Xirtec®140

Submittal Data Sheet

Job or Customer: .....

Engineer: .....

Contractor: .....

Submitted by: ..... Date

Approved by: ..... Date

Order No: ..... Date

Specification: .....

introduction

< STANDARDS >

ASTM D1784
ASTM D1785
ASTM D2672
ASTM F480
ASTM D2466
ASTM D2467
ASTM D2464
ASTM D2241
ASTM D672
ASTM F1970

NSF 14
NSF 61

Please see our listing on agency websites for NSF compliant pipe and fittings.

www.nsf.org
www.CSAgroup.org

PVC is the most frequently specified of all thermoplastic piping materials. It has been used successfully for over 60 years. PVC is characterized by distinctive physical properties, and is resistant to corrosion and chemical attack by acids, alkalis, salt solutions and many other chemicals. It is attacked, however, by polar solvents such as ketones and aromatics.

Of the various types and grades of PVC used in plastic piping, Type 1, Grade 1 PVC (Cell Classification 12454) conforming to ASTM D1784, is the most common. The maximum service temperature for PVC is 140°F (60°C), under pressure. PVC for drainage applications is also capable of handling near boiling temperatures for intermittent flow conditions. With a hydrostatic design basis of 4,000psi at 73°F (23°C) and a design stress of 2,000psi at 73°F (23°C), PVC has the highest long-term hydrostatic strength of any other major thermoplastic material used for piping.

material properties

Properties	PVC	Standards
Specific gravity	1.42	ASTM D792
Tensile strength, psi at 73°F	7,000	ASTM D638
Modulus of elasticity tensile, psi at 73°F	400,000	ASTM D638
Flexural strength, psi	14,500	ASTM D790
Izod impact, ft.lbs./in. at 73°F, notched	0.65	ASTM D256
Compressive strength, psi	9,000	ASTM D695
Poisson's ratio	0.38	
Working stress, psi at 73°F	2,000	
Coefficient of thermal expansion in./in./°F (x 10^{-5})	3	ASTM D696
Linear expansion, in./10°F per 100' of pipe	0.36	
Maximum operating temperature under pressure	140ºF (60ºC)	
Deflection temperature under load, °F at 66 psi	173	ASTM D648
Deflection temperature under load, °F at 264 psi	160	ASTM D648
Thermal conductivity, BTU.in./hr.ft^2.°F	1.2	ASTM C177
Burning rate	Self extinguish	ASTM D635
Burning class	V-0	UL-94
Flash ignition, °F	730	
Limited oxygen index (%)	43	ASTM D2863-70
Water absorption, %, (24 hrs. at 73°F)	0.05	ASTM D570

pipe availability

Pipe Size		
Schedule 40 White	Schedule 40 Grey	Schedule 80 Grey
1/2" - 24"	2" - 16"	1/4" - 24"

Fittings	Size (inches)	
	Schedule 40	Schedule 80
Tee (Soc)	1/2 - 12	1/4 - 12
Reducing Tee (Soc)	1/2 - 8 x 1/2 - 8 x 1/2 - 6	3/4 - 8 x 3/4 - 8 x 1/2 - 6
Tee (Soc x Soc x Fpt)	1/2 - 4	1/2 - 1
Reducing Tee (Soc x Soc x Fpt)	1/2 - 8 x 1/2 - 8 x 1/2 - 4	N/A
Tee (Fpt)	1/2 - 2	1/4 - 4
90° Elbow (Soc)	1/2 - 12	1/4 - 12
90° Elbow (Soc x Fpt)	1/2 - 4	1/2 - 2
90° Elbow (Fpt)	1/2 - 2	1/4 - 4
90° Elbow Reducing (Soc)	3/4 - 2 x 1/2 - 1-1/2	N/A
90° Elbow Reducing (Soc x Fpt)	1/2 - 2 x 1/2 - 1-1/2	N/A
90° Elbow (Mpt x Soc)	1/2 - 2	N/A
90° Elbow (Spig x Soc)	1/2 - 2	N/A
90° Elbow (Mpt x Fpt)	1/2 - 2	N/A
90° Street Elbow (Spig x Soc)	1/2 - 2	N/A
90° Street Elbow (Mpt x Fpt)	1/2 - 2	N/A
Side Outlet Elbow (Soc)	1/2	N/A
Side Outlet Elbow (Soc x Soc x Fpt)	1/2 - 1 x 1/2 -1 x 1/2 - 3/4	N/A
45° Elbow (Soc)	1/2 - 12	1/4 - 12
45° Elbow (Fpt)	N/A	1/4 - 4
22-1/2° Elbow (Soc)	N/A	2 - 4
30° Elbow (Soc)	N/A	6
Hose Adapter (Insert x Soc)	1/2 - 4	N/A
Hose Adapter (Insert x Mpt)	1/2 - 4	N/A
Cross (Soc)	1/2 - 4	1/2 - 4
Coupling (Fpt)	1/2 - 1	1/4 - 4
Coupling (Soc)	3/8 - 8	1/4 - 12
Reducer Coupling (Soc)	3/4 - 6 x 1/2 - 4	3/4 - 8 x 1/2 - 6
Reducer Coupling (Fpt)	N/A	1/2 - 2 x 1/4 - 1-1/2
Female Adapter (Soc x Fpt)	1/2 - 8	1/4 - 4
Female Adapter Reducer (Soc x Fpt)	1/2 - 1 x 1/4 - 1	N/A
Female Adapter (Spig x Fpt)	1/2 - 4	1/2 - 4
Male Adapter (Soc x Mpt)	3/8 - 8	1/2 - 4
Male Adapter Reducing (Soc x Mpt)	1/2 - 4 x 1/2 - 3	N/A
IPS to PIP Adapter (Spig x Soc)	6 - 8	N/A
Riser Extension (Fpt x Mpt)	1/2 - 1	N/A
Reducer Bushing (Spig x Soc)	1/2 - 8 x 1/4 - 6	3/8 - 8 x 3/8 - 6
Reducer Bushing (Spig x Fpt)	1/2 - 6 x 3/8 - 5	3/8 - 6 x 3/8 - 4
Reducer Bushing (Mpt x Fpt)	3/8 - 3 x 3/8 - 2-1/2	3/8 - 4 x 3/8 - 3
Cap (Soc)	3/8 - 8	1/4 - 8
Cap (Fpt)	3/8"- 6	1/4 - 4
Plug (Spig)	3/8 - 4	2
Plug (Mpt)	3/8 - 6	1/4 - 6
Wye (Soc)	1-1/2 - 6	1-1/2 - 6
Saddles (Soc)	2-1/2 - 10 x 3/4 - 4	N/A
Saddles (Fpt)	2-1/2 - 10 x 3/4 - 4	N/A

Fittings	Size (inches)	
	Schedule 40	Schedule 80
Fabricated Tee (Soc)	10 - 24	10 - 16
Fabricated Reducing Tee (Soc)	10 - 24 x 10 - 24 x 4 - 20	8 - 16 x 8 - 16 x 4 - 14
Fabricated 45° Elbow (Soc)	10 - 18	10 - 16
Fabricated 22-1/2° Elbow (Soc)	N/A	6 - 10
Fabricated Cross (Soc)	6 - 16	N/A
Fabricated Reducing Cross (Soc)	8 - 16 x 4 - 14	N/A
Fabricated Coupling (Soc)	10 - 24	10 - 16
Fabricated Concentric Reducing Coupling (Soc)	N/A	8 - 16 x 4 - 14
Fabricated Eccentric Reducing Coupling (Soc)	8 - 12 x 4 - 10	N/A
Fabricated Reducer Bushing (Spig x Soc)	10 - 12 x 4 - 10	10 - 16 x 4 - 14
Fabricated Cap (Soc)	10 - 24	10 - 16
Fabricated Wye (Soc)	8 - 16	8 - 14
One Piece Fabricated Flange (Soc)	N/A	10 - 16
Fabricated Blind Flange	N/A	10 - 16
Fabricated Vanstone Flange (Soc)	N/A	18 - 24
Nipples	N/A	1/4 - 4
Expansion Joints	N/A	1/2 - 4
Heavy Duty Vanstone Flange (Soc)	N/A	14 - 16

Fittings	Size (inches)
Union (Soc)	1/4 - 4
Union (Fpt)	1/4 - 4
One Piece Flange (Soc)	1/2 - 8
One Piece Flange (Fpt)	1/2 - 6
Blind Flange	1/2 - 8
Heavy Duty Vanstone Flange (Spig)	3 - 8
Vanstone Flange (Spig)	1/2 - 12
Heavy Duty Vanstone Flange (Soc)	1-1/2 - 12
Vanstone Flange (Soc)	1/2 - 12
Vanstone Flange (Fpt)	1/2 - 4
Wye	1 1/2 - 6

installation

To make consistently tight joints, the following points of solvent cementing should be clearly understood:

1. The joining surfaces must be softened and made semi-fluid.
2. Sufficient cement must be applied to fill the gap between pipe and fittings.
3. Assembly of pipe and fittings must be made while the surfaces are still wet and fluid.
4. Joint strength will develop as the cement cures. In the tight part of the joint, surfaces tend to fuse together; in the loose part, the cement bonds to both surfaces.

Step 1 Preparation

Assemble proper materials for the job. This includes the appropriate cement, primer and applicator for the size of piping system to be assembled.

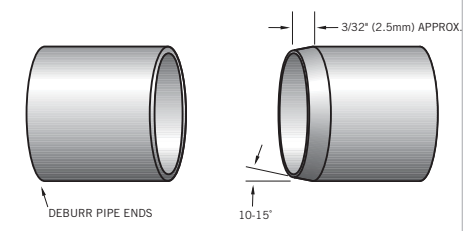
Step 2 Cut Pipe

Pipe must be cut as square as possible. (A diagonal cut reduces bonding area in the most effective part of the joint.) Use a handsaw and miter box or a mechanical saw.

Plastic tubing cutters may also be used for cutting plastic pipe; however, some produce a raised bead at the end of the pipe. This bead must be removed with a file or reamer, as it will wipe the cement away when pipe is inserted into the fitting.

Step 3 Deburr Pipe Ends

Use a knife, plastic pipe deburring tool, or file to remove burrs from the end of small diameter pipe. Be sure to remove all burrs from around the inside as well as the outside of the pipe. A slight chamfer (bevel) of about 15° should be added to the end to permit easier insertion of the pipe into the fitting. Failure to chamfer the edge of the pipe may remove cement from the fitting socket, causing the joint to leak. For pressure pipe systems of 2" and above, the pipe must be end-treated with a 15° chamfer cut to a depth of approximately 3/32" (2.5mm).



Step 4 Clean Pipe Ends

Remove all dirt, grease and moisture. A thorough wipe with a clean dry rag is usually sufficient. (Moisture will retard cure, dirt or grease can prevent adhesion).

Step 5 Check Fit

Check pipe and fittings for dry fit before cementing together. For proper interference fit, the pipe must go easily into the fitting one quarter to three quarters of the way. Too tight a fit is not desirable; you must be able to fully bottom the pipe in the socket during assembly. If the pipe and fittings are not out of round, a satisfactory joint can be made if there is a "net" fit, that is, the pipe bottoms in the fitting socket with no interference, without slop.

All pipe and fittings must conform to ASTM and other recognized standards.

Step 6 Select Applicator

Ensure that the right applicator is being used for the size of pipe or fittings being joined. The applicator size should be equal to half the pipe diameter. It is important that a proper size applicator be used to help ensure that sufficient layers of cement and primer are applied.

Step 7 Priming

The purpose of a primer is to penetrate and soften pipe surfaces so that they can fuse together. The proper use of a primer provides assurance that the surfaces are prepared for fusion.

Check the penetration or softening on a piece of scrap before you start the installation or if the weather changes during the day. Using a knife or other sharp object, drag the edge over the coated surface. Proper penetration has been made if you can scratch or scrape a few thousandths of an inch of the primed surfaces away.

Weather conditions can affect priming and cementing action, so be aware of the following:

- repeated applications to either or both surfaces may be necessary
- in cold weather, more time may be required for proper penetration
- in hot weather, penetration time may be shortened due to rapid evaporation

Step 8 Primer Application

Using the correct applicator, aggressively work the primer into the fitting socket, keeping the surface and applicator wet until the surface has been softened. More applications may be needed for hard surfaces and cold weather conditions. Re-dip the applicator in primer as required. When the surface is primed, remove any puddles of primer from the socket.

Step 9 Primer Application

Next, aggressively work the primer on to the end of the pipe to a point 1/2" beyond the depth of the fitting socket.

Immediately and while the surfaces are still wet, apply the appropriate IPEX cement.

Step 10 Cement Application

Stir the cement or shake can before using. Using the correct size applicator, aggressively work a full even layer of cement on to the pipe end equal to the depth of the fitting socket. Do not brush it out to a thin paint type layer, as this will dry within a few seconds.

Step 11 Cement Application

Aggressively work a medium layer of cement into the fitting socket.

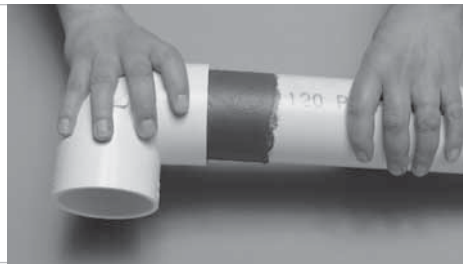
Avoid puddling the cement in the socket. On bell end pipe do not coat beyond the socket depth or allow cement to run down into the pipe beyond the spigot end.

Step 12 Cement Application

Apply a second full, even layer of cement on the pipe.

Step 13 Assembly

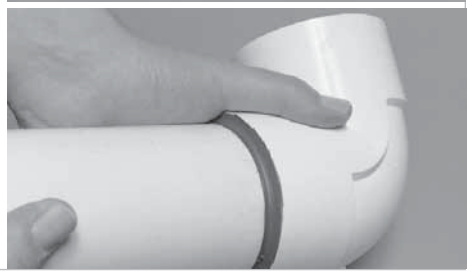
Without delay, while the cement is still wet, assemble the pipe and fittings. Use sufficient force to ensure that the pipe bottoms in the fitting socket. If possible, twist the pipe a quarter turn as you insert it.



Step 14 Assembly

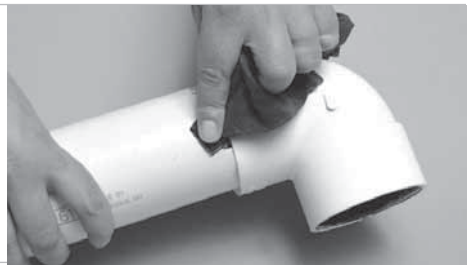
Hold the pipe and fitting together for approximately 30 seconds to avoid push out.

After assembly, a joint should have a ring or bead of cement completely around the juncture of the pipe and fitting. If voids in this ring are present, sufficient cement was not applied and the joint may be defective.



Step 15 Joint Cleaning

Using a rag, remove the excess cement from the pipe and fitting, including the ring or bead, as it will needlessly soften the pipe and fitting and does not add to joint strength. Avoid disturbing or moving the joint.



Step 16 Joint Setting & Curing

Handle newly assembled joints carefully until initial set has taken place. Allow curing to take place before pressurizing the system. (Note: in humid weather allow for 50% more curing time.)

For initial set and cure times for IPEX cements, refer to the table on page 10.

Cold Weather

Although normal installation temperatures are between 40°F (4°C) and 110°F (43°C), high strength joints have been made at temperatures as low as –15°F (–26°C).

In cold weather, solvents penetrate and soften the plastic pipe and fitting surfaces more slowly than in warm weather. In this situation, the plastic is more resistant to solvent attack and it becomes even more important to pre-soften surfaces with an aggressive primer. Be aware that because of slower evaporation, a longer cure time is necessary.

Tips for solvent cementing in cold weather

- Prefabricate as much of the system as is possible in a heated work area.
- Store cements and primers in a warmer area when not in use and make sure they remain fluid.
- Take special care to remove moisture including ice and snow from the surfaces to be joined.
- Ensure that the temperature of the materials to be joined (re: pipe and fittings) is similar.
- Use an IPEX Primer to soften the joining surfaces before applying cement. More than one application may be necessary.
- Allow a longer cure period before the system is used. Note: A heat blanket may be used to speed up the set and cure times.

Hot Weather

There are many occasions when solvent cementing plastic pipe at 95ºF (35ºC) temperatures and above cannot be avoided. If special precautions are taken, problems can be avoided.

Solvent cements for plastic pipe contain high-strength solvents which evaporate faster at elevated temperatures. This is especially true when there is a hot wind blowing. If the pipe is stored in direct sunlight, the pipe surface temperatures may be 20ºF to 30ºF (10ºC to 15ºC) higher than the ambient temperature. In this situation, the plastic is less resistant to attack and the solvents will attack faster and deeper, especially inside a joint. It is therefore very important to avoid puddling the cement inside the fitting socket and to ensure that any excess cement outside the joint is wiped off.

Tips for solvent cementing in hot weather:

- Store solvent cements and primers in a cool or shaded area prior to use.
- If possible, store fittings and pipe or at least the ends to be solvent welded, in a shady area before cementing.
- Try to do the solvent cementing in cooler morning hours.
- Cool surfaces to be joined by wiping with a damp rag.
- Make sure that the surface is dry prior to applying solvent cement.
- Make sure that both surfaces to be joined are still wet with cement when putting them together. With large size pipe, more people on the crew may be necessary.
- Using a primer and a heavier, high-viscosity cement will provide a little more working time.

Note: During hot weather the expansion-contraction factor may increase. Refer to the expansion-contraction design criteria in this manual.

Joint Cure Schedule

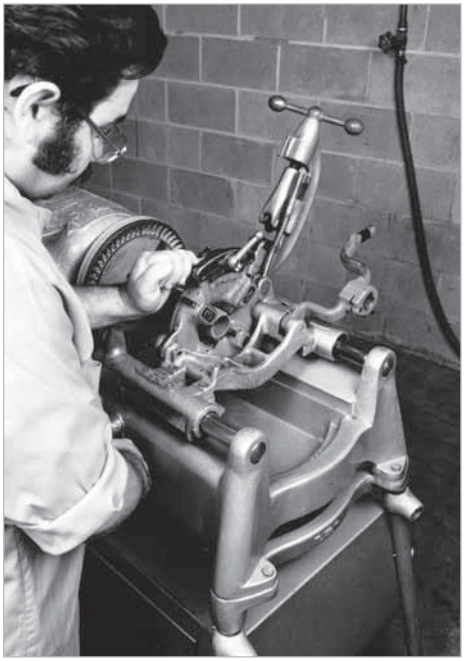
Temperature Range (°F)	Temperature Range (°C)	Pipe Size (in) & system operating pressure							
		1/2 to 1-1/4		1-1/2 to 2		2-1/2 to 8		10 to 14	>16
		<160psi	160 - 370psi	<160psi	160 - 315psi	<160psi	160 - 315psi	<100psi	<100psi
60 to 100	16 to 38	15 min	6 hr	30 min	12 hr	1-1/2hr	24 hr	48 hr	72 hr
40 to 60	4 to 16	20 min	12 hr	45 min	24 hr	4 hr	48 hr	96 hr	6 days
0 to 40	–18 to 4	30 min	48 hr	1 hr	96 hr	72 hr	8 days	8 days	14 days

* The figures in the table are estimates based on laboratory tests for water applications (chemical applications may require different set times). In damp or humid weather allow 50% more cure time (relative humidity over 60%).

Note 1: Due to the many variables in the field, these figures should be used as a general guideline only.

Note 2: Joint cure schedule is the necessary time needed before pressurizing the system.

joining methods – threading



Characteristics

Threading of PVC pipe is only recommended for Schedule 80. The wall thickness is diminished at the point of threading and thereby reduces the maximum working pressure by 50%. Because of this, threaded pipe should not be used in high pressure systems nor in areas where a leak might endanger personnel. Threaded joints will not withstand constant or extreme stress and strain and must be supported or hung with this in mind. The threading of pipe sizes above 4" is not recommended.

Note: Using threaded PVC products at or near the maximum temperature range should be avoided. Consult IPEX for specific details.

Tools & Equipment

- Power threading machine
- Threading ratchet and pipe vise (if hand pipe stock is used)
- Pipe dies designed for plastic
- Strap wrench
- Teflon* tape (PTFE)
- Cutting and de-burring tool
- Ring gauge (L-1)

*Trademark of the E.I. DuPont Company

Handling & Installation Procedures

Making the Pipe Thread

1. Cutting and Deburring

PVC pipe should be cut square and smooth for easy and accurate threading. A miter box or similar guide should be used when sawing is done by hand. Burrs should be removed inside and out using a knife or plastic pipe deburring tool.

2. Threading

Threading Schedule 80 PVC pipe can be easily accomplished using either a standard hand pipe stock or a power operated tool. Cutting dies should be clean and sharp.

Power-threading machines should be fitted with dies having a 5° negative front rake and ground especially for plastic pipe. Self opening die heads, and a slight chamfer to lead the dies will speed the operation; however, dies should not be driven at high speeds or with heavy pressure.

When using a hand-held cutter, the pipe should be held in a pipe vise. To prevent crushing or scoring of the pipe by the vise jaws, some type of protective wrap such as canvas, emery paper, rubber or light metal sleeve should be used.

For hand stocks, the dies should have a negative front rake angle of 5° to 10°. PVC is readily threaded and caution should be taken not to over-thread. This procedure is best done in a shop or fabricating plant. Thread dimensional specifications can be found in Table 25 under *"Joining Methods – Threading"* in the IPEX Industrial Technical Manual Series, *"Volume I: Vinyl Process Piping Systems"*, American National Standard Taper Pipe Threads (NPT).

Installation Guidelines

1. Preparing the Threaded Pipe

A ring gauge should be used to check the accuracy of the threads.

Tolerance = ±1-1/2 turns.

The threads should be cleaned by brushing away cuttings and ribbons. After cleaning, apply an IPEX recommended thread lubricant such as Teflon® tape (PTFE) to the threaded portion of the pipe.

Wrap the tape around the entire length of threads beginning with number two thread from the end. The tape should slightly overlap itself going in the same direction as the threads. This will prevent the tape from unraveling when the fitting is tightened on the pipe. Overlapping in the wrong direction and the use of too much tape can affect tolerances between threads. This can generate stress in the wall of female fittings resulting in failure during operations.

2. Assembly of Threaded Joints and Unions

After applying thread tape, screw the threaded fitting onto the pipe. Screwed fittings should be started carefully and hand tightened. Threads must be properly cut and a good quality thread tape must be used. If desired, the joint may be tightened with a strap wrench. In NO INSTANCE should a pipe or chain wrench be used as the jaws of this type of wrench will scar and damage the pipe wall.

Fittings should be threaded together until hand tight with an additional 1/2 to 1 turns more. Avoid stretching or distorting the pipe, fittings or threads by over tightening.

Note 1: Never apply solvent cement to threaded pipe or threaded fittings. Do not allow cleaners, primers, or solvent cements to “run” or drip into the threaded portion of the fitting.

Note 2: Avoid screwing metallic male threads into plastic female threads, except those that have metal reinforcement. Consult the factory or your IPEX sales representative for the availability of these metal reinforced fittings.

Note 3: It is recommended so that thread tape be used when connecting union ends to threaded pipe. However, thread tape is not needed on the union threaded interface assembly.

joining methods – flanging

Introduction

Flanging is used extensively for plastic process lines that require periodic dismantling. Thermoplastic flanges and factory flanged fittings in PVC are available in a full range of sizes and types for joining to pipe by solvent welding and threading. Gasket seals between the flange faces should be an elastomeric full-faced gasket with a hardness of 50 to 70 durometer A. Neoprene gaskets are commonly available in sizes from 1/2" through to 24" range having a 1/8" thickness. For chemical environments beyond the capabilities of neoprene, more resistant elastomers should be used.

Dimensions

IPEX PVC flanges are the same as 150lb metal flanges per ANSI B16.1. Threads are tapered iron pipe size threads per ANSI B2.1. The socket dimensions conform to ASTM D2467 which describes 1/2" through 8". Flanges 1/2" to 12" are third party tested by NSF according to ASTM F1970. Flange bolt sets are charted on page 15.

Maximum pressure for any flanged system is the rating of the pipe or up to 150psi. Maximum operating pressures for elevated temperatures are shown in the table below.

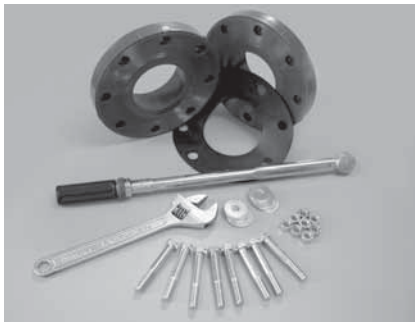
Blind flanges in sizes 14" – 24" have a maximum working pressure of 50psi.

Maximum Pressures for Flanged Systems

Operating Temp.		Max. Operating Pressure (psi)
°F	°C	PVC
73	23	150
80	27	132
90	32	113
100	38	93
110	43	75
120	49	60
130	54	45
140	60	33
150	66	*
160	71	*
170	77	*
180	82	*
200	93	NR
210	99	NR

** intermittent drainage only*
NR – not recommended

Installation Guidelines

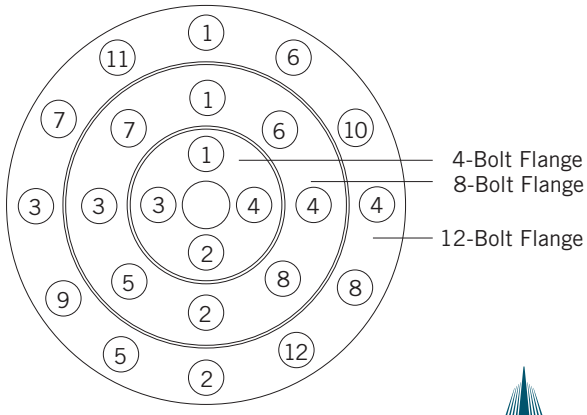


The faces of IPEX flanges have a phonographic-grooved finish providing positive seal on the gasket when the bolts are properly tightened.

Once a flange is joined to pipe, use the following method to join two flanges together:

1. Make sure all bolt holes of the matching flanges are aligned.
2. Insert all bolts.
3. Make sure the faces of the mating flanges are not separated by excessive distance prior to bolting down the flanges.
4. The bolts on the plastic flanges should be tightened by pulling down the nuts diametrically opposite each other using a torque wrench. Complete tightening should be accomplished in stages using the final torque values (see table on next page) Recommended Torque. Uniform stress across the flange will eliminate leaky gaskets.

   The following tightening pattern is suggested for the flange bolts.

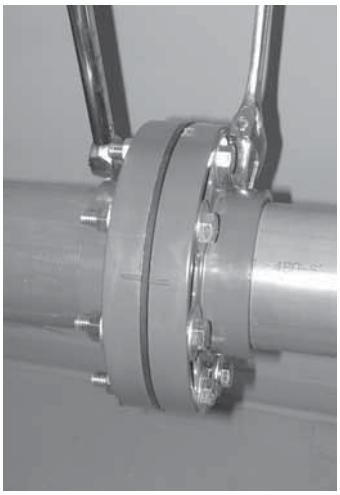


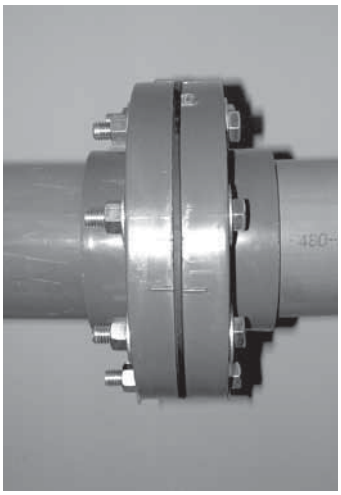
Recommended Torque

Flange Size (in.)	Recommended Maximum Torque (ft. lbs.)*
1/2 – 1-1/2	15
2 – 4	30
6 – 8	50
10	70
12 - 24	100

* Based on using flat-faced PVC flanges, a full-faced neoprene gasket, and well lubricated hardware, tightened in the proper sequence and applying torque in small increments. For raised-face flange assemblies, and vinyl-to-metal flange (or other materials), these torque recommendations may vary.

Note: When thermoplastic flanges with PVC rings are used with butterfly valves or other equipment where a full-faced continuous support does not exist, a back-up ring or fiberloc ring should be used to prevent potential cracking of the flange face.





Recommended Flange Bolt Set

Pipe Size	No. of Holes	Bolt Diameter	Bolt Length
1/2	4	0.50	1.75
3/4	4	0.50	2.00
1	4	0.50	2.00
1-1/4	4	0.50	2.25
1-1/2	4	0.50	2.50
2	4	0.63	2.75
2-1/2	4	0.63	3.00
3	4	0.63	3.00
4	8	0.63	3.25
6	8	0.75	3.50
8	8	0.75	4.00
10	12	0.88	5.00
12	12	0.88	5.00
14	12	1.00	7.00
16	16	1.00	7.00
18	16	1.13	8.00
20	20	1.13	9.00
24	20	1.25	9.50

Note: *Bolt length may vary depending on the style of flange and use of backing rings.*

⚠ CAUTION

1. Do not over-torque flange bolts.
2. Use the proper bolt tightening sequence.
3. Make sure the system is in proper alignment.
4. Flanges should not be used to draw piping assemblies together.
5. Flat washers must be used under every nut and bolt head.

testing

Site Pressure Testing

The purpose of an onsite pressure test is to establish that the installed section of line, and in particular all joints and fittings, will withstand the design working pressure, plus a safety margin, without loss of pressure or fluid.

Generally a test pressure of 1-1/2 times the safe working pressure for the pipe installed is adequate. Whenever possible, it is recommended that hydrostatic testing be carried out. It is suggested that the following hydrostatic test procedure be followed after the solvent-welded joints have been allowed to cure for a minimum period of 24 hours at 73ºF (23ºC) (timed from the cure of last joint). For more detail, refer to the joint cure schedules in Table 22 in the Installation section of the IPEX Volume I: Vinyl Process Piping Systems; Industrial Technical Manual Series.

Hydrostatic Test Procedure

1. Fully inspect the installed piping for evidence of mechanical abuse and/or dry suspect joints.
2. Split the system into convenient test sections not exceeding 1,000 ft.
3. Slowly fill the pipe section with water, preferably at a velocity of 1.0 fps or less. Any entrapped air should be evacuated by venting from the high points. Do not pressurize at this stage.
4. Leave the section for at least 1 hour to allow equilibrium temperature to be achieved.
5. Check the system for leaks. If clear, check for and remove any remaining air and increase pressure up to 50 psi. Do not pressurize further at this stage.
6. Leave the section pressurized for 10 minutes. If the pressure decays, inspect for leaks. If the pressure remains constant, slowly increase the hydrostatic pressure to 1½ times the nominal working pressure.
7. Leave the section pressurized for a period not exceeding 1 hour. During this time, the pressure should not change.

If there is a significant drop in static pressure or extended times are required to achieve pressure, either joint leakage has occurred or air remains in the line. Inspect for leakage and if none is apparent, reduce the pressure and check for trapped air. This must be removed before further testing.

Any joint leaks should be repaired and allowed to cure fully before re-pressurizing for a minimum of 24 hours.

WARNING

- NEVER use compressed air or gas in PVC/CPVC/PP/PVDF pipe and fittings.
- NEVER test PVC/CPVC/PP/PVDF pipe and fittings with compressed air or gas, or air-over-water boosters.
- ONLY use PVC/CPVC/PP/PVDF pipe for water and approved chemicals.

Handling & Storage

PVC is a strong, lightweight material, about one fifth the weight of steel or cast iron. Piping made of this material is easily handled and, as a result, there is a tendency for them to be thrown about on the jobsite. Care should be taken in handling and storage to prevent damage to the pipe.

PVC pipe should be given adequate support at all times. It should not be stacked in large piles, especially in warm temperature conditions, as bottom pipe may become distorted and joining will become difficult.

For long-term storage, pipe racks should be used, providing continuous support along the length. If this is not possible, timber supports of at least 3" bearing width, at spacings not greater than 3' centers, should be placed beneath the piping. If the stacks are rectangular, twice the spacing at the sides is required. Pipe should not be stored more than seven layers high in racks. If different classes of pipe are kept in the same rack, pipe with the thickest walls should always be at the bottom. Sharp corners on metal racks should be avoided.

For temporary storage in the field when racks are not provided, care should be taken that the ground is level and free of sharp objects (i.e. loose stones, etc.). Pipe should be stacked to reduce movement, but should not exceed three to four layers high.

Most pipe is now supplied in crates. Care should be taken when unloading the crates; avoid using metal slings or wire ropes. Crates may be stacked four high in the field.

The above recommendations are for a temperature of approximately 80°F (27°C). Stack heights should be reduced if higher temperatures are encountered, or if pipe is nested (i.e. pipe stored inside pipe of a larger diameter). Reduction in height should be proportional to the total weight of the nested pipe, compared with the weight of pipe normally contained in such racks.

Since the soundness of any joint depends on the condition of the pipe end, care should be taken in transit, handling and storage to avoid damage to these ends. The impact resistance and flexibility of PVC pipe is reduced by lower temperature conditions. The impact strength for both types of piping materials will decrease as temperatures approach 32°F (0°C) and below. Care should be taken when unloading and handling pipe in cold weather. Dropping pipe from a truck or forklift may cause damage. Methods and techniques normally used in warm weather may not be acceptable at the lower temperature range.

When loading pipe onto vehicles, care should be taken to avoid contact with any sharp corners (i.e. angle irons, nail heads, etc.), as the pipe may be damaged.

While in transit, pipe should be well secured and supported over the entire length and should never project unsecured from the back of a trailer.

Larger pipe may be off-loaded from vehicles by rolling them gently down timbers, ensuring that they do not fall onto one another or onto a hard, uneven surface.

Prolonged Outdoor Exposure

Prolonged exposure of PVC pipe to the direct rays of the sun will not damage the pipe. However, some mild discoloration may take place in the form of a milky film on the exposed surfaces. This change in color merely indicates that there has been a harmless chemical transformation at the surface of the pipe. A small reduction in impact strength could occur at the discolored surfaces but they are of a very small order and are not enough to cause problems in field installation.

Protection – Covering

Discoloration of the pipe can be avoided by shading it from the direct rays of the sun. This can be accomplished by covering the stockpile or the crated pipe with a light colored opaque material such as canvas. If the pipe is covered, always allow for the circulation of air through the pipe to avoid heat buildup in hot summer weather. Make sure that the pipe is not stored close to sources of heat such as boilers, steam lines, engine exhaust outlets, etc.

Protection – Painting

PVC pipe and fittings can be easily protected from ultraviolet oxidation by painting with a heavily pigmented, exterior water-based latex paint. The color of the paint is of no particular importance; the pigment merely acts as an ultraviolet screen and prevents sunlight change. White or some other light color is recommended as it helps reduce pipe temperature. The latex paint must be thickly applied as an opaque coating on pipe and fittings that have been well cleaned and very lightly sanded.

Xirtec140 schedule 40 & 80 PVC industrial pipe & fittings

Scope

This specification sheet covers the manufacturers' requirements for PVC Schedule 40 and Schedule 80 IPS pressure pipe. The pipe and fittings meet or exceed all applicable ASTM, NSF and CSA standards and are suitable for potable water.

Xirtec140 PVC Materials

Rigid PVC (polyvinyl chloride) used in the extrusion of Schedule 40 & 80 pipe and fittings complies with the material requirements of ASTM D1784 (formerly Type 1, Grade 1) and has a cell classification of 12454. Raw material used in the extrusion shall contain the standard specified amounts of color pigment, stabilizers and other additives. The compounds used are listed to the requirements of NSF 61 for use in potable water service.

Dimensions

Physical dimensions and properties of Xirtec140 PVC Schedule 40 and 80 pipe and fittings shall meet the requirements of ASTM D1785 and/or be certified to CSA B137.3. Socket dimensions of belled end pipe shall meet the requirements of ASTM D2672 or F480.

Marking

Xirtec140 PVC Schedule 40 and 80 pipe is marked as prescribed in ASTM D1785, NSF 14 and/or CSA B137.0/137.3. The marking includes the following: IPEX; Xirtec140; IPS PVC and the Schedule and Pressure Rating at 73°F (23ºC); ASTM D1785; CSA B137.3; NSF 14; and NSF 61 Potable.

Sample Specification

All Xirtec140 PVC Schedule 40 and 80 pipe shall conform to ASTM D1785, NSF 14, and/or CSA B137.0/B137.3. Xirtec140 Schedule 40 fittings shall conform to ASTM D2466. Xirtec140 Schedule 80 socket fittings shall conform to ASTM D2467 and Schedule 80 threaded fittings shall conform to ASTM D2464. All fittings must be third party certified to NSF 14.

All PVC fittings shall be molded or fabricated from Xirtec140 PVC compound compatible with the pipe material.

Only Xirtec140 Schedule 80 pipe shall be threaded and the pressure rating shall be reduced by 50%. Belled end pipe socket dimensions shall conform to ASTM D2672 or F480. All pipe, fittings and valves shall be compatible Xirtec140 and produced by one manufacturer; as supplied by IPEX.

PVC SDR pressure rated pipe

Scope

This specification sheet covers the manufacturers' requirements for PVC Standard Dimension Ratio (SDR) pressure rated pipe. The pipe meets or exceeds all applicable ASTM, NSF and CSA standards and is suitable for potable water.

PVC Materials

Rigid PVC (polyvinyl chloride) used in the extrusion of SDR pressure rated pipe complies with the material requirements of ASTM D1784 (formerly Type 1, Grade 1) and has a cell classification of 12454. Raw material used in the extrusion shall contain the standard specified amounts of color pigment, stabilizers and other additives. The compounds used are listed to the requirements of NSF 61 for use in potable water service.

Dimensions (Plain End)

Physical dimensions and properties of PVC SDR pressure rated pipe shall meet the requirements of ASTM D2241 (available in sizes 1/2" through 48") and CSA B137.3.

Dimensions (Bell End)

Physical dimensions and properties of PVC SDR pressure rated pipe bells shall meet the requirements of ASTM D2672 or ASTM F480.

Marking

PVC SDR rated pressure pipe is marked as prescribed in ASTM D2241 and/or CSA B137.3 as follows: IPEX; PVC; SDR# and/or the pressure rating in psi for water at 73°F (23ºC); ASTM D2241; CSA B137.3; and NSF 61 potable.

Sample Specification

All PVC SDR/PR 160 and 200 pipe shall conform to ASTM D2241 and/or CSA B37.0/B137.3. Belled ends shall meet the requirements of ASTM D672 or ASTM F80. SDR pipe and Schedule 40 fittings shall be compatible and produced by one manufacturer Xirtec140 as supplied by IPEX.

drain, waste & vent pipe (DWV)

Scope

This specification sheet covers the manufacturers' requirements for PVC DWV pipe. This pipe meets or exceeds all applicable ASTM, NSF and CSA standards.

PVC Materials

Rigid PVC (polyvinyl chloride) used in the extrusion of DWV pipe complies with the material requirements of ASTM D1784 (formerly Type 1, Grade 1) and has a cell classification of 12454.

Dimensions

Physical dimensions and tolerances of PVC-DWV pipe shall meet the requirements of ASTM D2665.

Marking

PVC DWV pipe is marked as prescribed in ASTM D2665. The marking includes the following: IPEX; nominal pipe size; PVC-DWV; ASTM D2665, NSF 14.

Sample Specification

All PVC DWV pipe shall conform to ASTM D1785.

All pipe and fittings shall be compatible and produced by one manufacturer as supplied by IPEX.

fabricated fittings

Pressure Rating

The pressure rating of the fitting shall be the same as that of the pipe used in the fabrication of the fitting. The pipe shall be certified to CSA B137.3 and NSF 14.

Hydrostatic Pressure Test of Fittings

At the engineer's or customer's request, representative sample fittings may be assembled and pressure tested for 1,000 hours at 1-1/2 times the pressure rating of the pipe at 73°F (23ºC). At the end of the 1,000 hours, the pressure shall be increased to 2-1/2 times the pressure rating within two minutes. No failure shall occur.

Quality Control Tests

Joints from fittings shall be subjected to a spark test (power source of 24,000 volts). The joint shall not permit any passage of spark at any point along the weld.

Fiberglass Reinforcing

Fiberglass reinforcing should be applied to the fitting in such a manner and thickness to meet the hydrostatic pressure requirements specified. Bonding shall be done with primer resin to provide an adequate bond to the PVC pipe.

Marking

All fittings to have an exterior label identifying size, configuration, pressure rating and manufacturer's name.

Socket Weld Depths

Each solvent weld bell must have a minimum socket depth of one-half times the pipe diameter.

One-Source Supply

All components of a piping system including pipe, fittings and valves, shall be supplied by one manufacturer as supplied by IPEX.

About IPEX

About the IPEX Group of Companies

As leading suppliers of thermoplastic piping systems, the IPEX Group of Companies provides our customers with some of the world's largest and most comprehensive product lines. All IPEX products are backed by more than 50 years of experience. With state-of-the-art manufacturing facilities and distribution centers across North America, we have established a reputation for product innovation, quality, end-user focus and performance.

Markets served by IPEX group products are:

- Electrical
- Telecommunications and utility
- Industrial process piping
- Municipal pressure and gravity flow
- Plumbing and DWV and water supply
- Irrigation
- Electrofusion PE for gas and water
- Industrial, plumbing and electrical cements
- PVC, CPVC, PVCO, ABS, PE, PEX, PP and PVDF pipe and fittings

Products manufactured by IPEX Inc.

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