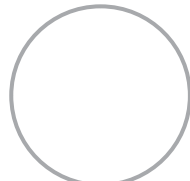


Corrugated Steel Pipe

Available in a variety of sizes, corrugation profiles, thicknesses and coatings to suit virtually any application.

PROFILES

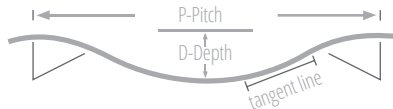


Round



Pipe Arch

CORRUGATIONS



13 mm (.5")



25 mm (1")



25 mm (1")



RECOMMENDED FOR

Culverts Drainage Systems Stormwater Systems
Fish Passages Conveyor Covers and Overcasts
Ventilation Systems Utilidor Systems Culvert Relines

Corrugated Steel Pipe (CSP) is the material of choice because it offers the optimum combination of strength, flexibility and performance.



It will not crack under impact loads or vibrations due to the inherent strength of steel and the flexibility of the corrugated pipe section. The high ring compression of the pipe absorbs and transfers the load to the surrounding soil around the entire circumference. The beam strength maintains the grade and line of the structure by bridging inequalities of the trench bottom and side fill.

These characteristics ensure that the conduit has a superior ability to maintain the hydraulic properties and capacity for which it was designed.

- Economical, strong, lightweight and easy to install
- Variety of sizes, thicknesses and materials
- Complete line of standard and specialized fittings and accessories
- Available in Round or Pipe Arch Profiles
- Can be used to reline existing systems
- Full engineering support and field service
- Manufactured to CSA Standard G401

Choose the right coating for the job.

Research shows that coated CSP can provide a service life of up to 100 years for a wide range of environments and applications. Ontario Agra offers three factory-applied finishes to accommodate the wide variety of performance and hydrology considerations: Galvanized, Aluminized Type 2, and Polymer- Laminated. Soil conditions and a variety of other site/application factors can influence the choice of CSP coatings. ^{7*} As recommended by the Corrugated Steel Pipe Institute, an environmental assessment will help to select the appropriate coating to meet your Design Service Life requirements. ^{7*}

Galvanized

Standard
Service Life

Z610 Galvanized steel is the standard finish for all CSP and performs well in low-abrasion conditions. This continuous galvanized coating is applied under strict quality control procedures to provide excellent bonding to the steel. Its hot-dip-zinc coating is reactive to water environments and is positively affected by higher levels of Calcium Carbonate CaCO_3 (hardness) in the water, which can actually increase service life as calcium is attracted to the galvanized surface and forms an additional protective mineral scale. Galvanized coatings have proven their performance through many years of field application. Many Canadian sites have relatively neutral conditions and the galvanized zinc coating is sufficient. An environmental assessment will help to confirm this.

Aluminized Type 2

75-Year
Service Life

For more corrosive environments, Aluminized Type 2 coating offers the superior corrosion resistance and surface characteristics of aluminum with the strength and economy of steel. In this process, a commercially pure aluminum coating is uniformly applied to both sides of the steel, forming a strong bond between the metals. A hard aluminum-iron alloy layer, just below the aluminum coating, provides further protection. Aluminized Type 2 CSP can provide a 75-year service life in a low-abrasion environment with pH between 5 and 9 and resistivity above 1,500 ohm-cm. CaCO_3 (hardness) levels do not affect service life.



Polymer-Laminated 100-Year + Service Life

Polymer Laminate is a tough, heavy-gauge film that is laminated to both sides of galvanized steel to produce a corrosion and abrasion barrier for the most aggressive environments.

A proven performer with excellent adhesion

Thick Polymer Laminate is engineered to bond chemically and physically to galvanized steel to become an integral part of the galvanized surface that resists delamination, even under harsh conditions. Experienced Polymer laminators have been coating galvanized steel for over 40 years to create CSP that outlasts and outperforms concrete pipe and other materials in test after test.

Resists abrasion and corrosion

Polymer-Laminated CSP will stand up to aggressive conditions with high concentrations of acids and alkalis to extend the environmental limits and life expectancies of where traditional galvanized CSP can be used. It performs well in both corrosive and moderate abrasion environments and provides a service life beyond 100 years, if pH is between 5 and 9 and resistivity is above 1500 ohm-cm. 2* Service life is not affected by the CaCO₃ (hardness) level of water.



Potential cost savings

Polymer-Laminated CSP can be less expensive across all diameters of concrete pipe. The exceptional durability of Polymer-Laminated CSP provides the potential for reduced lifecycle costs. Plus, CSP can be formed into longer nestable lengths that are substantially lighter than concrete, making it easier to transport and install.

1* For more information, refer to the Corrugated Steel Pipe Institute's Canadian Performance Guideline for Corrugated Steel Pipe Culverts:

http://cspi.ca/sites/default/files/download/cspiTECOne_109.pdf

2* Service life is reduced to 75 years for pH 4 to 9 and resistivity greater than 750 ohm-cm. In extreme conditions, with pH between 3 and 12 and resistivity above 250 ohm-cm, the service life is reduced to 50 years. 2008 The Dow Chemical Company.

Polymer-Laminated Steel: for the performance of a lifetime.

Even in some of the harshest conditions, Polymer- Laminated Corrugated Steel Products will consistently deliver outstanding design service life expectancies. The numbers say it all.*

Service life expectancies of Polymer Coating

Estimated Service Life ⁽³⁾	pH Levels	Resistivity
100 years	5 – 9	> 1500 ohm.cm
75 years	4 – 9	> 750 ohm.cm

⁽³⁾When installed as recommended.

Physical properties of Polymer Coating

Properties	Test Method	Value
Color	—	Black
Film Thickness, mm (minimum)	— ASTM D 1005	0.254
Yield Tensile Strength, N/mm ²	MD ASTM D 882	10.7
	TD	10.3
Ultimate Tensile Strength, N/mm ²	MD ASTM D 882	20.7
	TD	19.3
Ultimate Elongation, %	MD ASTM D 882	470
	TD	490
2% Secant Modulus, N/mm ²	MD ASTM D 882	160
	TD	165
Elmendorf Tear Strength, g	— ASTM D 1922	2800-3200

⁽⁴⁾Values are averages of typical film: not to be construed as specifications.

Physical and chemical resistance characteristics of Polymer Coating

Properties	Test Method	Value ⁽⁴⁾
Dielectric Strength, volts/mil	ASTM D 149	2200
Resistance to Acid, 10%, HCl	ASTM D 1308(5)	No Change
Resistance to Acid, 10%, HNO ₃	ASTM D 1308(5)	No Change
Resistance to Base, 10%, NH ₄ OH	ASTM D 1308(5)	No Change
Resistance to Base, 10%, NaOH	ASTM D 1308(5)	No Change
Resistance to Acid, 30%, H ₂ SO ₄	ASTM D 543, A 742	No Change
Resistance to Base, 10%, NaOH	ASTM D 543, A 742	No Change
Resistance to Salt, 10%, NaCl	ASTM D 543, A 742	No Change
Resistance to Chloroform(6) (trichloromethane)		No Change
Resistance to DMSO(6) (dimethylsulfoxide)		No Change
Resistance to Methylene Chloride(6) (dichloromethane)		No Change
Resistance to THF(6) (tetrahydrofuran)		No Change
Microbial Resistance	AASHTO M 246	No Attack
Adhesion, at 23°C (73°F)	ASTM D 903	Exceeds Tensile Strength of the Film
Imperviousness, 48 Hours Reagent Exposure	ASTM A 742	No Change
Resistance to Moist SO ₂ Attack, 40 cycles	Kesternich Method	No Attack
	DIN 50018.2.0L	or Adhesion Loss
Cleveland Condensing Humidity Cabinet, 6 Months Exposure at 54°C (130°F)	ASTM D 2247-68	No Attack
Weatherability, 3000 Hours	ASTM D 3361	or Adhesion Loss
Hardness, Shore D, 10 sec	ASTM D 2240	No Cracking or Delamination
		46

⁽⁴⁾ Values are averages of typical film: not to be construed as specifications.

⁽⁵⁾ Exposure to the coated surface for 1400 hours at 23°C (73°F).

⁽⁶⁾ Test method: ISO 175, 28 days exposure at room temperature.

*Chart data from The Dow Chemical Company 2008.

Aluminum Pipe

Superior corrosion/abrasion resistance for harsh environments.

Our Corrugated Aluminum Pipe products have a long history of proven performance with predictable service life expectancies of over 75 years when installed in the recommended soil/water environment. It features an aluminum alloy core clad on both sides with alloy 7072 which is anodic to the core alloy – protecting it both physically and electrochemically against corrosion and abrasion. This combination takes full advantage of the protective oxide film that re-forms immediately if the surface is scratched. Aluminum Corrugated Pipe is available in many of the same profiles, fittings and accessories as our Corrugated Steel Pipe.

Polymer Coating on Structural Steel Plate

Polymer Coating can be used on all or part of many types of plate structures to enhance their performance. The polymer coating is engineered to bond chemically and physically to the steel substrate to become an integral part of the plate surface and resist delamination, even under harsh conditions.

Dur-A-Span® Aluminum Structural Plate

An attractive alternative to coated steel, our corrosion/abrasion-resistant Dur- A-Span® solid aluminum alloy structural plate products are ideal for saltwater and softwater conditions. Dur-A-Span® is not affected by deicing agents that leech into waterways.