

# PIPING SYSTEMS FOR WATER & WASTEWATER TREATMENT APPLICATIONS



## WATER & WASTEWATER TREATMENT SOLUTIONS

- Process Piping
- Double Containment Piping
- Ventilation Ductwork
- Valves, Automation and Instrumentation
- Electrical Systems

# IPEX Integrated Solutions for Water & Wastewater Treatment Plants

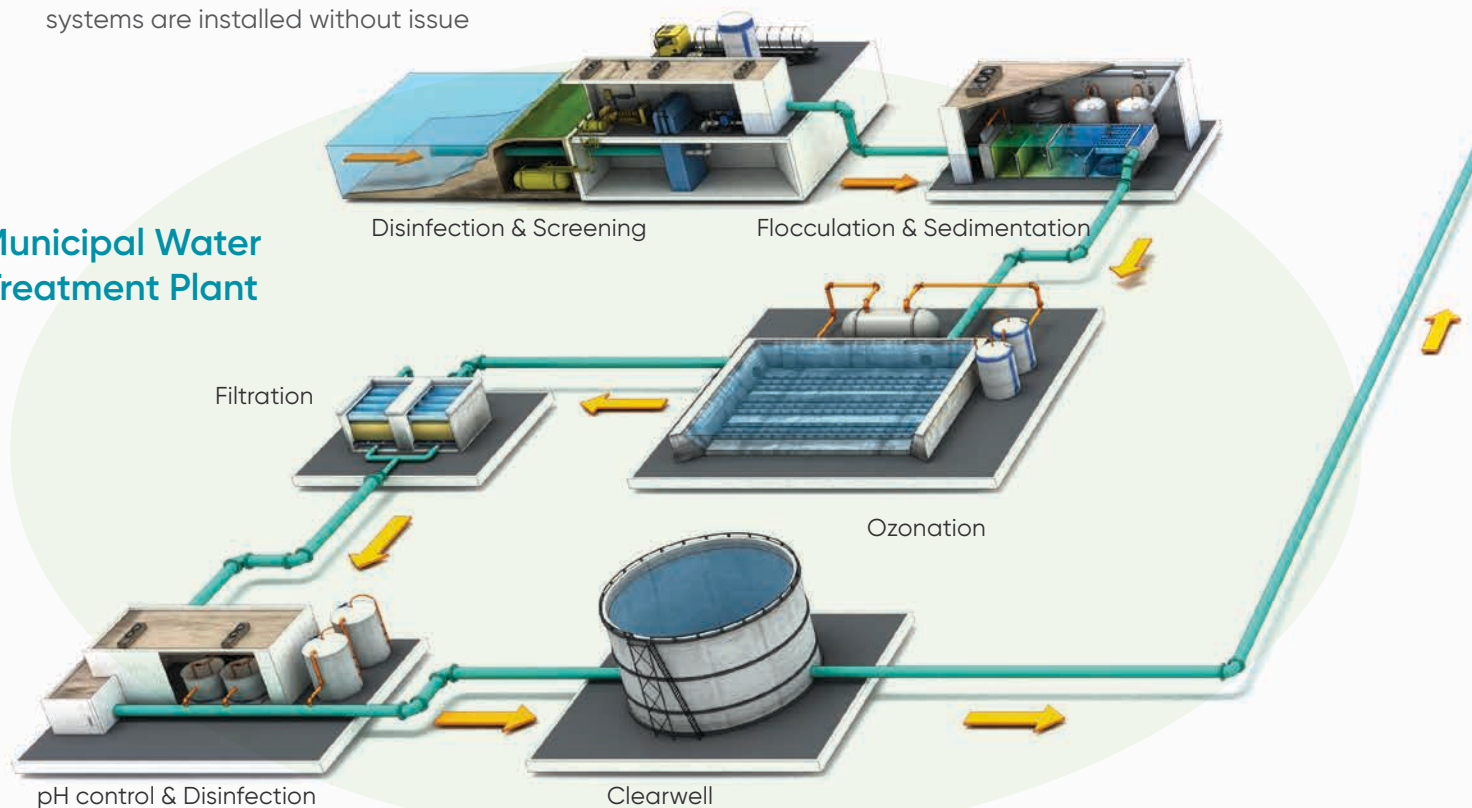
As one of the world's leading suppliers of industrial piping products; IPEX offers a comprehensive range of integrated solutions to meet the needs of water and wastewater facilities.

Superior to the competition, the IPEX system consisting of Pipe, Valves, and Fittings (PVF) ensures uniform performance throughout treatment facilities.



- Noncorroding properties ensure long-term performance coupled with low maintenance costs
- Lightweight thermoplastics are cost effective and easy to install
- Ease of installation and repair of systems makes IPEX the supplier of choice amongst facilities maintenance personnel
- IPEX products are available through an extensive network of local distributors
- Local sales representation provides support where and when you need it
- Onsite training, prior to installation, ensures systems are installed without issue
- Responsive product support is provided by our team of applications engineers, material scientists, technical sales representatives, and chemists
- Tool rentals are available should you need to service or expand an existing system
- Limited lifetime warranty on our products ensures peace of mind for you and your facility maintenance personnel
- Ask your sales representative for case histories showing similar installations

## Municipal Water Treatment Plant

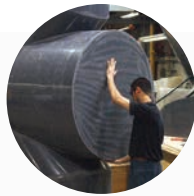


## CORROSIVE & HIGH HUMIDITY VENTILATION DUCTWORK

IPEX's PVC and CPVC Ventilation ductwork are ideally suited for both high humidity and corrosive applications in Water and Wastewater Treatment Plants. These ducts can be used as a cost effective alternative to Stainless Steel.

Some typical applications include:

- Headwork building ventilation
- Flocculation and sedimentation ventilation
- Laboratory exhaust

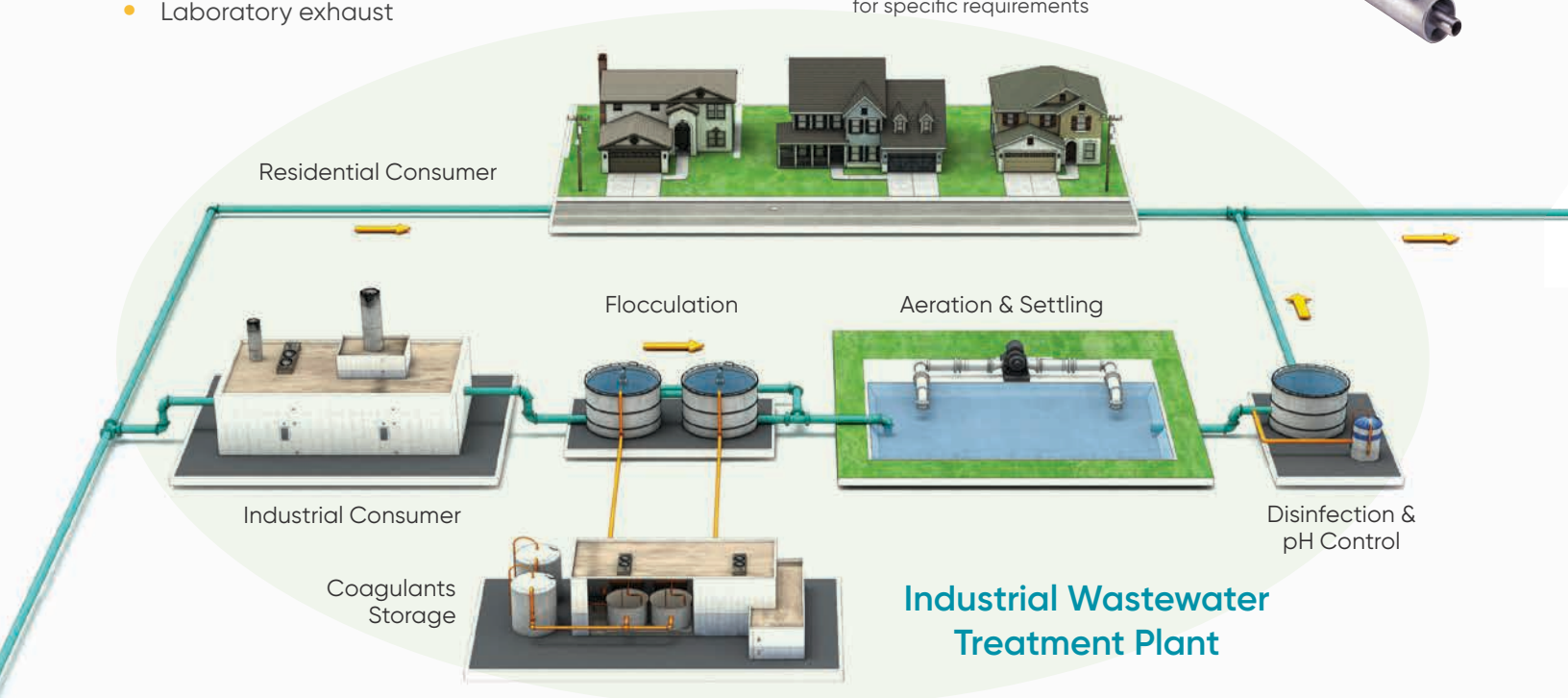


## EMERGENCY FUEL SUPPLY

### CustomGuard® Centra-Guard™

CustomGuard® double containment piping systems are the ideal solution for the conveyance of petroleum products. Our systems satisfy the federal requirement 40 CFR 280 for underground storage tanks (UST)\*. This regulation requires all UST and the associated underground piping to be double contained. Installing a double containment system will help to minimize down-time, mitigate risks, eliminate potential EPA issues, and reduce replacement and maintenance costs.

\* Please check with your local regional authority for specific requirements



## AERATION & CO<sub>2</sub> INJECTION

### Xirtec<sup>140</sup> CORZAN® Duraplus™

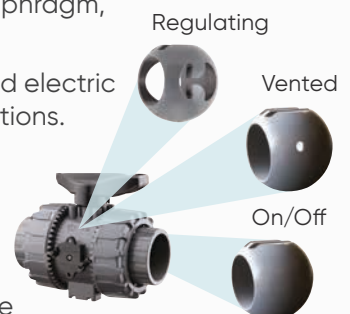
Throughout North America, our highly engineered products are widely used within the aeration and CO<sub>2</sub> injection process. Suitable products include Xirtec<sup>140</sup> PVC, Corzan® CPVC (warmer climate), and Duraplus™ Industrial ABS (colder climates).

- Xirtec<sup>140</sup> PVC & Corzan® CPVC offer an economical alternative to traditional materials used in the aeration and CO<sub>2</sub> injection piping process.
- Duraplus™ Industrial ABS offers additional impact strength and ductility even in cold weather environments.

## VALVES, ACTUATORS & INSTRUMENTATION

IPEX offers one of the most comprehensive ranges of high quality, high performance thermoplastic valves, actuators and instrumentation available today. Whether you require a valve for isolation, an actuator for control, or instrumentation to measure, IPEX has a solution to meet your needs.

- Valve types include ball, butterfly, diaphragm, check, and specialty.
- Actuator types include pneumatic and electric for use in indoor and outdoor applications.
- Instrumentation includes monitors for Flow, Batch, Conductivity and PH.
- Material options such as PVC, CPVC, PP, PVDF, and ABS make our corrosion-resistant valves ideal for use in a wide variety of WTP and WWTP applications.





## WATER, SLUDGE & CHEMICAL DISTRIBUTION

**Xirtec<sup>140</sup> CORZAN<sup>®</sup> Duraplus<sup>™</sup> enpure<sup>™</sup>**

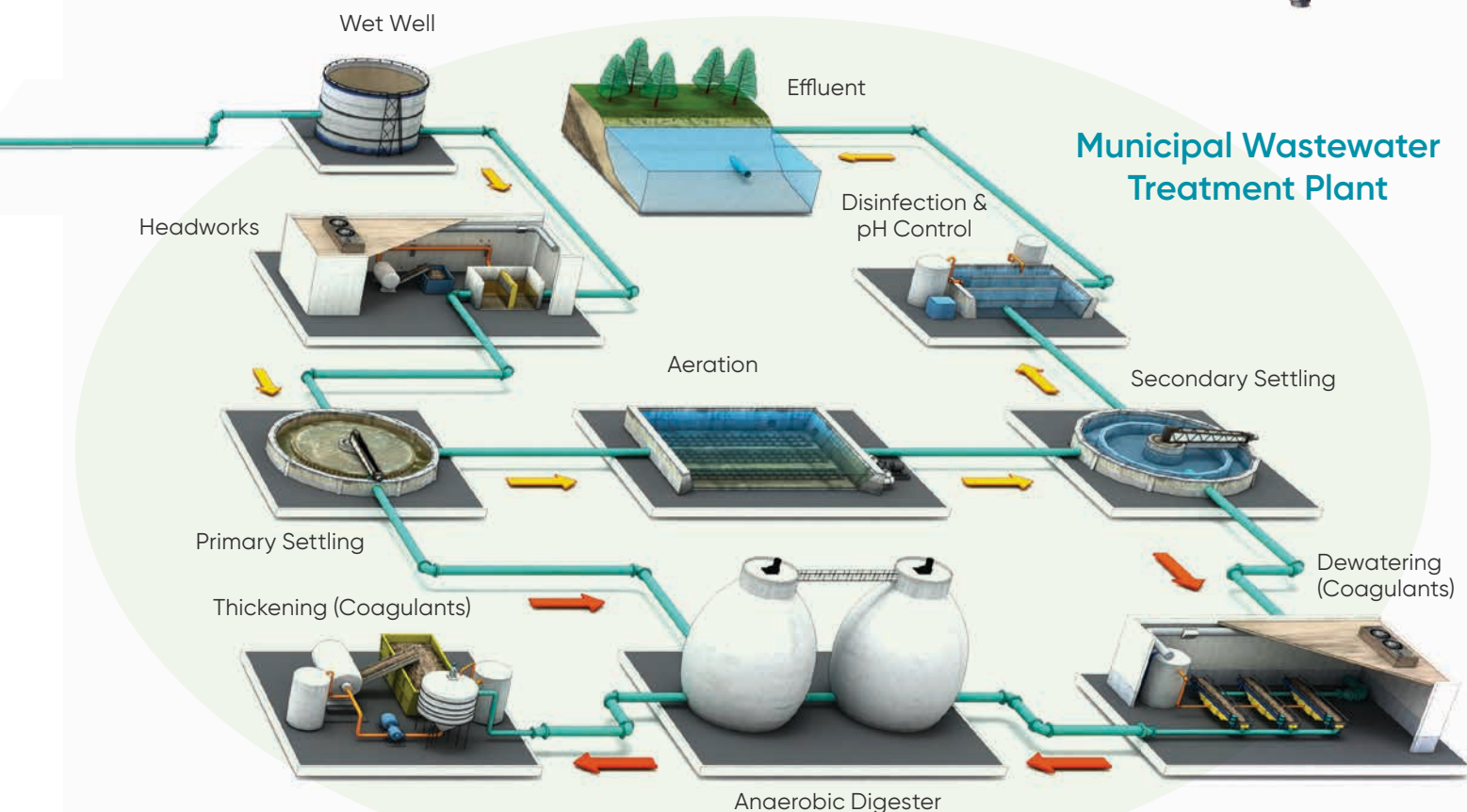
Our superior plastic piping systems offer resistance to a broad spectrum of chemicals. Our products have been successfully used to transport:

- Coagulants, flocculants and precipitants
- pH control
- Disinfectants and oxidants
- Water (raw, potable, RO, DI)
- Sludge

## CHEMICAL DISTRIBUTION ADDED PROTECTION

**Guardian<sup>™</sup> CustomGuard<sup>®</sup> Centra-Guard<sup>™</sup>**

Double Containment piping has an inner and an outer barrier with an interstitial space that is monitored for leaks. Almost all of the chemicals used in treatment plants are classified by the EPA as hazardous and should be double contained.



## TREATED EFFLUENT DISCHARGE

**Xirtec<sup>140</sup> IPEX CENTURION<sup>™</sup>**

IPEX PVC (up to 60" diameter) is the ideal solution for transporting treated water from the WWTP to the appropriate discharge point.



## ELECTRICAL & AUTOMATION SYSTEMS

**Scepter<sup>®</sup> Scepter<sup>®</sup> JBox<sup>™</sup> Sceptalight<sup>™</sup>**

Electrical and automation systems are subjected to harsh corrosive and humid environments. IPEX offers a wide range of lighting, conduit, fittings and junction boxes made from industrial grade PVC.



# Common Chemicals in Water & Wastewater Treatment Plants

Temperature are in Fahrenheit  
Swelling / Weight loss / Elongation at  
break

R<sup>MAX RATED TEMP</sup> – Resistant  
< 3% / < 0.5% / No Change

C – Limited Resistance  
< 8% / < 5% / decreased by  
< 50%

N – Not Resistant  
> 8% / > 5% / decreased by  
> 50%

A – Case by  
Case

	Chemical	Formula	Concentration	PVC	CPVC	ABS	PP-n	EPDM	FPM <sup>†</sup>	PTFE
Coagulants, Flocculants & Precipitants	Aluminum Sulfate (Alum)	Al <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub> ·18H <sub>2</sub> O	Saturated	R <sup>140</sup>	R <sup>140</sup>	R <sup>160</sup>	R <sup>104</sup>	R <sup>140</sup>	R <sup>140</sup>	R <sup>248</sup>
	Aluminum Chloride	AlCl <sub>3</sub>	Saturated	R <sup>140</sup>	R <sup>140</sup>	R <sup>160</sup>	R <sup>104</sup>	R <sup>140</sup>	R <sup>176</sup>	R <sup>248</sup>
	Calcium hydroxide (Lime)	Ca(OH) <sub>2</sub>	Aqueous	R <sup>140</sup>	R <sup>104</sup>	R <sup>68</sup>	R <sup>104</sup>	R <sup>176</sup>	R <sup>176</sup>	R <sup>248</sup>
	Ferric Chloride	FeCl <sub>3</sub>	Saturated	R <sup>140</sup>	R <sup>176</sup>	R <sup>104</sup>	R <sup>104</sup>	R <sup>176</sup>	R <sup>176</sup>	R <sup>248</sup>
	Ferric Sulfate	Fe <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub>	Saturated	R <sup>140</sup>	R <sup>140</sup>	R <sup>68</sup>	R <sup>104</sup>	R <sup>104</sup>	R <sup>176</sup>	R <sup>248</sup>
	Ferrous Sulfate (Copperas)	FeSO <sub>4</sub> ·7H <sub>2</sub> O	Saturated	R <sup>140</sup>	R <sup>140</sup>	R <sup>140</sup>	R <sup>104</sup>	R <sup>176</sup>	R <sup>176</sup>	R <sup>248</sup>
	Polymer (PVC is typically used in this application)			A	A	A	A	A	A	A
pH Control	Sodium Aluminate	Na <sub>2</sub> Al <sub>2</sub> O <sub>4</sub>	Saturated	R <sup>140</sup>	R <sup>200</sup>	R <sup>180</sup>	R <sup>70</sup>	R <sup>140</sup>	R <sup>140</sup>	R <sup>350</sup>
	Calcium Carbonate	CaCO <sub>3</sub>	Aqueous	R <sup>140</sup>	R <sup>176</sup>	R <sup>104</sup>	R <sup>104</sup>	R <sup>104</sup>	R <sup>104</sup>	R <sup>248</sup>
	Calcium Oxide	CaO	Saturated	R <sup>140</sup>	R <sup>176</sup>	R <sup>140</sup>	R <sup>104</sup>	R <sup>176</sup>	R <sup>176</sup>	R <sup>350</sup>
	Carbon Dioxide	CO <sub>2</sub>	100%	R <sup>140</sup>	R <sup>200</sup>	R <sup>140</sup>	R <sup>104</sup>	R <sup>176</sup>	R <sup>176</sup>	R <sup>248</sup>
	Magnesium Hydroxide	Mg(OH) <sub>2</sub>	Saturated	R <sup>140</sup>	R <sup>104</sup>	R <sup>140</sup>	R <sup>104</sup>	R <sup>176</sup>	R <sup>212</sup>	R <sup>248</sup>
	Magnesium Oxide	MgO	Saturated	R <sup>140</sup>	R <sup>200</sup>	R <sup>160</sup>	R <sup>104</sup>	R <sup>70</sup>	R <sup>70</sup>	R <sup>70</sup>
	Sodium Bicarbonate	NaHCO <sub>3</sub>	Saturated	R <sup>140</sup>	R <sup>140</sup>	R <sup>140</sup>	R <sup>104</sup>	R <sup>176</sup>	R <sup>212</sup>	R <sup>248</sup>
	Sodium Carbonate (Soda Ash)	NaCO <sub>3</sub>	Aqueous	R <sup>140</sup>	R <sup>176</sup>	R <sup>140</sup>	R <sup>104</sup>	R <sup>176</sup>	R <sup>176</sup>	R <sup>248</sup>
	Sodium Hydroxide (Caustic Soda)	NaOH	<50%	R <sup>104</sup>	A	N	R <sup>104</sup>	R <sup>140</sup>	N	R <sup>248</sup>
			>50%	R <sup>104</sup>	A	N	C <sup>104</sup>	R <sup>140</sup>	N	R <sup>248</sup>
	Carbonic Acid	H <sub>2</sub> CO <sub>3</sub>	Saturated	R <sup>104</sup>	R <sup>176</sup>	R <sup>104</sup>	R <sup>104</sup>	R <sup>176</sup>	R <sup>176</sup>	R <sup>248</sup>
	Hydrochloric Acid	HCl	<25%	R <sup>140</sup>	R <sup>176</sup>	R <sup>68</sup>	R <sup>104</sup>	R <sup>68</sup>	R <sup>176</sup>	R <sup>248</sup>
			<30%	R <sup>140</sup>	R <sup>176</sup>	N	R <sup>104</sup>	N	R <sup>140</sup>	R <sup>248</sup>
			<37%	R <sup>140</sup>	R <sup>140</sup>	N	R <sup>104</sup>	N	R <sup>104</sup>	R <sup>248</sup>
			>37%	R <sup>104</sup>	R <sup>68</sup>	N	N	N	R <sup>68</sup>	R <sup>248</sup>
			>50%	R <sup>104</sup>	R <sup>68</sup>	N	N	N	R <sup>68</sup>	R <sup>248</sup>
	Sulfuric Acid	H <sub>2</sub> SO <sub>4</sub>	<50%	R <sup>140</sup>	R <sup>176</sup>	R <sup>68</sup>	C <sup>104</sup>	C <sup>68</sup>	R <sup>212</sup>	R <sup>248</sup>
			<70%	C <sup>140</sup>	R <sup>176</sup>	N	C <sup>104</sup>	N	R <sup>176</sup>	R <sup>212</sup>
			<78%*	C <sup>104</sup>	R <sup>104</sup>	N	C <sup>104</sup>	N	R <sup>176</sup>	R <sup>212</sup>
			<93%*	C <sup>104</sup>	R <sup>104</sup>	N	N	N	R <sup>176</sup>	R <sup>212</sup>
			<96%*	C <sup>104</sup>	R <sup>104</sup>	N	N	N	C <sup>140</sup>	R <sup>212</sup>
			96% – 98%*,**	C <sup>68</sup>	R <sup>104</sup>	N	N	N	N	R <sup>176</sup>
	Sodium Hexametaphosphate	[NaPO <sub>3</sub> ] <sub>6</sub>	Saturated	R <sup>140</sup>	R <sup>180</sup>	–	R <sup>104</sup>	R <sup>180</sup>	R <sup>122</sup>	R <sup>122</sup>
Disinfectants, Odor Control & Color Removal	Aqua Ammonia <sup>††</sup>	NH <sub>3</sub>	Saturated	R <sup>140</sup>	N	N	R <sup>104</sup>	R <sup>140</sup>	N	R <sup>248</sup>
	Liquid Ammonium Sulfate (LAS)	(NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub>	Saturated	R <sup>140</sup>	R <sup>200</sup>	R <sup>140</sup>	R <sup>176</sup>	R <sup>176</sup>	R <sup>176</sup>	R <sup>248</sup>
	Calcium Hypochlorite	Ca(OCl) <sub>2</sub>	Saturated	C <sup>104</sup>	R <sup>104</sup>	R <sup>70</sup>	R <sup>104</sup>	R <sup>104</sup>	R <sup>122</sup>	R <sup>212</sup>
	Chlorine dioxide	ClO <sub>2</sub>	14 g/L	R <sup>104</sup>	R <sup>68</sup>	–	N	N	C <sup>68</sup>	R <sup>248</sup>
	Hypochlorous Acid	HClO	10%	R <sup>140</sup>	C <sup>176</sup>	–	R <sup>68</sup>	R <sup>68</sup>	R <sup>140</sup>	R <sup>248</sup>
	Hydrogen Peroxide <sup>††</sup>	H <sub>2</sub> O <sub>2</sub>	<5%	R <sup>140</sup>	R <sup>104</sup>	–	C <sup>68</sup>	R <sup>68</sup>	R <sup>140</sup>	R <sup>248</sup>
			>5%	R <sup>104</sup>	C <sup>68</sup>	–	–	–	R <sup>68</sup>	R <sup>248</sup>
	Ozone (Aqueous)	O <sub>3</sub>	0.5mg/L in H <sub>2</sub> O	R <sup>68</sup>	R <sup>68</sup>	N	N	R <sup>104</sup>	R <sup>104</sup>	R <sup>176</sup>
	Peracetic Acid	CH <sub>3</sub> CO <sub>3</sub> H	<10%	R <sup>104</sup>	R <sup>180</sup>	N	C <sup>68</sup>	C <sup>68</sup>	C <sup>68</sup>	R <sup>248</sup>
			>15%	C <sup>104</sup>	N	N	C <sup>68</sup>	C <sup>68</sup>	C <sup>68</sup>	R <sup>248</sup>
	Potassium Permanganate	KMnO <sub>4</sub>	Aqueous	C <sup>104</sup>	R <sup>104</sup>	N	C <sup>104</sup>	R <sup>140</sup>	R <sup>140</sup>	R <sup>248</sup>
	Sulfur dioxide	SO <sub>2</sub>	Aqueous	R <sup>104</sup>	R <sup>68</sup>	–	R <sup>104</sup>	R <sup>104</sup>	R <sup>140</sup>	R <sup>68</sup>
	Sodium Hypochlorite <sup>††</sup>	NaOCl	12.5%	R <sup>104</sup>	R <sup>200</sup>	N	N	C <sup>104</sup>	R <sup>104</sup>	R <sup>140</sup>
			15% <sup>†</sup>	R <sup>68</sup>	R <sup>200</sup>	N	N	C <sup>104</sup>	R <sup>104</sup>	R <sup>140</sup>
	Sodium Sulfite	Na <sub>2</sub> SO <sub>3</sub>	Saturated	R <sup>68</sup>	R <sup>176</sup>	R <sup>140</sup>	R <sup>104</sup>	R <sup>140</sup>	R <sup>140</sup>	R <sup>248</sup>
	Sodium Bisulfite	NaHSO <sub>3</sub>	Saturated	R <sup>140</sup>	R <sup>140</sup>	R <sup>122</sup>	R <sup>104</sup>	R <sup>176</sup>	R <sup>212</sup>	R <sup>248</sup>
	Sodium Metabisulfite	Na <sub>2</sub> S <sub>2</sub> O <sub>5</sub>	Saturated	R <sup>68</sup>	–	R <sup>140</sup>	R <sup>104</sup>	R <sup>68</sup>	R <sup>68</sup>	R <sup>122</sup>
	Sodium Permanganate	NaMnO <sub>4</sub>	20%	C <sup>68</sup>	–	–	–	R <sup>68</sup>	R <sup>140</sup>	R <sup>140</sup>

## RATINGS

Chemical compatibility ratings are specific to our products suppliers. The absence of any class indication for any given materials, signifies the absence of data for such material(s) with respect to the specific chemical(s), temperature(s) and concentration(s).

**Note:** Chemical resistance data is determined in a laboratory setting and cannot account for all possible variables of an installed application.

It is up to the design engineer or final user to use this information as guidance for a specific application design. If a material is chemically resistant to the concentrated form of a specific chemical, it should be resistant to the diluted form of that same chemical.

Ratings outside of the temperature and pressure range may be possible, please contact IPEX for more information.

\*\* PTFE Diaphragm valve with spigot or flanged ends are available

<sup>†</sup> IPEX's unique and specifically engineered formula

<sup>††</sup> Vented ball valve required

Toll Free: (800) 463-9572  
E-mail: [engineering@ipexna.com](mailto:engineering@ipexna.com)



## SALES AND CUSTOMER SERVICE

IPEX USA LLC  
Toll Free: (800) 463-9572  
[ipexna.com](http://ipexna.com)

### About the IPEX Group of Companies

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

Markets served by IPEX group products are:

- Municipal pressure and gravity piping systems
- Plumbing and mechanical piping systems
- PE Electrofusion systems for gas and water
- Industrial process piping systems
- Electrical systems
- Telecommunications and utility piping systems
- Irrigation systems
- Industrial, plumbing and electrical cements
- PVC, CPVC, PP, PVCO, ABS, PEX, FR-PVDF, NFRPP, FRPP, HDPE, PVDF and PE pipe and fittings (1/2" to 60")

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This literature is published in good faith and is believed to be reliable. However, it does not represent and/or warrant in any manner the information and suggestions contained in this brochure. Data presented is the result of laboratory tests and field experience.

A policy of ongoing product improvement is maintained. This may result in modifications of features and/or specifications without notice.



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# IPEX Industrial Case Study

## Water & Wastewater Treatment Applications

### Baltimore's Patapsco Wastewater Treatment Plant Needs Double Containment Pipe

**T**he Patapsco Wastewater Treatment Plant has a current capacity of 63 million gallons of water per day, and a mandate to preserve the aquatic life of the Patapsco River and Chesapeake Bay. Increasingly stringent requirements for the purity of the wastewater that is returned to the Patapsco River require the safe



use of chemicals in the cleaning process. IPEX Guardian™ and CustomGuard® double containment systems were used to guarantee durability and the secure transport of potentially dangerous chemicals throughout the wastewater treatment plant.

The primary and secondary piping material selected for each chemical line in the double containment system varied depending on the caustic properties of the chemicals. To aid in the detection of leaks, the engineers opted for IPEX Clear-Guard™, PVC secondary containment pipe, where applicable, which allowed visual monitoring of the pipes. They also required the installation of the IPEX Centra-Guard™ Electronic Low Point Leak Detection System. This system allows for the installation of sensors at strategic low points that detect leaks and are connected to a reliable and maintenance-free leak detection monitoring station.

“The double containment system provides great safety when chemicals are transported over the heads of workers.”

**Paul Sherer,**  
Fru-Con Construction

Steven Dolejsi, IPEX Regional Sales Manager adds, “IPEX was the only manufacturer that could provide material for all the different chemical conveyance lines, along with the specified leak detection. We were also consulted on venting and expansion/contraction compensation. We visited the site several times during start up to ensure that the product was being installed properly and answered any questions and concerns.”

Paul Sherer with Fru-Con Construction adds. “We’re still working on the project and pressure testing. The double containment system provides great safety when chemicals are transported over the heads of workers. A good product.”

To meet the challenges of complex systems, IPEX double containment includes a variety of different system choices ranging from Fluoropolymers, Thermosets and carbon and stainless steel to hybrid combinations. Spooled pieces are preassembled to minimize installation time and field joints.

For most common chemical-waste or process applications, IPEX offers double containment systems that are highly engineered solutions.





# IPEX Industrial Case Study

## Water & Wastewater Treatment Applications

### IPEX ❤️ New York City



Photo Credit:  
architecturalrecord.com

**T**he Croton Water Filtration Plant is a \$3.2 billion state-of-the-art water treatment facility with the capacity to filter about a third of New York City's drinking water (290 million GPD) from 12 upstate reservoirs. It is the largest infrastructure project ever tackled by the City of New York. The building covers an area of 9 acres and sinks 12 stories into the earth—deep enough to hold Yankee Stadium. The surface of the structure in Van Cortland Park in the Bronx is covered by a golf driving range, making it the largest continuous living roof in North America. IPEX was proud to be a part of this once-in-a-lifetime project.

More typically, the plant will supply about 100 million gallons of water a day by gravity flow to the western edges of Manhattan and low-lying areas of the Bronx.

IPEX supplied over 17 miles of PVC and CPVC Double Containment Piping Systems: Guardian™ and CustomGuard®. The general rule in the project was that if the fluid wasn't potable it needed to be double contained. Almost all of the distribution piping conveying coagulants was double contained.

“IPEX was accommodating and always there to answer questions even when things changed.”

**Kevin Hanley,**  
Mechanical Project Manager  
Skanska/Durr Mechanical

The project was a challenging one with installation time compressed from four years to two. Kevin Hanley, Mechanical Project Manager at Skanska/Durr Mechanical, stated that he enjoyed working with IPEX. **“IPEX was accommodating and always there to answer questions even when things changed.”**

Examining all opportunities to streamline the process and compress the installation schedule, Hanley identified that **“we needed 10m bell-end lengths of CPVC double containment pipe, and IPEX made it happen.”** Craig Szachta (Plant Manager of the IPEX double containment facility in Chesterfield, Michigan), recalls this situation. **“These custom lengths of double containment pipe also incorporated a coupling at one end.**





Photo Credit:  
Ángel Franco,  
The New York Times

Our normal length of pipe would have required a lot of field cut joints. These custom lengths allowed the contractor to transition from one area to another using one unbroken length of pipe."

When Hanley was asked what the wow factor was, he stated, "There was no double containment expansion joint out there. Being able to give Craig the design specs and having him solve a multi-million-dollar problem for me was a factor that instilled credibility for me with IPEX. They were always there and took care of stuff." Craig Szachta adds, "Providing a customized double contained piston style expansion joint was just another opportunity for us to solve a customer's problem".

The NYDEP (New York Department of Environmental Protection) required their 3" valves to be double-contained and also completely removable from the system. To satisfy this requirement, IPEX utilized 12" containment tees with flanges and stem extensions for the valves."

IPEX's history with the New York City Department of Environmental Protection goes back a long way. Dave Kitchen, Northeastern Regional Sales Manager IPEX, explains, "Over the last 20 years, IPEX has been involved in approximately 50 different projects. We work closely with all the stakeholders: the NYCDEP, the design engineering firms, and the contractors. IPEX and its Guardian and CustomGuard Double Containment Systems are very highly regarded.

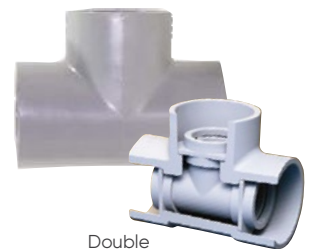
More importantly, the stakeholders know that they can count on IPEX personnel who are knowledgeable and ready to help identify problems or issues and then find a solution. Devising expansion and contraction joints, manufacturing non-spec lengths of pipe, these kinds of things are the value-added that come along with the product. We're a manufacturer, but more importantly, we provide solutions."

To meet the challenges of complex systems, CustomGuard includes a variety of different system choices ranging from vinyls, fluoropolymers, carbon and stainless steel to hybrid combinations. IPEX offers assistance with material selection, design and specification support and fabrication of preassembled spooled pieces to minimize installation time and field joints.

**When leaks are not an option**, whether it be an off-the-shelf system or a customized solution, IPEX double containment piping systems will keep you dry.



VKD  
Automated  
Valve



Double  
Containment Tee

# IPEX Industrial Case Study

## Water & Wastewater Treatment Applications

### IPEX Thermoplastic Piping Systems Deliver Potable Water and Conserve Groundwater in Sugar Land, Texas

**F**ounded as a sugar plantation in the mid 1800s, Sugar Land is one of the most affluent and fastest-growing cities in Texas, having grown more than 158% in population over the last decade. With such development, it's no wonder that the City of Sugar Land needed a better way to provide potable water to support the population while reducing dependence on the existing groundwater withdrawal method that



The City of Sugar Land Surface Water Treatment Plant delivers 9 mgd of potable water to residents.

had been contributing to flooding problems in the region. In fact, the Fort Bend Subsidence District mandated reduction of groundwater use by 30% in 2013 and 60% by 2025.

After nearly a decade of planning, the City recently approved the construction of a new \$69 million surface water treatment plant in the Gannaway Lake area adjacent to Kempner High School. Expected to be operational in late 2013, the Sugar Land Surface Water Treatment Plant (SWTP) will utilize raw water from Oyster Creek, a local creek that parallels the Brazos River, to produce 9 million gallons per day (mgd) of drinking water. From retention ponds, to pump stations, treatment and filtration, the surface water from Oyster Creek will ultimately be turned into potable water for Sugar Land residents—all through a complete thermoplastic

piping system from IPEX – comprised of single-wall and double containment polyvinyl chloride (PVC) and chlorinated polyvinyl chloride (CPVC) pipe, fittings and manual and automated thermoplastic valves.

At the new Sugar Land SWTP, water from four retention ponds is pretreated and then pumped to the treatment facility where coagulation and flocculation systems treat the water and remove suspended solids, sediment and turbidity. The water then flows to a low-pressure membrane ultra-filtration system that removes any further organic molecule contaminants to create potable water that goes through a final granular activated carbon system prior to distribution.

Anywhere the chemical treatment system flows underground from storage or pump systems, double containment pipe and fittings are required to prevent any possible leaks or spills into the surrounding groundwater. For the double containment, the Sugar Land SWTP used



The IPEX Guardian™ Vinyl double containment system was required for underground runs, which transitioned to IPEX single wall PVC and Corzan CPVC inside the facility.

the IPEX Guardian™ Vinyl double containment system. The Guardian system was comprised of both Xirtec® 140 Schedule 80 PVC and Corzan® Schedule 80 CPVC carrier and containment pipe and fittings, ranging in size from 1/2-inch carrier inside of 2-inch containment to 2-inch carrier inside of 4-inch containment.



IPEX Corzan® CPVC pipe, valves and fittings are used in areas transporting highly-corrosive chemicals.

"While we've installed piping for many years, double containment was somewhat new to me," says James Schmerber, project manager with LEM Construction who provided design assistance and installation services for the new treatment plant. "IPEX set up demonstration training for our crews, and we found that the system was ultimately as easy to install as single-wall PVC and CPVC piping systems from IPEX."

IPEX Guardian double containment systems offer a complete selection of pretested modular components which are extremely easy to install. Compared to conventional double containment piping systems, the patented Centra-Lok™ design reduces the number of overall joints by up to 60% and the number of field joints by up to 10%. Since joints are always the most common source of premature failures and leaks, it is easy to realize the immense impact the Centra-Lok design has on maintenance, repair and installation costs.

Areas within the treatment facility, including the chemical and membrane areas, consist of IPEX single-wall Xirtec140 PVC and Corzan CPVC pipe, valves and fittings.

"The treatment chemical specification originally called for all PVC, but due to the chlorine dioxide, sodium hypochlorite and sodium chlorite chemicals used in the treatment process, IPEX application engineers recommended Corzan CPVC for those areas," says Schmerber. "The change in material, along with delivery times on some fittings and numerous inspectors on the site, caused some project and schedule challenges. However, Robert Dragisic, our IPEX regional sales manager was always easy to get a hold of, and he was extremely helpful in coordinating the chemical compatibility analysis and getting us the product we needed. It was nice to have such great customer service and one point of contact."

removed from the piping system and fully serviced. Available in both PVC and Corzan CPVC for use throughout all areas of the Sugar Land SWTP, the valves offer precise machined ball and stem components that provide improved seal integrity under tough service conditions. The ball valve handle also functions as a tool for ball seat carrier adjustment.

For areas in the chemical treatment system requiring remote operation, the Sugar Land SWTP deployed electric actuated IPEX VKD Series Ball Valves with integrally molded mounting features that allow an actuator to be directly mounted on the top of the valve. These features also permit easy removal of the actuator from the valve for maintenance purposes. IPEX's comprehensive line of pneumatic and electric actuated valves allow an operator to control a near infinite number of valves/functions with speed and precision, from a centralized remote location.

"In the membrane filtration area, we installed solenoid valves from IPEX for precise control in automated applications," says Schmerber. "We also used IPEX sediment strainers to remove any solids and impurities." IPEX Solenoid Valves are 100% duty cycle solenoid valves with an innovative lever-shutter design that offer precise control and high-cycle service. IPEX RV Sediment Strainers help protect critical pipeline components with a clear construction that enables easy inspection of the screen while in service and reduces operating costs with a bottom-entry design that enables maintenance on the valve while in-line.

For more than 20 years, IPEX has offered one of the most comprehensive lines of single wall and double containment pipe, valves and fittings—all engineered and manufactured to strict quality, performance and dimensional standards. With all the corrosion resistance and installation benefits, combined with the performance and longevity of easy-to-use valves, the thermoplastic piping system from IPEX at the newly constructed Sugar Land Surface Water Treatment Plant will reliably do what it is intended to do—deliver potable water to the surrounding community for many years to come while shifting them away from reliance on precious groundwater.



IPEX manual VXE, VX and electric actuated VKD Series Ball Valves were used throughout the facility to control flow as needed.

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### Dallas' Elm Fork Water Treatment Plant is Fit for the Future with IPEX Piping Systems



**F**unded through water and wastewater revenues rather than tax dollars, Dallas Water Utilities maintains three water treatment plants and nearly 5,000 miles of water mains to deliver 900 million gallons per day (mgd) of potable water from six different reservoirs to millions of customers in the City of Dallas and surrounding communities.

While the city currently has enough water to meet its needs, Dallas Water Utilities knows that even with conservation and reuse, additional water supply will be needed by 2035. To prepare for the city's future water needs, an improvement plan was approved that included renovating the Elm Fork Water Treatment Plant (EFWTP).

Elements of the EFWTP upgrade included improvements to chlorine and ozone destruct unit systems that involved new bulk chlorine storage tanks, evaporator units, chlorinators, ejectors and transfer, booster and recirculation pumps. The plant's East Chemical Building was also expanded to house a third 90-ton chlorine railcar and a new electrical and control room. All associated thermoplastic piping systems for the upgrades were also a part of the extensive project.

With chlorine, ferric sulfate and caustic soda all used in the water treatment process, the piping systems needed to be of the highest quality with plenty of options to meet various requirements for chemical resistance and leak prevention throughout the plant. Fortunately, piping systems from IPEX provided the quality, breadth of product and available options to effectively meet the plant's day-to-day operations.

**"I would definitely consider specifying IPEX again in the future. The range of material, fittings and valve options to choose from really helps to meet the specific needs of any project."**

**Shela Chowdhury,  
JQ Infrastructure**

In all underground areas, the piping for the EFWTP upgrade was required to be double contained to protect against leaks. The IPEX Guardian™ Vinyl double containment piping system was selected as the system of choice. The Guardian double containment systems

**The compact VXE and VX ball valves offer an innovative floating ball flow control system that features a full-port, bi-directional double block design.**



were comprised of approximately 2000 feet of 6-inch Xirtec®140 Schedule 80 PVC carrier inside 10-inch Xirtec140 Schedule 80 PVC containment. Another nearly 2500 feet of larger diameter 10-inch carrier inside 16-inch containment and 8-inch carrier inside 12-inch containment were also deployed.

For underground ferric sulfate piping for transfer of chemical from bulk storage tanks to day tanks, the Guardian double containment systems consisted of 360 feet of 4-inch Corzan® CPVC carrier inside 8-inch Corzan CPVC containment.

To reduce system installation and maintenance costs, the IPEX Guardian system features a patented Centra-Lok™ design, reducing the required joints by 40–60% compared to traditional double containment systems. And less joints means less potential for problems and greater overall system integrity. The Guardian system is also available in spool piece fabrications according to specific application designs.

"Larger diameter double containment systems are not as common and can be tricky to install. The IPEX Guardian system was good to work with and the system passed pressure testing better than what we expected," said Mike Hughey with Archer Western, a member of the Walsh Group that specializes in general contracting and construction management. "We asked our IPEX sales representative, Bob Dragisic, for training on joint installation and ended up learning about a better solvent cement for the joints that would also be suitable for all piping on the project.

Throughout the underground double containment piping systems, leak detection stations were deployed at various low points to provide the ability to check for potential leaks.

To control flow for redundancy and enable isolation of piping sections for maintenance, the EFWTP used IPEX VXE and VX Series Ball Valves in several different supply areas and branch points throughout the plant. The compact VXE and VX ball valves offer an innovative floating ball flow control system that features a full-port, bi-directional double block design. Their true union style allows the valves to be easily removed from the piping system and fully serviced. Available in both PVC and CPVC for use throughout all areas of the plant, the valves offer a threaded seat stop carrier that provides improved seal integrity under tough service conditions and a removable handle that also functions as a tool for ball seat adjustment.

For use with the ball valves, IPEX EasyFit SXE Series True Union Ball Check Valves were used to ensure reliability by enabling positive shutoff in both vertical and horizontal installations in the presence of back pressure.

"IPEX offers high quality valves and flanges that I would definitely recommend. Plus, they were the only supplier that could meet the specification on some of the valves," says Hughey. "Due to the need for consistency, we were also able to get IPEX specified for some of the valves that they were not originally specified for."

Shela Chowdhury, one of the project's yard piping designers with JQ Infrastructure, the civil engineering firm for the EFWTP project, had never worked with IPEX products before and was ultimately impressed with the company's responsiveness, material options and range of pipe, fittings, and valves.

"IPEX had the material compatibility we required for some of the chemicals used at the treatment plant," says Chowdhury. "I would definitely consider specifying IPEX again in the future. The range of material, fittings and valve options to choose from really helps to meet the specific needs of any project."

With the first phase of construction nearly complete at the EFWTP, the City of Dallas has several additional improvements planned over the next few years for biological active filtration to meet regulatory requirements and rehabilitate a deteriorated pump station to further improve reliability. With IPEX Guardian double containment, Xirtec140 pipe, fittings, and valves in place, the plant is well equipped to move forward with additional improvements and continue to deliver water to the growing Dallas population.



**IPEX PVC & CPVC systems were painted brown with latex paint for chemical identification and UV protection.**

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### IPEX Guards 137 Million Gallons a Day at the Lakeview Wastewater Treatment Plant



Originally built in the late 1950s to handle an average flow of 2 million gallons per day (mgd), the G.E. Booth (Lakeview) Wastewater Treatment Plant (WWTP) is a key facility for the Region of Peel. In 2009, the facility underwent a \$260 million expansion to treat 137 mgd from the more than 1.3 million residents and 90,000 commercial businesses in the eastern section of Mississauga, Brampton, Bolton, and Caledon East.

Now expected to effectively meet the area's waste water treatment needs until at least 2031, the expanded Lakeview WWTP includes a new headworks facility, enhanced nitrification, a new biosolids handling facility and additional incinerator capacity. Upon completion of the project, Lakeview became the largest perforated-plate screening facility in North America and the largest fluidized-bed biosolids incineration facility in the world.

At the Lakeview facility, wastewater flowing through eleven primary sedimentation tanks is mixed with ferrous chloride at aeration tanks to solidify and

**"We chose the PVC Guardian™ double containment system because it offered the corrosion resistance we needed, and it was the most cost-effective option."**

**Vlad Petran,**  
Manager of Wastewater Treatment

remove excess phosphorus. After secondary clarifiers remove the additional solids from the wastewater, the wastewater is further disinfected before it flows over weirs and eventually discharges into Lake Ontario. The diffusion pipe system reaches more than 1.25 kilometers from the shore to the lake bottom. To ensure safety and reliability, the chemical feed system that transports the ferrous chloride diluted with carrier water is double contained to prevent any possible leaks or spills.

"The chemical feed system is a long system of pipes running through underground tunnels, and ferrous



# IPEX Double Containment Systems

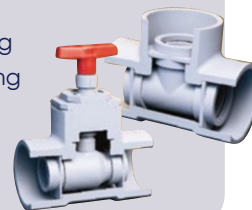
**Xirtec<sup>®</sup>140**

- Available in schedule 40, schedule 80 and SDR 1/2" through 24" sizes
- Completed systems of vales, pipe and fittings
- Easy to install



**Guardian<sup>™</sup>**

- Available in schedule 40 and schedule 80 1/2"-12" carrier and 2"-18" containment sizes
- Patented Centra-Lock<sup>™</sup> Design – minimizing potential for failures and leaks and reducing installation and maintenance costs
- Easy to install



chloride is a very corrosive chemical," explains Vlad Petran, Manager of Wastewater Treatment, Capital Works, Region of Peel, and former senior project engineer with AECOM Canada Ltd.\* that designed the system. "Any leaks can create a safety hazard, as well as potentially cause damage to the concrete structure or



other systems running through the tunnels. Using a double containment system ensures a spill-free system for better reliability."

During the initial design phase of the Lakeview project, IPEX worked

with designers to introduce its Guardian<sup>™</sup> Vinyl double containment system. The Guardian system is comprised of 2" Xirtec<sup>®</sup>140 Schedule 80 PVC carrier pipe inside a 4" Xirtec140 Schedule 40 PVC containment pipe. To reduce system installation and maintenance costs, the Guardian system features a patented Centra-Lok<sup>™</sup> design that allows the system to be installed with full 20-foot lengths, while keeping the carrier pipe perfectly centered inside the containment piping. The system is also available in spool piece fabrications according to specific application designs.



"We chose the PVC Guardian double containment system because it offered the corrosion resistance we needed, and it was the most cost-effective option," says Petran. "IPEX also worked with us to find the most economical way to design the system with expansion joints to accommodate the seasonal temperature changes in the tunnels. We also liked the fact that IPEX provided a local technical sales representative to work closely with us and the contractor."

Maple Reinders Constructors Ltd. of Mississauga, ON did the Guardian system installation. Maple Reinders is an award winning contractor with offices located across Canada. Project Manager Lyndon Grovum of Maple Reinders coordinated onsite training by IPEX for piping installers to emphasize proper solvent welding and other installation procedures prior to the job.

Visual leak detection stations were created using clear PVC S40 pipes.

"The plant operation staff was concerned about detecting any leaks in the system. To provide extra peace of mind and a worry-free system, IPEX provided clear tubes at visible low points in the system where potential leaks would be noticed," says Petran. "These detection points are inspected on a regular basis. The system is working as intended—we have not experienced any leaks since the system was installed in 2009."



For more than 20 years, Guardian systems from IPEX have been the benchmark in double containment piping in North America. With all the corrosion resistance, performance and longevity benefits of Xirtec140 PVC, the Guardian Vinyl double containment system improves overall safety at the Lakeview WWTP, while ensuring reliable service to the surrounding community for the life of the system.

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**IPEX**  
by aliaxis

# IPEX Industrial Case Study

Water & Wastewater Treatment Applications

## IPEX Double Containment PVC System Protects Chemical Lines at North Toronto Wastewater Treatment Plant



Originally commissioned in 1929, the North Toronto Wastewater Treatment Plant is one of four wastewater treatment facilities operated by the City of Toronto. Located in the Don Valley, the plant currently serves a population of about 55,000. The facility operates at a rate of about 7.5 million gallons per day (mgd) with major treatment processes that include screening and grit removal, primary treatment, secondary treatment, phosphorus removal, effluent disinfection and dechlorination.

Before being discharged into the Don River, final effluent at the North Toronto plant is disinfected with sodium hypochlorite and dechlorinated with sodium bisulphate. The end result is a high-quality effluent that has consistently surpassed the requirements of the Ontario Ministry of the Environment (MOE). To ensure safety and reliability, the systems that transport the sodium hypochlorite and sodium bisulphate are double contained to prevent any possible leaks or spills.

**"We have confidence in the Guardian™ product, and IPEX has also been easy to work with. They were very involved, even coming onsite to provide product demonstration and training."**

**Buddhika Liyanage,**  
Resident Engineer with AECOM

"The Don River is a sensitive waterway and ecosystem, and the MOE has ordered all facilities in the area to use sodium bisulphate to bring chlorine down to safe levels," explains Umberto Lafarciola, Mechanical Foreman with Malfar Mechanical Inc., a Woodbridge, Ontario-based mechanical contractor that installed the piping on the project. "In the plant's containment area, piping from the pump stations delivers the disinfection and dechlorination chemicals, and we needed to use a double containment system due to the corrosive nature of the chemicals."

# IPEX Double Containment Systems

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- Available in schedule 40 and schedule 80 1/2"-12" carrier and 2"-18" containment sizes
- Patented Centra-Lok<sup>™</sup> Design – minimizing potential for failures and leaks and reducing installation and maintenance costs
- Easy to install



For the double containment system, the North Toronto plant used the Guardian<sup>™</sup> Vinyl double containment system from IPEX. The Guardian system is comprised mostly of 2" Xirtec<sup>®</sup>140 Schedule 80 PVC carrier pipe inside a 4" Xirtec140 Schedule 40 PVC containment pipe. Some portions of the system also used 1" Xirtec140 Schedule 80 PVC inside a 3" Xirtec140 Schedule 40 PVC. To reduce system installation and maintenance costs, the Guardian system features a patented Centra-Lok<sup>™</sup> design that allows the system to be installed with full 20-foot lengths, while keeping the carrier pipe perfectly centered inside the containment piping. The system is also available in spool piece fabrications according to specific application designs.



**IPEX double containment ball valves were used.**

"Guardian double containment was specified due to the corrosive nature of the sodium bisulphate. We believe that PVC provides excellent resistance to the chemicals," says Buddhika Liyanage, resident engineer with AECOM, a global provider of professional technical and management support services to environmental, energy, water and government facilities. "We have confidence in the Guardian product, and IPEX has also been easy to work with. They were very involved, even coming onsite to provide product demonstration and training."

Onsite training by IPEX was arranged for Malfar piping installers to emphasize proper solvent welding and other installation procedures prior to the job. "IPEX has always been responsive to our needs, and it gives me peace of mind to know that they will be there onsite when we need technical support and training," says Lafarciola. "For the North Toronto plant, the Guardian system performed perfectly. We haven't had any leaks or failures."

For more than 20 years, Guardian systems from IPEX have been the benchmark in double containment piping in North America. With all the corrosion resistance, performance and longevity benefits of Xirtec140 PVC, the Guardian Vinyl double containment system improves overall safety at the North Toronto Wastewater Treatment Plant, while ensuring reliable service to the surrounding community for the life of the system.