

METRO ROD

COATINGS

- Waterproofs
- Strengthens
- Protects



100% solids structural epoxy coating system for

- Manholes
- Bund Lining
- Chambers
- Tunnels
- Tanking
- Pumping Stations



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EMERGENCY
24
HOUR
RESPONSE

Introduction

Metro Rod, in partnership with Source One Environmental, has established a new Coatings Division to provide a much needed rehabilitation solution for the assets of our clients. The specialist Coatings Division will apply Ultracoat, a unique, hard-wearing, chemically-resistant epoxy coating system.

Ultracoat has been independently proven as a highly chemically resistant structural coating with over 25 years use on 50,000 projects worldwide with a 100% success rate!

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Ultracoat in brief

Ultracoat is a waterproof and chemical resistant 100% solids structural epoxy coating system for the rehabilitation, repair and permanent protection of a range of structures.

- Bunds
- Tanking
- Manholes
- Reservoirs
- Pipelines
- Tunnels
- Pumping Chambers
- And Many More

The system can be used for the rehabilitation of virtually any substrate including concrete, brick, stone, GRP, metals, most plastics and even timber. It is ideal for use on any substrate which has experienced corrosion or is at risk from corrosion.

Ultracoat has been used successfully throughout the world for over 20 years, providing protective coatings and extending the life of a vast number of structures in a wide range of industries.

Key Properties of standard Ultracoat epoxy - S301-14

Liquid Properties

- Viscosity = 90,000 to 120,000 cps
- Thixotropic index = 5.0 to 6.0
- Allows 6mm on a vertical surface
- Set time 25°C = 2hrs 4.4°C = 8hrs
- Tensile strength = 7,000 psi

Solid Properties

- Compressive strength (ASTM D695-85) = 83 MPa (12,000 psi/827 bar)
- Permeability (water vapour transmission) = 1.5×10^{-6} g/m²/day
- Tensile Elongation at break = 4.8%
- Shore Durometer Hardness = 83-85
- Flexural Modulus at 3mm (ASTM D790-86) = 34,474 bar (500,000 psi)
- Adhesive strength = 600 psi

Different Types of Ultracoat Epoxy are available...

- NSF Approved - certified to NSF-61 (for use with potable water)
- Flame Resistant Class A rated - tested to ASTM E-84-98a
- Hand applied - for local repairs
- Flexible resins



Why use Ultracoat?

Reasons to choose Ultracoat for your project...

- 100% solids epoxy coating system - solvent free
- No VOCs - therefore safe for confined spaces
- Highly chemical resistant (pH 2-14), see page 10
- Excellent adhesion to damp substrates
- Structurally reinforcing
- Up to a 10mm thick coating in a single application
- Reduced overspray compared with other systems
- Fast application, with no primer coat
- Only applied by our licensed applicators in partnership with Source One Environmental
- 50,000+ projects to date – no failures
- A range of coatings is available, to suit specialist applications
- Up to a 50 year design life - project specific warranties available

Ultracoat is proven as a highly chemical resistant coating with over twenty years use on over 50,000 projects - and zero failures. A range of independent test reports are available on request.

Up to a
50 year
design life -
project specific
warranties
available

Provides excellent adhesion to damp substrates

Exceptional resistance to pH 2-14 - as shown on this immersion test



Ultracoat for pipelines

The same Ultracoat advanced epoxy resin can now be used for the permanent protection of pipelines. This can be applied as a non-structural coating or as part of a CIPP system.

Patented spray system for pipelines
NOW AVAILABLE

- Ideal for all pipe materials, except PP and PE
- For repair of up to 200 metres in a single pass
- Suitable for 150 -1200mm pipe diameter
- A superior bonding to host pipe, compared with traditional CIPP systems
- A fast cure time, with no primer required
- Application applied, avoiding the need to reopen connections

Used successfully on hundreds of kilometres of pipelines throughout the world, this pipeline rehabilitation system has been tested for flexural modulus of elasticity, flexural strength, water impermeability and abrasion resistance.

In comparison to traditional CIPP systems the cure time is reduced; this means projects can be completed more quickly, with less disruption.



Rehabilitation of a GRP pipe used as part of an air-conditioning system

General installation procedure

Step 1 Preparation

As with all coatings, proper surface preparation is essential to ensure effective adhesion. In terms of efficiency, Ultracoat is an ideal system as no primer is required. It also has excellent bonding to damp substrates.

With correct surface preparation, Ultracoat has outstanding adhesion to all surfaces with the exception of polyethylenes and polypropylenes.

Surface preparation is simple: clean and abrade the surface, remove previous coatings and any oil and grease and remove any algae growth.

Step 2 Application

Ultracoat is delivered via a patented plural component spray system, which mixes the resin and disperses it through an airless spray hose.

A standard kit can deliver the material up to 100 metres away from the vehicle housing the delivery system. Greater distances can be accommodated with other kit options.

Coating thickness recommendations depend on the service environment and the condition of the substrate to be coated. In general, a thickness of between 3mm and 6mm should be applied in a single coat. Exact specifications are subject to customer requirements and a site inspection.

Ultracoat epoxies are only applied by trained technicians, who have completed our training programme and are licensed and independently audited.

For application procedure for pipelines please contact Metro Rod Coatings.

Coating of a tunnel at a composting facility NB: due to Ultracoat being free of VOCs, no breathing apparatus is required

Saturation blasting a concrete pumping chamber



General installation procedure

Step 3 Curing

Ultracoat is an epoxy system, therefore the ambient temperature and the temperature of the surface to which it is applied greatly affect curing time. The higher the temperature, the faster the coating will cure.

Being exothermic, the thickness of the epoxy should also be considered – thicker coatings will cure more quickly.

For many general uses, the asset can be returned to service after the material has set (usually 2-4 hours). However, for more aggressive chemicals, a 24 hour cure time may be necessary. Please contact Metro Rod Coatings for more details.

An applicator truck, which contains the patented Ultracoat delivery system



Step 4 Inspection

After the coating has set (usually 2-4 hours), it is recommended that thickness tests and holiday detection (checking for breaks and pinholes) are performed.

Small imperfections can be corrected by hand-applying Ultracoat to the affected area.

A bond strength test, performed to EN1542/ASTM D 4541, is recommended 24 hours after applying the coating. Independent tests by IKT (Institute for Underground Infrastructure based in Germany), the American Navy and others, concluded that the average bond strength to concrete is 250-300 psi.

In a hydrostatic pressure test carried out by Watkins Haggart structural engineering lab, the epoxy withstood over 400 psi/27.6 bar.

Ultracoat has been subjected to many independent tests. Please see page11 for more information.

A spark test of an Ultracoat project, to verify a break and pinhole free coating



Successful projects

Developed in the early 1990s, Ultracoat has been used in over 50 000 projects worldwide - without a single failure



Wet well, pumping station, UK

Manholes - Replacement vs Rehabilitation

A leading utility company recently paid £8,029.09 to replace a manhole of 1.2 m dia and 2.5 m depth. A further £3,300 was paid to close one lane of a carriageway for three nights.



A similar manhole was rehabilitated using a spray epoxy system. A standard 3mm thick coating cost £2,100, with a 3hr project time and a Highway cost of £1,100 .



£11,329.09 vs £3,200

Culverts, Tunnels and Pipelines

55%
increase in
flow rate after
coating



Flume, hydroelectric power station, Tasmania



Composting facility air corridor, UK



Power plant pipeline, USA



New York aqueduct



Underground reservoir, UK



Pipeline fittings, Holland

Successful projects

Digesters

Increased use of covers on digesters for odour control and CHP systems has naturally led to increased levels of H_2S resulting in greater concentration of H_2SO_4 attacking the concrete.

In turn, this has led to a greater requirement for concrete protection above the sludge level.

Ultracoat has excellent proven resistance to this corrosive acid and can add 50 years to asset life.



Digester, UK water treatment works

Bunds

As a result of tougher legislation, such as the Oil Storage Regulations 2001, Ultracoat was selected as the coating system of choice by a major utility company

The main reasons quoted by the customer were the speed of application, the 50 year expected life span, the ability to spray in all weather conditions and the adherence to all substrates.



Diesel cooler bunds, power supply company, UK

Diesel cooler bund, major power supply company, UK



Chemical resistance properties

Organic compounds

● Acetone	-	● Acetic acid (96%)	++	● Methylene chloride	-
● Aniline	++	● Ethyl acetate	+	● Lactic acid (90%)	++
● ASTM Fuel A	++	● Ethylene carbonate	++	● Motor oil	++
● ASTM Fuel B	++	● Fluorohydrocarbon	++	● Perchloroethylene	+
● ASTM Fuel C	++	● Furfural	++	● Petroleum ether	++
● Normal gasoline	++	● Furfuryl alcohol	++	● Phenol	+
● Super gasoline	++	● Glutaraldehyde	++	● Propylene carbonate	++
● Benzene	++	● Glycol	++	● Lubricating greases	++
● Benzyl benzoate	++	● Glyoxal	++	● Dashpot oil	++
● Butyl acetate	+	● Hydraulic oil	++	● Styrene	++
● Cyclohexanol	++	● Fuel oil	++	● Table oil	++
● Cyclohexanone	++	● Isooctane	++	● Carbon tetrachloride	++
● Dibutyl phthalate	++	● Isopropyl alcohol	++	● Tetrahydrofurane	-
● Diesel oil	++	● Kerosene	++	● Toluene	++
● Dimethyl formamide	-	● Linseed oil	++	● Trichloroethylene	+
● Dioctyl phthalate	++	● Methanol	+		
● Acetic acid (10%)	++	● Methyl ethyl ketone	+		

Inorganic compounds

● Calcium chloride (up to 50%)	++
● 10% caustic potash solution	++
● Sea water	++
● Sodium chloride (up to 30%, aqueous)	++
● Sodium hydroxide solution (up to 40%)	++
● Phosphoric acid (up to 10 %)	++
● Nitric acid (up to 40%)	-
● Hydrochloric acid (up to 40%)	++
● Sulphuric acid (up to 40%)	++
● Water (drinking water)	++
● Water (distilled water)	++

Legend

++ resistant
 + partly resistant
 - no long-term resistance
 Resistance to Municipal Sewage: -
 pH 2 to 14

Thoroughly tested, independently evaluated

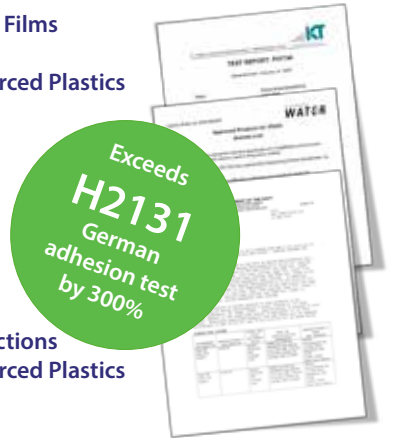
- EN 1770 Thermal Expansion
- EN 5470-1 Abrasion Resistance
- EN 1062-6 CO₂ Permeability
- EN 7783 Water Vapour Permeability
- EN 1062-6 Capillary Water Absorption and Permeability
- EN 6272-1 Impact Resistance
- EN 1542 Pull-off Test (To Evaluate Adhesion)
- EN 13578 Adhesion on Damp Concrete
- EN 53505 Shore Hardness
- EN 527-2 Tensile Strength and Elongation at Break
- EN 1062-1 Crack Bridging Capacity
- EN 12617-1 Shrinkage
- EN 2812-1 Chemical Resistance to H₂SO₄ at 70%
- EN 1504-2 Protection and Repair of Concrete Structures
- D2584 Volatile Matter Content
- D4414 Wet Film Thickness by Notch Gauges
- D4541 Pull-off Strength of Coatings Using a Portable Adhesion Tester
- D4541 Concrete Failure Chemical Resistance to: Sulphuric Acid, 70%
- D543 Resistance of Plastics to Chemical Reagents
- D543 Water Vapour Transmission of Organic Coating Films
- D543 Immersion Service
- D638 Flexural Properties of Unreinforced and Reinforced Plastics
- ASTM C297 Tensile Strength
- ASTM D2240 Durometer Hardness
- ASTM D638 Tensile Properties of Plastics
- ASTM D638 Flexural Strength
- ASTM D638 Tensile Elongation
- ASTM D638 Tensile Strength
- ASTM D695 Compressive Properties of Rigid Plastics
- ASTM D695 Compressive Strength
- ASTM D695 Flatwise Tensile Strength of Sandwich Constructions
- ASTM D790 Flexural Properties of Unreinforced and Reinforced Plastics
- ASTM D790 Bond Strength – Concrete
- ASTM D790 Flexural Modulus
- ASTM D790 Flexural Strength
- ASTM E84 Surface Burning Characteristics of Building Materials



Testing Ultracoat's tensile strength



Immersion to test pH tolerance





Other services from Metro Rod

- Emergency Pipe and Drain Clearance
- Closed Circuit Television Surveys
- Electro-Mechanical Clearing
- Drain Lining and Rehabilitation
- High Pressure Water Jetting
- Drain Excavation & Repair
- Drainage surveys
- Pre-Planned Maintenance

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