

CORZAN[®] CPVC SCHEDULE 40 AND SCHEDULE 80 IRON PIPE SIZE (IPS) PIPE, VALVES AND FITTINGS

Sample Specification: Industrial Piping Systems

PART 1 – SCOPE

CPVC schedule 40 and schedule 80 iron pipe size (IPS) pipe and fittings shall be extruded/molded from Corzan[®] CPVC compounds manufactured by Lubrizol Advanced Materials. Corzan pipe and fittings are intended for use wherever aggressive media such as acids, alkalis, or mixed wastes at a high temperature are transported. Examples of applications include, but not limited to, water, wastewater, effluent treatment, and a wide range of chemical applications.

PART 2 – BASIC SYSTEM DATA

2.1 Material Specification

Corzan CPVC compounds shall meet a minimum cell class 23447 (24448 preferred) as defined by ASTM D1784. Corzan piping is available in schedule 40 and schedule 80 IPS through 24-in. diameter. Cell class 24448 piping material is available in sizes from ¼-in. to 8-in. from select manufacturers, and pipe sizes greater than 8-in. meet cell class 23447. The compounds shall carry a pressure rating listed by the Plastic Pipe Institute (PPI). Both the pipe and the fitting compounds shall be certified by NSF International for use with potable water and shall be from the same compound manufacturer.

2.2 Pipe and Fittings

A. Pipes, fittings, valve, and other components made of CPVC shall be made from Corzan CPVC and shall comply with or be tested to the following standards:

Standard	Description
ASTM F437	Standard Specification for Threaded Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80
ASTM F439	Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80
ASTM F441	Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80
ASTM F1970	Plastic pipes and fittings for industrial applications
CSA B137.6	Pipe, Tubing, and Fittings for Hot and Cold Water Distribution Systems
ISO 7675	Plastics piping systems for soil and waste discharge (low and high temperature) inside buildings - Chlorinated poly(vinyl chloride) (CPVC)

B. Pipe shall be certified by an independent testing agency to meet or exceed the requirements of ASTM F441, NSF 14 and NSF 61.

C. Fittings shall be certified by an independent testing agency to meet or exceed the requirements of ASTM F437 (Schedule 80 threaded), ASTM F439 (Schedule 80 socket), NSF 14 and NSF 61.

D. Various adaptor style type fittings shall be certified by an independent testing agency to meet or exceed the requirements ASTM F1970 standards, NSF 14 and NSF 61.

E. The installer shall use ancillary building products (including, but not limited to fire stops, thread sealants, leak detectors, cutting oils etc.) that are chemically compatible with Lubrizol CPVC compounds.



2.3 Solvent Welding

- A. All socket type joints shall be assembled with solvent cements that meet or exceed the requirements of ASTM F493 and primers that meet or exceed the requirements of ASTM F656.
- B. Safe handling of solvent cements shall be in accordance with ASTM F402.
- C. Solvent cement and primer shall be listed by NSF International for use with potable water and approved by the pipe and fittings manufacturers.

2.4 Basic Use

- A. Corzan® CPVC IPS pipe and fittings are intended for use in pressure applications in hot and cold potable water distribution systems, general chemical plants, pulp and paper mills, water treatment plants, metal treating/electroplating plants, water purification plants and food processing plants.
- B. Sizes range from 1/2" to 24".
- C. Pressure rating varies by size and temperature of operation. See sections 3.0B for details.
- D. For industrial drain applications, Corzan CPVC pipe and fittings may convey fluids with a temperature up to 220°F with proper support. A drain is defined as a non-pressurized (<15 psig) piping system that is open to the atmosphere. Depending on temperature and duration of exposure to elevated temperatures, continuous support may be advisable.
 - a. CPVC resistance to all chemicals being washed down the drain must be confirmed. Chemical resistance of Corzan CPVC is dependent on temperature.
 - b. Two-step Corzan solvent cement must be used for joining pipe and fittings. Silica-free solvent cement may be needed depending on chemical exposure. Refer to manufacturers' chemical resistance guides to ensure the proper solvent cement is used.
- E. Hydronic heating and cooling
 - a. Maximum operating temperature of 180°F
 - b. Antifreeze / Heat Transfer Fluids: Corzan Piping Systems may be used to handle propylene glycol solutions up to 35%, methanol solutions up to 10%, and ethylene glycol or glycerin solutions at any concentration. Check the compatibility of other types of antifreezes or heat transfer fluids with the manufacturer prior to use.
- F. Corzan® pipe and fittings have been listed by ICC-ES under PMG 1264. The following systems have been tested water filled or dry in general accordance with UL 723/ASTM E84 test methods for surface burning characteristics and have been found to meet the 25/50 -flame spread/smoke developed requirements of the International Mechanical Code® (IMC) and the Uniform Mechanical Code® (UMC) for installation in ducts and plenums.
 - 1/2" – 6" water filled Corzan® CPVC pipe and fittings have a flame spread index of 0 and a smoke developed index of no more than 20.
 - 1/2" – 2" dry Corzan® CPVC pipe and fittings for condensate lines have a flame spread index of 0 and a smoke developed index of no more than 20.
- G. Corzan CPVC compounds have been evaluated and pass the FM 4910 test protocol for fire propagation & smoke development. These compounds include gray duct compound (for manufacture into seamless, round extruded duct), gray pipe compound, and the Corzan 4910 compounds, which are used to manufacture sheet for fabrication into cleanroom equipment.
- H. Pipes, fittings and valves made from Corzan CPVC have been tested to U.S. Coast Guard and American Bureau of Shipping standards for use on marine vessels.
- I. Pipe shall be certified by an independent testing agency to meet or exceed the requirements of NSF 14 and NSF 61. Solvent cement and primer shall be listed by NSF for use with potable water, and approved by the Corzan CPVC pipe and fitting manufacturers.
- J. Refer to manufacturers for additional approvals and listings.



2.5 Manufacturers

Refer to www.corzan.com for the most current list of manufacturers.

A. Pipe and/or Fittings

Georg Fischer Piping Systems, USA, Switzerland

Huaya Industrial Plastics, China

IPEX, Inc., Canada

NIBCO, USA

Formatura Iniezione Polimeri (FIP), Italy

Futura, Mexico

Tianjin Hongtai, China

Youli, China

B. Valves

Asung, South Korea

CEPEX, Spain

Formatura Iniezione Polimeri (FIP)

Huaya Industrial Plastics, China

IPEX, Inc., Canada

NIBCO, USA

Tianjin Hongtai, China

Youli, China

C. Other Products

RAUSCHERT, Germany

SIMONA AG, Germany

VYCOM, USA

D. Solvent Cements and Primers

Griffon, The Netherlands

IPS Corporation, USA

PART 3 - EXECUTION

3.0 System Design

A. System design shall be in accordance with standard industry practice for fluid conveyance and the manufacturers' instructions. Refer to ASME NM.1 for design and installation guidance. The design shall take into consideration the pressure and flow requirements, friction loss, operating temperatures, support spacing, joining methods, thermal expansion and contraction, and chemical resistance.

B. The maximum design pressure ratings shall be determined in accordance with ASTM F441 and based on the hydrostatic design basis (HDB) as determined by ASTM D2837. The maximum pressure ratings shall not exceed those listed in the tables below. Pressure ratings apply to water at various temperatures. It may be necessary to adjust the design factor used in the calculation of the hydrostatic design basis (HDB) for applications other than water service. Refer to ASTM D2837 for the HDB calculation method.



Maximum Design Pressure Ratings: Corzan® CPVC Schedule 80 IPS pipe per ASTM F441

Nominal Pipe Size (in.)	Schedule 80 Unthreaded	Schedule 80 Threaded	Schedule 40
1/2	850	420	600
3/4	690	340	480
1	630	320	450
1 1/4	520	260	370
1 1/2	470	240	330
2	400	200	280
2 1/2	420	210	300
3	370	190	260
4	320	160	220
6	280	140	180
8	250	120	160
10	230	120	140
12	230	110	130
14	220	–	130
16	220	–	130
18	220	–	130
20	220	–	120
24	210	–	120

NOTE: Pressure rating applies for water at 73°F. For temperatures greater than 73°F, see derating factor in the following table.

Working Temperature	Derating Factor with 180°F HDS of:	
(°F)	500 psi (CPVC 4120-05)	600 psi (CPVC 4120-06#)
73 – 80	1.00	1.00
90	0.91	0.91
100	0.82	0.83
120	0.65	0.70
140	0.50	0.57
160	0.40	0.44
180	0.25	0.31
200	0.20	*

Preferred

* Consult with specific product or component manufacturers for temperature derating factors above 180°F.

C. Joining Systems

- Integrating of pipe and fittings shall be done by solvent welding, flanging, cut grooving, butt welding or threading.
- Solvent cement that meets or exceeds the requirements of ASTM F493 shall be used in conjunction with a primer meeting the requirements of ASTM F656 as manufactured by companies listed in Section 2.5.
- Flanges shall be installed on pipe ends with CPVC primer and CPVC solvent cement and then bolted together with a gasket per the manufacturer's instructions and torque ratings. Gaskets listed on the FBC® System Compatible program



have been certified by NSF International for use in potable water systems and are compatible with Corzan® piping systems. Gaskets not included in this program shall have their compatibility with CPVC verified by the gasket manufacturer. Flanged systems of any size shall not exceed 150 psi working pressure at 73°F without additional considerations and prior approval from design engineer or authority having jurisdiction. For systems intended for higher pressures, contact a Corzan® representative or the manufacturer for alternative flanging options.

d. Cut-groove joints shall be made utilizing the Victaulic® PGS-300 cut-groove profile and Victaulic® couplings (Style 356, 357, and 358) for schedule 80 CPVC pipe. The groove shall be cut and the coupling shall be installed per the coupling manufacturer's instructions. Compatibility of gasket and lubricant materials with CPVC must be confirmed with the coupling manufacturer.

e. Butt welding of CPVC pipe shall follow the requirements of DVS 2207-13 Heated Tool Welding of Piping, Parts and Panels Made out of CPVC.

f. Threading shall be performed only on Schedule 80 pipe 4" and smaller, per the manufacturer's instructions. Cutting oils and thread sealants used for threaded joints shall be compatible with Corzan CPVC. A list of compatible materials can be found on the FBC™ System Compatible website, <https://www.lubrizol.com/CPVC/FBC-System-Compatible-Program>.

D. Chemical Resistance

Corzan pipe and fittings are intended for use wherever aggressive media such as acids, alkalis, or mixed wastes at a high temperature are transported. Contact the piping system manufacturer or visit www.corzan.com for guidance regarding the chemical resistance of Corzan CPVC with a wide range of media.

3.1 Installation Procedures

A. Installation practices such as pipe support spacing, bracing, allowance for thermal expansion/contraction, solvent welding and handling and storage shall be in accordance with industry best practices and/or the manufacturer's instructions and this specification.

B. Refer to 3.2 below for submittal of installer training documentation.

C. Ancillary products coming into contact with pipe and fittings must be chemically compatible as determined by CPVC pipe and fittings manufacturer or compound manufacturer, and thus listed on pipe, fittings or compound manufacturer's chemical compatibility program (i.e. FBC™ System Compatible Program). For products not listed on one of these program lists, consult the product manufacturer for compatibility with CPVC.

3.2 Quality Assurance

Installer Qualifications

Plumbing contractor must submit to the contracting officer documentation that lists personnel assigned to this project prior to beginning construction who have successfully completed formal Lubrizol CPVC plumbing systems training conducted by an authorized Lubrizol CPVC manufacturer's representative. Installer should have an ASME B31.3 CPVC schedule 80 bonder qualification for installation of CPVC process piping systems. The contractor training documentation shall be specific to the manufacturer of the pipe and fittings. Personnel's training documentation must be current and have been updated within the past two (2) years. (Note: this training does not imply compliance with any local or state contractor certification or licensing laws.)

3.3 Technical Data

A. APPLICABLE STANDARDS

- a. NSF/ANSI Standard 14 Plastic Piping Components and Related Materials
- b. NSF/ANSI Standard 61 Drinking Water System Components – Health Effects
- c. ASTM D1784 Specification for Rigid Poly (Vinyl Chloride)(PVC) Compounds and Chlorinated Poly (Vinyl Chloride)(CPVC) Compounds



- d. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials
- e. UL 723 Standard for Test for Surface Burning Characteristics of Building Materials
- f. ASTM F402 Standard Practice for Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings
- g. ASTM F437 Standard Specification for Threaded Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80
- h. ASTM F439 Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80
- i. ASTM F441 Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80
- j. ASTM F493 Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) CPVC Plastic Pipe and Fittings
- k. ASTM F656 Standard Specification for Primers for Use in Solvent Cement Joints of Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings
- l. ASTM F1970 Standard Specification for Special Engineered fittings, Appurtenances or Valves for use in Poly(Vinyl Chloride) (PVC) or Chlorinated Poly(Vinyl Chloride) (CPVC) Systems
- m. CSA B137.6 CPVC Pipe, Tubing, and Fittings for Hot and Cold Water Distribution Systems
- n. ASME NM.1

B. APPLICABLE CODES

- a. ASME B31.3
- b. ASME 31.1
- c. IAPMO, Uniform Plumbing and Mechanical Codes
- d. ICC, International Building, Mechanical and Plumbing Codes
- e. NBCC, National Building Code of Canada

C. Computer aided design files can be found on manufacturing partners' websites or on www.bimobject.com.

3.4 Testing

After the system is installed and any solvent-welded joints have cured, the system shall be hydrostatically tested per the manufacturer's installation instructions and the requirements of ASME NM.1 or the applicable plumbing or mechanical code. **DO NOT PRESSURE TEST CPVC SYSTEMS WITH AIR OR OTHER GASES.**

3.5 Warranty

Consult the manufacturer for specific warranty information.



corzan@lubrizol.com
www.corzan.com

Lubrizol Advanced Materials Europe BV
Chaussée de Wavre, 1945
B- 1160 Brussels
Belgium

Corzan® is a registered trademark of The Lubrizol Corporation.
January 2021
21-1116

