



# INSTALLATION GUIDE

**SYSTEM 15® DWV**

**SYSTEM XFR® DWV**

**DRAIN-GUARD™ DWV**

**MJ GREY™ DWV**

## D W V S Y S T E M S

System 15® Pipe & Fittings

System XFR® Pipe & Fittings

Drain-Guard™ Double Containment

MJ Grey™ Mechanical Couplings



**IPEX**

by **alialaxis**

We build tough products  
for tough environments®

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## INTRODUCTION

System 15® & System XFR® by IPEX are two compatible product lines designed for use in Drain, Waste and Vent (DWV) applications for buildings designated as combustible or noncombustible construction.

While both thermoplastic systems meet the demanding Flame - Spread requirements for noncombustible construction, System XFR also meets the Smoke-Developed Classification requirements for installation in high buildings and air plenum spaces.

This installation guide describes design and usage of these DWV systems. Information presented here is intended to supplement basic knowledge of DWV systems. Should designers or contractors require additional information or clarification, please refer to Volume I: Drainage Systems for Noncombustible Construction from IPEX ([www.ipexinc.com](http://www.ipexinc.com)).

### System 15®

IPEX's complete line of System 15 DWV pipe and fittings has been engineered to safely endure years of reliable usage. System 15 is certified to CSA B181.2 and meets the requirements of National and Provincial Plumbing Codes.

System 15 pipe and fittings are listed to CAN/ULC S102.2-10 and exhibit a Flame Spread Rating of 15 which meets the NBC Flame Spread Rating limit of 25 for combustible DWV piping in noncombustible construction.

### System XFR®

System XFR DWV is also certified to CSA B181.2 and is listed to CAN/ULC S102.2-10 to exhibit a Flame Spread Rating of not greater than 25 and a Smoke Developed Classification of not greater than 50. Having this makes System XFR permissible for use in High Buildings (as defined in NBC section 3.2.6) and Air Plenums (section 3.6.4.3).

### Drain-Guard™ Double Containment

Depending on your application, Drain-Guard is a double containment piping system using System 15 and or System XFR as its primary components. The many performance benefits of System 15 and System XFR are enhanced by this dual pipe concept, including excellent thermal properties, improved flow, longevity and durability, and the security of meeting all code requirements for noncombustible buildings.

Drain-Guard double containment piping systems provide safe transport of sanitary or storm drainage in critical areas. Should a leak occur, people, equipment and valuable property will be protected from possible harm.

[Contact IPEX for product availability and pricing for a customized solution on your project.](#)

## MJ Grey™ Couplings

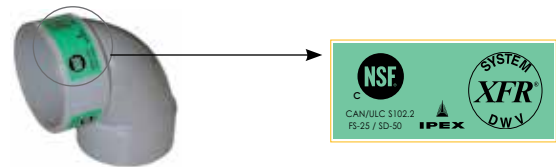
MJ Grey™ couplings are a mechanical joint assembly suitable only for use on IPEX System 15 or System XFR DWV piping sizes 1-1/2" through 18" for DWV to DWV and 1-1/2" through 6" for CI to DWV. The couplings are certified to CSA B602. MJ Grey also carries a listing to CAN/ULC S102.2-10 to demonstrate a Flame/Smoke listing not exceeding 25/50, similar to that of System XFR and thus is permitted in most areas of noncombustible construction including high buildings and plenums.

### Visual ID

From a distance, there are some differences in appearance between System 15 and System XFR to help with their identification.

Description	System 15	System XFR
Colour	Light grey	Dark grey
Pipe print line	Black	Green
Fitting labels	White	Green

The photos below show the position of one of two labels on System XFR fittings and a close-up of information printed on the label.



MJ Grey couplings can be easily differentiated from standard cast iron couplings by noting that the rubber interior sleeve is grey in colour (versus the traditional black colour) and exterior identification labels showing the System XFR trade name and the Flame and Smoke values as per ULC S102.2.

MJ Grey



MJ Grey



## PIPE DIMENSIONS

The physical dimensions and tolerances of System 15 and System XFR pipe and fittings are specified by CSA B181.2

### System 15 Pipe Dimensions & Weights

Pipe Size Nominal inches	Average OD inches	Average ID inches	Min. Wall Thickness inches	Pipe Lengths feet	Pipe Weights lb/ft
1-1/2	1.90	1.56	0.14	12	0.5
2	2.38	2.01	0.15	12	0.7
3	3.50	3.01	0.22	12	1.5
4	4.50	3.95	0.24	12	2.1
6	6.63	5.97	0.28	12	3.8
8	8.62	7.82	0.32	12 or 20	5.7
10	10.75	9.81	0.36	12 or 20	8.0
12	12.75	11.70	0.41	12 or 20	10.6
14	14.00	12.86	0.44	20	12.6
16	16.00	14.69	0.50	20	16.5
18	18.00	16.54	0.56	20	20.8
20	20.00	18.45	0.59	20	24.4
24	24.00	22.19	0.69	20	34.0

#### NOTES:

1. Pipe lengths of 12 foot are plain end while 20 foot lengths of pipe are solvent bell ended.
2. Sizes 20" and 24" System 15 are not ULC Listed for a Flame Spread Rating not greater than 25.

### System XFR Pipe Dimensions & Weights

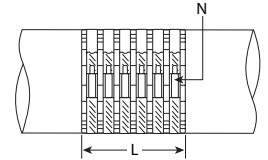
Pipe Size Nominal inches	Average OD inches	Average ID inches	Min. Wall Thickness inches	Pipe Lengths feet	Pipe Weights lb/ft
1-1/2	1.90	1.56	0.14	12	0.5
2	2.38	2.01	0.15	12	0.7
3	3.50	3.01	0.22	12	1.5
4	4.50	3.95	0.24	12	2.1
6	6.63	5.97	0.28	12	3.8
8	8.62	7.82	0.32	12	5.7
10	10.75	9.81	0.36	12	8.0
12	12.75	11.70	0.41	12	10.6

NOTE: Pipe lengths are plain end.

MJ Grey offers installers an alternative joining method for System 15 and System XFR in all sizes. In particular, MJ Grey may be advantageous for colder weather, minor offsets, difficult installation areas, repairs or tie-ins.

### MJ Grey Dimensions

Coupling Size inches	Length (L) inches	(N) Number of Clamps
1-1/2	4.0	4
2	4.0	4
3	4.0	4
4	4.0	4
6	6.0	6
8	6.0	6
10	6.0	6
12	6.0	6
14	8.0	8
16	8.0	8
18	8.0	8



## TEMPERATURE CONSIDERATIONS

For continuous flow non-pressure applications, System 15 and System XFR can be safely used up to 140°F (60°C) and 180°F (82°C) for intermittent flow.

### THERMAL EXPANSION IN SYSTEM 15 AND SYSTEM XFR

Typically, where an installation of System 15 or System XFR is exposed to significant ambient temperature change cycles, i.e., unconditioned construction spaces spanning the colder winter months to warmer summer months (and vice versa), accommodation for thermal expansion and contraction of the piping system should be considered. To address this, the installer may consider one or more of the following options:

Option	Method	For Vertical Stacks**	For Horizontal Runs
1	CSA certified mechanical joint couplings	Every second floor	As required
2	CSA certified expansion joints (sizes up to 14")	Type I or Type II Expansion Joint as required*	Type I Expansion Joint (storm only) as required*
3	Directional offsets	As required	As required

**\*NOTE:** Piston-style expansion joints are classified as either Type I (a joint providing at least 75 mm of travel) or Type II (a joint providing at least 200 mm of travel). Mechanical joint couplings should not be installed adjacent to a piston-style expansion joints as the linear travel movement of the piston expansion joint may cause movement of the pipe within the mechanical coupling and affect the coupling's ability to seal.

**\*\*BEST PRACTICE:** For construction spanning the colder to warmer months (and vice versa) where the stack piping is left exposed to large seasonal temperature changes, as a best practice, the installer should consider rigidly supporting (i.e., anchoring) the stack to the concrete slab every other floor. This can help minimize the effect of thermal expansion and contraction of the stack and uplift of riser clamp supports until the building is climatized.

Below is a table of expansion values applicable to both System 15 and System XFR. The expansion in inches is shown for numerous temperature changes ( $\Delta T$ ) versus various straight-length runs of pipe.

Thermal Expansion (DL) in inches of PVC

Temp. Change $\Delta T^{\circ}F$	Length of Run in Feet									
	10	20	30	40	50	60	70	80	90	100
20	0.07	0.14	0.22	0.29	0.36	0.43	0.50	0.58	0.65	0.72
30	0.11	0.22	0.32	0.43	0.54	0.65	0.76	0.86	0.97	1.08
40	0.14	0.29	0.43	0.58	0.72	0.86	1.01	1.15	1.30	1.44
50	0.18	0.36	0.54	0.72	0.90	1.08	1.26	1.44	1.62	1.80
60	0.22	0.43	0.65	0.86	1.08	1.30	1.51	1.73	1.94	2.16
70	0.25	0.50	0.76	1.01	1.26	1.51	1.76	2.02	2.27	2.52
80	0.29	0.58	0.86	1.15	1.44	1.73	2.02	2.30	2.59	2.88
90	0.32	0.65	0.97	1.30	1.62	1.94	2.27	2.59	2.92	3.24
100	0.36	0.72	1.03	1.44	1.80	2.16	2.52	2.88	3.24	3.60

## ADDRESSING MOVEMENT IN A WOOD FRAMED BUILDING

In the case of wood-framed construction, building settlement and shrinkage can be more significant than thermal expansion or contraction. Wood shrinkage can be as high as 3/4" (20mm) per floor depending on moisture content and height of the wood framing. Building shrinkage is not considered significant for piping design in noncombustible (i.e. steel/concrete) structures.

The following installation recommendations for this example are based on years of experience and have proven successful in most installations:

- Install a rubber coupling, MJ Grey or CSA-certified expansion joint at every second floor of the building.
- Rigidly support the stack pipe on alternating floors to direct any movement into the appropriate expansion compensator.

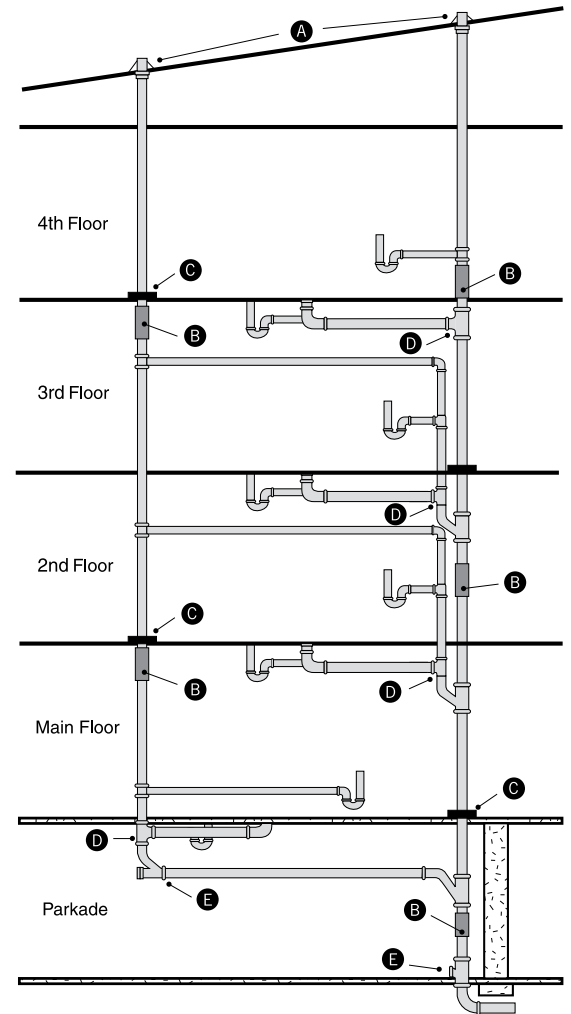
Installation will segment the pipeline and thus limit its overall movement.

The illustration, 'Addressing Movement in a DWV Stack' indicates the proper location for the devices to be installed.

Using this method of installation will limit movement between any two floors of the building. If you require additional information, please contact IPEX.

Follow IPEX installation instructions for proper installation of expansion joints in either the horizontal or vertical position. Always check with the local authority having jurisdiction for approval prior to installation of the DWV system.

For more specific details regarding expansion and contraction, please refer to Volume I: Drainage Systems for Noncombustible Construction, available from IPEX.



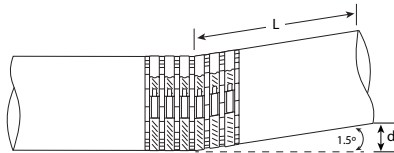
- A** Neoprene flashing may be considered to be an expansion compensator
- B** Expansion fitting
- C** Riser clamps
- D** Side inlet, TY
- E** Pipe anchor and/or support at the base of all stacks

## MJ GREY JOINT DEFLECTION

The MJ Grey coupling may be used to accommodate small changes in alignment up to 1.5° in any direction.

Below are the offset distances resulting from a deflection limit of 1.5 degrees:

Pipe Length (L) feet	Offset (d) mm	Offset (d) in
3	23	0.9
5	41	1.5
10	79	3.1
12	97	3.8



## SUPPORT SPACING

Support of pipe and placement of hangers must adhere to the requirements of the National Plumbing Code of Canada or the local plumbing Authority Having Jurisdiction. Specifically, the NBC calls for a minimum support spacing of 1.2m (4ft) for horizontal pipe runs of all sizes. However, local authorities may be receptive to increased spacing of hangers if supported by engineering analysis.

Consider the following guidelines when installing a DWV system:

1. Allow the pipe to move freely within the hangers. Do not tighten the hangers so that the pipe is compressed, distorted or bent. Since thermoplastic pipe expands and contracts approximately three times that of steel, hangers should not be of the type that will restrict this movement.

2. Use strap-type metal hangers or equivalent that are free of rough edges and burrs, and have a broad support base. Hangers should provide as much bearing surface as possible. Sharp supports or sharp edges on supports should not be used with these materials since they will cause mechanical damage if the pipe moves.
3. Avoid placing System 15 and System XFR lines alongside steam or other high temperature pipelines.
4. Refer to the support spacing chart and fluid correction factors for recommended support locations.

### Recommended Maximum Support Spacing (feet)\*

Nominal Pipe Size inches	Temperature 73°F / 23°C	Temperature 140°F / 60°C
1-1/2	4.6	4.1
2	5.2	4.6
3	6.6	5.9
4	7.5	6.7
5	9.2	8.2
8	10.6	9.4
10	12.0	10.6
12	13.2	11.7
14	13.9	12.4
16	15.2	13.5
18	16.5	14.6
20	17.4	15.5
24	19.5	17.3

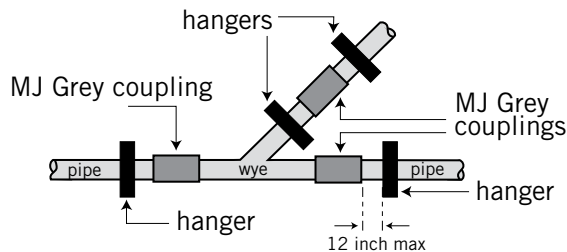
\* based on an engineering analysis with centre span sag limited to 0.2% of span length

### MJ Grey Support Spacing

**Horizontal:** All MJ Grey coupling installations should be supported on each side (both the pipe and fitting side) to a maximum distance of 12" (305mm) away from the coupling, and in accordance local building codes.

**Vertical:** Regular vertical support methods for solvent weld System 15 or System XFR may be employed.

**Restraints:** Fully restraining fittings that will be exposed to high thrust forces may be required. Consult the project engineer.



## VERTICAL SERVICE SPACES

When using System 15 or System XFR, contractors and designers must be aware that National and Provincial Building Codes restrict the use of these products in vertical service spaces.

A vertical service space is an open area that is intended to accommodate a number of building services such as mechanical, electrical and communication systems. A vertical service space generally runs from the basement of a building through to the top of the building, much like an elevator shaft or garbage chute. As an area that is completely open from the bottom to the top of the building, it offers no opportunity to properly firestop the combustible piping system at each floor as required by Code.

Distinct from a vertical service space, a 'chase' is a designated area that also runs vertically through the building from bottom to top. This designated area may be a vertical wall assembly or other area designated to accommodate building services.

In a 'chase', specific holes are drilled through the horizontal fire separations to accommodate each individual service, allowing proper fire stopping materials to be used as the service penetrates each separation. By firestopping at each level through the building, the integrity of the fire separations are maintained and the building remains compartmentalized.



## HANDLING AND STORAGE

System 15 and System XFR are strong, lightweight piping materials and, as such, are easily handled. However, installers are advised to adhere to the guidelines below to maintain safety and avoid damaging the pipe.

### CAUTION

Use a forklift to unload System 15 and System XFR crates directly from the delivery vehicle. Avoid using wire ropes, chains or slings. Failure to properly handle crates may cause injury.

As is common for most rigid piping materials, impact strength for System 15 and XFR is reduced in colder weather. Thus, when unloading these components in cold weather, take extra care to minimize impact damage. Since the soundness of any joint depends on the condition of the pipe end, exercise care during storage and handling to avoid damaging these ends.

While in transit, make sure pipe and fittings are well-secured, so there is no potential for a load to shift.

When storing System 15 and System XFR pipe, bear the following points in mind:

- Treat these products as you would other DWV piping products: take care during handling and storage to prevent damaging the pipe.
- Store System 15 and System XFR pipe on a level surface. If placed on the ground, make sure the pipe is supported by timbers spaced no more than 3 feet apart.
- When storing pipe on a flat smooth surface place smaller diameter pipe on top of larger pipe.
- Make sure the pipe is not stored close to sources of heat such as boilers, steam lines, engine exhaust outlets, etc.

## SOLVENT CEMENT

Only high quality IPEX System 15 and System XFR cements and primers are recommended for use with System 15 or System XFR DWV piping.

This product offering includes the option of using Two-Step or One-Step cement (i.e. no primer required) in both Medium Bodied and Heavy Bodied. Depending on contractor preference, medium body one step cement is fast setting while heavy body cement is slower setting and offers gap filling capabilities. All cement options are grey in color. Our System 15 and System XFR cement products are CSA certified.

Specific cement recommendations are shown below for proper selection of System 15 and System XFR cement products.

Pipe Diameter (in.)	IPEX System 15 System XFR
1-1/2 to 6	One-Step with or without Primer*
8 to 12	Two-Step with Primer
14 and larger	Xirtec 19 PVC cement with primer

\*Under normal conditions, One-Step cements may be used without the need for primer however, in colder installation temperatures, the use of primer is recommended for best results

### Proper Cement Applicators

Pipe Diameter (in.)	Applicator
1-1/2 to 3	1" Round Dauber
3 to 6	3" Roller
8 and larger	7" Roller or 6" Swab

## WELDING SYSTEM 15 & SYSTEM XFR

Below are some general guidelines to help achieve proper solvent-welded joints for System 15 and System XFR PVC piping systems:

1. Cut pipe squarely and remove all burrs on pipe end, also bevel front edge of pipe slightly;
2. Select proper applicator for pipe size;
3. Ensure surfaces to be welded are clean and dry;
4. Attempt to dry fit the assembly to ensure an interference fit occurs at an insertion depth between 1/4 and 3/4 of the socket depth. Should the fit be tighter or looser than this, contact and consult IPEX before proceeding.
5. Apply a generous amount of cement (and primer beforehand if required) to pipe exterior and socket interior;
6. Assemble pipe into socket and hold for 5-10 seconds;
7. Wipe away excess cement;
8. Observe initial set and cure times in tables below according to pipe size, ambient temperature and humidity level.

### Average Initial Set Schedule

#### For IPEX System 15 and System XFR Solvent Cements

Temperature Range (during assembly)	Pipe Sizes 1-1/2" to 2"	Pipe Sizes 3" to 8"		Pipe Sizes 10" to 14"	Pipe Sizes 16" +	Note: Initial set schedule is the necessary time to allow before the joint can be carefully handled.
60° – 100°F	5 minutes	30 minutes		2 hours	4 hours	
40° – 60°F	10 minutes	2 hours		8 hours	16 hours	
0° – 40°F	15 minutes	12 hours		24 hours	48 hours	

### Average Joint Cure Schedule

#### For System 15 and System XFR Solvent Cements

Temperature Range (during assembly)	Cure Time Pipe Sizes 1-1/2" to 2"	Cure Time Pipe Sizes 3" to 8"		Cure Time Pipe Sizes 10" to 14"	Cure Time Pipe Sizes 16" +	Note: This data is valid for Relative Humidity not greater than 60%. In damp or humid weather, allow 50% more curing time.
60° – 100°F	30 minutes	1-1/2 hours		48 hours	72 hours	
40° – 60°F	45 minutes	4 hours		96 hours	6 days	
0° – 40°F	1 hour	72 hours		8 days	14 days	

## MJ GREY ASSEMBLY

MJ Grey is intended for use only on IPEX System 15 or System XFR DWV pipe or spigot end fittings.

### General Instructions

- 1) Loosen the exterior band as much as possible without removing the straps from the screw housing.
- 2) Mark insertion depth on both spigots or pipe  
2 inches for 1-1/2" - 6" sizes and  
3 inches for 8" - 12" sizes from pipe and  
4 inches for 14" - 18" sizes from pipe end.
- 3) Slide the MJ Grey coupling over one end of the spigot ends to be joined. Slide until contact is made with the spigot end and centre stop on the inner surface of the rubber sleeve.
- 4) Fit the second pipe end into the open end of the MJ Grey coupling, to the depth of the insertion line.
- 5) Tighten all screws to a torque of 80 in-lbs. Best results will be had if tightening middle screws and working progressively outwards towards the end of the coupling. After each screw has been torqued once, re-torque each screw to ensure they did not loosen during the first pass. A calibrated torque wrench is available for purchase from IPEX.
- 6) Important: If a screw is over-torqued it may be stripped. If this occurs the coupling should be replaced.

### NOTES:

1. If working in a confined space, it is recommended to do partial tightening of the inserted end before inserting the second spigot.
2. DO NOT use any lubricants of any kind to aid in the assembly of MJ Grey couplings.
3. Pipe ends must be cut squarely, should have all sharp edges removed and be clean prior to assembly.
4. No chamfering of the pipe end is required.
5. When there is a temperature variation between the time of installation and testing, joint tightness must be rechecked prior to testing using a torque wrench calibrated to 80 in-lbs.

## TESTING DRAINAGE SYSTEMS

After a system is installed and all solvent weld joints cured, a hydrostatic pressure test should be performed prior to the piping system being commissioned. Testing of drainage and venting systems shall be conducted in accordance to the requirements of local plumbing codes.

When pressure testing, the system should be slowly filled with water and all air bled from the highest and farthest points in the installation. Once the system has reached the desired test pressure, it should remain at this pressure for one hour.

During this time the assembled sections should be visually inspected for joint leaks that may have occurred in the system. If a leak is discovered at a solvent weld joint, the joint must be removed and replaced or alternatively may be back-welded in place by a worker certified or experienced in thermoplastic welding. It is not necessary to fully drain the system if the affected fitting can be isolated for the required work.

Solvent weld systems may be pressure-tested with water at levels higher than code requirements if desired by the project design engineer. Contact IPEX for details.

Normal testing procedures for System 15 or System XFR may be employed if using MJ Grey couplings. Maximum water pressure shall be 10 feet of head for all sizes. Proper safety precautions and protective equipment should be employed during all testing procedures.

## APPLICATIONS AS PER 2010 NBC SUITABILITY FOR USE

PRODUCT	NONCOMBUSTIBLE BUILDING				
	General Usage	Air Plenum	Vertical Service Spaces	High Building	Under-ground
System 15 DWV	P†	N	N	N	P
System XFR DWV	P	P	N	P	P
MJ Grey Coupling	P	P	N	P	P*

† Sizes 20" and 24" would be N.

\* permitted by Code but not recommended by IPEX

**FOOTNOTES:**

**P = Permitted, N = Not Permitted**

1. Combustible piping in non-combustible construction is subject to the requirements of 3.1.5.16.(1) of the NBC 2010.
2. Combustible piping that penetrates a fire separation is subject to the requirements in articles 3.1.9.1, 9.10.9.6 and 9.10.9.7 of the NBC 2010.

Drain-Guard is a double containment piping system using System 15 and/or System XFR as its primary components.

# SALES AND CUSTOMER SERVICE

**IPEX Inc.**

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**ipexna.com**

## About IPEX by Aliaxis

As leading suppliers of thermoplastic piping systems, IPEX by Aliaxis provides our customers with some of the world's largest and most comprehensive product lines. All IPEX by Aliaxis 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 earned a reputation for product innovation, quality, end-user focus and performance.

Markets served by IPEX by Aliaxis products are:

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

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