

**EXCEED THE EXPECTED
WITH FLOWGUARD[®]
PLUMBING SYSTEMS !**



FLOWGUARD[®]
PIPE & FITTINGS

INSTALLATION GUIDE

FlowGuard® plumbing pipe is made from a specialty thermoplastic, known chemically as post-chlorinated polyvinyl chloride (CPVC). FlowGuard® CPVC systems are assembled with readily available, inexpensive tools. Solvent welded joints – proven reliable with more than 50 years of successful CPVC service history – assure the reliability of a FlowGuard® system.

Where to use FlowGuard® systems?

FlowGuard® CPVC is used in hot and cold water distribution systems. Typical potable water piping requirements in today's residential homes, apartments, hotels and commercial buildings can be accommodated by FlowGuard® CPVC systems.

CPVC plumbing systems are approved for contact with potable water in a wide range of countries including USA, Canada, UK, Germany, France and The Netherlands amongst others.

Joining FlowGuard® tubing and fittings

1. CUTTING

FlowGuard® tubing can be easily cut with a wheel-type plastic tubing cutter, a hack saw or other fine toothed hand or power saws. Use of ratchet cutters is permitted, provided blades are sharpened regularly. A miter box should be used to ensure a square cut when using a saw. Cutting tubing as squarely as possible provides optimal bonding area within the joint. If any indication of damage or cracking is evident at the tubing end, cut off at least 5 cm beyond any visible crack.

2. DEBURRING/BEVELING

Burrs and filings can prevent proper contact between tube and fitting during assembly, and should be removed from the outside and inside of the tubing. A chamfering tool is preferred but a pocketknife or file are suitable for this purpose. A slight bevel on the end of the tubing will ease entry of the tubing into the fitting socket and minimize the chances of pushing solvent cement to the bottom of the joint.

3. FITTING PREPARATION

Wipe any dirt or moisture from the fitting sockets and tubing end. Check the dry fit of the tubing and fitting. The tubing should make contact with the socket wall 1/3 to 2/3 of the way into the fitting socket. At this stage, tubing should not bottom out in the socket.

4 & 5. SOLVENT CEMENT APPLICATION

Use only CPVC cement or joint failure may result! Apply a heavy, even coat of cement on the tubing end. Apply a thin coat inside the fitting socket. It is important to use a proper applicator. A dauber or natural bristle paint brush approximately 1/2 the size of the tubing diameter is appropriate.

6. ASSEMBLY

Immediately insert the tubing into the fitting socket, rotating the tubing 1/4 to 1/2 turn while inserting. This motion ensures an even distribution of cement within the joint. Properly align the fitting. Hold the assembly for approximately 10 seconds allowing the joint to set-up. An even bead of cement should be evident around the joint. If this bead is not continuous around the socket edge, it may indicate that insufficient cement was applied. In this case, remake the joint to avoid potential leaks. Wipe excess cement from the tubing and fittings surfaces for an attractive, professional appearance.



SET AND CURE TIMES

Solvent cement set and cure times are a function of pipe size, temperature, and relative humidity. Curing time is shorter for drier environments, smaller sizes, and higher temperatures. Refer to the following table for minimum cure times after the last joint has been made up before pressure testing can begin.

Minimum cure prior to pressure testing at 10 bar		
ambient temperature during cure period	pipe size	
	up to 32 mm	40 mm and above
Above 15°C	1 hour	2 hours
4 - 15°C	2 hours	4 hours
Below 4°C	4 hours	8 hours

Special care should be exercised when assembling CPVC systems in extremely low temperatures (below 4°C) or extremely high temperatures (above 38°C). Frozen cement cannot be recovered and should be discarded. In extremely hot temperatures, make sure both surfaces to be joined are still wet with cement when putting them together.

TESTING

Once an installation is completed and cured per these recommendations, the systems should be hydrostatically pressure tested. 10 bar for one hour is recommended. When pressure testing, the system should be filled with water and all air bled from the highest and farthest points in the run. If a leak is found, the joint must be cut out and discarded. A new section can be installed using couplings. During sub-freezing temperatures, water should be blown out of the lines after testing to eliminate potential damage from freezing. Air testing is not recommended.

HANDLING AND STORAGE

FlowGuard® CPVC is a tough, corrosion resistant material, but it does not have the mechanical strength of metal. Reasonable care should be exercised in handling tubing and fittings. They should not be dropped, stepped on, or have objects thrown on them. If improper handling or heavy impact results in cracks, splits, or gouges, the damaged section should be discarded. FlowGuard® tubing should be covered with a non-transparent material when stored outdoors for long periods of time. Normal short term exposure to sunlight on the job site will not affect physical properties or ultimate performance.

Product rating and capabilities

DIMENSIONS

CPVC plumbing systems are produced according to a wide range of international standards including ASTM F441 (schedule 80), ASTM D2846 (copper tube size), DIN 8079 and EN ISO 15877. The below table shows the EN ISO 15877 dimensions.

Pipe series			
Outside diameter	S 6,3 (SDR 13.6)	S 5 (SDR 11)	S 4 (SDR 9)
	Minimum wall thickness in millimeters		
20	1,5	1,9	2,3
25	1,9	2,3	2,8
32	2,4	2,9	3,6
40	3,0	3,7	4,5
50	3,7	4,6	5,6
63	4,7	5,8	7,1

PRESSURE RATING

Pipes, fittings and joints are designed for continuous use at the following conditions (DIN 8079):

Pressure rating			
	S 6,3 (PN16)	S 5 (PN20)	S 4 (PN25)
20°C	16 bar	20 bar	25 bar
40°C	11 bar	14 bar	17 bar
60°C	6 bar	8 bar	10 bar
80°C	4 bar	4 bar	6 bar

HYDRAULIC DESIGN

Hydraulic calculations should be calculated using the Hazen-Williams C value of 150.

FIRE RATED CONSTRUCTION

Testing demonstrates that FlowGuard® CPVC meets 25/50 flame spread/smoke development requirements for installations within plenums. Fire wall penetrations must be sealed with approved materials or devices, such as those listed in the UL® Building Materials Directory. Consult the local building official in your area.

THERMAL EXPANSION

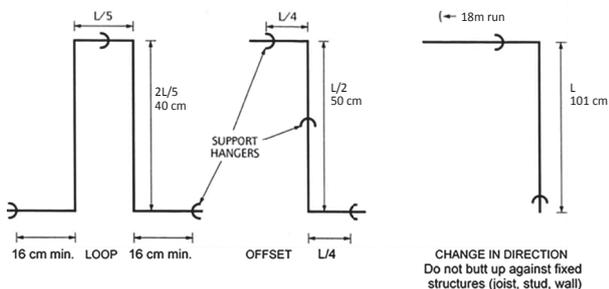
CPVC, like all piping materials, expand and contract with changes in temperature.

CPVC tubing (regardless of pipe diameter) will expand about 7.5 cm per 30 meters length for a 40 °C temperature change. The stresses developed in CPVC are generally much smaller than those developed in metal systems for equal temperature changes because of the differences in elastic modulus. Therefore, expansion loop requirements are not significantly different than those recommended for copper tubing. Generally, thermal expansion can be accommodated with changes in direction; however, a long straight run may require an offset or loop.

For convenience, loop (or offset) lengths have been calculated for different pipe sizes and different run lengths with a temperature increase of 50 °C. The results, shown in the table below, are presented simply as a handy guide for quick and easy determinations of acceptable loop lengths for the approximate conditions.

Expansion loop length (L) for 50°C temperature change					
Pipe size	Length of run				
	6 meters	12 meters	18 meters	24 meters	30 meters
20 mm	58 cm	81 cm	101 cm	115 cm	130 cm
25 mm	64 cm	92 cm	113 cm	130 cm	144 cm
32 mm	73 cm	103 cm	124 cm	144 cm	161 cm
40 mm	78 cm	110 cm	135 cm	156 cm	173 cm
50 mm	86 cm	122 cm	150 cm	173 cm	193 cm

An example was selected from the table to demonstrate the use of these data in the following 3 methods of compensating for the thermal expansion. Example: Pipe size = 20 mm, length of run = 18 m, L = 101 cm (from table)



TRANSITIONS FROM FLOWGUARD® CPVC TO OTHER MATERIALS

Numerous specialty transitions incorporating rubber seals at the plastic-to-metal interface are available and should always be used on lines where normal water temperature of 65 °C or higher are anticipated. Male CPVC threaded adapters are also available for connecting valves and appurtenances on cold water lines. CPVC female threaded adapters SHOULD NOT BE USED.

TFE (Teflon®) thread tape is always safe for making CPVC threaded connections. Some paste-type sealants contain solvents that may be damaging to CPVC. If you prefer to use a paste or pipe dope, always check with the manufacturer regarding its compatibility with CPVC. Use of an improper paste or dope can result in failure of CPVC systems.

HANGERS AND SUPPORT

Because FlowGuard® tubing is rigid, it requires fewer supports than flexible plastic systems.

For vertical runs, provide a support at each floor level, plus a mid-story guide. For horizontal runs, support at 90 cm intervals for diameters of 32 mm and below and at 1.2 m intervals for larger sizes.

Piping should not be anchored tightly to supports, but rather secured with smooth straps or hangers that allow for movement caused by expansion and contraction. Most hangers designed for metal pipe are suitable for FlowGuard®. Hangers should not have rough or sharp edges which come in contact with the tubing.

WATER HEATER HOOK-UPS

When connecting electrical water heaters to a CPVC plumbing system it is recommended that a suitable flexible hose, braided or non-braided, with union type end couplings be used to connect both the inlet cold water and outlet hot water CPVC lines. The flexible connector shall be in accordance with the water heater manufacturer's specifications/recommendations.

When connecting gas water heaters to a CPVC plumbing system, it is recommended that at least 50 cm of a suitable metal nipple or flexible metal connector be used so that the CPVC piping system cannot be damaged by the build-up of excessive radiant heat from the water heater flue.

Note: Some code jurisdictions require metal connections on all water heaters. Verify code requirements prior to installation. For all installations adequate safety valves should be incorporated in case of water heater malfunction.



If you would like to know more about FlowGuard® CPVC plumbing systems, please visit our website: www.lubrizolcpvc.com or contact us by e-mail, cpvc.emena@lubrizol.com or at the address below.

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