type 304L or 316L stainless steel roll grooved from material conforming to ASTM A 403/ A 403M, or pipe conforming to ASTM A 312/A 312M, or sheet conforming to ASTM A 240/A 240M.

Adapter Nipples:

¾ – 12"/20 – 300 mm:

Schedule 10S, Type 304L or 316L stainless steel roll grooved from pipe conforming to ASTM A 312/A 312M.

Concentric Reducers:

1 ½ x ¾ – 2 ½ x 2"/40 x 20 – 65 x 50 mm and 76.1 x 60.3 mm:

Schedule 10S, Grade CF8M (Type 316 stainless steel) conforming to ASTM A 351/A 351M, A 743/A 743 M and A 744/A 744M.

3 x 1 – 12 x 10"/80 x 25 – 300 x 250 mm:

Schedule 10S, Type 304 or 316 stainless steel roll grooved from material conforming to ASTM A 403/A 403M.

Eccentric Reducers:

1 ½ x ¾ – 6 x 4"/40 x 20 – 150 x 100 mm:

Schedule 10S, Type 304L or 316L stainless steel roll grooved from material conforming to ASTM A 403/A 403M, or pipe conforming to ASTM A 312/A 312M, or sheet conforming to ASTM A 240/A 240M.

SECTION 1: ANSI Schedule 10S Stainless Steel Fittings

Caps:

¾ – 12"/20 – 300 mm:

For use with Schedule 10S pipe, Grade CF8M (Type 316 stainless steel) conforming to ASTM A 351/A 351M, A 743/A 743M and A 744/A 744M.

SECTION 1: ANSI Schedule 10S Stainless Steel Fittings

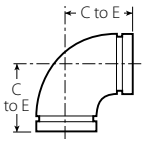
Schedule 10S Weights and Dimensions

Schedule 5S fittings feature the same C to E and E to E dimensions as Schedule 10S fittings, found below. For Schedule 5S weights, please contact Victaulic.

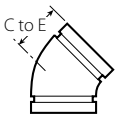
Dimensions:

Elbows

No. 410 SS 90° Elbow
No. 411 SS 45° Elbow



No. 410 SS

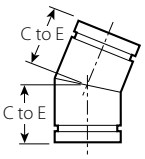


No. 411 SS

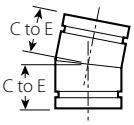
Nominal Size inches mm	Actual Outside Diameter inches mm	No. 410 SS 90° Elbow C to E inches mm	No. 410 SS 90° Elbow Approx. Weight Each Lbs. kg	No. 411 SS 45° Elbow C to E inches mm	No. 411 SS 45° Elbow Approx. Weight Each Lbs. kg
1 25	1.315 33.7	2.88 73	0.7 0.3	2.00 51	0.6 0.3
1 ¼ 32	1.660 42.4	3.13 80	1.0 0.5	2.00 51	0.8 0.4
1 ½ 40	1.900 48.3	3.50 89	1.4 0.6	2.13 54	1.0 0.4
2 50	2.375 60.3	4.50 114	2.2 1.0	2.75 70	1.6 0.7
2 ½ 65	2.875 73.0	5.00 127	3.3 1.5	2.88 73	2.2 1.0
76.1 mm	3.000 76.1	3.75 95	2.8 1.3	2.25 57	1.3 0.6
3 80	3.500 88.9	4.50 114	2.6 1.2	2.00 51	1.3 0.6
4 100	4.500 114.3	6.00 152	4.7 2.1	2.50 63	2.3 1.0
139.7 mm	5.500 139.7	7.50 190	7.8 3.5	3.13 79	3.1 1.4
165.1 mm	6.500 165.1	9.00 229	10.8 4.9	3.75 95	5.3 2.4
6 150	6.625 168.3	9.00 229	11.0 5.0	3.75 95	5.5 2.5
216 JIS	8.000 216.3	12.00 305	20.7 9.4	5.00 127	9.7 4.4
8 200	8.625 219.1	12.00 305	21.2 9.6	5.00 127	11.0 5.0
267 JIS	10.000 267.4	15.00 381	35.7 16.2	6.25 159	17.7 8.0
10 250	10.750 273.0	15.00 381	36.6 16.6	6.25 159	18.5 8.4
318 JIS	12.000 318.5	18.00 457	54.2 24.6	7.50 190	21.1 9.6
12 300	12.750 323.9	18.00 457	59.6 25.8	7.50 190	28.4 12.9

Elbows

No. 412 SS 22½° Elbow
No. 413 SS 11¼° Elbow



No. 412 SS



No. 413 SS

Nominal Size inches mm	Actual Outside Diameter inches mm	No. 412 SS 22½° Elbow C to E inches mm	No. 412 SS 22½° Elbow Approx. Weight Each Lbs. kg	No. 413 SS 11¼° Elbow C to E inches mm	No. 413 SS 11¼° Elbow Approx. Weight Each Lbs. kg
¾ 20	1.050 26.9	1.63 41	–	1.38 35	–
1 25	1.315 33.7	1.63 41	0.5 0.2	1.38 35	0.2 0.1
1 ¼ 32	1.660 42.4	1.75 44	0.6 0.3	1.38 35	0.4 0.2
1 ½ 40	1.900 48.3	1.75 44	0.6 0.3	1.38 35	0.4 0.2
2 50	2.375 60.3	1.88 48	1.0 0.5	1.38 35	0.7 0.3
2 ½ 65	2.875 73.0	2.00 51	1.4 0.6	1.50 38	0.7 0.3
76.1 mm	3.000 76.1	2.25 57	–	1.50 38	–
3 80	3.500 88.9	2.25 57	1.7 0.8	1.50 38	1.2 0.5
4 100	4.500 114.3	2.88 73	2.8 1.3	1.75 44	1.8 0.8
139.7 mm	5.500 139.7	2.88 73	–	2.00 51	–
165.1 mm	6.500 165.1	3.13 79	5.5 2.5	2.00 51	3.5 1.6
6 150	6.625 168.3	3.18 81	5.8 2.6	2.00 51	3.4 1.5
8 200	8.625 219.1	3.88 99	9.2 4.2	2.00 51	4.6 2.1
10 250	10.750 273.0	4.38 111	13.6 6.2	2.13 54	5.3 2.4
12 300	12.750 323.9	4.88 124	19.2 8	2.25 57	14.1 6.4

Note: All No. 412 SS and No. 413 SS elbows are segmentally welded stainless steel.

SECTION 1: ANSI Schedule 10S Stainless Steel Fittings

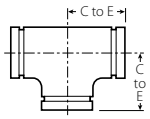
Schedule 10S Weights and Dimensions

Schedule 5S fittings feature the same C to E and E to E dimensions as Schedule 10S fittings, found below. For Schedule 5S weights, please contact Victaulic.

Dimensions:

Tees

No. 420 SS



No. 420 SS

Nominal Size inches mm	Actual Outside Diameter inches mm	No. 420 SS Tee	
		C to E inches mm	Approx. Weight Each Lbs. kg
1 (sw) 25 (sw)	1.315 33.7	2.25 57	0.7 0.3
1 ¼ 32	1.660 42.4	3.13 79	1.5 0.7
1 ½ 40	1.900 48.3	3.38 86	2.2 1.0
2 50	2.375 60.3	2.75 70	2.4 1.1
2 ½ 65	2.875 73.0	3.13 79	3.7 1.7
76.1 mm	3.000 76.1	3.75 95	4.5 2.2
3 80	3.500 88.9	3.75 95	3.1 1.4
4 100	4.500 114.3	4.50 114	4.9 2.2
139.7 mm	5.500 139.7	5.25 133	7.9 3.6
165.1 mm	6.500 165.1	5.88 149	11.3 5.1
6 150	6.625 168.3	5.88 149	11.7 5.3
216 JIS	8.000 216.3	7.75 197	20.3 9.2
8 200	8.625 219.1	7.75 197	20.4 9.3
267 JIS	10.000 267.4	8.88 226	33.9 15.4
10 250	10.750 273.0	8.88 226	34.4 15.6
318 JIS	12.000 318.5	10.38 264	48.4 22.0
12 300	12.750 323.9	10.38 264	52.4 23.8

NOTE: (sw) denotes segmentally welded

SECTION 1: ANSI Schedule 10S Stainless Steel Fittings

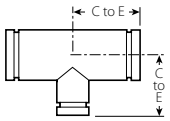
Schedule 10S Weights and Dimensions

Schedule 5S fittings feature the same C to E and E to E dimensions as Schedule 10S fittings, found below. For Schedule 5S weights, please contact Victaulic.

Dimensions:

Reducing Tees

No. 425 SS



No. 425 SS

Nominal Size inches mm						No. 425 SS Reducing Tee		
						C to E Run inches mm	C to E Branch inches mm	Approx. Weight Each Lbs. kg
1 ½ 40	x	1 ½ 40	x	¾(sw) 20		2.75 70	2.75 70	1.3 0.6
			x	1(sw) 25		2.75 70	2.75 70	1.4 0.6
			x	1 ¼(sw) 32		2.75 70	2.75 70	1.5 0.7
2 50	x	2 50	x	¾(sw) 20		3.25 83	3.25 83	2.0 0.9
			x	1(sw) 25		3.25 83	3.25 83	2.1 1.0
			x	1 ¼(sw) 32		3.25 83	3.25 83	2.3 1.0
			x	1 ½ 40		2.75 70	2.75 70	2.0 0.9
2 ½ 65	x	2 ½ 65	x	¾(sw) 20		3.75 95	3.75 95	2.8 1.3
			x	1(sw) 25		3.75 95	3.75 95	3.0 1.4
			x	1 ½(sw) 40		3.75 95	3.75 95	3.5 1.8
			x	2 50		3.07 78	3.07 78	3.5 1.6
76.1	x	76.1	x	60.3		3.75 95	3.75 95	3.5 1.6
3 80	x	3 80	x	¾(sw) 20		4.25 108	4.25 108	4.0 1.8
			x	1(sw) 25		4.25 108	4.25 108	4.1 1.9
			x	1 ¼(sw) 32		4.25 108	4.25 108	4.2 1.9
			x	1 ½(sw) 40		4.25 108	4.25 108	4.3 2.0
			x	2 50		3.77 96	3.23 82	3.1 1.4
			x	2 ½ 65		3.77 96	3.23 82	3.1 1.4
			x	76.1		3.77 96	3.23 82	3.1 1.4

NOTE: (sw) denotes segmentally welded

Nominal Size inches mm						No. 425 SS Reducing Tee		
						C to E Run inches mm	C to E Branch inches mm	Approx. Weight Each Lbs. kg
4 100	x	4 100	x	1(sw) 25		5.00 127	5.00 127	5.0 2.3
			x	1 ¼(sw) 32		5.00 127	5.00 127	5.3 2.4
			x	1 ½(sw) 40		5.00 127	5.00 127	5.6 2.5
			x	2 50		4.47 114	3.88 99	4.9 2.2
			x	2 ½ 65		4.47 114	3.82 97	4.9 2.2
			x	76.1		4.47 114	3.82 97	4.9 2.2
			x	3 80		4.47 114	3.88 99	4.9 2.2
139.7	x	139.7	x	88.9		5.28 134	4.38 111	6.85 3.1
			x	114.3		5.28 134	4.62 117	7.85 3.6
6 150	x	6 150	x	2(sw) 50		6.50 165	6.50 165	11.6 5.3
			x	2 ½(sw) 65		6.50 165	6.50 165	12.1 5.5
			x	3 80		5.91 150	4.88 124	8.8 4.0
			x	4 100		5.91 150	5.12 130	9.5 4.3
8 200	x	8 200	x	2 ½(sw) 65		7.75 197	7.75 197	17.5 7.9
			x	3(sw) 80		7.75 197	7.75 197	18.0 8.2
			x	4 100		7.79 198	6.31 160	18.1 8.2
			x	6 150		7.79 198	6.62 168	18.5 8.4
10 250	x	10 250	x	3(sw) 80		9.00 229	9.00 229	29.0 13.2
			x	4(sw) 100		9.00 229	9.00 229	30.0 13.6
			x	6 150		8.89 226	7.70 196	28.2 12.8
			x	8 200		8.89 226	8.59 218	31.3 14.2
12 300	x	12 300	x	6(sw) 150		10.00 254	10.00 254	43.0 19.5
			x	8 200		10.39 264	9.51 242	40.1 18.2
			x	10 250		10.39 264	9.89 251	47.6 21.6

NOTE: (sw) denotes segmentally welded

SECTION 1: ANSI Schedule 10S Stainless Steel Fittings

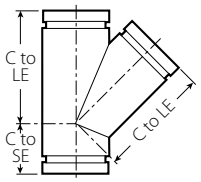
Schedule 10S Weights and Dimensions

Schedule 5S fittings feature the same C to E and E to E dimensions as Schedule 10S fittings, found below. For Schedule 5S weights, please contact Victaulic.

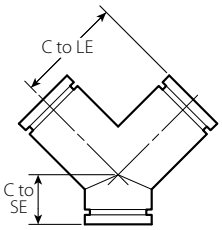
Dimensions:

45° Laterals, True Wyes and Crosses

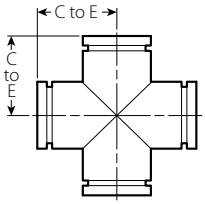
No. 430 SS 45° Lateral
No. 433 SS True Wye
No. 435 SS Cross



No. 430 SS



No. 433 SS



No. 435 SS

Nominal Size inches mm	Actual Outside Diameter inches mm	No. 430 SS 45° Lateral C to LE inches mm	No. 430 SS 45° Lateral C to SE inches mm	No. 430 SS 45° Lateral Approx. Weight Each Lbs. kg	No. 433 SS True Wye C to LE inches mm	No. 433 SS True Wye C to SE inches mm	No. 433 SS True Wye Approx. Weight Each Lbs. kg	No. 435 SS Cross C to E inches mm	No. 435 SS Cross Approx. Weight Each Lbs. kg
¾ 20	1.050 26.9	4.50 114	2.00 51	0.8 0.4	2.25 57	2.00 51	0.6 0.3	2.25 57	0.7 0.3
1 25	1.315 33.7	5.00 127	2.25 57	1.4 0.6	2.25 57	2.25 57	0.9 0.4	2.25 57	1.1 0.5
1 ¼ 32	1.660 42.4	5.75 146	2.50 64	1.9 0.9	2.75 70	2.50 64	1.2 0.5	2.75 70	1.6 0.7
1 ½ 40	1.900 48.3	6.25 159	2.75 70	2.6 1.2	2.75 70	2.75 70	1.4 0.6	2.75 70	1.9 0.9
2 50	2.375 60.3	7.00 178	2.75 70	3.3 1.5	3.25 83	2.75 70	1.8 0.8	3.25 83	2.7 1.2
2 ½ 65	2.875 73.0	7.75 197	3.00 76	5.3 2.4	3.75 95	3.00 76	2.5 1.1	3.75 95	3.6 1.6
3 80	3.500 88.9	8.50 216	3.25 83	6.5 2.9	4.25 108	3.25 83	3.4 1.5	4.25 108	5.8 2.6
4 100	4.500 114.3	10.50 267	3.75 95	11.2 5.1	5.00 127	3.75 95	5.1 2.3	5.00 127	8.0 3.6
6 150	6.625 168.3	14.00 356	4.50 114	20.9 9.5	6.50 165	4.50 114	10.7 4.9	6.50 165	13.4 6.1
8 200	8.625 219.1	18.00 457	6.00 152	33.1 15.0	7.75 197	6.00 152	16.6 7.5	7.75 197	22.1 10.0
10 250	10.750 273.0	20.50 521	6.50 165	47.5 21.5	9.00 229	6.50 155	31.6 14.3	9.00 229	54.9 24.9
12 300	12.750 323.9	23.00 584	7.00 178	79.2 35.9	10.00 254	7.00 178	38.4 17.4	10.00 254	52.8 23.9

NOTE: All No. 430 SS, No. 433 SS and No. 435 SS fittings are segmentally welded.

SECTION 1: ANSI Schedule 10S Stainless Steel Fittings

Schedule 10S Weights and Dimensions

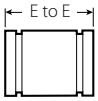
Schedule 5S fittings feature the same C to E and E to E dimensions as Schedule 10S fittings, found below. For Schedule 5S weights, please contact Victaulic.

Dimensions:

Adapter Nipples

No. 442 SS Grv. x Bev.
No. 443 SS Grv. x Grv.

No. 442 SS



No. 443 SS

Nominal Size inches mm	Actual Outside Diameter inches mm	No. 442 SS / No. 443 SS Adapter Nipple	
		E to E inches mm	Approx. Weight Each Lbs. kg
¾ 20	1.050 26.9	3.00 76	0.2 0.1
1 25	1.315 33.7	3.00 76	0.3 0.1
1 ¼ 32	1.660 42.4	4.00 102	0.6 0.3
1 ½ 40	1.900 48.3	4.00 102	0.7 0.3
2 50	2.375 60.3	4.00 102	0.8 0.4
2 ½ 65	2.875 73.0	4.00 102	1.1 0.5
3 80	3.500 88.9	4.00 102	1.2 0.5
4 100	4.500 114.3	6.00 152	2.8 1.3
6 150	6.625 168.3	6.00 152	4.6 2.1
8 200	8.625 219.1	6.00 152	6.5 2.9
10 250	10.750 273.0	8.00 203	12.2 5.5
12 300	12.750 323.9	8.00 203	15.8 7.2

SECTION 1: ANSI Schedule 10S Stainless Steel Fittings

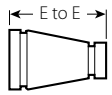
Schedule 10S Weights and Dimensions

Schedule 5S fittings feature the same C to E and E to E dimensions as Schedule 10S fittings, found below. For Schedule 5S weights, please contact Victaulic.

Dimensions:

Concentric Reducers

No. 450 SS



No. 450 SS

Nominal Size inches mm	Actual Outside Diameter inches mm	No. 450 SS Concentric Reducer	
		E to E inches mm	Approx. Weight Each Lbs. kg
1½ 40 x ¾ 20	1.900 48.3 x 1.050 26.7	3.75 95	1.3 0.6
x 1 25	x 1.315 33.7	3.75 95	1.4 0.6
x 1¼ 32	x 1.660 42.4	3.75 95	1.5 0.7
2 50 x ¾ 20	2.375 60.3 x 1.050 26.7	3.75 95	2.0 0.9
x 1 25	x 1.315 33.7	3.75 95	2.1 1.0
x 1¼ 32	x 1.660 42.4	3.75 95	2.3 1.0
x 1½ 40	x 1.900 48.3	5.00 127	1.3 0.6
2½ 65 x 1 25	2.875 73.0 x 1.315 33.7	5.00 127	3.0 1.4
x 1¼ 32	x 1.660 42.4	5.00 127	2.8 1.3
x 2 50	x 2.375 60.3	5.00 127	1.7 0.8
76.1 x 60.3	3.000 76.1 x 2.375 60.3	2.50 64	1.7 0.8
3 80 x 1 25	3.500 88.9 x 1.315 33.7	5.00 127	4.0 1.8
x 1¼ 32	x 1.660 42.4	5.00 127	4.1 1.9
x 1½ 40	x 1.900 48.3	5.00 127	4.2 1.9
x 2 50	x 2.375 60.3	5.00 127	1.6 0.7
x 2½ 65	x 2.875 73.0	5.00 127	1.5 0.7
x 76.1	x 3.000 76.1	5.00 127	1.5 0.7
4 100 x 2 50	4.500 114.3 x 2.375 60.3	5.00 127	3.9 1.8
x 2½ 65	x 2.875 73.0	5.00 127	5.8 2.6
x 76.1	x 3.000 76.1	5.00 127	5.8 2.6
x 3 80	x 3.500 88.9	5.00 127	2.0 0.9

Nominal Size inches mm	Actual Outside Diameter inches mm	No. 450 SS Concentric Reducer	
		E to E inches mm	Approx. Weight Each Lbs. kg
139.7 x 88.9	5.500 139.7 x 3.500 88.9	5.00 127	3.0 1.4
x 114.3	x 4.500 114.3	5.00 127	3.2 1.5
6 150 x 2½ 65	6.625 168.3 x 2.875 73.0	9.00 229	6.8 3.1
x 3 80	x 3.500 88.9	5.50 140	4.0 1.8
x 4 100	x 4.500 114.3	5.50 140	4.2 1.9
x 139.7	x 5.500 139.7	5.50 140	4.5 2.0
8 200 x 4 100	8.625 219.1 x 4.500 114.3	6.00 152	5.3 2.4
x 139.7	x 5.500 139.7	6.00 152	6.1 2.8
x 6 150	x 6.625 168.3	6.00 152	7.0 3.2
10 250 x 6 150	10.750 273 x 6.625 168.3	7.00 178	8.8 4.0
x 8 200	x 8.625 219.1	7.00 178	11.5 5.2
12 300 x 8 200	12.750 323.9 x 8.625 219.1	8.00 203	13.2 6.0
x 10 250	x 10.750 273.0	8.00 203	17.0 7.7

SECTION 1: ANSI Schedule 10S Stainless Steel Fittings

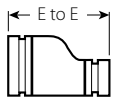
Schedule 10S Weights and Dimensions

Schedule 5S fittings feature the same C to E and E to E dimensions as Schedule 10S fittings, found below. For Schedule 5S weights, please contact Victaulic.

Dimensions:

Eccentric Reducers

No. 451 SS

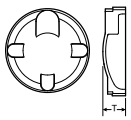


No. 451 SS

Nominal Size inches mm			Actual Outside Diameter inches mm			No. 451 SS Eccentric Reducer	
						E to E inches mm	Approx. Weight Each Lbs. kg
1 ½ 40	x	¾ 20	1.900 48.3	x	1.050 26.9	3.75 95	1.3 0.6
	x	1 25		x	1.315 33.7	3.75 95	1.4 0.6
	x	1 ¼ 32		x	1.660 42.4	3.75 95	1.5 0.7
2 50	x	¾ 20	2.375 60.3	x	1.050 26.7	3.75 95	2.0 0.9
	x	1 25		x	1.315 33.7	3.75 95	2.1 1.0
	x	1 ¼ 32		x	1.660 42.4	3.75 95	2.3 1.0
	x	1 ½ 40		x	1.900 48.3	3.75 95	2.5 1.1
2 ½ 65	x	1 25	2.875 73.0	x	1.315 33.7	5.00 127	2.8 1.3
	x	1 ½ 32		x	1.900 48.3	5.00 127	3.0 1.4
	x	2 50		x	2.375 60.3	5.00 127	3.5 1.6
3 80	x	1 25	3.500 88.9	x	1.315 33.7	5.00 127	4.0 1.8
	x	1 ¼ 32		x	1.660 42.4	5.00 127	4.1 1.9
	x	1 ½ 40		x	1.900 48.3	5.00 127	4.2 1.9
	x	2 50		x	2.375 60.3	5.00 127	4.3 2.0
	x	2 ½ 65		x	2.875 73.0	5.00 127	4.5 2.0
4 100	x	2 50	4.500 114.3	x	2.375 60.3	5.00 127	4.8 2.2
	x	2 ½ 65		x	2.875 73.0	5.00 127	5.8 2.6
	x	3 80		x	3.500 88.9	5.00 127	5.9 2.7
6 150	x	2 ½ 65	6.625 168.3	x	2.875 73.0	9.00 229	6.8 3.1
	x	3 80		x	3.500 88.9	9.00 229	6.9 3.1
	x	4 100		x	4.500 114.3	9.00 229	7.0 3.2

Caps

No. 460 SS



No. 460 SS

Nominal Size inches mm	Actual Outside Diameter inches mm	No. 460 SS Cap	
		Thickness "T" inches mm	Approx. Weight Each Lbs. kg
¾ 20	1.050 26.9	0.75 19	0.1 0.1
1 25	1.315 33.7	0.75 19	0.2 0.1
1 ¼ 32	1.660 42.4	0.75 19	0.3 0.1
1 ½ 40	1.900 48.3	0.75 19	0.4 0.2
2 50	2.375 60.3	1.00 25	0.6 0.3
2 ½ 65	2.875 73.0	1.13 29	0.9 0.4
76.1 mm	3.000 76.1	1.13 29	1.1 0.5
3 80	3.500 88.9	1.00 26	1.1 0.5
4 100	4.500 114.3	1.13 29	1.8 0.8
139.7 mm	5.500 139.7	1.38 35	3.2 1.5
165.1 mm	6.500 165.1	1.75 44	4.1 1.9
6 150	6.625 168.3	1.75 44	4.0 1.8
216 JIS	8.000 216.3	2.25 57	7.0 3.2
8 200	8.625 219.1	2.25 57	7.0 3.2
267 JIS	10.000 267.4	2.75 70	7.5 3.4
10 250	10.750 273.0	2.75 70	17.8 8.1
318 JIS	12.000 318.5	3.25 83	26.3 12.0
12 300	12.750 323.9	3.25 83	26.7 12.1

SECTION 2: ANSI Schedule 40S Stainless Steel Fittings

Schedule 40S Material Specifications:

Note: Schedule 40S fittings in this document, except No. 410H SS and No. 411H SS, are segmentally welded stainless steel.

Elbows:

¾ – 12"/20 – 300 mm:

Schedule 40S, Type 304L or 316L stainless steel roll or cut grooved from material conforming to ASTM A 403/ A 403M.

Tees:

1 – 12"/25 – 300 mm:

Schedule 40S, Type 304L or 316L stainless steel roll or cut grooved from material conforming to ASTM A 403/ A 403M, or pipe conforming to ASTM A 312/A 312M, or sheet conforming to ASTM A 240/A 240M.

Reducing Tees:

2 x 2 x 1 – 12 x 12 x 10"/50 x 50 x 25 – 300 x 300 x 250 mm:

Schedule 40S, Type 304L or 316L stainless steel roll or cut grooved from material conforming to ASTM A 403/ A 403M, or pipe conforming to ASTM A 312/A 312M, or sheet conforming to ASTM A 240/A 240M.

Laterals, True Wyes, Crosses:

¾ – 12"/20 – 300 mm:

Schedule 40S, Type 304L or 316L stainless steel roll or cut grooved from material conforming to ASTM A 403/ A 403M, or pipe conforming to ASTM A 312/A 312 M, or sheet conforming to ASTM A 240/A 240M.

Adapter Nipples:

¾ – 12"/20 – 300 mm:

Schedule 40S, Type 304L or 316L stainless steel roll or cut grooved from pipe conforming to ASTM A 312/ A 312 M.

Concentric Reducers:

2 x 1 – 12 x 10"/50 x 25 – 300 x 250 mm:

Schedule 40S, Type 304L or 316L stainless steel roll or cut grooved from material conforming to ASTM A 403/ A 403M, or pipe conforming to ASTM A 312/A 312M, or sheet conforming to ASTM A 240/A 240M.

Eccentric Reducers:

2 x 1 – 12 x 10"/50 x 25 – 300 x 250 mm:

Schedule 40S, Type 304L or 316L stainless steel roll or cut grooved from material conforming to ASTM A 403/ A 403M, or pipe conforming to ASTM A 312/A 312M, or sheet conforming to ASTM A 240/A 240M.

Caps:

¾ – 12"/20 – 300 mm:

For use with Schedule 40S pipe, Type 304L or 316L stainless steel conforming to ASTM A 403/A 403M.

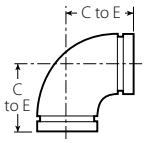
SECTION 2: ANSI Schedule 40S Stainless Steel Fittings

Schedule 40S Weights and Dimensions

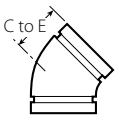
Dimensions:

Elbows

No. 410H SS 90° Elbow
No. 411H SS 45° Elbow



No. 410H SS



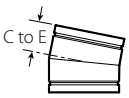
No. 411H SS

Nominal Size inches mm	Actual Outside Diameter inches mm	No. 410H SS 90° Elbow C to E inches mm	No. 410H SS 90° Elbow Approx. Weight Each Lbs. kg	No. 411H SS 45° Elbow C to E inches mm	No. 411H SS 45° Elbow Approx. Weight Each Lbs. kg
1 25	1.315 33.7	2.88 73	0.7 0.3	2.25 57	0.6 0.3
1 ¼ 32	1.660 42.4	3.25 83	1.3 0.6	2.38 61	0.9 0.4
1 ½ 40	1.900 48.3	3.63 92	1.4 0.6	2.50 64	1.1 0.5
2 50	2.375 60.3	4.38 111	2.5 1.1	2.75 70	2.4 1.1
2 ½ 65	2.875 73.0	5.13 130	3.8 1.7	3.13 80	2.8 1.3
3 80	3.500 88.9	5.88 149	5.4 2.4	3.38 86	4.1 1.9
4 100	4.500 114.3	7.50 191	12.0 5.4	4.00 102	4.8 2.2
6 150	6.625 168.3	10.75 273	29.3 13.3	5.50 140	17.0 7.7
8 200	8.625 219.1	14.25 362	59.0 26.8	7.25 184	34.0 15.4
10 250	10.750 273.0	17.25 438	99.0 44.9	8.50 216	58.3 26.4
12 300	12.750 323.9	20.50 521	142.0 64.4	10.00 254	85.0 38.6

Elbows

No. 412H SS 22½° Elbow
No. 413H SS 11¼° Elbow

No. 412H SS



No. 413H SS

Nominal Size inches mm	Actual Outside Diameter inches mm	No. 412H SS 22½° Elbow C to E inches mm	No. 412H SS 22½° Elbow Approx. Weight Each Lbs. kg	No. 413H SS 11¼° Elbow C to E inches mm	No. 413H SS 11¼° Elbow Approx. Weight Each Lbs. kg
¾ 20	1.050 26.9	1.63 41	–	1.38 35	–
1 25	1.315 33.7	1.63 41	0.6 0.3	1.38 35	0.3 0.1
1 ¼ 32	1.660 42.4	1.75 44	0.8 0.4	1.38 35	0.5 0.2
1 ½ 40	1.900 48.3	1.75 44	0.8 0.4	1.38 35	0.5 0.2
2 50	2.375 60.3	1.88 48	1.4 0.6	1.38 35	1.0 0.5
2 ½ 65	2.875 73.0	2.00 51	2.3 1.0	1.50 38	1.1 0.5
3 80	3.500 88.9	2.25 57	3.1 1.4	1.50 38	2.1 1.0
4 100	4.500 114.3	2.88 73	5.6 2.5	1.75 44	3.6 1.6
6 150	6.625 168.3	3.18 81	12.2 5.5	2.00 51	7.0 3.2
8 200	8.625 219.1	3.88 99	20.0 9.1	2.00 51	10.1 4.6
10 250	10.750 273.0	4.38 111	30.0 13.6	2.13 54	11.8 5.3
12 300	12.750 323.9	4.88 124	40.0 18.1	2.25 57	29.3 13.3

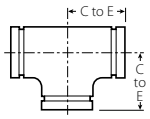
SECTION 2: ANSI Schedule 40S Stainless Steel Fittings

Schedule 40S Weights and Dimensions

Dimensions:

Tees

No. 420H SS



No. 420H SS

Nominal Size inches mm	Actual Outside Diameter inches mm	No. 420H SS Tee	
		C to E inches mm	Approx. Weight Each Lbs. kg
1 25	1.315 33.7	2.25 57	0.9 0.4
1 ¼ 32	1.660 42.4	2.75 70	1.5 0.7
1 ½ 40	1.900 48.3	2.75 70	1.7 0.8
2 50	2.375 60.3	3.25 83	2.5 1.1
2 ½ 65	2.875 73.0	3.75 95	4.7 2.1
3 80	3.500 88.9	4.25 108	7.0 3.2
4 100	4.500 114.3	5.00 127	13.0 5.9
6 150	6.625 168.3	6.50 165	26.4 12.0
8 200	8.625 219.1	7.75 197	46.1 20.9
10 250	10.750 273.0	9.00 229	71.5 32.4
12 300	12.750 323.9	10.00 254	100.0 45.4

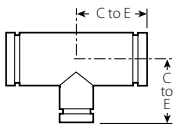
SECTION 2: ANSI Schedule 40S Stainless Steel Fittings

Schedule 40S Weights and Dimensions

Dimensions:

Reducing Tees

No. 425H SS



No. 425H SS

Nominal Size inches mm						Actual Outside Diameter inches mm						No. 425H SS Reducing Tee C to E inches mm	No. 425H SS Reducing Tee Approx. Weight Each Lbs. kg
2 50	x	2 50	x	1 25		2.375 60.3	x	2.375 60.3	x	1.315 33.7		3.25 83	2.5 1.1
			x	1 ¼ 32					x	1.660 42.4		3.25 83	2.8 1.3
			x	1 ½ 40					x	1.900 48.3		3.25 83	3.2 1.5
2 ½ 65	x	2 ½ 65	x	1 ½ 40		2.875 73.0	x	2.875 73.0	x	1.900 48.3		3.75 95	4.4 2.0
			x	2 40					x	2.375 60.3		3.50 89	4.5 2.0
3 80	x	3 80	x	1 ½ 40		3.500 88.9	x	3.500 88.9	x	1.900 48.3		4.25 108	4.5 2.0
			x	2 50					x	2.375 60.3		4.25 108	5.2 2.4
			x	2 ½ 65					x	2.875 73.0		4.25 108	5.6 2.5
4 100	x	4 100	x	2 50		4.500 114.3	x	4.500 114.3	x	2.375 60.3		5.00 127	10.2 4.6
			x	2 ½ 65					x	2.875 73.0		5.00 127	10.5 4.8
			x	3 80					x	3.500 88.9		5.00 127	11.6 5.3
6 150	x	6 150	x	2 50		6.625 168.3	x	6.625 168.3	x	2.375 60.3		6.50 165	22.0 10.0
			x	3 80					x	3.500 88.9		6.50 165	22.4 10.2
			x	4 100					x	4.500 114.3		6.50 165	22.8 10.3
8 200	x	8 200	x	3 80		8.625 219.1	x	8.625 219.1	x	3.500 88.9		7.75 197	35.0 15.9
			x	4 100					x	4.500 114.3		7.75 197	39.3 17.8
			x	6 150					x	6.625 168.3		7.75 197	45.0 20.4

Nominal Size inches mm						Actual Outside Diameter inches mm						No. 425H SS Reducing Tee C to E inches mm	No. 425H SS Reducing Tee Approx. Weight Each Lbs. kg
10 250	x	10 250	x	4 100		10.750 323.9	x	10.750 323.9	x	4.500 88.9		9.00 229	63.0 28.6
			x	6 150					x	6.625 168.3		9.00 229	68.3 31.0
			x	8 200					x	8.625 219.1		9.00 229	71.0 32.2
12 300	x	12 300	x	6 150		12.750 323.9	x	12.750 323.9	x	6.625 168.3		10.00 254	73.0 33.1
			x	8 200					x	8.625 219.1		10.00 254	75.0 34.0
			x	10 250					x	10.750 273.0		10.00 254	77.0 34.9

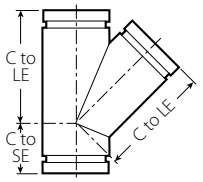
SECTION 2: ANSI Schedule 40S Stainless Steel Fittings

Schedule 40S Weights and Dimensions

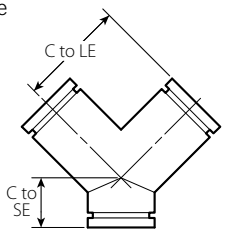
Dimensions:

45° Laterals, True Wyes and Crosses

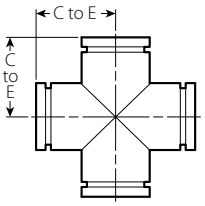
No. 430H SS 45° Lateral
No. 433H SS True Wye
No. 435H SS Cross



No. 430H SS



No. 433H SS



No. 435H SS

Nominal Size inches mm	Actual Outside Diameter inches mm	No. 430H SS 45° Lateral C to LE inches mm	C to SE inches mm	Approx. Weight Each Lbs. kg	No. 433H SS True Wye C to LE inches mm	C to SE inches mm	Approx. Weight Each Lbs. kg	No. 435H SS Cross C to E inches mm	Approx. Weight Each Lbs. kg
¾ 20	1.050 26.9	4.50 114	2.00 51	1.0 0.5	2.25 57	2.00 51	0.7 0.3	2.25 57	0.9 0.4
1 25	1.315 33.7	5.00 127	2.25 57	1.7 0.8	2.25 57	2.25 57	1.1 0.5	2.25 57	1.3 0.6
1 ¼ 32	1.660 42.4	5.75 146	2.50 64	2.5 1.1	2.75 70	2.50 64	1.5 0.7	2.75 70	2.1 1.0
1 ½ 40	1.900 48.3	6.25 159	2.75 70	3.5 1.6	2.75 70	2.75 70	1.8 0.8	2.75 70	2.5 1.1
2 50	2.375 60.3	7.00 178	2.75 70	4.6 2.1	3.25 83	2.75 70	2.5 1.1	3.25 83	3.8 1.7
2 ½ 65	2.875 73.0	7.75 197	3.00 76	9.0 94.1	3.75 95	3.00 76	4.3 2.0	3.75 95	6.1 2.8
3 80	3.500 88.9	8.50 216	3.25 83	11.7 5.4	4.25 108	3.25 83	6.1 2.8	4.25 108	10.5 4.8
4 100	4.500 114.3	10.50 267	3.75 95	22.2 10.1	5.00 127	3.75 95	10.0 4.5	5.00 127	15.8 7.2
6 150	6.625 168.3	14.00 356	4.50 114	43.6 19.8	6.50 165	4.50 114	22.3 10.1	6.50 165	28.0 12.7
8 200	8.625 219.1	18.00 457	6.00 152	72.0 32.7	7.75 197	6.00 152	36.0 16.3	7.75 197	48.0 21.8
10 250	10.750 273.0	20.50 521	6.50 165	105.0 47.6	9.00 229	6.50 155	69.9 31.7	9.00 229	121.5 55.1
12 300	12.750 323.9	23.00 584	7.00 178	165.0 74.8	10.00 254	7.00 178	80.0 36.3	10.00 254	110.0 49.9

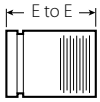
SECTION 2: ANSI Schedule 40S Stainless Steel Fittings

Schedule 40S Weights and Dimensions

Dimensions:

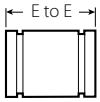
Adapter Nipples

No. 440H SS Grv. x Thd.
No. 442H SS Grv. x Bev.
No. 443H SS Grv. x Grv.



No. 440H SS

No. 442H SS



No. 443H SS

Nominal Size inches mm	Actual Outside Diameter inches mm	No. 440H SS / No. 442H SS / No. 443H SS Adapter Nipple	
		E to E inches mm	Approx. Weight Each Lbs. kg
¾ 20	1.050 26.9	3.00 76	0.3 0.1
1 25	1.315 33.7	3.00 76	0.4 0.2
1 ¼ 32	1.660 42.4	4.00 102	0.8 0.4
1 ½ 40	1.900 48.3	4.00 102	0.9 0.4
2 50	2.375 60.3	4.00 102	1.2 0.5
2 ½ 65	2.875 73.0	4.00 102	1.9 0.9
3 80	3.500 88.9	4.00 102	2.5 1.1
4 100	4.500 114.3	6.00 152	5.5 2.5
6 150	6.625 168.3	6.00 152	9.5 4.3
8 200	8.625 219.1	6.00 152	14.2 6.4
10 250	10.750 273.0	8.00 203	27.0 12.2
12 300	12.750 323.9	8.00 203	33.0 15.0

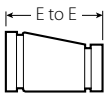
SECTION 2: ANSI Schedule 40S Stainless Steel Fittings

Schedule 40S Weights and Dimensions

Dimensions:

Concentric Reducers

No. 50H SS



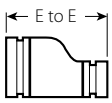
No. 50H SS

Nominal Size inches mm			Actual Outside Diameter inches mm			No. 50H SS Concentric Reducer E to E inches mm	No. 50H SS Concentric Reducer Approx. Weight Each Lbs. kg
2 50	x	1 25	2.375 60.3	x	1.315 33.7	9.00 229	2.1 1.0
	x	1 ¼ 32		x	1.660 42.4	9.00 229	2.4 1.1
	x	1 ½ 40		x	1.900 48.3	9.00 229	2.5 1.1
2 ½ 65	x	1 25	2.875 73.0	x	1.315 33.7	9.50 241	3.2 1.5
	x	1 ¼ 32		x	1.660 42.4	9.50 241	3.4 1.5
	x	2 50		x	2.375 60.3	9.50 241	4.0 1.8
3 80	x	1 ½ 40	3.500 88.9	x	1.900 48.3	9.50 241	3.6 1.6
	x	2 50		x	2.375 60.3	9.50 241	4.8 2.2
	x	2 ½ 65		x	2.875 73.0	9.50 241	5.5 2.5
4 100	x	2 50	4.500 114.3	x	2.375 60.3	10.00 254	6.8 3.1
	x	2 ½ 65		x	2.875 73.0	10.00 254	7.5 3.4
	x	3 80		x	3.500 88.9	10.00 254	8.6 3.9
6 150	x	3 80	6.625 168.3	x	3.500 88.9	11.50 292	15.0 6.8
	x	4 100		x	4.500 114.3	11.50 292	16.0 7.3
8 200	x	4 100	8.625 219.1	x	4.500 114.3	12.00 305	24.0 10.9
	x	6 150		x	6.625 168.3	12.00 305	26.0 11.8
10 250	x	6 150	10.750 273.0	x	6.625 168.3	13.00 330	40.0 18.1
	x	8 200		x	8.625 219.1	13.00 330	43.0 19.5
12 300	x	8 200	12.750 323.9	x	8.625 219.1	14.00 356	52.5 23.8
	x	10 250		x	10.750 273.0	14.00 356	57.0 25.9

Dimensions:

Eccentric Reducers

No. 51H SS



No. 51H SS

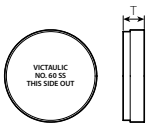
Nominal Size inches mm			Actual Outside Diameter inches mm			No. 51H SS Eccentric Reducer E to E inches mm	No. 51H SS Eccentric Reducer Approx. Weight Each Lbs. kg
2 50	x	1 25	2.375 60.3	x	1.315 33.7	9.00 229	2.1 1.0
	x	1 ¼ 32		x	1.660 42.4	9.00 229	2.4 1.1
	x	1 ½ 40		x	1.900 48.3	9.00 229	2.5 1.1
2 ½ 65	x	1 25	2.875 73.0	x	1.315 33.7	9.50 241	3.2 1.5
	x	1 ½ 40		x	1.900 48.3	9.50 241	3.6 1.6
	x	2 50		x	2.375 60.3	9.50 241	4.0 1.8
3 80	x	1 ½ 40	3.500 88.9	x	1.900 48.3	9.50 241	3.6 1.6
	x	2 50		x	2.375 60.3	9.50 241	4.8 2.2
	x	2 ½ 65		x	2.875 73.0	9.50 241	5.5 2.5
4 100	x	2 50	4.500 114.3	x	2.375 60.3	10.00 254	6.8 3.1
	x	2 ½ 65		x	2.875 73.0	10.00 254	7.5 3.4
	x	3 80		x	3.500 88.9	10.00 254	8.6 3.9
6 150	x	3 80	6.625 168.3	x	3.500 88.9	11.50 292	15.0 6.8
	x	4 100		x	4.500 114.3	11.50 292	16.0 7.3
8 200	x	4 100	8.625 219.1	x	4.500 114.3	12.00 305	24.0 10.9
	x	6 150		x	6.625 168.3	12.00 305	26.0 11.8
10 250	x	6 150	10.750 273.0	x	6.625 168.3	13.00 330	40.0 18.1
	x	8 200		x	8.625 219.1	13.00 330	43.0 19.5
12 300	x	8 200	12.750 323.9	x	8.625 219.1	14.00 356	52.5 23.8
	x	10 250		x	10.750 273.0	14.00 356	57.0 25.9

SECTION 2: ANSI Schedule 40S Stainless Steel Fittings

Dimensions:

Caps

No. 60 SS



No. 60 SS

Nominal Size inches mm	Actual Outside Diameter inches mm	No. 60 SS Cap	
		Thickness "T" inches mm	Approx. Weight Each Lbs. kg
¾ 20	1.050 26.9	0.91 23	0.2 0.10
1 25	1.315 33.7	0.91 23	0.3 0.14
1 ¼ 32	1.660 42.4	0.94 24	0.6 0.27
1 ½ 40	1.900 48.3	0.94 24	0.7 0.32
2 50	2.375 60.3	0.94 24	1.2 0.54
2 ½ 65	2.875 73.0	0.97 25	1.7 0.77
3 80	3.500 88.9	0.97 25	2.6 1.18
4 100	4.500 114.3	1.03 26	4.6 2.09
6 150	6.625 168.3	1.03 26	10.1 4.58
8 200	8.625 219.1	1.31 33	21.8 9.89
10 250	10.750 273.0	1.31 33	34.0 15.42
12 300	12.750 323.9	1.31 33	47.9 21.73

Installation
Reference should always be made to the I-100 Victaulic Field Installation Handbook for the product you are installing. Handbooks are included with each shipment of Victaulic products for complete installation and assembly data, and are available in PDF format on our website at www.victaulic.com.

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

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

Trademarks
Victaulic is a registered trademark of Victaulic Company.

Design Data

DESIGN CONSIDERATIONS

The Victaulic piping method may be used for joining a variety of piping systems for a wide variety of services. It may be utilized for varied pipe sizes, pipe materials and wall thickness. Products are available to provide rigid or flexible systems. For specific product information relating to use on varied pipe materials refer to the appropriate sections of this catalog.

As with any piping method, the nature of the method should be considered in designing the piping systems. This design data applies primarily to grooved end pipe, however, much of the information applies to other Victaulic mechanical piping products used in conjunction with grooved components.

The material presented is intended solely for piping design reference in utilization of Victaulic products for their intended application. It is not intended as a replacement for competent, professional assistance which is an obvious requisite to any specific application. Good piping practice should always prevail. Specific pressures, temperatures, external or internal loads, performance standards and tolerances must never be exceeded.

While every effort has been made to ensure its accuracy, Victaulic Company, its subsidiaries and affiliated companies, make no express or implied warranty of merchantability or fitness for a particular purpose respecting the information contained in this catalog or the materials referred to therein. Illustrations shown within this catalog are not drawn to scale and may have been exaggerated for clarity. Anyone making use of the information or material contained herein does so at his own risk and assumes any and all liability resulting from such use.

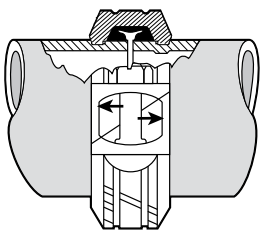
RIGID COUPLINGS

Rigid grooved end piping systems (including Styles 07, W07 (Advanced Groove System), 307, HP-70, 005, and others) provide a mechanical and frictional interlock onto the pipe ends sufficient to result in a rigid joint.

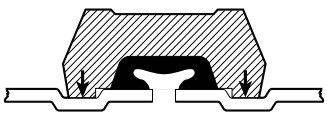
HP-70 rigid couplings grip the base of the groove providing a rigid joint.

Style 07 Zero-Flex® couplings have a unique, patented angle pad design which constricts the housing keys into the groove around the full circumference to grip the pipe rigidly. The housings slide on the angled pads rather than mating squarely.

PATENTED



ANGLED PAD STYLE COUPLINGS



HP-70 COUPLING

This sliding adjustment also forces the key sections into opposed contact on the inside and outside groove edges, pushing the joint to its maximum pipe end separation during assembly.

These products can be considered to have system behavior characteristics similar to those of welded or flanged systems, in that all piping remains in strict alignment and is not subject to deflections during operation. For this reason, these products require support techniques similar to those used in traditional flanged or welded systems.

Systems incorporating rigid couplings require the calculated thermal growth/contraction of the piping system to be fully compensated for in the design of the piping system. This requires adequate use of flexible components, (i.e. flexible couplings, expansion joints, expansion loops using flexible couplings at the elbows, etc.) such that no bending moments can be developed and imparted at the pipe joints. Please refer to Victaulic publication 26.02 for further details.

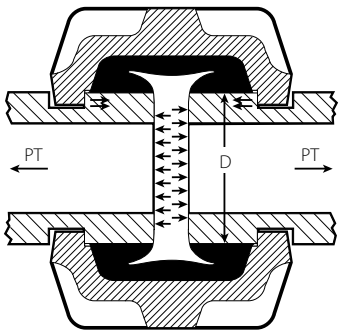
FLEXIBLE COUPLINGS

The following factors must be considered when designing or installing flexible grooved end piping systems (including Styles 75, 77, W77 [Advanced Groove System] and others).

PRESSURE THRUST

When a flexible grooved type mechanical coupling is sustaining forces trying to separate the pipe ends, the shoulder of the groove is pulled hard against the inside face of the coupling key. This is what prevents the pipes from separating.

The allowable force which a joint can sustain varies for different types of couplings, pipe wall thickness, types of pipes and grooving. The product data under the column “Maximum Permissible End Load” shows the maximum allowable end force due to internal pressure and external loading that different couplings will sustain.



When this end force is due to a closed end or change in direction, the pressure thrust transmitted by the joint can be computed from the formula:

$$PT = \frac{\pi}{4} D^2 P$$

Where:

PT = Pressure thrust or end load (lbs.)

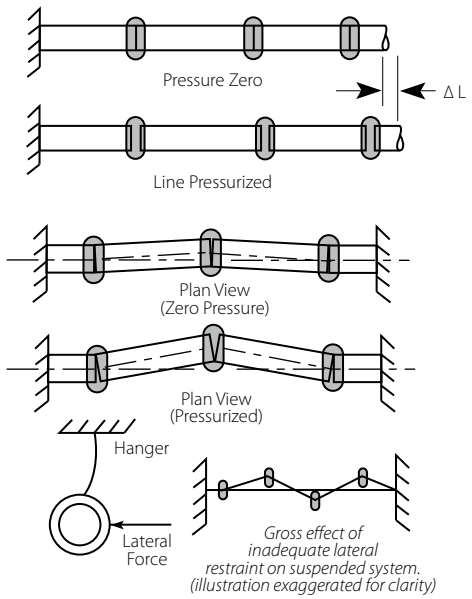
D = Outside diameter of pipe (inches)

p = Internal pressure (psi)

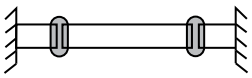
Pipe will be moved to the full extent of the available pipe end gaps when allowed to float. Ensure resulting movement of randomly installed systems is not harmful to joints at changes in directions or branch connections or to parts of structure or other equipment. Note also that thermal expansion of pipes will add to total movement in these cases.

JOB OWNER	CONTRACTOR	ENGINEER
System No. _____	Submitted By _____	Spec Sect _____ Para _____
Location _____	Date _____	Approved _____
		Date _____

Design Data

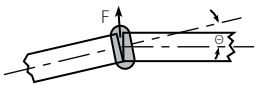


For anchored systems, where pressure thrusts do not act to hold the joints in tension, or in systems where the joints have been intentionally deflected (e.g., curves), provide lateral restraint to prevent movement of the pipes due to pressure thrusts acting at deflections. Lightweight hangers are not adequate in preventing sideways movement of pipes. It should be anticipated that small deflections will occur in all straight lines and side thrusts will be exerted on the joints.

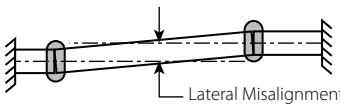


Angular deflection at butted or fully spaced joints is not possible unless the ends of the pipes are free to move as required.

Unrestrained deflected joints will straighten up under the action of axial pressure thrusts or other forces acting to pull pipes apart. If joints are to be maintained deflected, then lines must be anchored to restrain pressure thrusts and end pull forces, otherwise sufficient lateral force must be exerted to keep joint deflected.

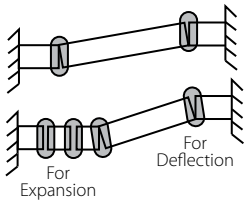


Lateral forces (F) will always act on deflected joints due to internal —pressure. A fully deflected joint will no longer be capable of providing the full linear movement normally available at the joint.



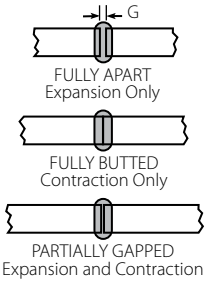
At least two flexible couplings are required to provide for lateral misalignment of pipes. Angular deflection of each joint must not exceed Maximum Deflection From Centerline published for each Victaulic coupling style.

JOINTS DEFLECTED
NO EXPANSION/CONTRACTION AVAILABLE

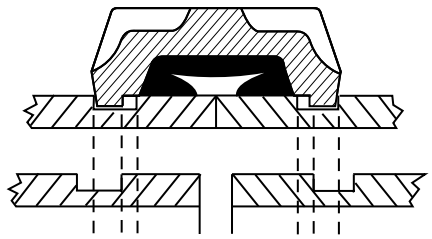


The grooved piping method will not allow both maximum linear movement and maximum angular movement simultaneously at the same joint. If both are expected simultaneously, systems should be designed with sufficient joints to accommodate both, including allowance for recommended tolerances.

Flexible couplings do not automatically provide for expansion or contraction of piping. Always consider best setting for pipe end gaps. In anchored systems, gaps must be set to handle combinations of expansion and contraction. In free floating systems offsets of sufficient length must be used to accommodate movement without overdeflecting joints.



Linear movement available at flexible grooved pipe joints is published under performance data for each Victaulic coupling style. These values are MAXIMUMS. For design and installation purposes, these figures should be reduced by the following factors to allow for pipe groove tolerances.



LINEAR MOVEMENT TOLERANCE

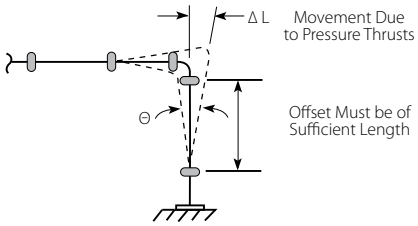
¾ – 3 ½"/20 – 90 mm – Reduce published figures by 50%

4"/100 mm and larger – Reduce published figures by 25%

Standard cut grooved pipe will provide double the expansion/contraction or deflection capabilities of the same size standard roll groove pipe.

Design Data

OFFSETS AND BRANCH CONNECTIONS



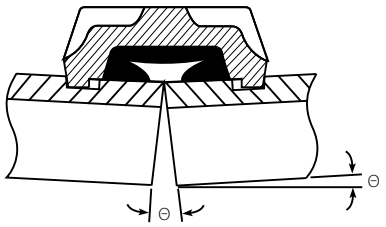
Ensure that branch connections and offsets are sufficiently long so that the maximum angular deflection of coupling (shown in Performance Data for each coupling style) is never exceeded and can accommodate anticipated total movement of pipes.

Otherwise, anchor system to direct movement away from these. Also ensure that adjacent pipes can move freely to provide anticipated movements. (Refer to page 6 for more details.)

ANGULAR DEFLECTIONS

Angular deflection available at flexible grooved pipe joints is published under Performance Data for each Victaulic coupling style. These values are MAXIMUMS. For design and installation purposes these figures should be reduced by the following factors to allow for pipe grooving tolerances.

Θ = Maximum angular deflection between center lines as shown under Performance Data.



ANGULAR MOVEMENT TOLERANCE

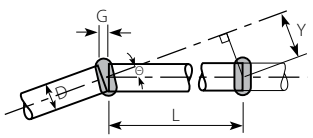
¾ – 3 ½"/20 – 90 mm – Reduce published figures by 50%

4"/100 mm and larger – Reduce published figures by 25%

Standard cut grooved pipe will provide double the expansion/contraction or deflection capabilities of the same size standard roll groove pipe.

The angular deflection available at a Victaulic flexible grooved pipe joint is useful in simplifying and speeding installation.

NOTE: Joints which are fully deflected can no longer provide linear movement. Partially deflected joints will provide some portion of linear movement. NOTE: Pressure thrusts will tend to straighten deflected pipe.



$$Y = L \sin \Theta$$

$$\Theta = \sin^{-1} \frac{G}{D}$$

$$Y = \frac{G \times L}{D}$$

Where:

Y = Misalignment (Inches)

G = Maximum Allowable Pipe End Movement (Inches) as shown under Performance Data (Published value to be reduced by Design Tolerance.)

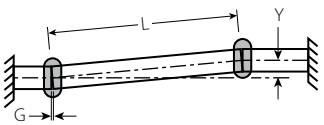
Θ = Maximum Deflection (Degrees) from Center Line as shown under Performance Data (Published value to be reduced by Design Tolerance.)

D = Pipe Outside Diameter (Inches)

L = Pipe Length (Inches)

MISALIGNMENT

Pipe misalignment can be accommodated with a Victaulic flexible grooved piping system. Note that at least two flexible couplings must be used for the combined lateral displacement and angular deflection (Y). (Refer to 26.03 for details.)

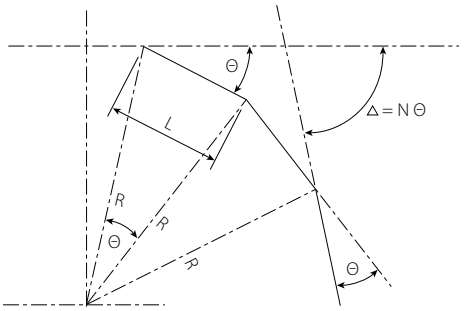


The movement available can be calculated from the flexible coupling Performance Data.

CURVE LAYOUT

Curves may be installed with straight pipe lengths utilizing the angular deflection (under performance data) available at each flexible coupling. Note that if the maximum angle of deflection at the couplings is used to lay the curve, no allowance is left for expansion/contraction.

NOTE: Pressure thrusts will tend to straighten the curve. Consideration must be given to proper anchoring.



$$R = \frac{L}{2 \sin \frac{\Theta}{2}} \qquad L = 2R \sin \frac{\Theta}{2} \qquad N = \frac{\Delta}{\Theta}$$

Where:

N = Number of Couplings

R = Radius of Curve (Feet)

L = Pipe Length (Feet)

Θ = Deflection from Centerline (°) of each Coupling (See Data Sheets – Published value to be reduced by Design Tolerance)

Δ = Combined Angular Deflection of all couplings

For curves of less than 90° total deflection, the data shown on the previous page can be used to determine:

1. The radius of curvature that can be made using pipes of a given length and utilizing either the full or partial angle of deflection available from the couplings used. Alternatively, the maximum length of pipe that can be used to negotiate a curve of a certain radius using either the maximum or partial angle of deflection available from the couplings.
2. The total number of flexible couplings required to negotiate a curve having a given deflection angle.

Design Data

PIPE SUPPORT – ANCHORAGE AND GUIDANCE

FLEXIBLE COUPLINGS – RIGID COUPLINGS

When designing anchorage, support and guidance systems for piping joined with flexible or rigid mechanical grooved type couplings, it is necessary to give consideration to certain characteristics of these couplings. These characteristics distinguish flexible grooved type couplings from other types and methods of pipe joining. When this is understood, the designer can utilize the many advantages that these coupling provide.

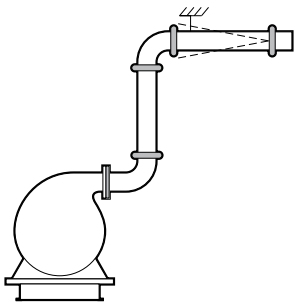
Coupling Key:

● = Rigid Coupling

● = Flexible Coupling

USE OF HANGERS AND SUPPORTS

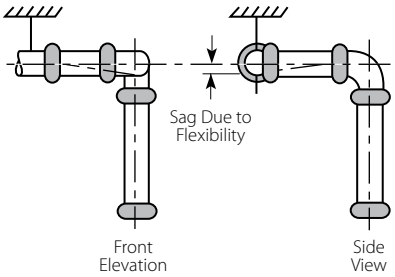
The use of hangers and supports offering freedom of movement in one or more directions has to be considered to allow pipes to move freely. Spring hangers are good practice at change of direction to allow freedom of pipe movement.



PUMP OCILLATION

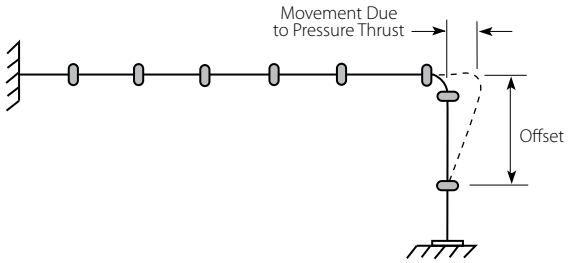
ACCOMMODATING COUPLING FLEXIBILITY

Flexible grooved type couplings allow angular flexibility and rotational movement to take place at joints. These features provide advantages in installing and engineering piping systems, but must be considered when determining hanger and support spacing.



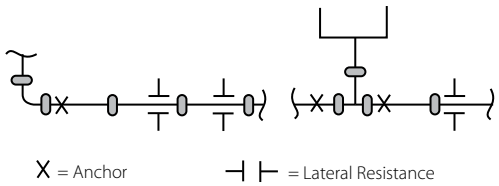
As illustrated, it is obvious that this system would require further hangers to eliminate the drooping of the pipes that would occur. Hanger positions must therefore be considered in relation to the angular and rotational movement that will occur at joints.

Good use can be made of rigid Zero-Flex Style 07 couplings in boiler and machinery rooms. These will increase rigidity where needed.



In the system illustrated, if the joints had all been installed butted or only partially open when pressurized, the pipe ends would all move to the maximum extent allowed by the coupling and this movement would all accumulate at the end of the system. The offset would have to be capable of deflecting sufficiently, otherwise harmful bending moments would be induced in the joints of the offset. Note, if the pipes were to expand due to thermal changes, then further growth of the pipes would also take place at the ends.

ANCHORAGE AND SUPPORT



Ensure anchorage and support is adequate. Use anchors to direct movement away from or to protect critical changes in direction, branch connections and structure. Spacing and types of supports should consider anticipated pipe movements.

If rigid couplings are used, consideration must be given to use of expansion joints if thermal movement is expected.

RULES APPLICABLE TO LONG RUNS OF PIPE

For long pipe runs incorporating flexible couplings, it is normal practice to anchor or block all changes in direction of piping to prevent pressure thrusts from creating linear growth at the flexible joints. It may be necessary to guide the pipe to prevent lateral movement of the pipe between the anchors.

Intermediate anchors can be installed to control pipe movement in selected areas and to reduce pipe end forces on joints.

When changes in direction are located in a structure (i.e. pump room) a main anchor can be used at the change in direction to handle loads created by pressure thrusts. The anchor would also prevent unwanted movement of the piping at equipment connections.

Design Data

PIPE SUPPORT

FLEXIBLE COUPLINGS – RIGID COUPLINGS

Piping joined with grooved type couplings, like all other piping systems, requires support to carry the weight of pipes, equipment and fluid. Like all other methods of joining pipes, the support or hanging method must be such as to eliminate undue stresses on joints, piping and other components. Additionally, the method of support must be such as to allow movement of the pipes where required and to provide for other special requirements such as drainage, etc. as may be required by the designer. The support system for flexible mechanical grooved type pipe couplings must consider some of the special requirements of these couplings.

The tables show suggested maximum span between pipe supports for horizontal straight runs of standard weight steel pipe carrying water or similarly dense liquids. They are not intended to be used as specifications for all installations. These DO NOT apply where critical calculations are made or where there are concentrated loads between supports.

Do not attach supports directly to the couplings. Support adjoining pipe and equipment only.

RIGID SYSTEMS

For Victaulic rigid coupling Styles 07, W07, 307, HP-70, 005, 009, and others, the Maximum Hanger Spacing below may be used.

Size		Suggested Maximum Span Between Supports Feet/meters					
		Water Service			Gas or Air Service		
Nominal Size In./mm	Actual Outside Dia. In./mm	*	†	‡	*	†	‡
1 25	1.315 33.7	7 2.1	9 2.7	12 3.7	9 2.7	9 2.7	12 3.7
1 ¼ 32	1.660 42.4	7 2.1	11 3.4	12 3.7	9 2.7	11 3.4	12 3.7
1 ½ 40	1.900 48.3	7 2.1	12 3.7	15 4.6	9 2.7	13 4.0	15 4.6
2 50	2.375 60.3	10 3.1	13 4.0	15 4.6	13 4.0	15 4.6	15 4.6
3 80	3.500 88.9	12 3.7	15 4.6	15 4.6	15 4.6	17 5.2	15 4.6
4 100	4.500 114.3	14 4.3	17 5.2	15 4.6	17 5.2	21 6.4	15 4.6
6 150	6.625 168.3	17 5.2	20 6.1	15 4.6	21 6.4	25 7.6	15 4.6
8 200	8.625 219.1	19 5.8	21 6.4	15 4.6	24 7.3	28 8.5	15 4.6
10 250	10.750 273.0	19 5.8	21 6.4	15 4.6	24 7.3	31 9.5	15 4.6
12 300	12.750 323.9	23 7.0	21 6.4	15 4.6	30 9.1	33 10.1	15 4.6
14 350	14.000 355.6	23 7.0	21 6.4	15 4.6	30 9.1	33 10.1	15 4.6
16 400	16.000 406.4	27 8.2	21 6.4	15 4.6	35 10.7	33 10.1	15 4.6
18 450	18.000 457.0	27 8.2	21 6.4	15 4.6	35 10.7	33 10.1	15 4.6
20 500	20.000 508.0	30 9.1	21 6.4	15 4.6	39 11.9	33 10.1	15 4.6
24 600	24.000 610.0	32 9.8	21 6.4	15 4.6	42 12.8	33 10.1	15 4.6

* Spacing corresponds to ASME B31.1 Power Piping Code.

† Spacing corresponds to ASME B31.9 Building Services Piping Code.

‡ Spacing corresponds to NFPA 13 Fire Sprinkler Systems.

FLEXIBLE SYSTEMS

For coupling Styles including 75, 77, W77, 770, and others. Standard grooved-type couplings allow angular, linear and rotational movement at each joint, to accommodate expansion, contraction, settling, vibration, noise and other piping system movement. These features provide advantages in designing piping systems but must be considered when determining hanger and support bracing and location.

Maximum Hanger Spacing

For straight runs without concentrated loads and where full linear movement is required.

PIPE SIZE	Pipe Length in Feet/meters									
Nominal Inches/ mm	7 2.1	10 3.0	12 3.7	15 4.6	20 6.1	22 6.7	25 7.6	30 9.1	35 10.7	40 12.2
	*Average Hangers per Pipe Length Evenly Spaced									
¾ – 1 20 – 25	1	2	2	2	3	3	4	4	5	6
1 ¼ – 2 32 – 50	1	2	2	2	3	3	4	4	5	5
2 ½ – 4 65 – 100	1	1	2	2	2	2	2	3	4	4
5 – 8 125 – 200	1	1	1	2	2	2	2	3	3	3
10 – 12 250 – 300	1	1	1	2	2	2	2	3	3	3
14 – 16 350 – 400	1	1	1	2	2	2	2	3	3	3
18 – 24 450 – 600	1	1	1	2	2	2	2	3	3	3
28 – 42 700 – 1050	1	1	1	1	2	2	2	3	3	3

*No pipe length should be left unsupported between any two couplings.

NOTE: 14 – 16" maximum hanger spacing values apply to 377 mm and 426 mm Style 77 couplings

Maximum Hanger Spacing

For straight runs without concentrated loads and where full linear movement is not required.

PIPE SIZE RANGE	Suggested Maximum Span Between Supports
Nominal Inches/mm	Feet/meters
3/4 - 1 20 - 25	8 2.4
11/4 - 2 32 - 50	10 3.0
21/2 - 4 65 - 100	12 3.7
5 - 8 125 - 200	14 4.3
10 - 12 250 - 300	16 4.9
14 - 16 350 - 400	18 5.5
18 - 24 450 - 600	20 6.1
28 - 42 700 - 1050	21 6.4

NOTE: 14 – 16" maximum hanger spacing values apply to 377 mm and 426 mm Style 77 couplings

Design Data

Light-Wall, Stainless Steel Rigid System Hanger Spacing

Light-wall, stainless steel piping requires hangers to meet the following spacing requirements. For flexible systems, refer to the preceding tables under the "Flexible Sysems" section. For rigid systems, refer to the table below for maximum hanger spacing.

P IPE SIZE	Suggested Maximum Span Between Supports Feet/meters	
Nominal Size Inches (mm)	Schedule 10S	Schedule 5S
2 50	10 3.1	9 2.7
3 80	12 3.7	10 3.1
4 100	12 3.7	11 3.4
6 150	14 4.3	13 4.0
8 200	15 4.6	13 4.0
10 250	16 4.9	15 4.6
12 300	17 5.2	16 4.9
14* 350	21 6.4	—
16* 400	22 6.7	—
18* 450	22 6.7	—
20* 500	24 7.3	—
24* 600	25 7.6	—

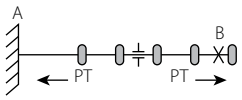
*Hanger spacing for these sizes applies to Style W89 and Style W489 AGS Rigid Couplings

ANCHORS

FLEXIBLE COUPLINGS – RIGID COUPLINGS

Anchors can be used to prevent movement due to pressure thrust. There are two types of anchors which are commonly used:

A. Main anchors
B. Intermediate anchors

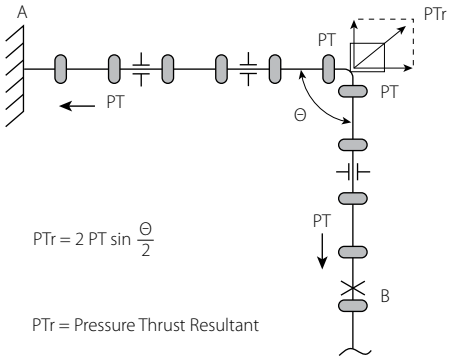


A. Main Anchors

Main anchors are installed at or near terminations and changes of direction of a pipe line. The forces acting on a main anchor will result from internal pressure thrust. These forces can generate substantial loads which may require structural analysis.

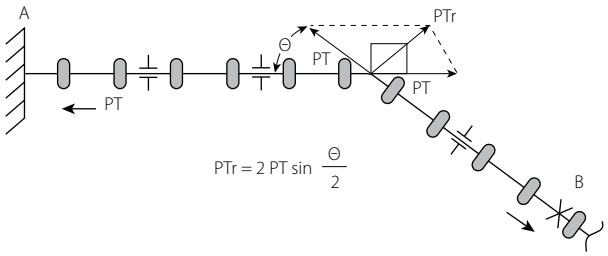
PT = Pressure Thrust (Pounds)
D = Outside Diameter of Pipe (Inches)
p = Internal Pressure (psi)

$PT = \frac{\pi}{4} D^2 p$



$PTr = 2\ PT \sin \frac{\Theta}{2}$

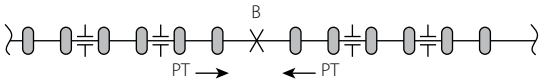
PTr = Pressure Thrust Resultant



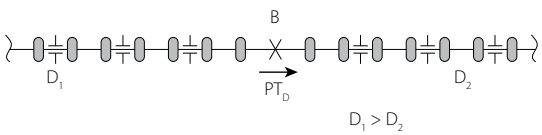
$PTr = 2\ PT \sin \frac{\Theta}{2}$

B. Intermediate Anchors

Intermediate anchors divide a long pipe run, with main anchors at each end, into individual expanding sections. The pressure thrust on the intermediate anchors cancel each other out.



Where there is a change in pipe diameter, there will be a differential pressure thrust acting on an intermediate anchor.



$D_1 > D_2$

Design Data

The differential pressure thrust PTD is calculated by:

$$PTD = p\left(\frac{\pi D_1^2}{4} - \frac{\pi D_2^2}{4}\right)$$

To keep pipe in alignment, guidance to prevent lateral movement or deflection at flexible coupling joints may be required. An alternative would be to use rigid couplings to keep joints from deflecting where not desired.

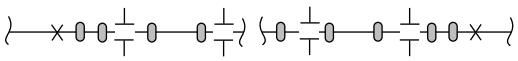
APPLICATIONS

The following are shown to call attention to the mechanical advantages of the grooved piping method; how they can be utilized to the piping systems designer's benefit. These are presented to stimulate thought and should not be considered as recommendations for a specific system.

The Victaulic grooved piping method, when used in a piping system, should always be utilized in designs consistent with good piping practice. The design considerations for engineering and installing grooved piping systems covered elsewhere in this manual should always be referred to.

THERMAL EXPANSION AND/OR CONTRACTION

Movement in piping systems due to thermal changes can be accommodated with the grooved piping method. Sufficient flexible joints must be available to accommodate anticipated movement, including Movement Tolerance. If anticipated movement will be greater than provided by the total number of joints in the system, additional expansion in the form of a Victaulic Style 150 or 155 expansion joint (see separate literature) must be provided. Rigid systems will necessitate use of expansion joints or flexible couplings at offsets where system movement is required.

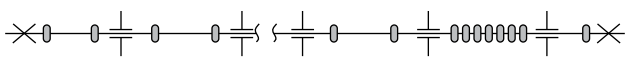


EXAMPLE 1

Example 1:

400 foot/122 m long, straight piping system; 6"/150 mm; 20 foot/6.1 m random lengths; installed at 60°F/15.5°C (also lowest operating temperature); maximum operating temperature of 180°F/82.2°C. Standard expansion tables show this system will give 3.7"/94 mm total anticipated movement.

20	Joints between anchor points
x ¼"/6.4 mm	Movement per cplg. (Style 77 on cut grooved pipe)
5"/128 mm	Available movement
– 25%	Movement tolerance (see Section 27.02)
3.75"/96 mm	Adjusted available movement



EXAMPLE 2

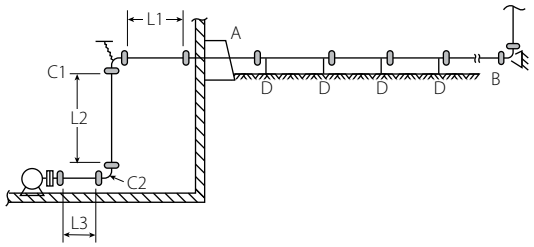
Example 2:

Same as above. Installed at 20°F/–6.7°C and operating at 200°F/93°C. Anticipated movement = 5.5"/139 mm.

A standard 6"/150 mm Victaulic Style 150 expansion joint will supply an additional 3"/80 mm of movement required. Refer to separate product literature for details.

In the above example, Style 07 rigid couplings could have been used and the expansion and/or contraction requirement be made up with additional flexible couplings and/or Style 150, 155 expansion joints as needed.

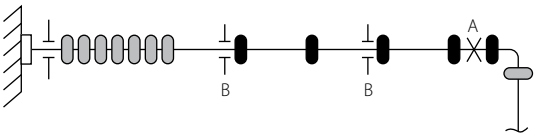
See page 5 for pipe support suggestions.



EXAMPLE 3

Example 3:

To properly restrain this system, it would be necessary to provide a pressure thrust anchor at "A" to prevent the piping outside being forced inside by the pressure thrust acting at the elbow "B." Inside, it would be necessary to provide a hanger at point C1, or a base support at point C2. Providing any expected pipe movements, no anchoring would be required and the self-restraining feature of the joints would hold the piping securely together. Outside, it would be necessary to ensure that the maximum end load of the joints was not exceeded due to thermal movement of the pipes. Intermediate anchors may be required. Pipe must be properly supported ("D") and guided. Where flexible couplings are not required, rigid couplings can reduce supports and offsets (except where thermal movement is anticipated).

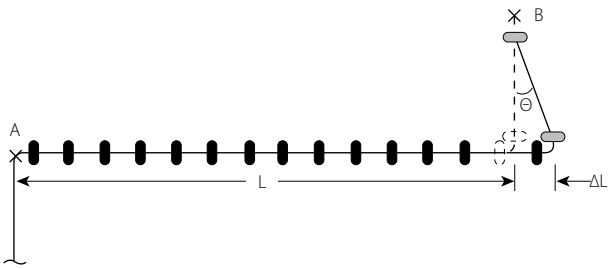


EXAMPLE 4

Example 4:

Anchor at "A" to prevent pressure thrust from moving expansion unit. Provide guides at points "B" to direct movement into expansion joint.

See page 5 for pipe support suggestions.

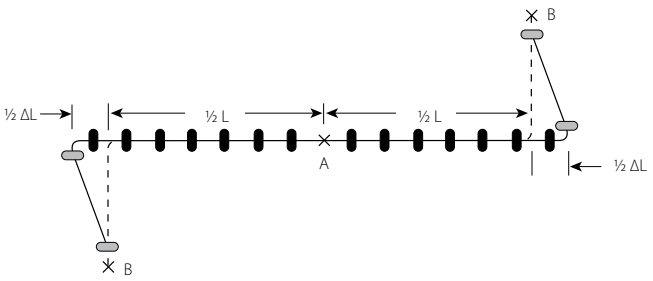


EXAMPLE 5

Example 5:

Anchor "A" at one end of the long run. A sufficiently long pipe between two flexible couplings, prior to a "fixed location" "B", may be used to accommodate the growth/contraction of the entire long run. Use rigid couplings on the long run to eliminate movement due to pressure thrust.

Design Data



EXAMPLE 6

Example 6:

Anchor "A" in the center of the long run. ½ of the movement will be directed towards each elbow. A sufficiently long pipe between two flexible couplings, prior to a "fixed location" "B", may be used to accommodate the growth/contraction of the long run. Use rigid couplings on the long run to eliminate movement due to pressure thrust.

ANCHORAGE AND SUPPORT OF VERTICAL PIPES

A number of methods of installing vertical piping systems may be considered:

VICTAULIC FLEXIBLE SYSTEM

Risers are commonly installed with anchors at the base and riser top with the piping in between guided at every other floor to prevent "snaking" of the line. Pre-gapping of the pipe ends will allow for thermal expansion up to the maximum published in our literature. Risers with branch connections should have intermediate anchors or offsets to prevent system movement at these locations which could cause shearing of components or branches.

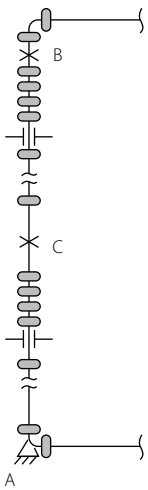
VICTAULIC RIGID SYSTEM

Risers consisting entirely of rigid couplings can get treated similar to welded systems and, where thermal movement is required, expansion joints or offsets will be necessary to prevent system movement and damage to components. These systems are obviously most advantageous where rigidity is desired as in mechanical equipment rooms, at pump connections, etc.

VICTAULIC COMBINATION SYSTEM

By designing risers with the combination system, you can make use of the rigidity of the Style 07 couplings to reduce guiding requirements, and the flexibility of the Style 77 couplings with short nipples or the Style 150 "Mover" expansion joint, to accommodate thermal movement as required.

1. Risers With Supplementary Thermal Compensators – When greater pipe movement is required, the movement at the joints can be supplemented by the use of Victaulic expansion units consisting of a series of short nipples and couplings or Style 155 or Style 150 Mover expansion joints. Refer to Victaulic publication 09.06 for installation details.



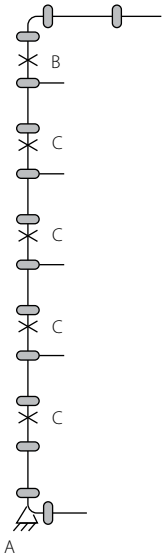
A typical system is illustrated. Adequate guidance must be provided. This system will require pressure thrust anchors at "A" and "B" and also, dependent upon the length of the stack, intermediate anchors such as at "C" to break up the pipe movement and carry some of the total weight if necessary.

When using this method, it is necessary to consider that if pipes are stacked (i.e., end butted) then couplings joining pipes cannot accommodate expansion so that it may be necessary to consider hanging pipes from points "C" and "B." Also, consider movement so that shear forces are not added at any branches.

Design Data

2. Treatment of Risers With Branch Connections – Free moving risers can cause shear forces at branch connections due to pressure thrusts and/or thermal movement. The pipe should be anchored at or near the base with a major pressure thrust anchor "A" capable of supporting the full pressure thrust and local weight of pipe and fluids. Any movement of horizontal pipe at the bottom of the riser must be considered independently with adequate provision for movement.

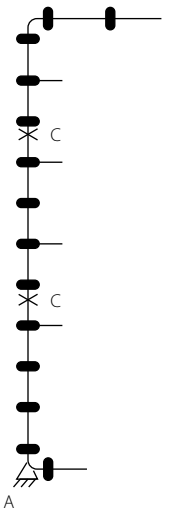
When flexible couplings are used, the system can be anchored at the top "B" with an anchor capable of withstanding full pressure thrust at the top of the riser plus local weight of pipe. The use of this upper anchor prevents any possibility of closed joints opening under pressure and causing movement at the riser top.



This method is often used for fire standpipe or similar systems where movement would cause shearing of intermediate components or branches.

Piping between upper "B" and lower "A" anchors should be supported by intermediate anchor ("C") capable of supporting local pipe weight and preventing lateral movement. Intermediate clamps should be placed a minimum of every other pipe length.

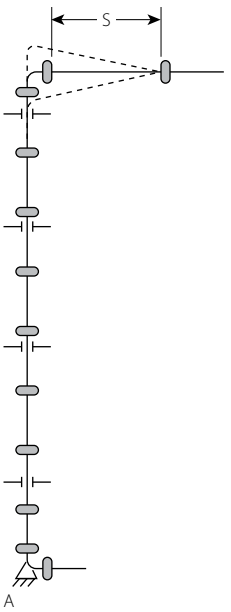
Proper gapping of pipe to allow adequate thermal movement should be considered depending on nature of movement expected. (Refer to Design Considerations.)



An alternative would be to use rigid couplings which would not allow "closed joints" to open. The system can be anchored at "A" also, and intermediate anchors at "C" can be used to support local pipe weight. Allowance for thermal movement should be considered depending on application.

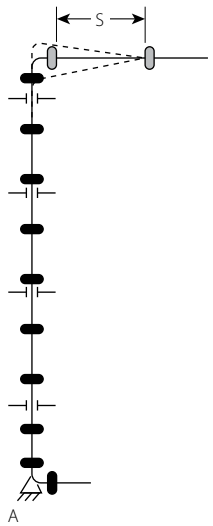
3. Treatment of Risers Without Branch Connections for Flexible Couplings – With this method, a major thrust anchor is again created at the bottom of the stack "A" supports the total weight of pipe and fluids.

Guidance is necessary at suitable intervals to prevent buckling of the riser.



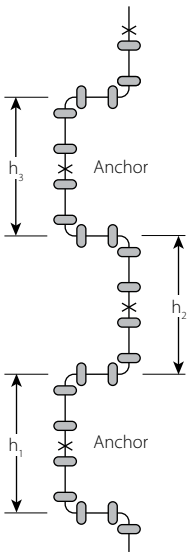
It is necessary that the pipe length "S" at the top of the stack be long enough to accommodate the total vertical movement. This movement is the result of the combined effect of pipe being moved to full extent of the available pipe end gaps due to pressure thrusts and thermal growth.

Design Data



Rigid couplings also could be used to prevent opening of "closed joints." For offset "S" at the top of the stack to accommodate thermal growth, it would be necessary to use the required number of flexible couplings depending on the angular deflection.

4. **Treatment of Risers To Eliminate Concentrated Anchor Loads**



When structural requirements dictate that base anchor load or upper anchor loads must be minimized, then the use of a "looped" system (as shown) should be considered. In the system illustrated, each anchor carries the local weight of pipe.

This method is often considered in tall buildings where high anchor loads would be generated.

The offsets must be long enough to accommodate movement in the pipes due to flexible couplings opening up under pressure plus any thermal or other movements of pipes or supports.

The use of rigid couplings could be considered to prevent joints from opening up and where thermal movement is anticipated, it should be accommodated with the use of flexible couplings or expansion joints.

SEISMIC APPLICATIONS

Please refer to Victaulic publication 26.12 for detailed information on seismic design issues.

The Victaulic system provides many mechanical design features useful in systems subject to earthquake conditions. The inherent flexibility of flexible couplings such as the Style 75 and 77, act to reduce the transmission of stresses throughout the pipe system and the resilient gasket aids to further reduce the transmission of vibration. Where flexibility is not desired, rigid couplings such as the Styles HP-70 and 07 Zero-Flex can be used.

As a general practice, seismic bracing and piping supports are utilized in piping systems to prevent excessive movement during a seismic occurrence which would result in stressing the piping system by controlling and directing system movement. In a similar manner, piping supports for a Victaulic grooved piping system must limit pipe movements such that they do not exceed the recommended allowable deflections and end loads.

An excellent reference source, which covers these piping systems, is NFPA 13 (Installation of Sprinkler Systems). The standard requires sprinkler systems to be protected to minimize or prevent pipe breakage where subject to earthquakes.

This is accomplished by using two techniques:

a) Making the piping flexible where necessary (Flexible Couplings)

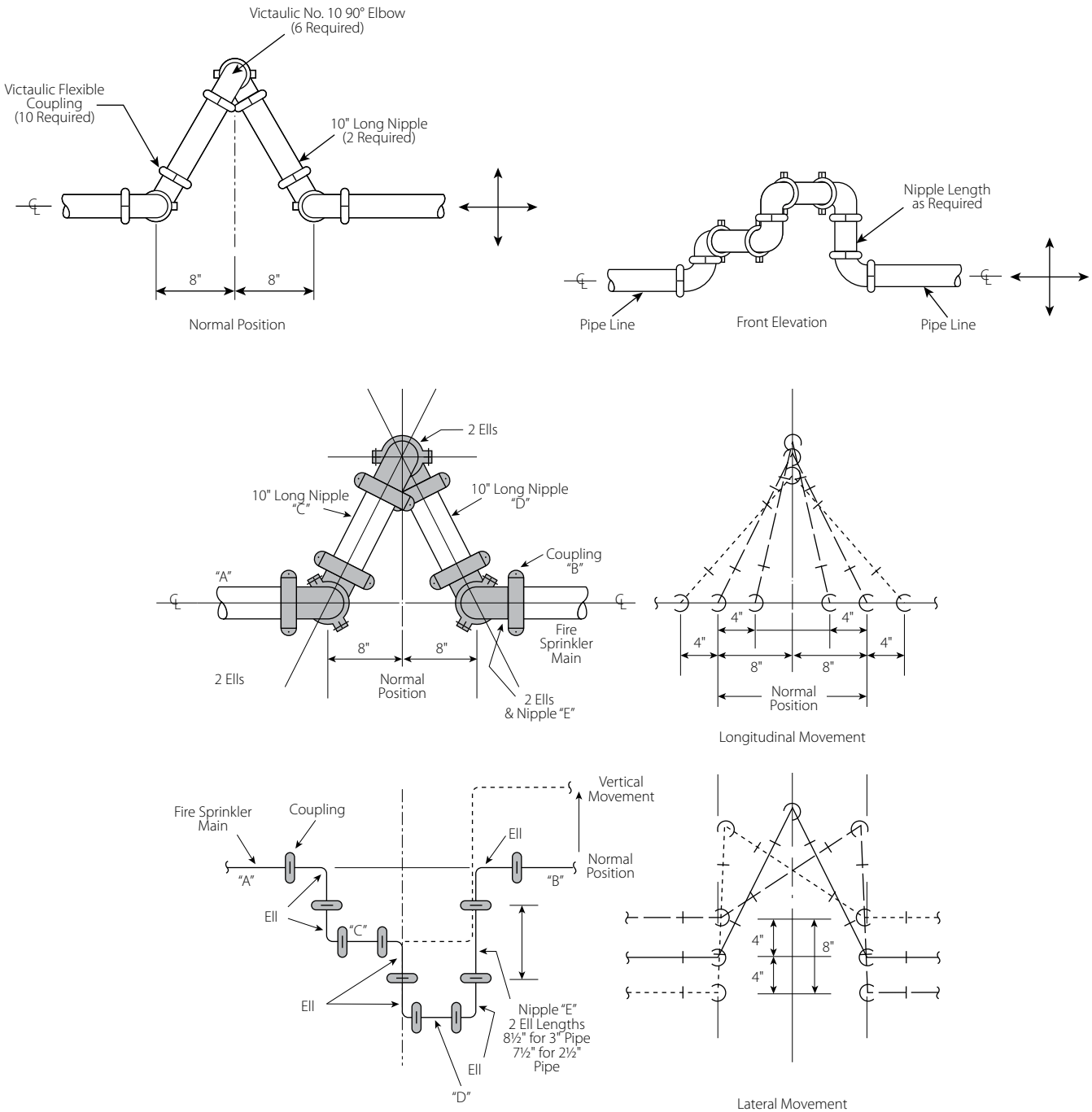
b) Affixing the piping to the building structure for minimum relative movement (Sway Bracing)

Flexibility is provided by using flexible couplings (e.g., 75, 77) joining grooved end pipe, and swing joints. "Rigid-Type" (e.g., HP-70, 07) mechanical couplings, which do not permit movement at the grooved connection, are not considered flexible couplings. Rigid couplings are used in horizontal piping for purposes other than the requirements of earthquake protection.

Branch lines also braced where movement could damage other equipment.

Where large pipe movements are anticipated, seismic swing joints are made up using flexible grooved couplings, pipe nipples and grooved elbows, as shown on page 10.

Design Data



The above illustration represents a typical configuration. Consult Victaulic publication 26.12 for specific design options.

Design Data

HYDROFLOW
DISTRIBUTORS (AUST) PTY LTD

Hydroflow Distributors (Aust) Pty Ltd
Unit 1 No 11 Salmon Street
Port Melbourne
Victoria 3207
P: +613 9676 8900 F: +613 9676 9268