



A division of
WGI Westman Group Inc.



StrataCat

A polymer coating for structural
corrugated steel bridges and
tunnel liner.

Armtec is the first structural plate manufacturer to develop and introduce this unique solvent free, environmentally friendly, two coat polymer coating system for structural plate, deep corrugated structural plate and tunnel liner plate. Our research and development started in 2004 and continues today. Our ongoing testing program has allowed us to increase the specified coating performance of 1,000 hours to over 3,000 hours for salt spray testing to ASTM B117A.

Armtec Strata-CAT layered corrosion arresting technology coating is a unique two-coat system that provides two layers of protection. It is based on the industry standard ethylene acrylic acid (EAA), as used and approved for culvert systems. The base coat is a zinc-rich layer providing outstanding corrosion resistance while the top coat polymer layer provides superior resistance to impact, corrosion, abrasion and diluted inorganic acid or alkali.

The minimum thickness of the coating system is 20mils (10mils per side). The system is designed to provide a service life between 50 and 100 years, depending on environmental parameters. Armtec Strata-CAT is available for all steel thicknesses, and it coats the entire plate.

Economical

The polymer system extends the service life of storm sewer and culvert structures by providing a 10 mil minimum barrier between the structure and the environment

Durability

Ideal for product that is exposed to aggressive environmental conditions

Superior Corrosion and Abrasion Resistance

The system is bonded chemically to the substrate, preventing delamination and providing excellent corrosion resistance against diluted acids, salts and alkalis

Environmental Safety

Coating is inert

TYPICAL APPLICATIONS

- Culverts
- Underpasses
- Bridges



MINISTÈRE DES TRANSPORTS / MINISTRY TRANSPORTATION QUÉBEC (MTQ) - MULTI-PLATE PIPE-ARCH WITH STRATA-CAT COATING



FIRST POLYMER COATED STRUCTURAL PLATE SUPPLIED TO REGIONAL MUNICIPALITY OF CHATHAM-KENT, ON - MULTI-PLATE PIPE-ARCH WITH INVERT PLATES HOT-DIP GALVANIZED COATED WITH POLYMER, AND SIDE AND CROWN PLATES



FIRST POLYMER COATED STEEL BOX CULVERT SUPPLIED TO REGIONAL MUNICIPALITY OF CHATHAM-KENT, ON - BRIDGE-PLATE BOX CULVERT WITH SKEWED ENDS, HOT-DIP GALVANIZED CROWN PLATES AND RIBS, AND STRATA-CAT COATED SIDE PLATES AND RIBS

COATING PROCESS

The coating process took over five years of research and development by Armtec engineers. There are three general steps taken in the coating process:

- Plate preparation
- Application of zinc-rich layer
- Application of EAA polymer

Each step entails unique processes to ensure proper adhesion of each coating layer. Each plate is encapsulated in a layer of zinc-rich followed by the final EAA polymer coating.

Polymer Finish Layer

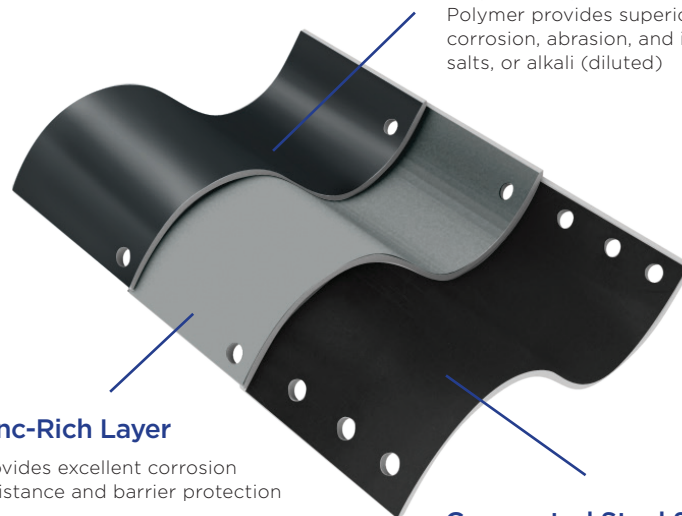
Ethylene Acrylic Acid (EAA) Polymer provides superior resistance to corrosion, abrasion, and inorganic acids, salts, or alkali (diluted)

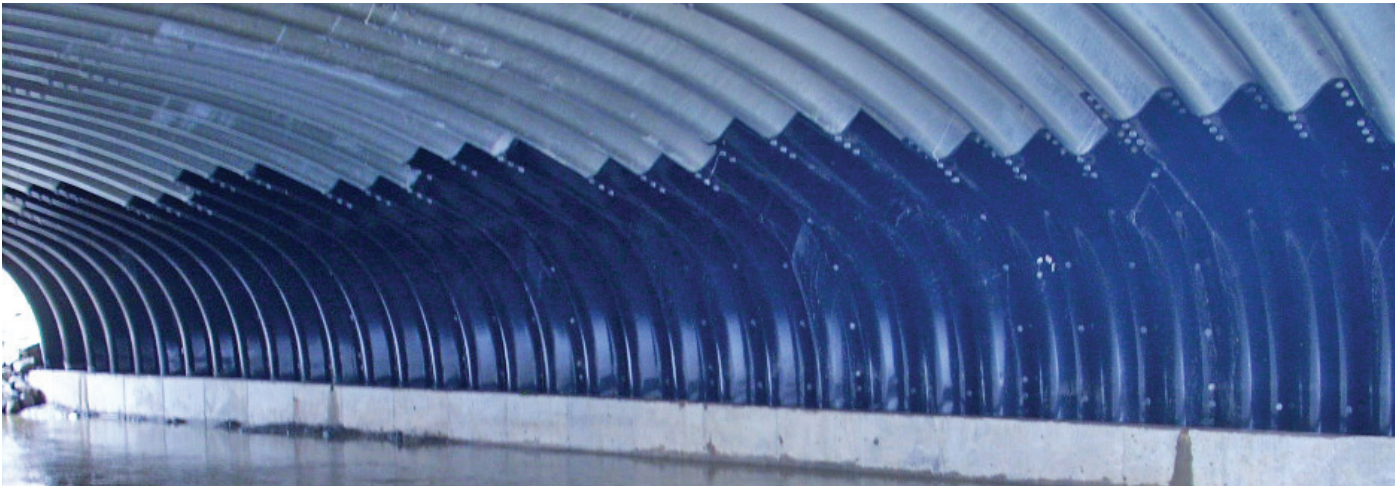
Zinc-Rich Layer

Provides excellent corrosion resistance and barrier protection

Corrugated Steel Structural Plate

Armtec Bridge-Plate, Multi-Plate or Tunnel Liner Plate





FIRST POLYMER COATED STRUCTURAL PLATE SUPPLIED TO MUNICIPALITY OF BLIND RIVER, ON - BRIDGE-PLATE BOX CULVERT WITH SIDE PLATES COATED WITH STRATA-CAT COATING AND CROWN PLATES HOT-DIP GALVANIZED



FIRST POLYMER COATED SUPPLIED TO MINISTÈRE DES TRANSPORTS / MINISTRY TRANSPORTATION QUÉBEC (MTQ) - MULTI-PLATE HORIZONTAL ELLIPSE WITH STRATA-CAT COATING



FIRST POLYMER COATED STRUCTURAL PLATE SUPPLIED TO MINISTRY OF TRANSPORTATION OF ONTARIO (MTO), HIGHWAY 401 - BRIDGE-PLATE ARCH WITH POLYMER COATING ON OUTSIDE OF ENDS

Environmental Limits for Galvanized Steel and Polymer Coated Plate Products

Environmental Parameter	Limits for Galvanized Steel	Limits for Polymer Coated Steel		
		50 Year EMSL	75 Year EMSL	100 Year EMSL
pH Preferred Range	5 - 9	3 - 12	4 - 9	5 - 9
Resistivity	2,000 - 8,000 ohm-cm	> 100 ohm-cm	> 750 ohm-cm	> 1,500 ohm-cm
Chlorides	< 250ppm	NA*	NA*	NA*
Sulfates	< 600ppm	NA*	NA*	NA*
Hardness	> 80ppm CaCO ₃	NA*	NA*	NA*

NOTE
*Resistivity is relative to total dissolved solids and therefore may indicate the presence of chlorides, sulfates, calcium and other ions.

SOURCE
CSPI Canadian Performance Guideline for Structural Plate Corrugated Steel Pipe and Deep Corrugated Structural Plate Structures

SALT SPRAY TEST - ASTM B117

A. Polymer System

At 4,000 hours this panel shows bleed out of the red rust at the scribe, but no signs of delamination

- ASTM D714-87 Rating = 10
- ASTM D1654-92 Rating = 10

B. Zinc-Rich Layer

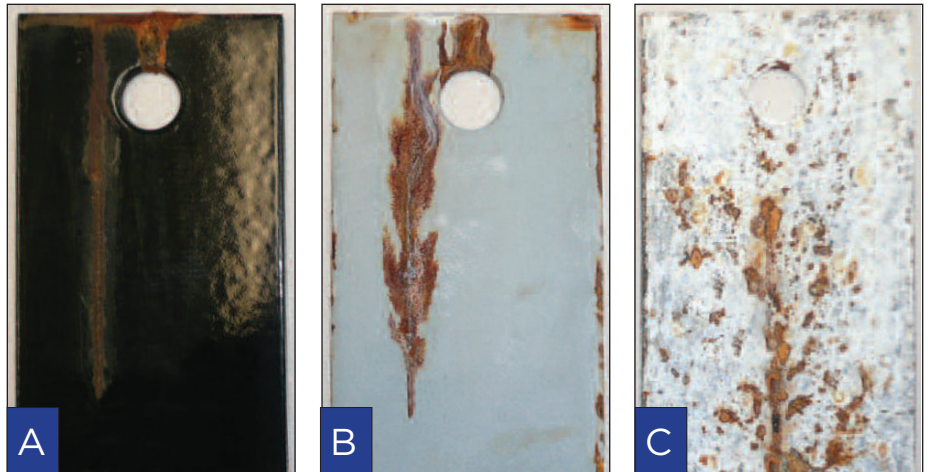
At 3,000 hours this panel shows bleed out of the red rust at the scribe, but no signs of delamination

- ASTM D714-87 Rating = 10
- ASTM D1654-92 Rating = 10

C. Hot-Dip Galvanized Only

At 3,000 hours this panel shows considerable red rust, blistering and delamination of 16mm+

- ASTM D714-87 Rating = 2
- ASTM D1654-92 Rating = 0



QUALITY CONTROL

Warner Custom Coatings

Armtec has worked for over 5 years with Warner Custom Coatings to develop and test this polymer coating process. WCC has an impressive list of qualifications, making them an ideal partner for this task, including:

- ISO 9001: 2000 certified since 1999
- Meticulous quality control parameters and continual process monitoring
- An ability to meet 'on-time' delivery requirements while supplying defect-free product conforming to the customer's specifications
- Coating capabilities, speed and efficiencies that are virtually second to none
- A strong understanding of the metal finisher's role in the supply chain
- The ongoing ability to meet and exceed expectations as a supplier
- An ongoing and extensive investment in technology



FIRST POLYMER COATED TUNNER LINER PLATE SUPPLIED TO REGIONAL MUNICIPALITY OF CHATHAM-KENT, ON - TUNNEL LINER PLATE PIPE-ARCH RELINE PROJECT WITH STRATA-CAT COATING

SPECIFICATIONS

1.0 Polymer Coating System

When specified for structural plate and tunnel liner plate applications, the polymer coating system shall consist of two layers of protection:

- The first layer shall be zinc-rich;
- The second layer shall be ethylene acrylic acid (EAA) polymer

1.1 Design Life

Structural plates with the polymer coating system have an estimated service life between 50 and 100 years.

1.2 Electrochemical Limits

The coating system shall only be used in applications that fall within the limits listed in Table 1.

1.3 Zinc-Rich Layer

1.3.1 Thickness

The zinc-rich layer shall have an average thickness exceeding 1.5 mils minimum per side.

1.3.2 Testing Requirements

The zinc-rich coating shall meet the requirements listed in Table 2.

1.4. Polymer Layer

1.4.1 Thickness

The polymer layer shall have an average thickness of not less than 10mils per side.

1.4.2 Physical Properties

The physical properties of the polymer shall conform or exceed the results listed in table 3.

1.4.3 Performance Requirements

The polymer coated steel shall meet or exceed the requirements listed in table 4.

Table 1 - Recommended Electrochemical Limits

Environmental Parameter	Limits for Polymer Coated Steel		
	50 Year EMSL	75 Year EMSL	100 Year EMSL
pH Preferred Range	3 - 12	4 - 9	5 - 9
Resistivity	> 100 ohm-cm	> 750 ohm-cm	> 1,500 ohm-cm
Chlorides	NA*	NA*	NA*
Sulfates	NA*	NA*	NA*
Hardness	NA*	NA*	NA*

NOTE

*Resistivity is relative to total dissolved solids and therefore may indicate the presence of chlorides, sulfates, calcium and other ions.

SOURCE

CSPI Canadian Performance Guideline for Structural Plate Corrugated Steel Pipe and Deep Corrugated Structural Plate Structures

Table 2 - Zinc Layer Testing Requirements

Property	Test Method	Minimum Results
Flexibility	ASTM D 523 - Method B	1/8" mandrel
Taber Abrasion - CS-10 wheel, 1000g load, 1000 cycles	ASTM D 4060	< 60mg loss
Impact Resistance - Direct	ASTM D 2794 - 5/8" Indenter	160in-lbs
Impact Resistance - Reverse	ASTM D 2794 - 5/8" Indenter	160in-lbs
Pencil Hardness - Mar	ASTM D 3363	H-2H
Pencil Hardness - Gouge	ASTM D 3363	4H-5H
Crosshatch Adhesion - 2mm cuts	ASTM D 3359 - Method B	5B
Humidity Resistance - Un-scribed	ASTM D 2247	5,000 hours
Salt Spray Resistance - Vertical scribe 1/8" undercut	ASTM B 117	3,000 hours

Table 3 - Physical Properties of Polymer Coating

Property	Result
Chemistry	Thermal plastic EAA copolymer
Colour	Black
60° gloss	50+
Peak melting point	92.8°C
Maximum service temperature	93.9°C
Thermal expansion	160 10 ⁻⁶ mm/mm/°C
Tensile yield	8 mPa
Tensile strength	20 mPa
Elongation - %	610
Shore D hardness	54
Tensile impact	550 kj/m ²



ABOVE AND RIGHT: RAILWAY BRIDGE REHABILITATION - CAPE BRETON NS
TUNNEL LINER PLATE WITH STRATA-CAT COATED SIDE PLATES

SPECIFICATIONS (CONTINUED)

1.5. Application

1.5.1. Coating Applicator

The coating applicator shall pass testing by, and be approved by, Market Tech Coatings Canada. The applicator must demonstrate that their equipment and coating process (plate preparation and coating application) are capable of properly conditioning the steel substrate, and applying and bonding the zinc-rich coating to the steel and the EAA coating to the zinc-rich layer.

1.5.2. Zinc-Rich Coating Material

The zinc-rich coating (grey colour) material shall be supplied by Market Tech Coatings Canada. The zinc-rich coating shall meet or exceed the performance requirements listed in Section 1.3.

1.5.3. Polymer Coating Material

The polymer coating material shall be Envelon Ethylene Acrylic Acid (EAA) (black colour) as supplied by Market Tech Coatings Canada. The polymer coating physical properties shall conform to or exceed the results listed in Section 1.4.3.

1.5.4. Structural Plate Preparation

Prior to application of the coating system, the plates shall be thoroughly cleaned and prepared for optimal adhesion.

1.5.5. Zinc-Rich Layer

The zinc-rich coating shall be applied to all sides and edges of the plates so as to meet the minimum thickness requirement specified in Section 1.3.1.

1.5.6. Polymer Layer

The polymer coating shall be applied to both sides and edges of the plates so as to meet the minimum thickness requirement specified in Section 1.4.3.

1.6. Repair Procedures

1.6.1. Zinc-Rich Layer

Damage to the zinc-rich layer shall be repaired in accordance with CAN/CSA G401, before repair of the polymer coating.

1.6.2. Polymer Layer

Damage to the polymer layer shall be repaired as per the manufacturer's recommended method.

1.7. Manufacturer Performance

1.7.1. Installation Performance

The Manufacturer shall provide a list of installed structures with the polymer coating system. The list shall include a minimum of 20 structures installed with this unique coating system (zinc-rich base and EAA top coat).

1.8. Quality Control

The coating applicator shall be ISO 9000:2008 certified.

EAA coating applied to a Hot-Dip Galvanized substrate surface is not acceptable

Table 4 - Polymer Coated Steel Performance Requirement

Property	ASTM Standard	Test Method or Condition	Requirement
Adhesion	D3359	X cut, method A elocmeter 99 tape	Pass 5A rating
	D4541	pull adhesion - glue failure	At 9 mPa
Chemical resistance	D1308, 24h	chloroform	No change
		methylene	No change
		tetrahydrofuran (THF)	No change
Acid Resistance	D543 60T 2160h	hydrochloric acid 35%	No change
		nitric acid 5%	No change
Bases Resistance	D543 60T 2160h	aluminum hydroxide	No change
		sodium hydroxide 50%	No change
Imperviousness	D543 60T 2160h	sulphuric acid 50%	No change
		sodium hydroxide 50%	No change
		sodium chloride saturated	No change
Freeze thaw resistance	A742/A742M	24h cycles, 100 cycles	No spalling, disbonding, or detrimental effects
Holidays test	A742/A742M	G62, method A	No holidays present
Humidity	D2247	X scribe, air blow off, 4500h	Blister rating 10 Undercut rating 10
		un-scribed, 5000h	Blister rating 10
Impact	A742/A742M	4.0 J impact on a 15.88mm punch	Ambient: No evidence of cracking
			-40°C - No evidence of cracking
Microbial attack	A742/A742M	G22, procedure B	No visible effect of bacterial attack
Salt Spray	B117	X scribe, air blow off, 4000h	Blister rating 10 Undercut rating 10
		X routed, air brush off, 4000h	Corrosion only in routed X with no peel back at X
		X scribe, air blow off, 7700h	Max 2.0mm creepage
Thickness of coating	A742/A742M	D1005	Minimum 10mils or 250µm per side
Weatherability	ASTM A742/A742M	G23	No cracking, delamination, dulling, or blistering

Find out how **StrataCat** can be used on your next drainage project.



Armtec is a leading national manufacturer of a comprehensive range of infrastructure products and engineered construction solutions for customers in a diverse cross-section of industries. With operations coast to coast, we are a trusted partner for transportation, public works, forestry, oil and gas, and mining operations throughout the country and abroad. Since 1908 our commitment to quality, customer service and innovation has set the benchmark in the Canadian drainage and bridge landscape.

Call **1-800-565-1152** or visit armtec.com