

CUSTOMER SERVICE CENTER

Vancouver

Tel (604) 534-8631
Fax (604) 534-7616

Calgary

Tel (403) 236-8333
Fax (403) 279-8443

Edmonton

Tel (780) 415-5300
Fax (780) 415-5358

Saskatoon

Tel (306) 933-4664
Fax (306) 934-2020

Winnipeg

Tel (204) 633-3111
Fax (204) 633-3075

About IPEX

IPEX is a leading supplier of thermoplastic piping systems. We provide our customers with one of the world's largest and most comprehensive product lines. All IPEX products are backed by over 50 years of experience. With state-of-the-art manufacturing facilities and distribution centers across North America, the IPEX name is synonymous with quality and performance.

Our products and systems have been designed for a broad range of customers and markets. Contact us for information on:

- Plumbing and mechanical piping systems
- Radiant heating systems
- PVC, CPVC, PP, ABS, PEX and PE pipe and fittings (¼" to 48")
- Municipal pressure and gravity piping systems
- Industrial process piping systems
- Telecommunications and utility piping systems
- Irrigation systems
- PVC electrical systems

www.plumb-better.com

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Installation Guide

PlumbBetter
IPEX PIPING SYSTEMS

HOT & COLD WATER SYSTEMS

- Kitec® XPA™ Pipe
- CTS SDR-9 PEX Tubing


IPEX
Committed to Excellence

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CSA B137.5
CSA B137.9
CSA B137.10



ASTM F876/877
ASTM F1281
ASTM F1282



Standard
14 & 61



PLUMBETTER COMPOSITE PIPING SYSTEM

Introduction

The PlumbBetter family of hot and cold water piping systems includes the two leading alternatives to copper – XPA™ pipe (multi layer pipe of polyethylene or x-linked polyethylene and aluminum) and PEX tubing (x-linked polyethylene). IPEX has supplied its XPA pipe using the industry leading Kitec® brand for many years.

Each piping system has unique features and performance characteristics as described in this guide, that make them the leading choice among North America's plumbing and building contractors.

This booklet provides plumbing system installers and inspectors with IPEX recommendations for handling, installing, testing and approving Kitec XPA pipe and PEX tubing systems. Following the recommendations contained in this booklet will lead to a professional plumbing installation and will ensure maximum life for the plumbing system.

Standards

Kitec XPA Pipe & Fittings		
	ASTM	CSA
PEX-AL-PEX Pipe	F1281	B137.10
PE-AL-PE Pipe	F1282	B137.9
Fittings	F1974	B137.9, B137.10

CTS SDR-9 PEX Tubing & Fittings		
	ASTM	CSA
Tubing	F876, F877	B137.5
Fittings	F1807	B137.5



Certifications & Listings

Plastic Pipe Institute - Pressure Ratings

- PE-AL-PE systems are rated for 200 psi at 73°F, 100 psi at 140°F.
- PEX-AL-PEX systems are rated for 200 psi at 73°F, 125 psi at 180°F.
- CTS SDR-9 PEX Tubing systems are rated for 160 psi at 73°F, 100 psi at 180°F.

Canadian Standards Association

- PE-AL-PE and PEX-AL-PEX pipe and fittings carry CSA certification to CSA B137.9 and CSA B137.10.
- CTS SDR-9 PEX tubing and fittings carry CSA certification to CSA B137.5.

National Sanitation Foundation

- PE-AL-PE and PEX-AL-PEX pipe and fittings are NSF certified to NSF Standards 14 and 61.
- CTS SDR-9 PEX tubing and fittings are NSF certified to NSF Standards 14 and 61.

International Association of Plumbing and Mechanical Officials - IAPMO

- PE-AL-PE and PEX-AL-PEX pipe and fittings carry IAPMO Classified Marking Certificates C-3388, C-3389 and C-3846.
- CTS SDR-9 PEX tubing and fittings carry IAPMO Certificates C-3699 and C-3720.

International Conference of Building Officials

- PEX-AL-PEX pipe and fittings carry ICBO ER-5187.

U.S. Department of Housing and Urban Development

- PE-AL-PE and PEX-AL-PEX pipe and fittings and CTS SDR-9 PEX tubing and fittings are approved by HUD for use in manufactured housing.



Code Recognition

XPA pipe and fitting systems and CTS SDR-9 PEX tubing and fitting systems are recognized in the following model codes:

- National Standard Plumbing Code
- International Plumbing Code
- International Residential Code
- International Mechanical Code
- Uniform Plumbing Code — composite systems proposed
- Uniform Mechanical Code — composite systems proposed
- Canadian National Plumbing Code
- National Building Code of Canada

Markings

XPA pipe is marked at 5 ft. intervals with the following information:

- Manufacturer's name and trademark - KITEC, XPA and IPEX
- ASTM F1281 or ASTM F1282
- CSA B137.9 or CSA B137.10
- Pipe Size - e.g. 1/2"
- Material Type - PEX-AL-PEX or PE-AL-PE
- Pressure Rating - 200 psi at 73°F or 125 psi at 180°F
- Mark of Certification Agency - CSA and NSF-PW
- Mark of Regulatory Body - IAPMO, ICBO
- Manufacturer's Date and Material Code

Fittings for composite pipe are marked with the following information:

- Manufacturer's name and trademark - KT or KITEC or IPEX
- Mark of Certification Agency - CSA and NSF-PW
- If size permits, ASTM F1974, CSA B137.9/10

CTS SDR-9 PEX tubing is marked at 5 foot intervals with the following information:

- Manufacturer's name and trademark - IPEX Plumbing PEX Potable Tubing
- Tubing Size - e.g. 1/2" (CTS-OD)
- Pressure Rating - 100 psi at 180°F / 160 psi at 73°F
- Mark of Certification Agency NSF-PW
- Standard - ASTM F876/F877
- Mark of Regulatory Body - IAPMO, ICBO
- Manufacturer's Date and Material Code

Fittings for CTS SDR-9 tubing are marked with the following information:

- Manufacturer's name and trademark - MB PEX
- Mark of Certification Agency - WH B137.5 and NSF-PW F1807

HANDLING & STORAGE

Kitec XPA pipe and PEX tubing are supplied in convenient light weight coils. Both Kitec XPA and PEX should be stored indoors to keep coils clean prior to installation and to protect product and packaging from the elements.

Kitec XPA and PEX are designed to withstand limited exposure to ultraviolet light but should not be exposed to sunlight for more than 60 days. For outdoor installations, specify black PEX-AL-PEX Kitec with UV inhibitor.

INSTALLATION

Kitec XPA and PEX are color coded to prevent cross connections and for easy identification of hot and cold water plumbing lines during and after installation. Kitec is colored solid orange or blue, while PEX tubing is white with an orange or blue stripe running the length of the tube.

Pipe and tubing coils may be lifted by hand, easily uncoiled and shaped by hand to create changes in direction.

PEX tubing lends itself to installation above grade for overhead plumbing where its flexibility makes pulling through wood frame floors, walls and ceiling joists easy. For installation below or on grade, Kitec XPA pipe has the advantage. It is easily rolled out like soft copper — the pipe will lay straight and will not recoil. And for engineered high rise plumbing, Kitec XPA has the advantage given its ability to maintain straight, neat, professional runs, while its low expansion/contraction, superior flame spread and smoke development ratings outperform thermoplastic piping.

Uncoilers are available to assist in dispensing XPA pipe or PEX tubing on the job site.

Protection of XPA Pipe and PEX Tubing

Abrasion - Pipe or tubing passing through metallic studs, joists, or hollow masonry walls shall be protected from abrasion or rough edges by elastomeric or plastic sleeves, grommets, punched holes with smooth edges or other approved means.

Puncture - Pipe or tubing installed within 1" of a nailing surface shall be protected with steel nailing plates.

Exposed Piping - Where exposed pipe or tubing may be subjected to mechanical damage it should be protected.

Freezing - In areas where the pipe or tubing system must be drained to protect from freezing, horizontal pipe and tubing shall be graded to drain.



XPA Pipe Thermal Expansion

The linear expansion rate for XPA pipe is 1.56 inches per 100 feet of pipe per 100°F change in temperature. No accommodation for thermal expansion is required.

Bored holes and sleeve through which XPA pipe runs shall provide adequate clearance to allow free longitudinal movement.

PEX Tubing Thermal Expansion

The linear expansion rate for PEX is approximately 10 inches per 100 feet of tubing per 100°F change in temperature.

When installing runs of tubing, 1/8" longitudinal clearance per foot of run shall be provided to accommodate thermal expansion. A vertical branch connected to a horizontal main shall be made with a loop or 12" horizontal offset to allow for expansion and contraction in both sections of tubing.

Adequate clearance shall be provided between tubing and structure to allow for free movement.

Hangers and Supports

	Kitec XPA	PEX
Vertical	Every story with mid-story guide	Every story with mid-story guide
Horizontal	Every 8'2"	³ / ₄ " diameter or less - every 32" 1" diameter or larger - every 48"

Neither Kitec XPA pipe nor PEX tubing shall be rigidly anchored to a support. Hangers and straps shall provide for movement to avoid damage to the pipe or tubing. Hangers or straps with sharp or abrasive edges or that pinch pipe or tubing shall not be used.

Bends

Kitec XPA pipe may be shaped by hand to a minimum radius of 5 times the outside diameter of the pipe. External bend supports or sleeves are not required.

Kitec XPA Pipe

Nominal Size		I.D.		O.D.		Min. Bend Radius	
in.	mm	in.	mm	in.	mm	in.	mm
3/8	9	0.364	9.2	0.50	12.7	2.5	63.5
1/2	12	0.500	12.7	0.65	16.5	3.2	81.3
3/4	20	0.806	20.5	1.00	25.4	5.0	127.0
1	25	1.030	26.2	1.27	32.3	6.4	163.0

PEX tubing may be shaped by hand to a minimum radius of 8 times the nominal tubing diameter. To avoid damaging the tubing, external bend supports or sleeves may be used to aid in close radius bends.

CTS SDR-9 PEX Tubing

Nominal Size		I.D.		O.D.		Min. Bend Radius	
in.	mm	in.	mm	in.	mm	in.	mm
3/8	9	0.364	9.2	0.500	12.7	3.0	76
1/2	12	0.485	12.3	0.625	16.5	3.8	97
3/4	20	0.681	17.3	0.875	22.2	7.0	178
1	25	0.875	22.2	1.125	28.6	9.0	229

Damage

Kinked, buckled, gouged or otherwise damaged pipe or tubing shall not be used. Remove and replace any damaged sections.

Hose Bibbs

Piping directly connected to any hose bibb shall be anchored so that any load on the hose bibb will not strain the XPA pipe or PEX tubing.

Water Heater Connection

Kitec XPA may be used to connect directly to a water heater where code authorities permit. Some jurisdictions may require a minimum 18 inches of metallic piping from the water heater before Kitec XPA may be used. Consult local regulations.

PEX tubing shall not be connected directly to a water heater. There must be a minimum of 18 inches of metallic piping between the water heater and PEX tubing.

Vents

XPA pipe and PEX tubing shall not be installed within 6 inches of a gas appliance vent nor within a confined space (e.g. stud cavity) containing any appliance vent.



Recessed Light Fixtures

XPA pipe and PEX tubing shall be installed near recessed light fixtures according to local code regulations. In the absence of code guidance, XPA and PEX shall not be installed closer than 12" from recessed light fixtures.

KITEC XPA JOINTS & CONNECTIONS

Kitec fittings are available in two versions — K1 Connector and K2 Crimp. Made from plumbing brass, both the K1 and K2 versions incorporate a double O-ring sealing system.

The K1 connector fittings use a locking nut and split ring. The K2 system uses a time tested crimp ring joining method. The K2 crimp rings are manufactured of nickel plated soft copper.

A full range of K1 connector and K2 crimp fittings is available for use with Kitec XPA pipe. Only fittings supplied or approved by IPEX are warranted for use with Kitec XPA. Because of Kitec's unique construction the inside diameter is different from other metal and plastic products.

Kitec K1 Connector Installation

Tools Required

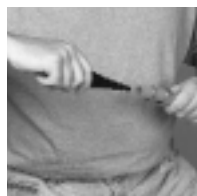
To install Kitec XPA pipe and K1 Connector fittings, you will need the following:

- Plastic pipe cutter
- Beveling or reaming tool
- Adjustable end-wrench(es)



Cutting and Joining Kitec XPA

1. Cut the pipe square. A plastic pipe cutter should be used. Ensure that the stainless steel cutting blade being used is in good condition and sharp.
2. Remove the nut and split ring from the fitting.
3. Push the nut and split ring onto the pipe. Bevel the inside of the pipe by inserting the reaming tool and rotating it 360° to engage the blades. The fitting will then slip easily



into the pipe without damaging or displacing the O-rings.

4. Push the fitting fully onto the pipe. If necessary, at this point the fitting can be rotated on the pipe to facilitate threading onto a valve, tee, etc.



Turn the nut finger tight, plus one full turn with a wrench.

** Note: Over-tightening the nut may cause damage to the pipe.*

5. If it is necessary to remove the fitting, release the nut, remove the split ring and pull the fitting off the pipe. Before reassembling the joint, inspect the split ring and O-rings and replace them if necessary.

Kitec K2 Crimp Installation

Tools Required

- Plastic pipe cutter
- Beveling or reaming tool
- Kitec K2 Crimp Tool
- Go-Gage



Cutting and Joining Kitec XPA

1. Cut the pipe square. A plastic pipe cutter should be used. Ensure that the stainless steel cutting blade is sharp and in good condition.
2. Push the K2 nickel plated soft copper crimp ring onto the pipe. Bevel the inside of the pipe by rotating the beveling tool 360°. The fitting will then slip easily into the pipe without damaging or displacing the O-rings.
3. Push the fitting fully onto the pipe. If necessary, at this point the fitting can be rotated on the pipe to facilitate threading onto a valve, tee, etc.
4. Position the crimp ring on the pipe so that the edge of the ring is 1/8" to 1/4" (3 to 6 mm) from the end of the pipe. Center the jaws of the K2 crimping tool around the ring and hold the tool at a right angle to the pipe and fitting. Completely close the jaws of



the tool around the ring to properly crimp the fitting. Care should be taken not to twist the tool while crimping or disengaging the crimp tool.

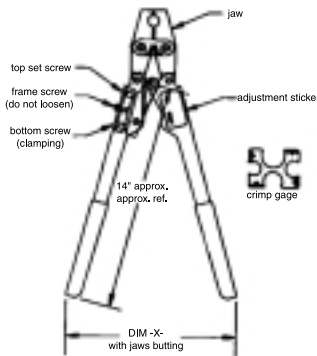
5. Check the crimp with the go-gage provided. The gage should fit over the compressed crimp ring which ensures a proper joint.
6. If the go-gage does not fit over the finished crimp joint, check crimp tool calibration as described in this booklet. With a properly calibrated crimp tool re-crimp the joint and check again using the go-gage.
7. Check crimp joints using the go-gage provided to ensure crimp tool remains properly calibrated. It may be advantageous for installers to identify joints or sections of a plumbing installation that have been crimped and checked.



Kitec K2 Crimp Tool Calibration

This tool is adjusted at the factory and no further adjustment should be required. Do your first crimp and measure with the go-gage to confirm factory settings.

Through extended use, the tools may require adjustment from time to time. If wear in the points occur, they may be compensated for as follows:



1. Close tool handles until preload point is reached (this is the point at which the jaws butt).
2. Measure the distance between the outside of the handles at the end of the handle grips. The distance should be within the specified range as tabulated below (wear will decrease this distance).
3. Loosen bottom set screw by turning counter clockwise. To increase the preload setting, adjust the top set screw clockwise until the pre-load distance is reached. Tighten the bottom set screw to clamp the setting.
4. Recheck the set distance after making 3 crimps.

5. Check the crimps with the crimp gage provided. If satisfactory crimps do not result, the tool is likely worn and should be replaced.

Remember to verify your crimp tool setting by gaging crimp joints. Never exceed the specified handle distance when adjusting the crimp tool. Premature wear will result. Keep crimp tool linkages lubricated and clean to maximize tool life.

18" LONG CRIMP TOOLS FOR KITEC XPA	
TOOL	DIM X (PRE-LOAD)
1/2"	10 1/2" - 10 7/8"
5/8"	10 1/2" - 10 7/8"
3/4"	10 1/2" - 10 7/8"
1"	10 1/2" - 10 7/8"

NOTE: Smaller 12 inch long crimp tools must be adjusted according to the manufacturer's instructions contained with the tool.

PEX JOINTS AND CONNECTIONS

All PEX fittings feature crimp style connections. When a fitting is required, simply cut the PEX tubing at a square 90° angle and slide the crimp ring over the tubing.

Fully insert the fitting into the tubing. Slide the crimp ring back over the fitting so that the edge of the crimp ring is between 1/8" and 1/4" from the end of the tubing.

Center the jaws of the PEX fitting crimp tool over the crimp ring and hold the crimp tool at a right angle to the tubing and fitting. Completely close the jaws of the tool around the ring to properly crimp the fitting. Care should be taken to avoid twisting the tool while crimping. Make certain the jaws of the tool are fully closed.

Check crimp ring diameters with the go-gage provided to ensure a proper joint.

Follow the crimp tool calibration procedure outlined for crimp tools previously in this booklet, using the pre-load distances for PEX tools shown below.

18" LONG CRIMP TOOLS FOR PEX	
TOOL	DIM X (PRE-LOAD)
1/2"	10 1/2" - 10 7/8"
3/4"	9 1/8" - 9 1/2"
1"	11" - 11 1/2"

NOTE: For small hand held PEX tool see instructions included with the tool.



SOLDERING JOINTS

Fittings are available to adapt Kitec XPA and PEX tubing to copper. Do not attach Kitec XPA or PEX fittings prior to soldering.

An open flame shall not be applied to Kitec XPA or PEX when brazing, soldering or welding joints.

Care must be taken to avoid damage to Kitec XPA fitting o-rings. Heat sink putty, spray or other methods of limiting heat transfer during soldering may be used as outlined below.

Kitec K1 Fittings

For Kitec K1 fittings, remove nut and split ring. Replace the nut loosely allowing it to act as a heat sink, preventing excessive heat from reaching the o-rings. Use only enough heat to melt the solder and quickly make the connection.

Alternatively, remove nut and split ring and wrap a wet cloth around the o-rings. Proceed with soldering in the normal way.

Finally, installers may remove the nut and split ring and apply a heat sink putty or spray over the o-rings and proceed with soldering in the usual way.

Kitec K2 Crimp Fittings

Installers may choose to either wrap a wet cloth around the o-rings to prevent excessive heat transfer, or apply a heat sink putty or spray to the o-rings. In either case apply only enough heat to melt the solder and finish the joint quickly.

PEX Tubing Crimp Fittings

As insert fittings for PEX tubing do not contain o-rings, the fitting may be soldered to copper in the usual manner.

PLUMBING STYLES

The method of plumbing a residence or commercial project is left to the discretion of the designer, contractor or developer. Proper flow and sizing design must be used regardless of plumbing style. Flow charts contained in this booklet should be used in conjunction with local model plumbing code tables to ensure proper sizing and performance.

Conventional Plumbing System

Kitec XPA pipe systems and PEX tubing systems may be used in a conventional manner using feeder lines to supply smaller branches that tee off and service an individual or small group of fixtures.

Home-Run Plumbing System

To minimize the number of fittings within a plumbing system, Kitec XPA pipe or PEX tubing may be used to supply individual fixtures from a single hot and a single cold water manifold location. Manifolds should be securely mounted and accessible for service. Individual lines should be marked to identify the fixture being served.

Modified Home-Run Plumbing System

Kitec XPA and PEX may be used to supply fixtures from two or more remotely located manifolds. A larger feeder line feeds remote manifolds that in turn service a grouping of fixtures in one area of the residence. This system uses less pipe or tubing than a Home-Run system, but requires more smaller manifolds. It can also allow for a continuous re-circulation line that provides instant hot water at remote locations - simply run a pipe or tubing line from the remote hot water manifold back to the heat source.

Slab Style Plumbing System

Kitec XPA pipe is ideally suited for plumbing applications that are buried in concrete slab construction. It is easily rolled out like soft copper, but requires no protective sleeving making for a quick and easy installation. When uncoiled, Kitec will not snap back.

Kitec hot and cold water lines are rolled out on grade, turned up above grade and bundled at manifold locations throughout the slab where fixture groupings will be served. Kitec's orange and blue color coding is especially useful in identifying hot and cold water lines in slab style plumbing – both before and after the slab is poured.

For slab style plumbing Kitec XPA's aluminum core creates an impermeable barrier to ground source contaminants such as fertilizers and termiticide, ensuring protection of potable water.

Kitec XPA pipe can penetrate concrete slabs, though local regulatory bodies may require sleeves at the penetration point. Consult local inspection staff. Pipe subject to mechanical damage must be protected with plastic sleeves complying with local code requirements.



Repairs to Kitec XPA pipe below grade may be done using repair couplings. Couplings must then be permanently protected using polyethylene heat shrink sleeves or other approved protective wrap. The sleeve should be a minimum of 2 inches longer than the body of the repair coupling or extend 2 inches beyond the crimp rings used to secure the repair coupling.

Stub-Outs

Both Kitec XPA and PEX tubing may be stubbed directly out of a wall. Commercially available support brackets may be used providing they do not deform or kink the Kitec XPA pipe or PEX tubing. IPEX supplies a number of stub out fittings to allow termination at a straight or angle stop valve, or in an open ended or spun closed copper stub out.

Electrical Grounding

PEX plumbing systems may not be used to ground an electrical system. Although Kitec XPA contains an aluminum core, its joining system is not designed to provide electrical continuity. Kitec plumbing systems may not be used to ground an electrical system.

A separate grounding rod or plate should be used — check with the local authority.

FLAME SPREAD/SMOKE DEVELOPMENT RATINGS

Kitec XPA pipe has the unique ability to allow minimal flame spread or smoke development when compared to traditional thermoplastic piping materials. Kitec XPA has a Flame Spread of 5 and Smoke Development of 5 when tested to CAN/ULC S102.2, making it a logical choice for fire rated buildings. Check local code regulations for approval.

PEX tubing from IPEX also meets certain Building Code requirements for flame and smoke. Contact your IPEX representative for more information.

FIRESTOPPING

When Kitec XPA penetrates a fire separation use firestop products and methods described in the following tables. Contact IPEX for further information on PEX firestop procedures.

Inspection and Testing

Kitec XPA and PEX plumbing systems shall be inspected to confirm compliance with manufacturer's installation instructions and with local code or model code regulations.

Upon installation, sections of the entire hot and cold water system shall be pressure tested to the local plumbing code to ensure a leak free system.

If no local code requirement exists, both Kitec XPA and PEX plumbing systems may be tested up to 50 psi over system working pressure. The maximum test duration for either piping system shall be 1 hour.

If a leak is detected, make the necessary repairs and re-do the test in its entirety.

Flushing

The system must be thoroughly flushed after installation. If the testing is done in subfreezing weather, all of the Kitec XPA or PEX lines should be drained, after the successful completion of the tests until the construction project has been heated.

FIRESTOP RATINGS FOR KITEC XPA PIPE USING 3M SILICONE 2000 AND 3M CP25WB						
CONSTRUCTION	ULC LISTING	ULI LISTING	MAX RATING	3M FIRESTOP MATERIALS	ANNULAR SPACE	
Concrete Walls	*SP 425	C-AJ-2024	2 HR	Silicone 2000+ or CP 25 WB+	1/4" (6 mm)	
Concrete Floor	*SP 425	C-AJ-2024	2 HR	Silicone 2000+ or CP 25 WB+	1/4" (6 mm)	
Wood Frame Floor/Ceiling	*SP 675	C-AJ-2206	2 HR	CP 25 WB+	1/4" (6 mm)	
Wood Frame-Gypsum Wallboard Wall	SP 676	W-L-2144	2 HR	Silicone 2000+ or CP 25 WB+	1/4" (6 mm)	
Wood Frame-Gypsum Wallboard Wall - 3 Kitec Pipes in Steel Sleeve (6" dia.)	*SP 677	W-L-2145	2 HR	CP 25 WB+	1" (25 mm) between pipe	

*Penetrations must be filled with mineral wool, having a minimum density of 42 lb/ft³, before caulking is applied.

* Check with local code authorities.

Tested in accordance with CAN/ULC S115 and ASTM E84.






FIRESTOP RATINGS FOR KITEC XPA PIPE USING PFP PARTNERS 4800 DW AND JOHNS MANVILLE FIRETEMP CI						
CONSTRUCTION	ITEM (size/type)	MAX HOLE Size	ANNULAR SPACE (min, max)	FIRESTOP SYSTEM	F RATINGS (min)	T RATINGS (min)
Wood Framed Floor/Ceiling, Concrete Floor or Wall	PE/AL/PE (up to 1" ID)	1-3/4"	0" - 3/4"	PFP Partners 4800 DW or Johns Manville Firetemp CI	1 Hour	1 Hour
	PEX/AL/PEX (up to 1" ID)	1-3/4"	0" - 3/4"	PFP Partners 480 DW or Johns Manville Firetemp CI	1 Hour	1 Hour
Gypsum Wallboard Wall (Membrane Penetration)	PE/AL/PE (up to 1" ID)	1-3/4"	0" - 3/4"	PFP Partners 4800 DW or John Manville Firetemp CI	1 & 2 Hour	1 & 2 Hour
	PEX/AL/PEX (up to 1" ID)	1-3/4"	0" - 3/4"	PFP Partners 4800 DW or John Manville Firetemp CI	1 & 2 Hour	1 & 2 Hour
Gypsum Wallboard Wall (Through-Penetration)	PE/AL/PE (up to 1" ID)	1-3/4"	0" - 3/4"	PFP Partners 4800 DW or John Manville Firetemp CI	1 & 2 Hour	40 min. & 2 Hour
	PEX/AL/PEX (up to 1" ID)	1-3/4"	0" - 3/4"	PFP Partners 4800 DW or John Manville Firetemp CI	1 & 2 Hour	40 min. & 2 Hour




Tested in accordance with CAN/ULC S115-M95, ASTM E814 and UL 1479.

QUICK REFERENCE PRODUCT GUIDE




Male Thread Adapters

Kitec K1	Kitec K2	PEX
		
3/8" K1 x 3/8" MPT 3/8" K1 x 1/2" MPT 1/2" K1 x 1/2" MPT 1/2" K1 x 3/4" MPT 3/4" K1 x 3/4" MPT 3/4" K1 x 1" MPT 1" K1 x 1" MPT	-- -- 1/2" K2 x 1/2" MPT 1/2" K2 x 3/4" MPT 3/4" K2 x 3/4" MPT 3/4" K2 x 1" MPT 1" K2 x 1" MPT	-- 3/8" PEX x 1/2" MPT 1/2" PEX x 1/2" MPT -- 3/4" PEX x 3/4" MPT -- 1" PEX x 1" MPT

Female Thread Adapters

Kitec K1	Kitec K2	PEX
		
3/8" K1 x 1/2" MPT 1/2" K1 x 1/2" MPT -- 3/4" K1 x 3/4" MPT 1" K1 x 1" MPT --	1/2" K2 x 1/2" MPT 1/2" K2 x 3/4" MPT 3/4" K2 x 1/2" MPT 3/4" K2 x 3/4" MPT 3/4" K2 x 1" MPT 1" K2 x 1" MPT 1" K2 x 3/4" MPT	3/8" PEX x 1/2" MPT 1/2" PEX x 1/2" MPT -- 3/4" PEX x 3/4" MPT -- --

Copper Spigot Adapters

Kitec K1	Kitec K2	PEX
		
3/8" K1 x 3/8" Copper 3/8" K1 x 1/2" Copper 1/2" K1 x 1/2" Copper -- 3/4" K1 x 3/4" Copper 1" K1 x 1" Copper	-- -- 1/2" K2 x 1/2" Copper 1/2" K2 x 3/4" Copper 3/4" K2 x 3/4" Copper 1" K2 x 1" Copper	-- 3/8" PEX x 1/2" Copper 1/2" PEX x 1/2" Copper -- 3/4" PEX x 3/4" Copper 1" PEX x 1" Copper






QUICK REFERENCE PRODUCT GUIDE



Copper Spigot 90° Elbows

Kitec K1	Kitec K2	PEX
		
1/2" K1 x 1/2" Copper	1/2" K2 x 1/2" Copper	--
1/2" K1 x 3/4" Copper	--	--
3/4" K1 x 3/4" Copper	--	--

Copper Socket Adapters

Kitec K1	Kitec K2	PEX
		
3/8" K1 x 1/2" Copper	--	3/8" PEX x 1/2" Copper
1/2" K1 x 1/2" Copper	1/2" K2 x 1/2" Copper	1/2" PEX x 1/2" Copper
1/2" K1 x 3/4" Copper	1/2" K2 x 3/4" Copper	--
--	3/4" K2 x 1/2" Copper	--
3/4" K1 x 3/4" Copper	3/4" K2 x 3/4" Copper	3/4" PEX x 3/4" Copper
--	3/4" K2 x 1" Copper	--
1" K1 x 1" Copper	1" K2 x 1" Copper	1" PEX x 1" Copper

Copper Socket 90° Elbows


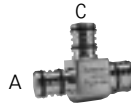
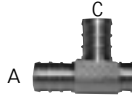
Kitec K1	Kitec K2	PEX
		
1/2" K1 x 1/2" Copper	1/2" K2 x 1/2" Copper	--
1/2" K1 x 3/4" Copper	1/2" K2 x 3/4" Copper	--
3/4" K1 x 3/4" Copper	3/4" K2 x 3/4" Copper	--

Tees

Kitec K1	Kitec K2	PEX
		
1/2" x 1/2" x 1/2"	1/2" x 1/2" x 1/2"	1/2" x 1/2" x 1/2"
3/4" x 3/4" x 3/4"	3/4" x 3/4" x 3/4"	3/4" x 3/4" x 3/4"
1" x 1" x 1"	1" x 1" x 1"	1" x 1" x 1"

QUICK REFERENCE PRODUCT GUIDE



Reducing Tees

Kitec K1	Kitec K2	PEX
		
A x B x C	A x B x C	A x B x C
--	1/2" x 1/2" x 3/4"	1/2" x 1/2" x 3/4"
3/4" x 1/2" x 1/2"	3/4" x 1/2" x 1/2"	3/4" x 1/2" x 1/2"
3/4" x 1/2" x 3/4"	3/4" x 1/2" x 3/4"	3/4" x 1/2" x 3/4"
3/4" x 3/4" x 1/2"	3/4" x 3/4" x 1/2"	3/4" x 3/4" x 1/2"
--	3/4" x 3/4" x 1"	--
--	1" x 1/2" x 1/2"	--
--	1" x 1/2" x 3/4"	--
--	1" x 1/2" x 1"	--
1" x 3/4" x 3/4"	1" x 3/4" x 3/4"	1" x 3/4" x 3/4"
--	1" x 3/4" x 1"	--
--	1" x 1" x 1/2"	--
1" x 1" x 3/4"	1" x 1" x 3/4"	1" x 1" x 3/4"

Elbows

Kitec K1	Kitec K2	PEX
		
1/2" x 1/2"	1/2" x 1/2"	1/2" x 1/2"
3/4" x 3/4"	3/4" x 3/4"	3/4" x 3/4"
1" x 1"	1" x 1"	1" x 1"

Male Thread 90° Elbows

Kitec K1	Kitec K2	PEX
		
1/2" K1 x 3/8" MPT	--	1/2" PEX x 3/8" MPT
1/2" K1 x 1/2" MPT	1/2" K2 x 1/2" MPT	--
3/4" K1 x 3/4" MPT	--	--
--	1" K2 x 1" MPT	--






QUICK REFERENCE PRODUCT GUIDE

Wing Back (Drop Ear) 90° Elbows

Kitec K1	Kitec K2	PEX
		
1/2" K1 x 1/2" FPT	1/2" K2 x 1/2" FPT	1/2" PEX x 1/2" FPT

Coupling

Kitec K1	Kitec K2	PEX
		
3/8" x 3/8" 1/2" x 1/2" 3/4" x 3/4" 3/4" x 1/2" 1" x 1" 1" x 3/4"	-- 1/2" x 1/2" 3/4" x 3/4" 3/4" x 1/2" 1" x 1" 1" x 3/4"	3/8" x 3/8" 1/2" x 1/2" 3/4" x 3/4" 3/4" x 1/2" 1" x 1" 1" x 3/4"

End Caps

Kitec K1	Kitec K2	PEX
		
3/8" 1/2" 3/4" 1"	-- 1/2" 3/4" 1"	3/8" 1/2" 3/4" 1"

Consult IPEX price lists for additional connectors, valves and accessories.

**HEAD LOSS (psi/100 ft. of XPA Pipe)
vs. FLOW RATE (U.S. GPM)**

Flow Rate U.S. GPM	3/8"		1/2"		5/8"		3/4"		1"	
	Head Velocity		Head Velocity		Head Velocity		Head Velocity		Head Velocity	
	Loss	Ft./s	Loss	Ft./s	Loss	Ft./s	Loss	Ft./s	Loss	Ft./s
	psi/c.ft.		psi/c.ft.		psi/c.ft.		psi/c.ft.		psi/c.ft.	
0.1	0.16	0.3	0.04	0.16	0.01	0.10	0.01	0.06	0.00	0.04
0.2	0.33	0.7	0.08	0.33	0.03	0.20	0.01	0.13	0.00	0.08
0.3	1.03	1.0	0.11	0.49	0.04	0.30	0.02	0.19	0.01	0.12
0.4	1.70	1.4	0.30	0.65	0.06	0.40	0.02	0.25	0.01	0.15
0.5	2.50	1.7	0.44	0.82	0.07	0.50	0.03	0.31	0.01	0.19
0.6	3.50	2.0	0.60	0.98	0.20	0.60	0.03	0.38	0.01	0.23
0.7	4.50	2.4	0.79	1.14	0.26	0.70	0.08	0.44	0.01	0.27
0.8	5.70	2.7	1.00	1.31	0.32	0.80	0.10	0.50	0.02	0.31
0.9	7.00	3.0	1.22	1.47	0.40	0.90	0.13	0.57	0.04	0.35
1.0	7.50	3.4	1.47	1.63	0.48	1.00	0.15	0.63	0.05	0.38
2.0	26.1	6.8	4.47	3.27	1.44	2.00	0.51	1.26	0.16	0.77
3.0	54.1	10.2	9.25	4.90	2.99	3.10	1.04	1.89	0.29	1.15
4.0	-	-	15.50	6.54	5.00	4.10	1.72	2.52	0.48	1.53
5.0	-	-	23.20	8.17	7.50	5.10	2.55	3.14	0.72	1.92
6.0	-	-	32.30	9.80	10.40	6.10	3.50	3.77	1.00	2.30
7.0	-	-	-	-	13.70	7.10	4.59	4.40	1.31	2.70
8.0	-	-	-	-	17.40	8.20	5.80	5.30	1.67	3.10
9.0	-	-	-	-	21.50	9.20	7.12	5.66	2.06	3.50
10.0	-	-	-	-	26.00	10.20	8.57	6.29	2.50	3.80
11.0	-	-	-	-	-	-	10.1	6.92	2.90	4.20
12.0	-	-	-	-	-	-	11.8	7.55	3.50	4.60
13.0	-	-	-	-	-	-	13.6	8.17	4.00	5.00
14.0	-	-	-	-	-	-	15.4	8.80	4.60	5.40
15.0	-	-	-	-	-	-	17.4	9.43	5.20	5.80
16.0	-	-	-	-	-	-	19.5	10.1	5.80	6.10
17.0	-	-	-	-	-	-	-	-	6.50	6.50
18.0	-	-	-	-	-	-	-	-	7.20	6.90
19.0	-	-	-	-	-	-	-	-	7.90	7.30
20.0	-	-	-	-	-	-	-	-	8.70	7.70
21.0	-	-	-	-	-	-	-	-	9.50	8.00
22.0	-	-	-	-	-	-	-	-	10.3	8.40
23.0	-	-	-	-	-	-	-	-	11.1	8.80
24.0	-	-	-	-	-	-	-	-	12.1	9.20
25.0	-	-	-	-	-	-	-	-	12.9	9.60

**HEAD LOSS (kPa/100 m of XPA Pipe)
vs. FLOW RATE (L/m)**

Flow Rate L/m	9 mm		12 mm		16 mm		20 mm		25 mm	
	Head Velocity		Head Velocity		Head Velocity		Head Velocity		Head Velocity	
	Loss	m/s	Loss	m/s	Loss	m/s	Loss	m/s	Loss	m/s
	kPa/100m		kPa/100m		kPa/100m		kPa/100m		kPa/100m	
0.39	3.62	0.09	0.91	0.05	0.23	0.03	0.23	0.02	0.00	0.01
0.78	7.47	0.21	1.81	0.10	0.68	0.06	0.23	0.04	0.00	0.02
1.17	23.3	0.30	2.49	0.15	0.91	0.09	0.45	0.06	0.23	0.04
1.56	38.5	0.43	6.79	0.20	1.36	0.12	0.45	0.08	0.23	0.05
1.95	56.6	0.52	9.96	0.25	1.58	0.15	0.68	0.09	0.23	0.06
2.33	79.2	0.61	13.6	0.30	4.53	0.18	0.68	0.12	0.23	0.07
2.72	102	0.73	17.9	0.35	5.89	0.21	1.81	0.13	0.23	0.08
3.11	129	0.82	22.6	0.40	7.24	0.24	2.26	0.15	0.45	0.09
3.50	158	0.91	27.6	0.45	9.06	0.27	2.94	0.17	0.91	0.11
3.89	170	1.04	33.3	0.50	10.9	0.30	3.40	0.19	1.13	0.12
7.78	591	2.07	101	1.00	32.6	0.61	11.5	0.38	3.62	0.23
11.7	1225	3.11	209	1.49	67.7	0.94	23.5	0.58	6.57	0.35
15.6	-	-	351	1.99	113	1.25	38.9	0.77	10.9	0.47
19.5	-	-	525	2.49	170	1.55	57.7	0.96	16.3	0.59
23.3	-	-	731	2.99	235	1.86	79.2	1.15	22.6	0.70
27.2	-	-	-	-	310	2.16	104	1.34	29.7	0.82
31.1	-	-	-	-	394	2.50	131	1.62	37.8	0.94
35.0	-	-	-	-	487	2.80	161	1.73	46.6	1.07
38.9	-	-	-	-	589	3.11	194	1.92	56.6	1.16
42.8	-	-	-	-	-	-	229	2.11	65.7	1.28
46.7	-	-	-	-	-	-	267	2.30	79.2	1.40
50.6	-	-	-	-	-	-	308	2.49	90.6	1.52
54.5	-	-	-	-	-	-	349	2.68	104	1.65
58.4	-	-	-	-	-	-	394	2.87	118	1.77
62.2	-	-	-	-	-	-	441	3.08	131	1.86
66.1	-	-	-	-	-	-	-	-	147	1.98
70.0	-	-	-	-	-	-	-	-	163	2.10
73.9	-	-	-	-	-	-	-	-	179	2.23
77.8	-	-	-	-	-	-	-	-	197	2.35
81.7	-	-	-	-	-	-	-	-	215	2.44
85.6	-	-	-	-	-	-	-	-	233	2.56
89.5	-	-	-	-	-	-	-	-	251	2.68
93.4	-	-	-	-	-	-	-	-	274	2.80
97.3	-	-	-	-	-	-	-	-	292	2.93

**Approximate Allowance for Kitec Fittings in Feet of Straight Pipe
(Based on 4 ft./sec. velocity)**

Size of Pipe in (mm)	Male Adapters *(forward) ft (m)	Male Adapters **(reverse) ft (m)	90° Elbow ft (m)	Tee Run ft (m)	Tee Branch ft (m)	Copper Adapter ft (m)
1/2 (12)	2.0 (.6)	3.0 (.91)	7.5 (2.3)	2.5 (.67)	8.0 (2.4)	2.0 (.6)
3/8 (15)	2.0 (.6)	3.0 (.91)	8.0 (2.4)	2.5 (.67)	10.0 (3.1)	2.0 (.6)
1/4 (20)	2.0 (.6)	3.0 (.91)	8.5 (2.6)	2.5 (.67)	10.5 (3.2)	1.5 (.46)
1 (25)	2.0 (.6)	3.0 (.91)	9.0 (2.7)	2.5 (.67)	11.0 (3.4)	1.5 (.46)

* Forward flow direction: Standard schedule steel pipe to PEX.
** Reverse flow direction: PEX to standard schedule steel pipe.



CTS SDR-9 PEX TUBING

HEAD LOSS (psi/100 ft.) vs. FLOW RATE (U.S. GPM)

Flow Rate U.S. GPM	3/8"		1/2"		5/8"		3/4"		1"	
	Head Loss psi/c.ft.	Velocity Ft./s	Head Loss psi/c.ft.	Velocity Ft./s	Head Loss psi/c.ft.	Velocity Ft./s	Head Loss psi/c.ft.	Velocity Ft./s	Head Loss psi/c.ft.	Velocity Ft./s
0.1	0.16	0.30	0.04	0.17	0.02	0.12	0.01	0.09	0.00	0.05
0.2	0.33	0.70	0.09	0.35	0.04	0.24	0.02	0.18	0.01	0.11
0.3	1.03	1.00	0.13	0.52	0.06	0.36	0.03	0.26	0.01	0.16
0.4	1.70	1.40	0.34	0.69	0.08	0.48	0.04	0.35	0.02	0.21
0.5	2.50	1.70	0.51	0.87	0.21	0.60	0.05	0.44	0.02	0.27
0.6	3.50	2.00	0.70	1.04	0.29	0.72	0.14	0.53	0.02	0.32
0.7	4.50	2.40	0.91	1.22	0.38	0.84	0.18	0.62	0.03	0.37
0.8	5.70	2.70	1.15	1.39	0.48	0.96	0.23	0.70	0.07	0.43
0.9	7.00	3.00	1.41	1.56	0.59	1.10	0.28	0.79	0.09	0.48
1.0	7.50	3.40	1.70	1.74	0.70	1.20	0.34	0.88	0.10	0.53
2.0	26.1	6.80	5.30	3.47	2.12	2.40	1.02	1.76	0.35	1.07
3.0	54.1	10.2	11.0	5.21	4.39	3.59	2.10	2.60	0.63	1.60
4.0	-	-	18.4	6.95	7.36	4.80	3.53	3.50	1.06	2.10
5.0	-	-	27.4	8.68	11.0	6.00	5.26	4.40	1.58	2.70
6.0	-	-	38.1	10.4	15.3	7.19	7.30	5.30	2.19	3.20
7.0	-	-	-	-	20.1	8.40	9.63	6.20	2.89	3.70
8.0	-	-	-	-	25.6	9.60	12.3	7.05	3.68	4.30
9.0	-	-	-	-	31.7	10.8	15.1	7.93	4.55	4.80
10.0	-	-	-	-	-	-	18.3	8.81	5.50	5.30
11.0	-	-	-	-	-	-	21.7	9.69	6.52	5.90
12.0	-	-	-	-	-	-	25.4	10.6	7.63	6.40
13.0	-	-	-	-	-	-	-	-	8.81	6.90
14.0	-	-	-	-	-	-	-	-	10.1	7.50
15.0	-	-	-	-	-	-	-	-	11.4	8.00
16.0	-	-	-	-	-	-	-	-	12.8	8.50
17.0	-	-	-	-	-	-	-	-	14.3	9.10
18.0	-	-	-	-	-	-	-	-	15.8	9.60
19.0	-	-	-	-	-	-	-	-	17.5	10.1
20.0	-	-	-	-	-	-	-	-	-	-
21.0	-	-	-	-	-	-	-	-	-	-
22.0	-	-	-	-	-	-	-	-	-	-
23.0	-	-	-	-	-	-	-	-	-	-
24.0	-	-	-	-	-	-	-	-	-	-
25.0	-	-	-	-	-	-	-	-	-	-

CTS SDR-9 PEX TUBING

HEAD LOSS (kPa/100m) vs. FLOW RATE (L/min.)

Flow Rate l/m	9mm		12mm		16mm		20mm		25mm	
	Head Loss kPa/100m	Velocity m/s	Head Loss kPa/100m	Velocity m/s	Head Loss kPa/100m	Velocity m/s	Head Loss kPa/100m	Velocity m/s	Head Loss kPa/100m	Velocity m/s
0.39	3.62	0.09	0.91	0.05	0.45	0.04	0.23	0.03	0.00	0.02
0.78	7.47	0.21	2.04	0.11	0.91	0.07	0.45	0.05	0.23	0.03
1.17	23.3	0.30	2.94	0.16	1.36	0.11	0.68	0.08	0.23	0.05
1.56	38.5	0.43	7.70	0.21	1.81	0.15	0.91	0.11	0.45	0.06
1.95	56.6	0.52	11.5	0.27	4.75	0.18	1.13	0.13	0.45	0.08
2.33	79.2	0.61	15.8	0.32	6.57	0.22	3.17	0.16	0.45	0.10
2.72	102	0.73	20.6	0.37	8.60	0.26	4.08	0.19	0.68	0.11
3.11	129	0.82	26.0	0.42	10.9	0.29	5.21	0.21	1.58	0.13
3.50	158	0.91	31.9	0.48	13.4	0.34	6.34	0.24	2.04	0.15
3.89	170	1.04	38.5	0.53	15.8	0.37	7.70	0.27	2.26	0.16
7.78	591	2.07	120	1.06	48.0	0.73	23.1	0.54	7.92	0.33
11.7	1225	3.11	249	1.59	99.4	1.09	47.5	0.79	14.3	0.49
15.6	-	-	417	2.12	167	1.46	79.9	1.07	24.0	0.64
19.5	-	-	620	2.65	249	1.83	119	1.34	35.8	0.82
23.3	-	-	863	3.17	346	2.19	165	1.62	49.6	0.98
27.2	-	-	-	-	455	2.56	218	1.89	65.4	1.13
31.1	-	-	-	-	580	2.93	278	2.15	83.3	1.31
35.0	-	-	-	-	718	3.29	343	2.42	103	1.46
38.9	-	-	-	-	-	-	414	2.69	125	1.62
42.8	-	-	-	-	-	-	491	2.95	148	1.80
46.7	-	-	-	-	-	-	575	3.23	173	1.95
50.6	-	-	-	-	-	-	-	-	199	2.10
54.5	-	-	-	-	-	-	-	-	229	2.29
58.4	-	-	-	-	-	-	-	-	258	2.44
62.6	-	-	-	-	-	-	-	-	290	2.59
66.1	-	-	-	-	-	-	-	-	324	2.77
70.0	-	-	-	-	-	-	-	-	359	2.93
73.9	-	-	-	-	-	-	-	-	396	3.08
77.8	-	-	-	-	-	-	-	-	-	-
81.7	-	-	-	-	-	-	-	-	-	-
85.6	-	-	-	-	-	-	-	-	-	-
89.5	-	-	-	-	-	-	-	-	-	-
93.4	-	-	-	-	-	-	-	-	-	-
97.3	-	-	-	-	-	-	-	-	-	-

Approximate Allowance for CTS SDR-9 PEX Fittings in Feet (Meters) of Tubing

Size of Tubing in (mm)	Male Adapters *(forward) ft (m)	Male Adapters **(reverse) ft (m)	90° Elbow ft (m)	Tee Run ft (m)	Tee Branch ft (m)	Copper Adapter ft (m)
3/8 (12)	2.0 (.6)	3.0 (.91)	7.5 (2.3)	2.5 (.67)	8.0 (2.4)	2.0 (.6)
1/2 (15)	2.0 (.6)	3.0 (.91)	8.0 (2.4)	2.5 (.67)	10.0 (3.1)	2.0 (.6)
3/4 (20)	2.0 (.6)	3.0 (.91)	8.5 (2.6)	2.5 (.67)	10.5 (3.2)	1.5 (.46)
1 (25)	2.0 (.6)	3.0 (.91)	9.0 (2.7)	2.5 (.67)	11.0 (3.4)	1.5 (.46)

* Forward flow direction: Standard schedule steel pipe to PEX.

** Reverse flow direction: PEX to standard schedule steel pipe.



inch	mm
1/2	12.7
3/4	19.1
1	25.4

UNIFORM PLUMBING CODE

Pipe Sizes for Water Systems Based on Number of Fixture Units Served

Water Service Inches	Water Distribution System Inches	Maximum Allowance Length in Feet (Meters)														
		40 (12)	60 (18)	80 (24)	100 (30)	150 (46)	200 (61)	250 (76)	300 (91)	400 (122)	500 (152)	600 (183)	700 (213)	800 (244)	900 (274)	1000 (305)
Pressure Range		Number of Fixture Units Served														
30 to 45 psi																
3/4	1/2	6	5	4	3	2	1	1	1	0	0	0	0	0	0	0
3/4	3/4	16	16	14	12	9	6	5	5	4	4	3	2	2	2	1
3/4	1	29	25	23	21	17	15	13	12	10	8	6	6	6	6	6
1	1	36	31	27	25	20	17	15	13	12	10	8	6	6	6	6
46 to 60 psi																
3/4	1/2	7	7	6	5	4	3	2	2	1	1	1	0	0	0	0
3/4	3/4	20	20	19	17	14	11	9	8	6	5	4	4	3	3	3
3/4	1	39	39	36	33	28	23	21	19	17	14	12	10	9	8	8
1	1	39	39	39	36	30	25	23	20	18	15	12	10	9	8	8
Over 60 psi																
3/4	1/2	7	7	7	6	5	4	3	3	2	1	1	1	1	1	0
3/4	3/4	20	20	20	20	17	13	11	10	8	7	6	6	5	4	4
3/4	1	39	39	39	39	35	30	27	24	21	17	14	13	12	12	11
1	1	39	39	39	39	38	32	29	26	22	18	14	13	12	12	11

inch	mm
1/2	12.7
3/4	19.1
1	25.4

CANADIAN PLUMBING CODE

Pipe Sizes for Water Systems Based on Number of Fixture Units Served

Water Service Inches	Water Distribution System Inches	Maximum Allowance Length in Feet (Meters)														
		40 (12)	60 (18)	80 (24)	100 (30)	150 (46)	200 (61)	250 (76)	300 (91)	400 (122)	500 (152)	600 (183)	700 (213)	800 (244)	900 (274)	1000 (305)
Pressure Range		Number of Fixture Units Served														
200 to 310 kPa																
3/4	1/2	6	5	4	3	2	1	1	1	0	0	0	0	0	0	0
3/4	3/4	18	16	14	12	9	6	6	5	4	3	3	2	2	2	2
3/4	1	29	25	23	21	17	15	15	12	10	9	7	6	6	6	6
1	1	36	31	27	25	20	17	17	13	12	8	8	6	6	6	6
311 to 413 kPa																
3/4	1/2	9	7	6	5	4	3	2	2	1	1	1	0	0	0	0
3/4	3/4	27	23	19	17	14	11	9	8	6	5	4	4	3	3	3
3/4	1	44	40	36	33	28	23	21	19	17	14	12	10	9	8	8
1	1	60	47	41	36	30	25	23	20	18	17	12	10	9	8	8
Over 413 kPa																
3/4	1/2	11	8	7	6	5	4	3	3	2	1	1	1	1	1	1
3/4	3/4	31	28	24	22	17	13	11	10	8	7	6	6	5	4	4
3/4	1	61	53	47	42	35	30	27	24	21	17	14	13	12	12	12
1	1	72	66	55	48	38	32	29	26	22	18	14	13	12	12	12



UNIFORM PLUMBING CODE WATER SUPPLY FIXTURE UNITS

inch	mm
1/2	12.7
3/4	19.1
1	25.4

Appliances, Appurtenances or Fixtures	Minimum Fixture Branch Pipe Size	Private Public Assembly		
		Private	Public	Assembly
Bathtub or Combination Bath/Shower (fill)	1/2"	4.0	4.0	
3/4" Bathtub Fill Valve	3/4"	10.0	10.0	
Bidet	1/2"	1.0		
Clotheswasher	1/2"	4.0	4.0	
Dental Unit, cuspidor	1/2"		1.0	
Dishwasher, domestic	1/2"	1.5	1.5	
Drinking Fountain or Watercooler	1/2"	0.5	0.5	0.75
Hose Bibb	1/2"	2.5	2.5	
Hose Bibb, each additional	1/2"	1.0	1.0	
Lavatory	1/2"	1.0	1.0	1.0
Lawn Sprinkler, each head		1.0	1.0	
Mobile Home, each (minimum)		12.0		
Sinks				
Bar	1/2"	1.0	2.0	
Clinic Faucet	1/2"		3.0	
Clinic Flushometer Valve with or without faucet	1"		8.0	
Kitchen, domestic	1/2"	1.5	1.5	
Laundry	1/2"	1.5	1.5	
Service or Mop Basin	1/2"	1.5	3.0	
Washup, each set of faucets	1/2"		2.0	
Shower, per head	1/2"	2.0	2.0	
Urinal, flush tank	1/2"	2.0	2.0	3.0
Washfountain, circular spray	3/4"		4.0	
Water Closet, 1.6 GPF Gravity Tank	1/2"	2.5	2.5	3.5
Water Closet, 1.6 GPF Flushometer Tank	1/2"	2.5	2.5	3.5
Water Closet, greater than 1.6 GPF Gravity Tank	1/2"	3.0	5.5	7.0

INTERNATIONAL PLUMBING CODE MINIMUM SIZES OF FIXTURE WATER SUPPLY PIPES

Fixture	Minimum Pipe Size (inch)
Bathtubs (60" x 32" & smaller)	1/2
Bathtubs (larger than 60" x 32")	1/2
Bidet	3/8
Combination Sink & Tray	1/2
Dishwasher, Domestic	1/2
Drinking Fountain	3/8
Hose Bibbs	1/2
Kitchen Sink	1/2
Laundry, 1, 2 or 3 Compartments	1/2
Lavatory	3/8
Shower, Single Head	1/2
Sinks, Flushing Rim	3/4
Sinks, Service	1/2
Urinal, Flush Tank	1/2
Urinal, Flush Valve	3/4
Wall Hydrant	1/2
Water Closet, Flush Tank	3/8
Water Closet, Flush Valve	1
Water Closet, Flushometer Tank	3/8
Water Closet, One Piece	1/2

