

Oil, Gas and Chemical Protection Systems

Asset protection in extreme environments

EpiMax 222

EpiMax 222AR

EpiMax 330

EpiMax 333AR

EpiMax 465

EpiMax 480

EpiMax 480UT

EpiMax 655AR

FlueGard 225-SQC



EpiMax



What needs to be considered in the selection of a concrete protection system for Extreme Environments?

- **Background**

Unprotected steel can deteriorate rapidly in many natural environments.

The corrosion of structural steel is an electrochemical process that requires the simultaneous presence of moisture and oxygen. Essentially, the iron in the steel is oxidised to produce rust, which occupies approximately six times the volume of the original material.

Corrosion of storage tank side and floors is one of the most critical problems worldwide in oil and gas industry. Corrosion rates can vary from 0.05 to 3.0 mm per year.

Crude oils contain water, as well as different water soluble inorganic and organic compounds. During the storage and transportation of crude oil, the aqueous solutions settle to the floor of the tanks.

- **Design life - budget compliance**

The first important question to ask when selecting a new protection system is - What is the required design life - 2, 5, 10 or 20 years? And, is frequent or regular maintenance feasible?

This environment requires careful consideration. If nothing is done, corrosion will cost in terms of maintenance, down time, and efficiency.

If the wrong solution is chosen, it will again cost in maintenance, down time, and efficiency.

The specification must meet the agreed design life and the intended maintenance-free period.

- **Management of surface preparation during application**

This is the basic foundation of any protection system. Preparation process must be effective and consistent. Inadequate surface preparation is a leading cause of premature failure.

- **Inherent chemical resistance requirement**

The particular chemical environment needs to be identified and understood. Steel and concrete are widely used engineering materials. However whilst strong in certain mechanical aspects, unprotected, they are extremely susceptible to a wide variety of chemical attack.

The specification for any protection system must address the specific chemical resistance requirements.

EpiMax offers a range of protection systems engineered for specific project requirements.

- **Abrasion resistance**

The specification for any protection system must address the abrasion performance requirements including impact and abrasion resistance.

Any protection system applied must exhibit excellent adhesion and have a bond strength that is maintained over the life of the system.

- **Thermal resistance**

The specification for any protection system must address the thermal performance requirements including impact and abrasion resistance.

Any protection system applied must exhibit excellent adhesion and have a bond strength that is maintained over the life of the system.

- **Practical application characteristics**

The particular needs of the structure including the practical aspects of access and application are important considerations in any project.

EpiMax supplies protection systems that can be applied by spray or roller in thicknesses of 150 - 3000 microns per pass. Trowel applied systems can achieve 75 mm thickness.





Corrosion in refinery operations has been, and still is, the subject of many studies, papers, courses and web forums. Although a lot of what has been written shows that significant progress in understanding corrosion has been made, it also makes it clear that the problem continues to exist and that quite possibly is getting worse.

It is estimated that the global costs of refinery corrosion are in the order of 15 billion USD annually. Getting more exact numbers is not possible as refineries do not make available the extent of their corrosion problems, which is understandable considering the ever increasing environmental legislation they face. It is worth mentioning that in these costs, profit losses and loss of production uptime have not been taken into account. An analysis report by NACE International states that in the USA alone annual profit losses due to refinery corrosion may be as high as 12 billion USD.

EpiMax is your source for the latest proven developments in performance protection systems. This is all we do. Our systems build on break-through technologies (extreme chemically resistant third generation epoxy novolac chemistry, high performance water based chemistry, new polyaspartic chemistry).

At EpiMax we pride ourselves in the chemical technology of the systems we offer, the knowledge value involved in their use and our overall responsiveness.

EpiMax has built its reputation on a construction engineering foundation. Our experience has been forged on an impressive variety of civil, environmental, industrial, mining, defence and general services construction.

This success has been proven through partnerships with forward-thinking architects, consultants, engineers, application contractors, project managers and materials testing agencies. We believe in teamwork, respect and integrity.

Our primary focus is

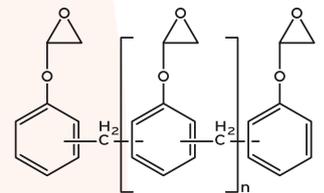
- Floor Protection Systems
- Industrial Concrete Protection Systems
- Green Star Protection Systems
- Water and Wastewater Processing Protection Systems
- Foundation Protection Systems
- Extreme CAT (Corrosion, Abrasion and Thermal) Protection Systems

EpiMax: Expertise Applied, Answers Delivered

What makes EpiMax 333AR different?

Epoxy functionality, cross-linking ability and application viscosity

Epoxy Type	Typical Functionality*	Relative Viscosity**
Bisphenol A	1.9	Medium
Bisphenol F	2.1	Low
Epoxy phenol novolac	2.6 - 3.5	High
EpiMax 333AR	>2.6	Low



* Typical Functionality = number of epoxy groups per molecule
= indication of ultimate cross-linking density = indication of chemical resistance

** Relative Viscosity = ease of field usage. Note: EpiMax 333AR is solvent - free

Applications

- Gasoline storage tanks
- Crude storage tanks
- Product storage tanks
- Chemical containment
- Jetty and wharf structures
- Process product storage tanks
- Distillation columns and splitters
- Pipe racks
- Fin fan coolers
- Heat exchangers
- Process vessels
- Desalter
- Pumps and compressors

Concrete Resurfacing EpiMax 222

Exceptional two-pack solventless epoxy resurfacing system demonstrating excellent adhesion and general durability.

- Trowel application to 5+ mm
- Resistant to a wide range of industrial chemicals
- Tough and abrasion-resistant; excellent for heavy traffic
- Certified traction levels available
- Ideal for maintenance workshops and processing areas

EpiMax 222AR

A two-pack solventless epoxy resurfacing system demonstrating excellent acid resistance and mechanical durability.

- Trowel application to 5+ mm
- Resistant to splashes and spills of mineral acids etc
- Selected for harsh industrial and mining applications
- Certified traction levels available
- Non flammable application

EpiMax 465

This system offers excellent thermal shock resistance and resistance to abrasion, mechanical stress and mid range chemical action. Installation is fast and placement is easy.

- Typically applied at between 4 - 5 mm
- Fast application - minimal downtime
- Extreme mechanical performance
- Excellent thermal shock resistance
- Good chemical resistance

Steel Protection EpiMax 330

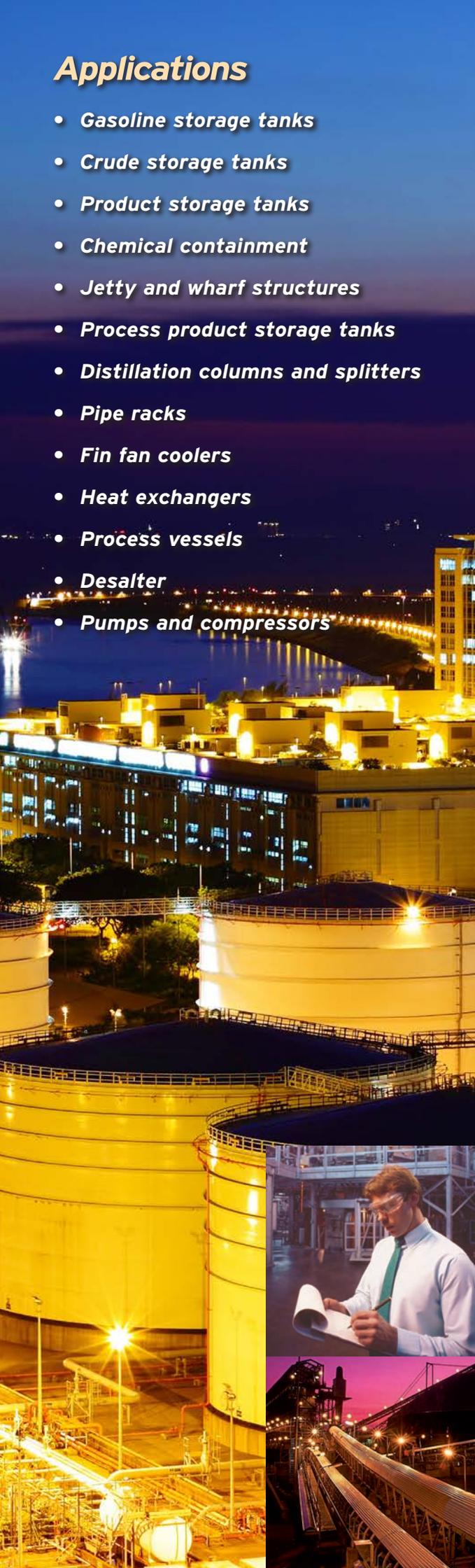
New two-pack solventless high build epoxy protection system demonstrating excellent adhesion and general durability.

- Roller or airless spray application to 500 microns
- Resistant to a wide range of industrial chemicals
- High abrasion resistance
- Variable slip resistance available
- Wide range of colours
- Express grade available

EpiMax 333AR

A two-pack solvent free novolac coating system demonstrating outstanding chemical resistance and adhesion.

- Roller or airless spray application to 300 microns in two coats
- Highly resistant to splashes and spills of mineral acids etc
- Selected for harsh industrial and mining applications
- Variable slip resistance available in flooring applications
- Potable water approved





EpiMax 655AR

A two-pack solventless epoxy coating system specially formulated and proven for UHB (ultra high build) application to all forms of concrete structures.

- Fast, airless spray, single coat application to 3000 microns on vertical surfaces
- Resistant to a wide range of industrial chemicals
- Selected for harsh industrial and mining applications
- Modified with high performance ceramic for enhanced abrasion resistance
- Used for high strength resurfacing projects



FlueGard 225-SQC

Exceptional two-pack polymeric alloy systems for corrosive, abrasive environments at high temperature.

- Airless spray application to 500 microns per coat
- Resistant to HCl, SO₃, SO₂, CO₂ and NO_x
- Ultra hard - highest abrasion resistance
- Excellent performance to 225°C
- Ideal for concrete and steel in hot, corrosive environments

Foundation Protection

EpiMax 480

Precision high strength fast cure non-shrink epoxy based grouting system offering ease of field use. Excellent resistance to vibration and chemicals. Tolerates damp surface application.

- Excellent flow into fine voids - fast and convenient
- Good strength gain
- High mechanical strength
- Dynamic load resistant; creep resistant
- Withstands wide range of chemicals



EpiMax 480UT

Precision high strength ultra long life epoxy based grouting system offering ease of field use. Excellent resistance to vibration and chemicals. Tolerates damp surface application.

- Excellent flow into fine voids - five hour work time
- Suitable for deep pours
- High mechanical strength
- Dynamic load resistant; creep resistant
- Withstands wide range of chemicals



Steel Surface Preparation the key to coating performance

The single most important function that can influence paint performance is the quality of surface preparation. For optimum service life, the surface must be completely free of all contaminants that might impair performance and should be protected to ensure sound adhesion.

What are the broad objectives of steel surface preparation?

- Remove contaminants on the steel surface that may cause initiation or continuation of the oxidation (rusting) process, and prevent adhesion.
- Effectively increase the surface area to maximise the adhesion capacity.

Why is blast cleaning the preferred method of preparation?

Abrasive blast cleaning is the most effective method of cleaning steel surfaces prior to coating. It is mandatory for certain specialized applications such as water immersion and high temperature exposure. It is recommended for removal of mill scale, heavy rust scale, and previous coatings from large areas. Careful selection of equipment, nozzles, and abrasives is essential for economical operation and achievement of the desired results.

In summary, abrasive blast cleaning can provide a consistent surface preparation result more easily than hand tool cleaning or power tool cleaning.

Description	Brush Blast	Commercial Blast	Near White Blast	White Blast
Australian	AS1627.4 Class 1	AS1627.4 Class 2	AS1627.4 Class 2.5	AS1627.4 Class 3
NACE	NACE 4	NACE 3	NACE 2	NACE 1
SSPC	SSPC - SP 7	SSPC - SP 6	SSPC - SP 10	SSPC - SP 5
Swedish Standard	Sa1	Sa2	Sa2 - 1/2	Sa3

What is flash rusting?

Flash rusting is corrosion of the recently prepared steel surface caused when water molecules contact the surface. This rust can appear quickly and can interfere with the adhesion of subsequent coatings.

Accepted steel surface preparation practice is to ensure that the dew point, air temperature, relative humidity and surface temperature are suitable for blasting. Dew point is the temperature at which moisture condenses on a surface. If the dew point is 10°C, condensation will occur if the metal is at or below this temperature. As a general rule, final blast cleaning should take place only when the surface is at least 3°C above the dew point.

However, the prepared surface is susceptible to flash rust formation if left unprotected for a time. EpiMax 230 has excellent penetrating properties and provides a means to effectively seal the prepared steel surface before rusting can take place.

After curing, EpiMax 230 offers excellent intercoat adhesion to subsequent EpiMax top coats if kept clean and uncontaminated.



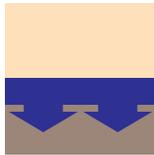
Environmentally sustainable



Resistance to abrasion and impact



Durable



High adhesion



Resistance to chemicals



Resistance to temperature



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