SECTION 22 11 16

DOMESTIC WATER PIPING

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\*\* NOTE TO SPECIFIER \*\* IPEX USA LLC; domestic water piping; pipe, valves and fittings.
This section is based on the products of IPEX USA LLC which is located at:
10100 Rodney Street
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Tel: 289-881-0120
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Website: [www.ipexna.com](http://www.ipexna.com) .
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Leader in Thermoplastic Piping Systems.
IPEX USA LLC supplies one of the world's most diverse lines of integrated thermoplastic piping systemspipe, valves, fittings, auxiliary components and toolsall engineered from the ground up to handle the full range of today's municipal, industrial and electrical applications. More than 50 years' experience in plastics combined with efficient distribution centers and coast-to-coast customer support has made the IPEX name synonymous with quality, innovation and performance.
When you choose IPEX, you can be confident that all your piping materials are designed, built and backed by one company. One supplier to stand behind you and your complete system.

1. GENERAL
	1. SECTION INCLUDES

\*\* NOTE TO SPECIFIER \*\* Delete items below not required for project. For applications other than potable water please refer to facilities specification section 22 11 13 - Facility Water Distribution Piping.

* + 1. PVC pipe, fittings, and valves.
		2. CPVC pipe, fittings, and valves.
		3. Double-containment pipe and fittings.
		4. Double-containment leak detection systems.
	1. RELATED SECTIONS

\*\* NOTE TO SPECIFIER \*\* Delete any sections below not relevant to this project; add others as required.

* + 1. Section 22 11 13 - Facility Water Distribution Piping.
		2. Section 22 10 00 - Plumbing Piping.
		3. Section 22 15 00 - General Service Compressed-Air Systems.
		4. Section 22 67 00 - Process Water Systems for Laboratory and Healthcare.
		5. Section 22 66 00 - Chemical-Waste Systems for Laboratory and Healthcare Facilities.
	1. REFERENCES

\*\* NOTE TO SPECIFIER \*\* Delete references from the list below that are not actually required by the text of the edited section.

* + 1. American Society of Mechanical Engineers (ASME):
			1. ASME B1.20.1 - Pipe Threads, General Purpose, Inch.
		2. ASTM International: (ASTM)
			1. ASTM D1784 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
			2. ASTM D1785 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
			3. ASTM D2464 - Standard Specification for Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
			4. ASTM D2466 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
			5. ASTM D2467 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
			6. ASTM D2665 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.
			7. ASTM D2672 - Standard Specification for Joints for IPS PVC Pipe Using Solvent Cement.
			8. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
			9. ASTM F439 - Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.
			10. ASTM F442 - Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR).
			11. ASTM F480 - Standard Specification for Thermoplastic Well Casing Pipe and Couplings Made in Standard Dimension Ratios (SDR), SCH 40 and SCH 80.
			12. ASTM F645 - Standard Guide for Selection, Design, and Installation of Thermoplastic Water- Pressure Piping Systems.
			13. ASTM F1970 - Standard Specification for Special Engineered Fittings, Appurtenances or Valves for use in Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Systems.
		3. FM Global (FM): Commercial Property Insurance:
			1. FM Approval.
		4. Underwriters Laboratories of Canada (CAN/ULC):
			1. CAN/ULC S102.2 - Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials and Assemblies.
		5. Underwriters Laboratories (UL):
			1. UL 723 - Standard for test for surface burning characteristics for building materials.
		6. National Standards of Canada (CSA):
			1. CSA B137.0 - Thermoplastic Pressure Piping Compendium.
			2. CSA B137.3 - Rigid Polyvinylchloride (PVC) Pipe and Fittings for Pressure Applications.
			3. CSA B137.6 - Chlorinated Polyvinylchloride (CPVC) Pipe, Tubing, and Fittings for Hot and Cold Water Distribution Systems.
		7. United States of American Military Specifications (MIL):
			1. MIL P- 29206 - Pipe and pipe fittings, glass fiber reinforced plastic, for liquid petroleum lines.
		8. National Fire Protection Association (NFPA):
			1. NFPA 24 - Standard for the Installation of Private Fire Service Mains and Their Appurtenances.
			2. NFPA 70 - National Electric Code.
		9. National Science Foundation (NSF):
			1. NSF 14 - Plastics Piping System Components and Related Materials.
			2. NSF 61 - Drinking Water System Components - Health Effects.
		10. Underwriters Laboratories (UL):
			1. UL 971 - Standard for Nonmetallic Underground Piping For Flammable Liquids.
	1. DEFINITIONS

\*\* NOTE TO SPECIFIER \*\* Delete any abbreviations that are no longer relevant after the sections has been edited.

* + 1. CPVC: Chlorinated polyvinyl chloride plastic.
		2. EPDM: Ethylene propylene diene monomer elastomer.
		3. HDB: Hydrostatic design basis.
		4. HMI: Human machine interface.
		5. LCD: Liquid crystal display.
		6. LED: Light emitting diode(s).
		7. PPI: Plastic Pipe Institute.
		8. PTFE: Polytetrafluoroethylene plastic (Teflon).
		9. PVC: Polyvinyl chloride plastic.
		10. SDR: Standard dimension ratio; used by plastic pipe manufacturers as a method of rating pressure piping.
	1. SUBMITTALS
		1. Submit under provisions of Section 01 30 00 - Administrative Requirements.
		2. Product Data: For each product type specified.
		3. Shop Drawings: Double containment piping systems:
			1. Piping, supports, spacing.
			2. Drain, vent, and joint details.

\*\* NOTE TO SPECIFIER \*\* Delete subparagraph below if there is no wiring required.

* + - 1. Wiring Diagrams: Signal, and control wiring.
		1. Coordination Drawings: Piping, specialties in relation to surrounding equipment and services.
			1. To scale: Show piping, equipment locations, and elevations.
			2. Field test reports.
			3. Operation and Maintenance data.
	1. QUALITY ASSURANCE

\*\* NOTE TO SPECIFIER \*\* Edit subparagraphs below as necessary. Delete if not required.

* + 1. Regulatory Requirements:
			1. Utility company:
				1. Water main tapping.
				2. Backflow prevention.
			2. Authorities having jurisdiction:
				1. Potable-water piping.
				2. Fire-suppression water piping.
		2. Piping: Labeled and marked as determined by agency approved by authorities having jurisdiction.
		3. Standards compliance:
			1. ASTM F 645.

\*\* NOTE TO SPECIFIER \*\* Delete the following three subparagraphs if piping is not being used for fire suppression services.

* + - 1. FMG's "Approval Guide."
			2. NFPA 24.
			3. UL's "Fire Protection Equipment Directory."

\*\* NOTE TO SPECIFIER \*\* Delete subparagraph below if not required.

* + - 1. NSF 14.
			2. NSF 61 Annex G.

\*\* NOTE TO SPECIFIER \*\* Delete paragraph below if there are no electrical devices specified.

* + 1. Electric Devices: NFPA 70, Article 100:
			1. Listed, labeled and marked by agency approved by authorities having jurisdiction.

\*\* NOTE TO SPECIFIER \*\* Delete paragraph below if a double containment system is not specified.

* + 1. Double containment systems:
			1. Manufacturer to design and fabricate.
				1. Minimum twenty years' experience.
			2. Contractor: Trained by manufacture or manufacturer appointed representative.
				1. Must be trained prior to installation.
		2. Source Limitations: Obtain piping, fittings, valves and accessory equipment from a single manufacturer.
	1. DELIVERY, STORAGE, AND HANDLING
		1. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.
			1. Protect plastic piping from direct sunlight.
				1. Support to prevent sagging and bending.
			2. Protect internal parts, valve ends, and specialties against corrosion, dirt, and damage.
			3. Store valves set in open position.
			4. Storage:
				1. Indoors: Higher than ambient dew point temperature.
				2. Outdoors: well ventilated, light colored watertight enclosures off ground.
		2. Handling: Comply with manufacturer's recommendations. Avoid damaging components.
			1. Large Valves: Operating handles or stems are not rigging points for slings.
	2. PROJECT CONDITIONS

\*\* NOTE TO SPECIFIER \*\* Delete this article if interruption of service is not required.

* + 1. Do not interrupt service without arranging temporary water-distribution service.
			1. Owner or Owner's representative is to be notified a minimum of two days prior to service interruption.
			2. Do not proceed without written permission.
1. PRODUCTS
	1. MANUFACTURER
		1. Acceptable Manufacturer: IPEX USA LLC, which is located at: 10100 Rodney St.; Pineville, NC 28134; Toll Free Tel: 800-463-9572; Email: [request info (specifications@ipexna.com)](http://admin.arcat.com/users.pl?action=UserEmail&company=IPEX+USA+LLC&coid=41230&rep=&fax=&message=RE:%20Spec%20Question%20(15140ipx):%20%20&mf=); Web: [www.ipexna.com](http://www.ipexna.com)

\*\* NOTE TO SPECIFIER \*\* Delete one of the following two paragraphs; coordinate with requirements of Division 1 section on product options and substitutions.

* + 1. Substitutions: Not permitted.
		2. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

\*\* NOTE TO SPECIFIER \*\* Delete Article if not required.

* 1. PVC PIPE AND FITTINGS

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Basis of Design: IPEX USA LLC; Xirtec140 PVC Schedule 40 and 80 Pipe and Fittings.
			1. Standards:
				1. ASTM D 1784.
				2. ASTM D 1785.
				3. ASTM D 2464.
				4. ASTM D 2466.
				5. ASTM D 2467.
				6. ASTM D2672.
				7. ASTM F480.
				8. CSA B137.0.
				9. CSA B137.3
				10. NSF 14.
				11. NSF 61.
			2. Material Requirements: ASTM D1784.
				1. Cell classification: 12454.
				2. Physical Dimensions: Comply with ASTM D1785.

Certified to: CSA B137.3.

Belled end pipe:

ASTM D 2672.

ASTM F 480.

* + - 1. Pipe Marking to Comply with the following:
				1. ASTM D 1785.
				2. NSF 14.
				3. CSA B 137.0 and 137.3.
			2. Potable Water Service: NSF 61.
			3. Pipe Threading: Use Schedule 80 pipe only. PVC threaded joints have a maximum pressure rating of 50 percent when compared to the same size solvent welded joints operating at the same temperature. Schedule 40 pipe is not to be threaded.

\*\* NOTE TO SPECIFIER \*\* Pressure ratings of pipe vary with pipe size. See detailed product literature for more information. Pipe pressure ratings must be devalued for higher temperatures.

* + - 1. Pressure rating at 73 degrees F (23 degrees C) (psi / kPa): \_\_\_\_\_\_.
			2. Fittings: Third party certified to NSF 14.
				1. Schedule 40: Per ASTM D 2466.
				2. Schedule 80: Fiberglass reinforced.

Socket: Per ASTM D 2467.

Threaded: PerASTM D 2464.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Basis of Design: IPEX USA LLC; Clear-Guard; Higher-Pressure Clear PVC Schedule 40 Pipe.
			1. Standards:
				1. ASTM D 1784.
				2. ASTM D 1785.
				3. NSF 61.
			2. Material Requirements: ASTM D1784.
				1. Cell classification: 15334.
				2. Physical Dimensions: Comply with ASTM D1785.
			3. Pipe Marking to Comply with the following:
				1. ASTM D 1785.
				2. NSF 14.
			4. Potable Water Service: NSF 61.

\*\* NOTE TO SPECIFIER \*\* Pressure ratings of pipe vary with pipe size. See detailed product literature for more information. Pipe pressure ratings must be devalued for higher temperatures.

* + - * 1. Pressure rating at 73 degrees F (23 degrees C) (psi / kPa): \_\_\_\_\_\_.
				2. Hydrostatic Design Basis (HDB): 3150 psi at 73 degrees F (23 degrees C).

\*\* NOTE TO SPECIFIER \*\* Delete Article if not required.

* 1. CPVC PIPE AND FITTINGS:
		1. Basis of Design: IPEX USA LLC; AquaRise CPVC Potable Water Piping, Fittings and Valves, NPS 1/2 to NPS 4 (DN 15 to DN 100).
			1. Standards Compliance:
				1. ASTM D1784.
				2. ASTM F442.
				3. ASTM F438.
				4. ASTM F439.
				5. ASTM F1970.
				6. CAN/ULC S102.2.
				7. CSA B137.6.
				8. NSF 14.
				9. NSF 61.
			2. Material Requirements: ASTM D1784.
				1. Cell classification:

Pipe: 24448 for NPS 1/2 to NPS 4 (DN 15 to DN 100).

Fittings: 23447 for NPS 1/2 to NPS 4 (DN 15 to DN 100).

* + - * 1. Pipe Dimensions:

Iron Pipe Size (IPS) outer diameters.

Standard Dimensional Ratio (SDR): 11.

Standard Lengths: 10 ft (3 m).

* + - * 1. Fittings:

NPS 1/2 to 1 (DN 15 to 25) socket type ASTM F438.

NPS 1 1/4 to 4 (DN 32 to 100) socket type ASTM F439.

* + - 1. Listed: In general accordance per UL 723/ ASTM E 84.
				1. Flame spread rating: less than 25.
				2. Smoke Development classification: less than 50.
			2. Pressure Rating:
				1. Water pressure rating of pipe, fittings with only solvent welded joints, threaded adapters, full pressure flange kits, and repair couplings shall be 400 psi at 73 degrees F (2758 kPa at 23 degrees C).
				2. Water pressure rating of pipe, fittings with only solvent welded joints, threaded adapters, full pressure flange kits, and repair couplings shall be 150 psi at 160 degrees F (1034 kPa at 71 degrees C).
			3. Potable Water Service: NSF 61.
			4. Threaded Adapters:
				1. Socket dimensions conform to ASTM F438 or F439, depending on the size
				2. Standards:

ASTM F1970

CSA B137.6

NSF 14.

NSF 61.

* + - * 1. Pressure Rating: 400psi at 73 degrees F and 150psi at 160 degrees F
			1. Flanges:
				1. 150 lbs (68 kg) bolt pattern per ANSI B16.5.
				2. Socket dimensions per ASTM F438 or ASTM F439, depending on size.
				3. Meets ASTM F1970.
				4. Pressure Rating: 150 psi at 73 degrees F (1034 kPa at 23 degrees C).
			2. Unions:
				1. Socket dimensions per ASTM F438 or ASTM F439, depending on size.
				2. Meets ASTM F1970.
				3. Pressure Rating: 150 psi at 73 degrees F (1034 kPa at 23 degrees C).
			3. Ball Valves: NPS 1/2 to NPS 2 (DN 15 to DN 50).
				1. Pressure Rating: 232 psi at 73 degrees F (1600 kPa at 23 degrees C).

\*\* NOTE TO SPECIFIER \*\* Delete one of the full-pressure flange kits or retain all.

* + - 1. Full-Pressure Flange Kit: Aquarise.
				1. Standards:

ASTM F 1970.

NSF 14.

NSF 61.

* + - * 1. Pressure Rating: 400psi at 73 degrees F and 150psi at 160 degrees F
				2. The Aquarise Full Pressure Flange Kit must be installed using all the components supplied. Any substitution of components, such as longer bolts or a replacement gasket must comply with the original kit specification.
			1. Full-Pressure Flange Kit:
				1. Standards:

ASTM F 1970.

NSF 14.

NSF 61.

* + - * 1. Elastomeric Gasket: Durometer Hardness: 75-80.
				2. Steel Backing Ring: Two-piece, zinc plated.
				3. Decal stickers: Installation instructions.
				4. Hardware: Grade 8, yellow zinc plated, hex bolts, hex nuts, and heavy duty flat washers.
			1. Solvent Cements
				1. One-Step Cement - NPS 1/2 to 2 (DN 15 to 50):

Meets ASTM F493.

NSF 14 and 61 listed for potable water.

Certified to CSA B137.6.

Color: Yellow.

* + - * 1. Two-Step Cement and Primer - NPS 2-1/2 to 4 (DN 65 to 100):

Meets ASTM F493.

NSF 14 and 61 listed for potable water.

Color: Orange (cement).

Color: Purple (primer).

\*\* NOTE TO SPECIFIER \*\* Delete Article if not required.

* 1. PVC AND CPVC VALVES

\*\* NOTE TO SPECIFIER \*\* Valves in this article may be copied and pasted into the specific piping product Articles being specified.

* + 1. All valves are to be made of the same material as the attached piping and supplied IPEX or by and IPEX approved equivalent.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Ball Valves:

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + - 1. IPEX VKD Series:

\*\* NOTE TO SPECIFIER \*\* Delete a body material if not acceptable, or retain all.

* + - 1. Body Material: ASTM D 1784. PVC, cell class 12454 per ASTM D1784.
			2. Body Material: ASTM D 1784. CPVC, cell class 23447 per ASTM D1784.

\*\* NOTE TO SPECIFIER \*\* Pressure rating varies with temperature. Consult detailed product data for more information.

* + - * 1. Pressure Rating (psi / kPa): 232 psi at 73 degrees F(1600 kPa at 23 degrees C).
				2. Design: Union type.
				3. Ends: Detachable, socket or threaded.
				4. Ball and stem:

\*\* NOTE TO SPECIFIER \*\* Delete a material if not acceptable, or retain all.

Material: PVC.

Material: CPVC.

Machined smooth.

Stem Design: Double-O-ring seal, safety shear point.

* + - * 1. Port: Full.
				2. Seats: PTFE with in-line micro adjustment.

\*\* NOTE TO SPECIFIER \*\* Delete stem seal material not required.

* + - * 1. Stem Seals: EPDM.
				2. Stem Seals: FPM.
				3. Unions: Double-blocking. DUAL BLOCK system, locks union nuts to prevent backing-off due to vibration of thermal cycling.
				4. Handle: Tee shaped, built-in tool for adjustment of seat carrier.
				5. Mounting features for actuation.
				6. NSF 61, potable.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + - 1. IPEX VXE Series:

\*\* NOTE TO SPECIFIER \*\* Delete a body material if not acceptable or retain all.

* + - * 1. Body Material: ASTM D 1784. PVC, cell class 12454 per ASTM D1784.
				2. Body Material: ASTM D 1784. CPVC, cell class 23447 per ASTM D1784.

\*\* NOTE TO SPECIFIER \*\* Pressure rating varies with temperature. Consult detailed product data for more information.

* + - * 1. Pressure Rating (psi / kPa): 232psi at 73 degrees F (1600 kPa at 23 degrees C).
				2. Design: Union type.
				3. Ends: Detachable, socket or threaded.
				4. Ball and stem:

\*\* NOTE TO SPECIFIER \*\* Delete a material if not acceptable, or retain all.

Material: PVC.

Material: CPVC.

Machined smooth.

Stem Design: Double-O-ring seal, safety shear point.

* + - * 1. Port: Full.
				2. Seats: PTFE.

\*\* NOTE TO SPECIFIER \*\* Delete stem seals material not required.

* + - * 1. Stem Seals Materal: EPDM.
				2. Stem Seals Material: FPM.
				3. Unions: Double-blocking.
				4. Handle: Tee shaped, built-in to tool to adjust seat carrier and union nuts; transparent PVC plug and tag holder for valve identification.
				5. NSF 61, potable.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + - 1. IPEX VEE Series:
				1. Body Material: PVC per ASTM D 1784. PVC cell class 12454 per ASTM D1784.

\*\* NOTE TO SPECIFIER \*\* Pressure rating varies with temperature. Consult detailed product data for more information.

* + - * 1. Pressure Rating (psi / kPa): 232 psi at 73 degrees F (1600 kPa at 23 degrees C).
				2. Design: Union type.
				3. Ends: Detachable, socket or threaded.
				4. Ball and stem:

Material: PVC.

Machined smooth.

Stem Design: Single-O-ring seal, safety shear point.

* + - * 1. Port: Full.
				2. Seats: PTFE.
				3. Stem Seals: EPDM.
				4. Unions: Double-blocking.
				5. Handle: Tee shaped, built-in to tool to adjust seat carrier and union nuts.
				6. NSF 61, potable.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Butterfly Valves:

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + - 1. IPEX FK Series:
				1. Body Material: Glass Reinforced Polypropylene (GRPP).

\*\* NOTE TO SPECIFIER \*\* Delete a disc material if not acceptable, or retain all.

* + - * 1. Disc Material: Polypropylene Type 1 homopolymer per ASTM D4101.
				2. Disc Material: PVC, cell class 12454 per ASTM D1784.
				3. Disc Material: CPVC, cell class 23447 per ASTM D1784.

\*\* NOTE TO SPECIFIER \*\* Pressure rating varies with temperature. Consult detailed product data for more information.

* + - * 1. Pressure Rating (psi / kPa): \_\_\_\_\_\_.
				2. Design: Lugged or wafer.

\*\* NOTE TO SPECIFIER \*\* Delete disc liner material not required.

* + - * 1. Disc Liner Material: EPDM.
				2. Disc Liner Material: FPM.
				3. Shaft: 316 Stainless steel. Standard ISO square dimension for direct mount actuation.

\*\* NOTE TO SPECIFIER \*\* Delete stem seals material not required.

* + - * 1. Stem Seals Material: EPDM.
				2. Stem Seals MAterial: FPM.
				3. Handle: Lever or gear box with locking device. Transparent PVC plug and tag holder for valve identification.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + - 1. IPEX FE Series
				1. Body Material: PVC, cell classification 12454 per ASTM D1784
				2. Disc Material: PVC.

\*\* NOTE TO SPECIFIER \*\* Pressure rating varies with temperature. Consult detailed product data for more information.

* + - * 1. Pressure Rating (psi / kPa): \_\_\_\_\_\_.
				2. Design: Wafer.
				3. Disc Liner: EPDM.
				4. Shaft: Zinc-plated steel. Standard ISO square dimension for direct mount actuation.
				5. Stem Seals: EPDM.
				6. Handle: Lever or gear box with locking device. Transparent PVC plug and tag holder for valve identification.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Ball-Check Valves:
			1. IPEX SXE Series:

\*\* NOTE TO SPECIFIER \*\* Delete body material not required.

* + - * 1. Body Material: PVC, cell class 12454 per ASTM D1784.
				2. Body Material: CPVC, cell class 23447 per ASTM D1784.

\*\* NOTE TO SPECIFIER \*\* Pressure rating varies with temperature. Consult detailed product data for more information.

* + - * 1. Pressure Rating (psi / kPa): 232 psi at 73 degrees F.
				2. True Union.
				3. Ends: Detachable, socket or threaded.

\*\* NOTE TO SPECIFIER \*\* Delete ball material that is not acceptable, or retain all.

* + - * 1. Ball Material: PVC.
				2. Ball Material: CPVC.

\*\* NOTE TO SPECIFIER \*\* Delete seals material not required.

* + - * 1. Seals Material: EPDM.
				2. Seals Material: FPM.
				3. Design:

Valve cavity includes full body guide ribs.

Transparent plug housing for labelling.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Spring Check Valves:
			1. IPEX SSE Series:
				1. Body: PVC, cell class 12454 per ASTM D1784.

\*\* NOTE TO SPECIFIER \*\* Pressure rating varies with temperature. Consult detailed product data for more information.

* + - * 1. Pressure Rating (psi / kPa): 232 psi at 73 degrees F.
				2. Design: True Union.
				3. Ends: Detachable, socket or threaded.
				4. Ball Material: PVC.

\*\* NOTE TO SPECIFIER \*\* Delete spring not required.

* + - * 1. Spring: 316 stainless steel.
				2. Spring: PTFE encapsulated 316 stainless steel.
				3. Seals: EPDM.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. FPM Diaphragm Valves:

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + - 1. IPEX DK Series

\*\* NOTE TO SPECIFIER \*\* Delete body material that is not acceptable or retain all.

* + - * 1. Body Material: PVC, cell class 12454 per ASTM D1784.
				2. Body Material: CPVC, cell class 23447 per ASTM D1784.

\*\* NOTE TO SPECIFIER \*\* Pressure rating varies with temperature. Consult detailed product data for more information.

* + - * 1. Pressure Rating (psi / kPa): \_\_\_\_\_\_.
				2. Design: Bolted-bonnet.
				3. End connection type:

Up to NPS 2 (DN 50):

Socket.

Flanged.

Spigot.

Threaded.

NPS 2-1/2 (DN 65) and larger:

Flanged.

Spigot.

\*\* NOTE TO SPECIFIER \*\* Delete diaphragm materials not required.

* + - * 1. Diaphragm Material: EPDM.
				2. Diaphragm Material: FPM.
				3. Diaphragm Material: PTFE backed with EPDM.
				4. Handle: Wheel type that can be adjusted and locked in over 300 positions
				5. Graduated optical position indicator to allow for a visual check of the valve position.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Strainer Valves:
			1. IPEX RV Series Sediment Strainer:

\*\* NOTE TO SPECIFIER \*\* Delete body material that is not acceptable or retain all.

* + - * 1. Body Material: PVC, cell class 12454 per ASTM D1784.
				2. Body Material: CPVC, cell class 23447 per ASTM D1784.

\*\* NOTE TO SPECIFIER \*\* Pressure rating varies with temperature. Consult detailed product data for more information.

* + - * 1. Pressure Rating (psi / kPa): \_\_\_\_\_\_.
				2. NSF 61 for potable water.

\*\* NOTE TO SPECIFIER \*\* Delete seals material not required.

* + - * 1. Seals Material: EPDM.
				2. Seals Material: FPM.
				3. Connections: Socket, NPT Threaded, flanged per ANSI B16.5.

\*\* NOTE TO SPECIFIER \*\* Delete the mesh screens not required.

* + - * 1. Mesh Screen: PVC, size 18 mesh.
				2. Mesh Screen: PVC, size 30 mesh.
				3. Mesh Screen: PVC, size 35 mesh.
				4. Mesh Screen: PVC, size 50 mesh.
				5. Mesh Screen: PP Homopolymer, size 30 mesh.
				6. Mesh Screen: 304 Stainless steel, size 35 mesh.
				7. Design: Y-pattern style. Must be able to service valve without removing it from the line.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Air Release Valves:
			1. IPEX VA Series Air Release Valves:
				1. Body: PVC, cell class 12454 per ASTM D1784.

\*\* NOTE TO SPECIFIER \*\* Pressure rating varies with temperature. Consult detailed product data for more information.

* + - * 1. Pressure Rating (psi / kPa): \_\_\_\_\_\_.
				2. NSF 61 for potable water.

\*\* NOTE TO SPECIFIER \*\* Delete seals material not required.

* + - * 1. Seals Material: EPDM.
				2. Seals Material: FPM.
				3. Connections: Socket, NPT Threaded.
				4. Design:

Single union design.

Piston-style sealing mechanism.

Opening and closing of valve is not affected by pressure.

Valve shall close when liquid is in contact with the piston.

Valve shall open when air or gas is in contact with the piston.

Valve shall function as a vacuum breaker.

\*\* NOTE TO SPECIFIER \*\* Delete Article if not required.

* 1. DOUBLE-CONTAINMENT PIPING AND FITTINGS

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Basis of Design: IPEX USA LLC; Clear-Guard Double Containment Systems.
			1. Description of Systems:

\*\* NOTE TO SPECIFIER \*\* Insert chemicals and percentages below. Copy and repeat as necessary.

* + - * 1. Chemical Name: \_\_\_\_\_\_\_. Percent: \_\_\_\_\_\_.
			1. Prefabricated double containment piping system; fabricated, installed and tested in accordance with IPEX's recommendations and as specified herein and shall be suitable for the intended service.
				1. Each system to have suitable drains and vents for both primary and secondary systems.
				2. Drain fittings: In secondary piping for valve attachment and drainage of containment area.
				3. All fittings will be preassembled and pre-tested by manufacture.
				4. Provide termination fittings to transition between single-wall and double-wall systems.
			2. Primary Piping System:

\*\* NOTE TO SPECIFIER \*\* Delete a primary piping system if not acceptable, or retain all.

* + - * 1. Xirtec140 PVC Pipe and Fittings:

\*\* NOTE TO SPECIFIER \*\* Delete the pressure pipe not required.

Pressure pipe, schedule 40 thickness per ASTM D 1785 and pressure fittings, schedule 40 per ASTM D 2466.

Pressure pipe, schedule 80 thickness per ASTM D 1785 and pressure fittings, schedule 80 per ASTM D2467.

* + - * 1. AquaRise CPVC Pipe and Fittings: IPS OD Pipe, SDR 11 thickness per ASTM F 442, and pressure fittings SDR 11 thickness per CSA B 137.6.
			1. Secondary Containment Piping System: Clear-Guard Clear PVC, schedule 40 thickness per ASTM D 1785 and fittings, schedule 40 per ASTM D 2466.
			2. Primary Fitting Supports:
				1. NPS 1/2 to NPS 4 (DN 15 to DN 100): Centra-Lok molded supports.
				2. NPS 6 (DN 150) or larger: PP fitting disks.
			3. Primary Piping Supports:
				1. NPS 1/2 to NPS 4 (DN 15 to DN 100): Centra-Lok molded supports.
				2. IPEX polypropylene Centra-Guide supports.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Basis of Design: IPEX USA LLC; Guardian Double Containment Systems.
			1. Prefabricated double containment piping system; fabricated, installed and tested in accordance with IPEX's recommendations and as specified herein and shall be suitable for the intended service.
				1. Each system to have suitable drains and vents for both primary and secondary systems.
				2. Drain fittings: In secondary piping for valve attachment and drainage of containment area.
				3. All fittings will be preassembled and pre-tested by manufacture.
				4. Piping system manufacturer to provide termination fittings to transition between single-wall and double-wall systems.
			2. Primary Piping System:

\*\* NOTE TO SPECIFIER \*\* Delete the primary piping system not required.

* + - * 1. Xirtec140 PVC Pipe and Fittings:

\*\* NOTE TO SPECIFIER \*\* Delete pressure pipe not required.

Pressure pipe, schedule 40 thickness per ASTM D 1785 and pressure fittings schedule 40 per ASTM D 2466.

Pressure pipe, schedule 80 thickness per ASTM D 1785 and pressure fittings schedule 80 per ASTM D2467.

* + - * 1. AquaRise CPVC Pipe and Fittings: IPS OD Pipe, SDR 11 thickness per ASTM F 442, and pressure fittings SDR 11 thickness per CSA B 137.6.
			1. Secondary Containment Piping System:

\*\* NOTE TO SPECIFIER \*\* Delete the secondary containment piping systems not required.

* + - * 1. Xirtec140 PVC Pipe and Fittings:

\*\* NOTE TO SPECIFIER \*\* Delete pressure pipe not required

Pressure pipe, schedule 40 thickness per ASTM D 1785 and pressure fittings schedule 40 per ASTM D 2466.

Pressure pipe, schedule 80 thickness per ASTM D 1785 and pressure fittings schedule 80 per ASTM D2467.

* + - * 1. AquaRise CPVC Pipe and Fittings NPS 2 to 4 (DN 50 to 100). IPS OD Pipe, SDR 11 thickness per ASTM F 442 and pressure fittings, SDR 11 Pressure fittings per CSA B 137.6.
				2. Corzan CPVC Pipe and Fittings NPS 6 and 8 (DN 150 and 200):

\*\* NOTE TO SPECIFIER \*\* Delete pressure pipe not required

IPS OD pipe, schedule 40 thickness per ASTM F 441, and pressure fittings schedule 80 per ASTM F 439.

IPS OD pipe, schedule 80 thickness per ASTM F 441, and pressure fittings schedule 80 per ASTM F 439.

* + - 1. Primary Fitting Supports:
				1. NPS 1/2 to NPS 4 (DN 15 to DN 100): Centra-Lok molded supports.
				2. NPS 6 (DN 150) or larger: PP fitting disks.
			2. Primary Piping Supports:
				1. IPEX polypropylene Centra-Guide supports.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* + 1. Basis of Design: IPEX USA LLC; Drain-Guard Double Containment Systems.
			1. Prefabricated double containment piping system; fabricated, installed and tested in accordance with IPEX's recommendations and as specified herein and shall be suitable for the intended service.
				1. Each system to have suitable drains and vents for both primary and secondary systems.
				2. Drain fittings: In secondary piping for valve attachment and drainage of containment area.
				3. All fittings will be preassembled and pre-tested by manufacture.
				4. Provide termination fittings to transition between single-wall and double-wall systems.
			2. Primary Piping System:
				1. PVC Pipe and Fittings:

DWV thickness according to ASTM D 2665, schedule 40 thickness according to ASTM D 1785 or schedule 80 thickness according to ASTM D 1785.

* + - 1. Secondary Containment Piping System:
				1. PVC Pipe and Fittings:

DWV thickness according to ASTM D 2665, schedule 40 thickness according to ASTM D 1785 or schedule 80 thickness according to ASTM D 1785.

Molded DWV fittings schedule 40 per ASTM D 2466.

Fabricated DWV fittings schedule 40 per ASTM F 1866.

* + - 1. Primary Piping Supports:
				1. NPS 1/2 to NPS 4 (DN 15 to DN 100): Centra-Lok molded supports.
				2. IPEX polypropylene Centra-Guide supports.

\*\* NOTE TO SPECIFIER \*\* Delete Article if not required.

* 1. DOUBLE-CONTAINMENT LEAK DETECTION SYSTEMS

\*\* NOTE TO SPECIFIER \*\* Delete one of the two paragraphs below. Choose point leak detection or continuous cable leak detection.

* + 1. Point Leak Detection Systems:

\*\* NOTE TO SPECIFIER \*\* Delete one of the two subparagraphs below or retain all.

* + - 1. Above-Ground Leak Detection System:
				1. Basis of Design: IPEX USA LLC; Centra-Guard Leak Detection.

Per Zone: Capacitive sensor station.

External, non-intrusive sensor, drip leg and drain valve with hose connection.

Sensor: LED testing lamp, adjusting potentiometer; removable for periodic testing. Not to penetrate containment piping nor contact with leaking media.

Control console: NEMA 4X enclosure.

Operating voltage: 120 VAC.

Voltage to zone sensors: 24 VDC.

Keyed on/off switch, keyed alarm silence switch, and common audible and visual alarm.

Power indicator light.

LCD display; continuous system operating conditions.

Indicate date, time, zone, and type of alarm (break/short, sensor malfunction or leak) and store data in nonvolatile memory.

HMI buttons; scroll through history, status, test screens, and alarm acknowledgement.

An external output switch for accessory alarms; RS-232 communication port.

* + - 1. Below-Ground Leak Detection System:
				1. Basis of Design: IPEX USA LLC; Centra-Guard Leak Detection.

Per Zone: Capacitive sensor station.

Internal, non-intrusive sensor, drip leg, and pump-out port.

\*\* NOTE TO SPECIFIER \*\* Delete sensor if not required.

Sensor: LED testing lamp, adjusting potentiometer; removable for periodic testing.

\*\* NOTE TO SPECIFIER \*\* Delete control console if not required.

Control Console: NEMA 4X enclosure.

Operating voltage: 120 VAC.

Voltage to zone sensors: 24 VDC.

Keyed on/off switch, keyed alarm silence switch, and common audible and visual alarm.

Power indicator light.

LCD display; continuous system operating conditions.

Indicate date, time, zone, and type of alarm (break/short, sensor malfunction or leak) and store data in nonvolatile memory.

HMI buttons; scroll through history, status, test screens, and alarm acknowledgement.

An external output switch for accessory alarms; RS-232 communication port.

* + 1. Continuous Cable Leak Detection:
			1. Basis of Design: IPEX USA LLC; PAL-AT Continuous Cable Leak Detection.
				1. Microprocessor based panel: Continuous monitoring of sensor string for leaks, breaks and shorts.
				2. Sensing range: Per cable.
				3. Alarm Units Operation: Pulsed energy reflection and capable of mapping entire length of sensor cable and storing the digitized system map in nonvolatile memory.

Continuous indication sensor cable is being monitored.

Enclosure: Modified NEMA 12 enclosure with two line by forty-character display providing status and alarm data.

* + - * 1. Monitoring Units:

Power Source: 120 / 240 VAC, 50/100 VA, 50 / 60 Hz, single phase or 24 VDC, 24 VA.

\*\* NOTE TO SPECIFIER \*\* Keep the subparagraph below if communication with a PLC is required.

SPDT Output Relay: 250 VAC, 10 A; one common and one per cable.

Alarm Horn: 75 dB chime.

\*\* NOTE TO SPECIFIER \*\* Choose one of the two subparagraphs below.

Field connected.

Factory mounted.

Red LED illuminated when any cable is in alarm.

Provide connections for intrinsically safe sensor circuits for use in Class 1, Division 1, Group C and D or Zone 0, Group II B Hazardous Locations.

\*\* NOTE TO SPECIFIER \*\* Choose one or both of the two subparagraphs below.

UL Listed.

FM Approved to provide connections for intrinsically safe sensor circuits for use in Class 1, Division 1, Group C and D Hazardous Locations.

* + - * 1. Sensor cables, connectors, probes and jumpers: Supplied by the manufacturer of the monitoring units.
				2. Software: Will allow manufacturer to remotely or on-site interface through the RS-232 serial port for trouble shooting and diagnostics.

Will operate the PAL-AT monitoring units and retrieve each of the stored reference maps and current condition TDR traces.

1. EXECUTION
	1. EARTHWORK
		1. Refer to applicable sections in Division 31 for excavating, trenching, and backfilling.
	2. EXAMINATION
		1. Verification of Conditions: Examine areas and conditions under which Work is to be performed and identify conditions that may be detrimental to proper or timely completion.
			1. Rough-in for water-supply, sanitary drainage and vent piping systems: Verify locations; pipe and connection.
			2. Walls and partitions: Suitable thickness.
		2. Fixture and Valve Interiors: Clean and free of foreign matter, and corrosion. Remove packing used to prevent disc movement.
			1. Operate valves from fully open to fully closed positions.
			2. Verify guides and seats are clean and free of foreign matter, and corrosion.
		3. Threads on Valves Fittings and Fixtures: Inspect valve and mating pipe for form and cleanliness.
		4. Mating Flange Faces: Inspect for conditions that may cause leaking.
			1. Bolting: Proper size, length, and material.
			2. Gaskets: Proper size and material composition suitable for application; defect and damage free.
		5. Replace defective fixtures and valves with new.
		6. Do not proceed until unsatisfactory conditions have been corrected.
	3. PIPING INSTALLATION
		1. See appropriate sections in Division 33 for common requirements for utility piping.
		2. All Fixtures: level and plumb.
		3. Attach all support framing to building substrate per manufacturer's written instructions.
		4. Wall-mounted fixtures: Install off-the-floor carrier supports. Install accessible, wall-mounted water closets according to ICC/ANSI A117.1.
		5. Water-supply piping: Ball or gate shutoff valves on supply to each fixture connected to domestic-water piping. See section 23 05 00 - Common Work Results for HVAC "Common Work Results for Plumbing Piping."
			1. Locations: easily accessible.
		6. Pressure-reducing valves to be downstream of shutoffs.
		7. Fixture drain outlets: Install trap and waste piping to be connected to sanitary drainage system.

\*\* NOTE TO SPECIFIER \*\* Delete paragraph below if not in an active seismic zone.

* + 1. Seismic restraints to be installed on piping.
		2. Conceal piping whenever possible except in equipment rooms and service areas.
			1. Diagonal pipe runs are prohibited.
			2. No sagging or bending.
		3. Escutcheons and wall flanges: Wall piping penetrations finished locations.
		4. Joints between fixtures and walls: Seal with silicone sealant:
			1. Sanitary, one-part, mildew-resistant. Match colors.
		5. See appropriate sections in Division 33 for common requirements for utility piping.
		6. Install PVC pipe according to ASTM F 645.

\*\* NOTE TO SPECIFIER \*\* Verify that the value in the paragraph below is adequate for the specific location and work being specified.

* + 1. Bury in accordance with manufacturers recommendations.
		2. Minimum top below frost penetration: 12 inches (300 mm).
		3. Driveways: Minimum cover over top 36 inches (910 mm).
		4. Railroad Tracks: Minimum cover over top 48 inches (1220 mm).
		5. Loose rocky soil: Minimum cover over top 24 inches (605 mm).
		6. Tunneling or Jacking: Allowed when necessary not to disturb obstructions.
		7. Connect building-water-piping systems at locations and pipe sizes indicated, on outer wall face.
		8. Cap piping. Connect to building when building systems are ready.
		9. Pipe joints: Per manufacturer's written instructions.
			1. Join dissimilar pipe materials with adapters compatible with pipe materials being joined.

\*\* NOTE TO SPECIFIER \*\* Retain and edit first subparagraph below for piping with gasketed joints. Delete if not required.

* + - 1. Underground piping: Restrained joints at directional changes both horizontal and vertical.
				1. Restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.
		1. Anchorages

\*\* NOTE TO SPECIFIER \*\* Remove or add to subparagraphs below as required. Anchorages are used for tees, plugs and caps, bends, crosses, valves, and hydrant branches.

* + - 1. Thrust blocks.
			2. Pipe clamps and tie rods.
			3. \_\_\_\_\_\_.
		1. Restrained joints:

\*\* NOTE TO SPECIFIER \*\* Remove or add to subparagraphs below as required.

* + - 1. Mechanical.
			2. Set-screw retainers.
			3. Flanged.
			4. Heat-fused.
			5. \_\_\_\_\_\_.
	1. VALVE INSTALLATION
		1. Install products in accordance with manufacturer's instructions, approved submittals, and in proper relationship with adjacent construction.
			1. Valves in horizontal piping to have stems at or above pipe center.
			2. Valves to be positioned allowing full stem movement.
			3. Valves with threaded connections to have unions at each piece of equipment.
				1. Arrange to allow easy access, service, maintenance, and equipment removal without system shutdown. Provide separate support where necessary.
			4. Valve tags and signage:
				1. Comply with Section 22 05 53 - Identification for Plumbing Piping and Equipment "Identification for Plumbing Piping and Equipment" for valve tags, schedules and signs on surfaces concealing valves.
				2. Comply with NFPA 24 as it applies to the piping system in which valves are installed.
	2. LEAK-DETECTION AND MONITORING SYSTEM INSTALLATION FOR DOUBLE\_CONTAINMENT PIPING
		1. Install panel where indicated on drawings.
		2. System manufacturer to provide factory trained personnel for pre-installation meeting and installation of sensors and electronics.
	3. CONNECTIONS
		1. See sections in Division 33 that cover piping connections to valves and equipment.
		2. Connection of water-distribution piping:
			1. Facility:

\*\* NOTE TO SPECIFIER \*\* Choose one or both of the two subparagraphs below or delete and insert method of connection.

* + - * 1. Domestic water piping.
				2. Fire-suppression piping.
		1. Waste piping:
			1. Sanitary sewerage system.
				1. See appropriate sections in Division 22 that cover sanitary sewerage connections.
			2. Storm-drainage system.
				1. See appropriate sections in Division 33 that cover storm-sewer connections.
	1. FIELD QUALITY CONTROL

\*\* NOTE TO SPECIFIER \*\* Revise this article to suit requirements of authorities having jurisdiction.

* + 1. Test per authorities having jurisdiction to a maximum pressure of the lowest pressure-rated appurtenance in the system.
		2. Piping Tests: prior to covering and after curing and setting of concrete thrust blocks. Fill and pressurize pipeline to test pressure a minimum of 24 hours before testing.
			1. Use high purity water for testing of high purity piping systems.
			2. Use potable water for all other piping systems.
		3. Hydrostatic Tests, Single-Wall Pressure Piping:
			1. Test Pressure: One-and-one-half times the working pressure up to the maximum pressure of the lowest pressure-rated appurtenance in the system.
				1. Fully inspect installed piping for evidence of mechanical abuse and/or suspect joints.
				2. Split system into test sections not exceeding 1,000 feet (305 m).
				3. Slowly fill the pipe section with water, at a velocity of 1.0 feet/sec. (.3 m/s) or less.
				4. Evacuate any entrapped air venting from the high points.
				5. Allow a minimum of one hour for temperature equilibrium to be achieved in test section before pressurizing.
				6. Visually check the test section for leaks. If clear, check for and remove any remaining air and increase pressure up to 50 psi (345 kPa).
				7. Leave section pressurized for 10 minutes.

If the pressure decays, inspect for leaks.

If the pressure remains constant, slowly increase the hydrostatic pressure to one-and - one-half times the nominal working pressure up to the maximum pressure of the lowest pressure-rated appurtenance in the system.

* + - * 1. Leave the section pressurized for a period not exceeding 1 hour. During this time, the pressure should remain constant.

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.

Trapped air must be removed before further testing.

Repair joint leaks and allow to cure fully before re-pressurizing.

* + 1. Hydrostatic Tests, Single-Wall DWV Piping:
			1. Hydrostatically test in accordance with local authority having jurisdiction or with a maximum of 10 feet (3 m) of head pressure.
				1. Fully inspect the installed piping for evidence of mechanical abuse and suspect joints.
				2. Split the system into convenient test sections, not exceeding 1,000 feet (305 m).
				3. Prior to starting the test in below grade applications, straight lengths of pipe should be backfilled between fittings that are tested.
				4. Slowly fill the pipe section with water, taking care to evaluate all trapped air in the process.
				5. Allow a minimum of one hour for temperature equilibrium to be achieved in test section before pressurizing.
				6. Visually check the system for leaks.
				7. Pressurize the system to a suggested maximum of 10 feet (3 m) of head by means of a standard 10 foot (3 m) standing water test using a 10 foot (3 m) vertical riser, or a low-pressure hand pump.
				8. Leave the line at 10 feet (3 m) of head for a period of 2 hours, during which time the water level should not change, nor should the pressure gauge reading change (hand pump test).

If there is a significant drop in pressure, or extended times are required to achieve the desired pressure, either joint leakage has occurred or air is entrapped.

Remove air pockets if present.

Repair leaking joints per manufacturer's recommendations.

* + - 1. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.
		1. Testing, Double Containment Piping:
			1. Primary Pipe - Hydrostatic Test:
				1. Hydrostatically test in accordance with local authority having jurisdiction up to the maximum pressure of the lowest pressure-rated appurtenance in the system.

Repeat steps as outlined in this Article, Paragraph C. for testing a single wall pressure system or Paragraph D. for testing a single wall DWV piping system.

* + - 1. Secondary Pipe - Air Testing
				1. To be completed if it is determined by the engineer and/or authority having jurisdiction that a hydrostatic test is not possible.
				2. Do not drain the primary pipe, leave the primary pipe at 10 foot (3 m) head hydrostatic pressure.

Fill the secondary pipe with air to a maximum of 5 psi (34.5 kPa) for 1 hour.

Exposed secondary should be wiped with an IPEX approved leak detector.

Continuously check the pressure gauge to ensure that there is no pressure decay.

* + 1. Prepare test and inspection reports.
	1. IDENTIFICATION
		1. Comply with requirements for identification specified in Section 22 05 53 - Identification for Plumbing Piping and Equipment.
		2. Comply with requirements for identification specified in Section 26 05 53 - Identification for Electrical Systems.
		3. Continuous underground detector tape is to be installed during backfilling.
			1. Below finished grade, over piping.
				1. See relevant sections in Division 31 for detector tape specification.
	2. ADJUSTING
		1. Flow regulators: Proper flow of water through fixtures.
		2. Replace damaged fixtures, fittings, and controls.
	3. CLEANING

\*\* NOTE TO SPECIFIER \*\* Retain one of the following paragraphs below for piping not connected to potable-water supply.

* + 1. Flush and disinfect piping systems as described by authorities having jurisdiction.
		2. Flush and disinfect piping systems per NFPA 24 for flushing of piping.
			1. Use potable water until contaminants no longer appear at outlets.

\*\* NOTE TO SPECIFIER \*\* Retain one of the following paragraph below for piping connected to potable-water supply.

* + 1. Flush and disinfect piping systems:

\*\* NOTE TO SPECIFIER \*\* Retain one of first three subparagraphs below. If the first subparagraph is used, delete all remaining subparagraphs.

* + - 1. Use procedures described by AWWA C651 or do as follows:
			2. Fill system with water containing a minimum of 50 ppm of chlorine.
				1. Let stand for twenty-four hours.
			3. Fill system with water containing a minimum of 200 ppm of chlorine.
				1. Let stand for three hours.
			4. Flush system with potable water until no chlorine remain in system.
				1. Submit water samples to authorities having jurisdiction for testing.
			5. Repeat procedure if biological examination shows evidence of contamination.
		1. Remove paint spots, dirt, and debris. Damaged finish to match original finish.
		2. Clean fixtures, according to manufacturer's written instructions.
		3. Provide protective covering for installed fixtures.
		4. Not to be uses for temporary facilities without written approval by Owner.
		5. Prepare reports: Flushing, disinfecting, and testing.

END OF SECTION