The Copper Connection System for Copper Tubing (CTS)

PRODUCT DESCRIPTION

BOCA
SBCC
NYBSA

The Victaulic copper connection system was developed for joining large diameter copper tubing. In use since 1925 for steel (and other IPS pipe), cast and ductile iron, the grooved piping concept is now available to join hard drawn copper tubing sizes (CTS) in 2 - 8" (50 - 200 mm) sizes.

The system uses a proven pressure-responsive synthetic rubber gasket to seal on the outside diameter of the tubing. This means no heat is required and no lead is used. The coupling housing surrounds the gasket gripping into grooves rolled into the tubing. The housing is isolated from the fluid, but provides the gripping strength for pressure ratings up to 300 psi (2065 kPa), depending on the wall thickness and diameter of copper tubing.

A Vic-Flange® adapter works in a similar manner with a pressure-responsive gasket and flange design which mates to ANSI Class 125 or 150 flanged products. This permits easy adapting of flanged components.

Compatible copper fittings in 90°, 45° elbow, tee and reducing configurations are supplied grooved ready for installation.

Victaulic Vic-Easy® roll grooving tools VE272SFS, VE270FSD, VE268, VE416FSD, and VE414MC can be used to roll groove Types K, L, M and DWV copper tubing from 2 - 8" (54,0 - 206,4 mm). The Vic-Easy VE226C can be used for 2 - 6" (54,0 - 155,6 mm) copper tubing. The VE26C allows in-place manual grooving of 2 - 6" (54,0 - 155,6 mm) copper tubing. Tools must be equipped only with Victaulic rolls designed specifically for grooving copper tube (color coded copper).

Testing

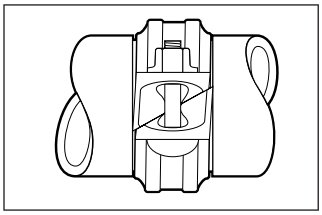
The normally thin wall and high ductility of copper piping make a grooved mechanical connection the simplest means for joining tubing. Recognizing that this roll groove would alter the flow pattern, Victaulic Company of America contracted with the LaQue Center for Corrosion Technology, Inc. (LaQue Center) to conduct a series of tests to evaluate what effect, if any, this protrusion might have on the flow stream pattern and, consequently, the historically low corrosion rate of copper piping in potable water systems.

Conclusions

In review of these tests, the aggressive 60-day exposure in natural seawater revealed that effects of the increased turbulence caused by the introduction of roll grooves for the Victaulic® piping method were no more than those caused by the tees and elbows in the system, which are the same as for sweated piping systems.

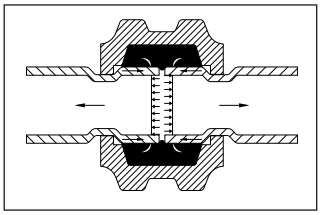
Results of the six-month potable water test, while not being anywhere near the expected life of an actual copper piping system, demonstrated that the roll grooves had no adverse effects on the formation and retention of a protective corrosion product film.

Based upon these test results, the Victaulic piping system should perform equally with a sweated piping system under the same conditions. See section 22.07.



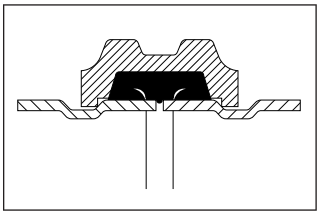
Provides rigidity

Patented angle-pad design adjusts to standard tubing tolerances. Provides positive clamping on the tubing to resist flexural and torsional loads. Assures rigidity for ease of hanging.



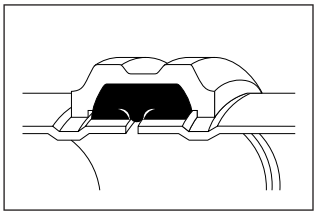
Proven joint reliability

Full circumferential engagement of housing into groove provides end load strength. Working pressures to 300 psi (2065 kPa), at temperatures up to +230°F (+110°C). Tested in field installations and by independent services.



Easily roll grooved

Victaulic tools permit easy grooving of hard drawn copper tubing in Types K, L, M and DWV, using specifically designated copper roll sets on various Victaulic Vic-Easy® roll grooving tools. Fits standard power drives and tools.



Accepted and approved

The Victaulic grooved system is accepted under national, state and local plumbing codes. Accepted by BOCA, IAPMO, SBCCI, UL and others. Tested to industry standards...and beyond!

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PERFORMANCE

The Victaulic copper connection system has been thoroughly tested on Types K, L, M and DWV drawn copper tubing. Victaulic products are routinely tested to failure in unrestrained hydrostatic and flexure tests. Using a nominal 3 to 1 safety factor, these tests provide regular verification of the product working pressures. The ratings below apply with Victaulic couplings Style 606, Vic-Flange adapter Style 641, Series 608 butterfly valve, and roll grooved copper fittings on the indicated Types of tubing.

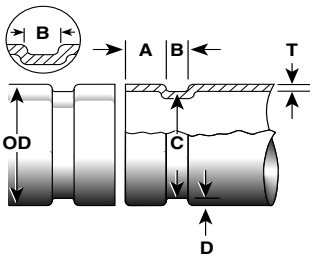
TUBING Nominal Inches Actual mm	Type "K" ASTM B-88			Type "L" ASTM B-88			Type "M" ASTM B-88			DWV ASTM B-306		
	Wall Thick. Inch. mm	Max. Joint Work. Press. PSI/kPa	Max. Permis. End Load Lbs./N	Wall Thick. Inch. mm	Max. Joint Work. Press. PSI/kPa	Max. Permis. End Load Lbs./N	Wall Thick. Inch. mm	Max. Joint Work. Press. PSI/kPa	Max. Permis. End Load Lbs./N	Wall Thick. Inch. mm	Max. Joint Work. Press. PSI/kPa	Max. Permis. End Load Lbs./N
2 54,0	0.083 2,1	300 2065	1,065 4740	0.070 1,8	300 2065	1,065 4740	0.058 1,5	250 1725	890 3960	0.042 1,1	100 690	354 1576
$2^1/_2$ 66,7	0.095 2,4	300 2065	1,625 7230	0.080 2,0	300 2065	1,625 7230	0.065 1,7	250 1725	1,350 6010	– –	– –	– –
3 79,4	0.109 2,8	300 2065	2,300 10235	0.090 2,3	300 2065	2,300 10235	0.072 1,8	250 1725	1,415 6300	0.045 1,1	100 690	765 3405
4 104,8	0.134 3,4	300 2065	4,005 17825	0.110 2,8	300 2065	4,005 17825	0.095 2,4	250 1725	3,340 14865	0.058 1,5	100 690	1,335 5940
5 130,2	0.160 4,1	300 2065	6,190 27550	0.125 3,2	300 2065	6,190 27550	0.109 2,8	200 1375	4,125 18360	0.072 1,8	100 690	2,060 9170
6 155,6	0.192 4,9	300 2065	8,840 39340	0.140 3,6	300 2065	8,840 39340	0.122 3,1	200 1375	5,890 26210	0.083 2,1	100 690	2,945 13105
8 206,4	0.271 6,9	300 2065	15,550 69200	0.200 5,1	300 2065	15,550 69200	0.170 4,3	200 1375	10,370 46100	0.109 2,8	100 690	5,180 23000

Working Pressure and End Load are total, from all internal and external loads, based on the indicated Type of hard drawn copper tubing, standard roll grooved in accordance with Victaulic specifications.

NOTE: FOR ONE TIME FIELD TEST ONLY, the Maximum Joint Working Pressure may be increased to 1½ times the figures shown.

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

ROLL GROOVE SPECIFICATIONS



Exaggerated for Clarity

The groove is achieved by the upper male roll being pressed, with manual or hydraulic force, into tubing which rotates on a lower female roll. Use only roll sets for copper tubing.

Tubing grooves must be within tolerances listed below to assure proper coupling assembly.

⚠ CAUTION

DO NOT use rolls intended for steel , stainless steel, aluminum or PVC pipe.

1	2		3	4	5	6	7	8
	Pipe Outside Diameter Inches/mm		Dimensions – Inches/millimeters					
TUBING Nominal Inches Actual mm	Basic	Tolerance	Gasket Seat A ±0.03 ±0.76	Groove Width B +0.03/-0.00 +0.76/-0.00	Groove Dia. C +0.000/-0.020 +0.00/-0.50	Groove Depth (ref.) D	Min. Allow. Wall Thick. T	Max. Allow. Flare Diameter
2 54,0	2.125 54,0	±0.002 ±0,05	0.610 15,5	0.300 7,6	2.029 51,5	0.048 1,2	DWV	2.220 56,4
$2^1/_2$ 66,7	2.625 66,7	±0.002 ±0,05	0.610 15,5	0.300 7,6	2.525 64,1	0.050 1,2	0.065 1,7	2.720 69,1
3 79,4	3.125 79,4	±0.002 ±0,05	0.610 15,5	0.300 7,6	3.025 76,8	0.050 1,2	DWV	3.220 81,8
4 104,8	4.125 104,8	±0.002 ±0,05	0.610 15,5	0.300 7,6	4.019 102,1	0.053 1,4	DWV	4.220 107,2
5 130,2	5.125 130,2	±0.002 ±0,05	0.610 15,5	0.300 7,6	4.999 127,0	0.053 1,4	DWV	5.220 132,6
6 155,6	6.125 155,6	±0.002 ±0,05	0.610 15,5	0.300 7,6	5.999 152,4	0.063 1,6	DWV	6.220 158,0
8 206,4	8.125 206,4	+0.002/-0.004 +0,05/-0,10	0.610 15,5	0.300 7,6	7.959 202,2	0.083 2,1	DWV	8.220 208,8

Column 1 – Nominal ASTM B-88 drawn copper tubing size.

Column 2 – Outside diameter: the outside diameter and tolerances of roll grooved tubing shall be in accordance with ASTM B-88 for drawn tubing as shown here. The maximum allowable tolerance from square cut ends is 0.030" for 2 - 3" (50 - 80 mm); 0.045" (1.14 mm) for 4 - 8" (100 - 200 mm), measured from true square line.

Column 3 – Gasket seat: the tubing surface shall be free from indentations, roll marks, and projections from the end of the tubing to the groove, to provide a leak-tight seal for the gasket. All loose scale, dirt, chips and grease must be removed.

Column 4 – Grooving width: bottom of groove to be free of loose dirt, chips, and scale that may interfere with proper coupling assembly.

Column 5 – Groove outside diameter: the groove must be uniform depth for the entire tubing circumference. Groove must be maintained within the "C" diameter tolerance listed.

Column 6 – Groove depth: for reference only. Groove must conform to the groove diameter "C" listed.

Column 7 – ASTM B-306 drain waste and vent (DWV) is minimum wall thickness copper tubing which may be roll grooved.

Column 8 – Maximum allowable end flare diameter. Measured at the most extreme tubing end diameter.