

ECOCLEAR AEGIS

Graphene Reinforced
Anti-Corrosion Clear Coat



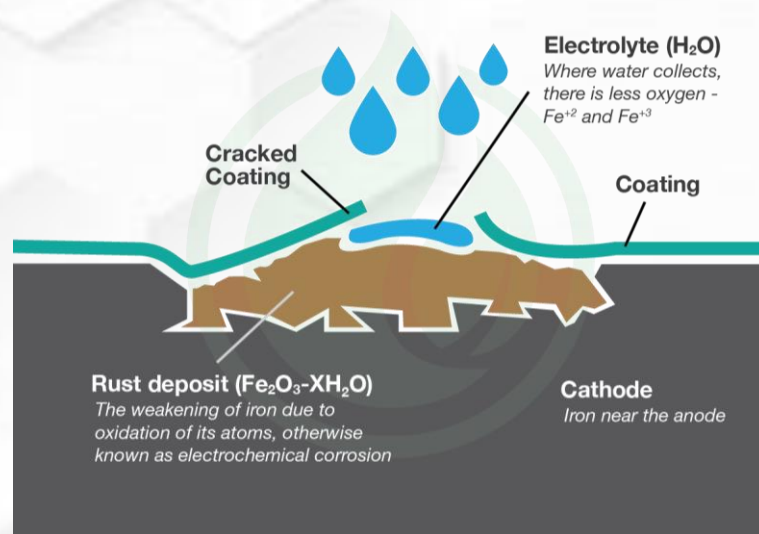
INTRO



IGL Coatings formulates and manufactures eco-friendly surface coatings which are safe and outperform existing products in the market in terms of durability, quality and ease of application.



CORROSION



Corrosion is a natural process which converts refined metals into a more chemically stable form, such as oxide hydroxide, carbonate or sulfide.

The NACE International estimates the global cost of corrosion in 2016 to be US\$2.5 trillion.

Several factors can influence the deterioration of a protective coating system such as:

- Energy
- Permeation
- Stress
- Biological influences

CORROSION CATEGORIES

Table 1 Atmosphere corrosivity categories and examples of typical environments

Corrosivity category	Exterior environment	Interior environment
C1 very low	...	Heated buildings with clean atmospheres, e.g., offices, shops, schools, hotels
C2 low	Atmospheres with low levels of pollution. Mostly rural areas	Unheated buildings where condensation may occur, e.g., depots, sports halls
C3 medium	Urban and industrial atmospheres, moderate sulfur dioxide pollution. Coastal areas with low salinity	Production rooms with high humidity and some air pollution, e.g., food processing plants, laundries, breweries, dairies
C4 high	Industrial areas and coastal areas with moderate salinity	Chemical plants, swimming pools, coastal ship- and boatyards
C5-I very high (industrial)	Industrial areas with high humidity and aggressive atmosphere	Buildings or areas with almost permanent condensation and with high pollution
Categories for water and soil		
Im 1	Fresh water	River installations, hydroelectric plants
Im 2	Sea or brackish water	Harbor areas with structures such as sluice gates, locks, jetties; offshore structures
Im 3	Soil	Buried tanks, steel piles, steel pipes

PROBLEM STATEMENT



Durable protection for items prone to corrosion



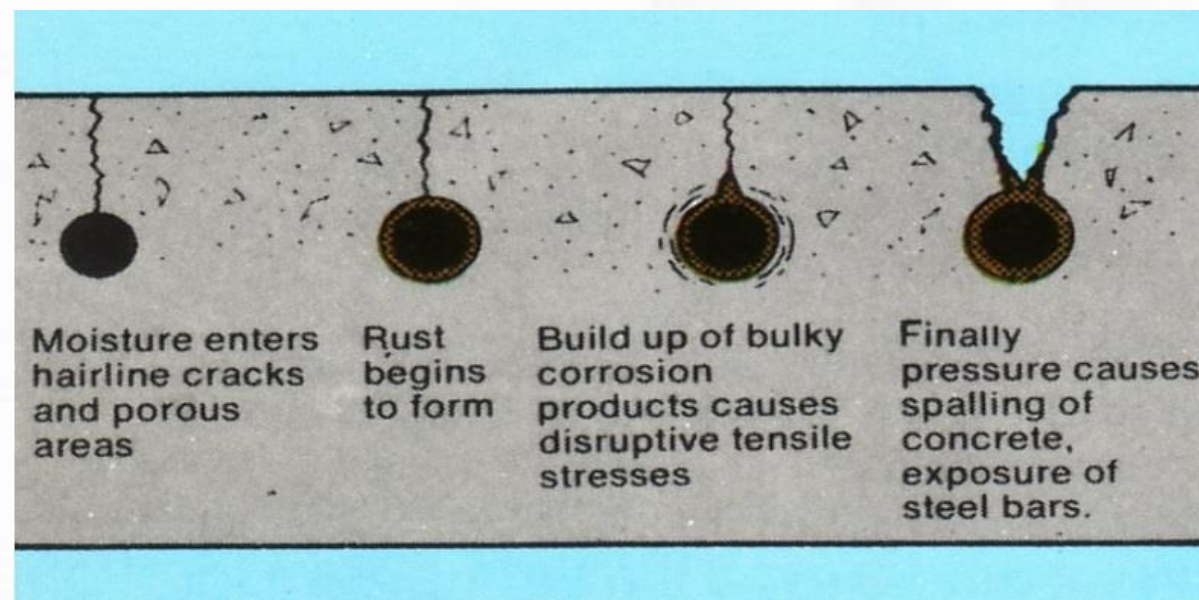
Non Transparent



Immunity from mechanical shocks and overcoming elongations



Corrosion under paint



Corrosion under concrete

INDUSTRY AFFECTED



Mining



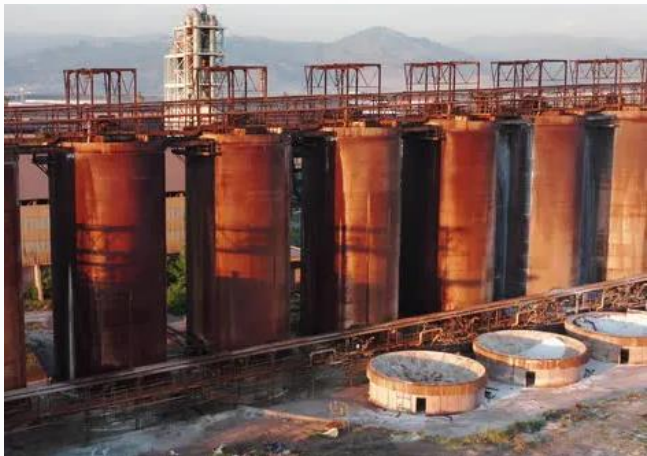
Cargo



Oil and gas



Windmill



Storage



Pipeline

INSPIRATION & INNOVATION

IGL Coatings introduced Ecoclear Aegis, a transparent anti-corrosion coating:

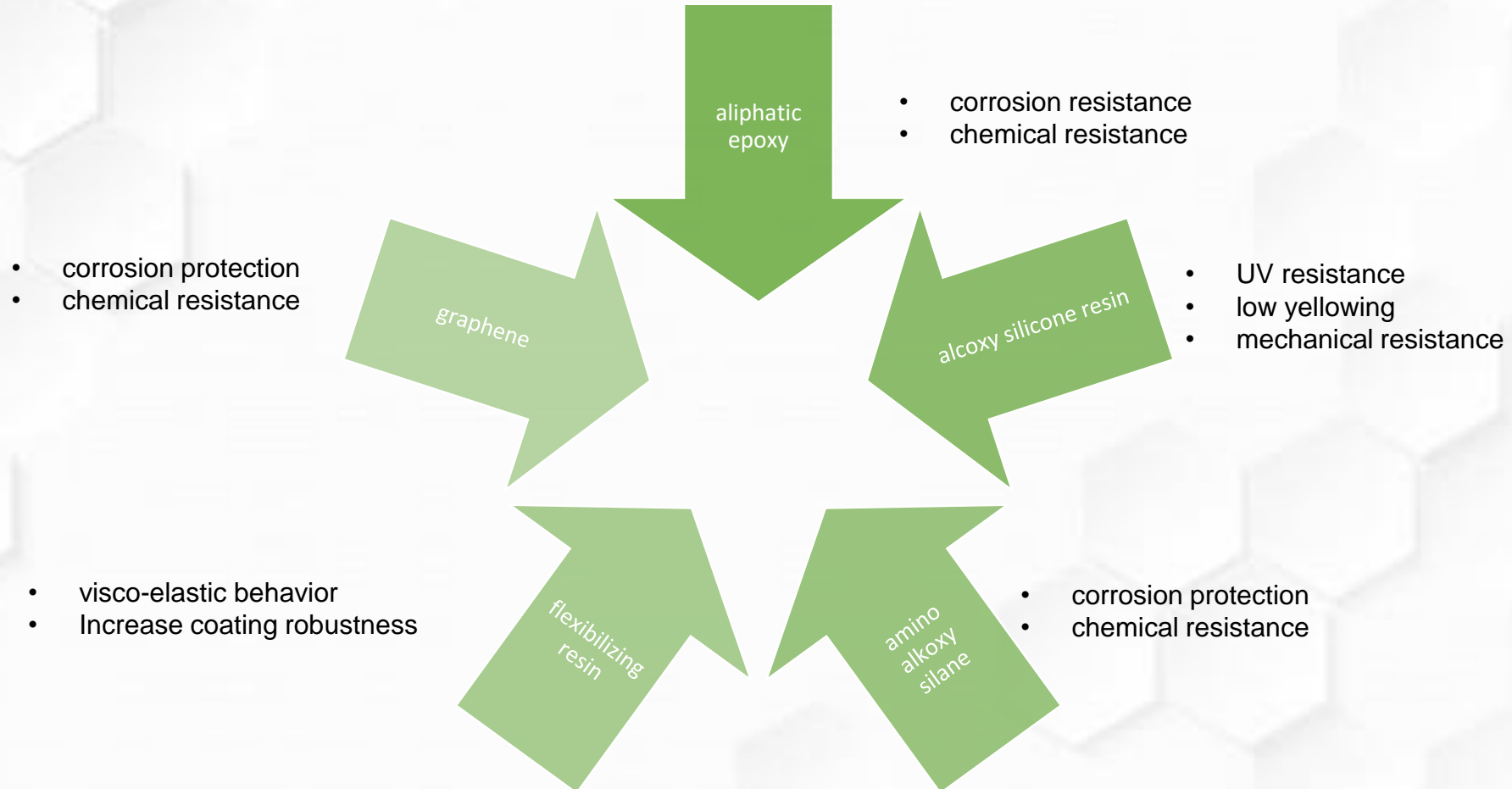
- silicone hybrid resin **based 2K paint system**
- reinforced with graphene

Designed to protect steel, concrete, glass and all other kind of surfaces in high corrosive environments (C5).

It is transparent and areare able to provide the ability to identify early signs of corrosion, allowing for early preventive measures. Saving time, costs and accidents.

FLEXIBLE SILICONE-EPOXY HYBRID+GRAPHENE

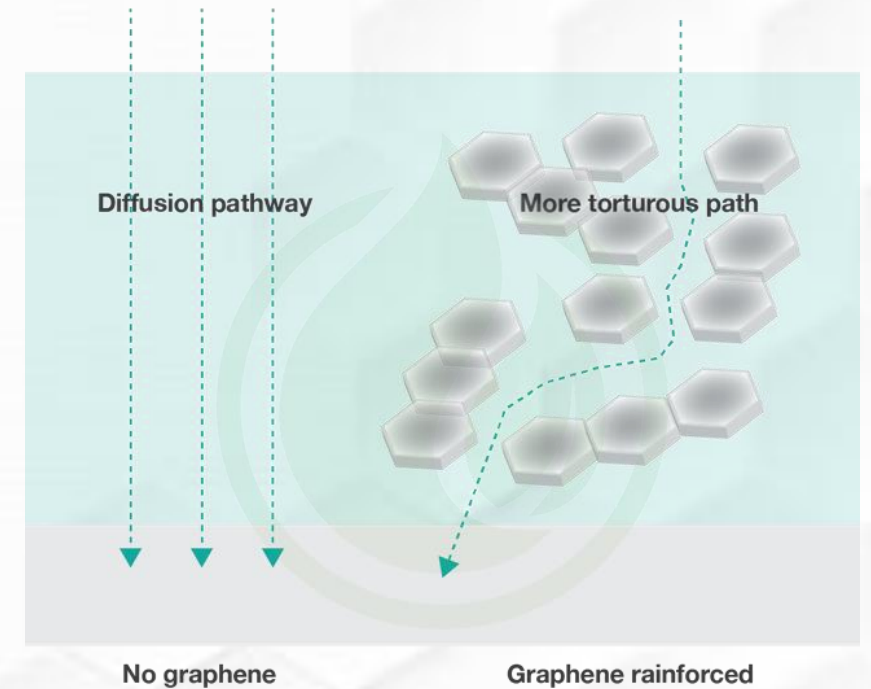
ECOCLEAR
AEGIS



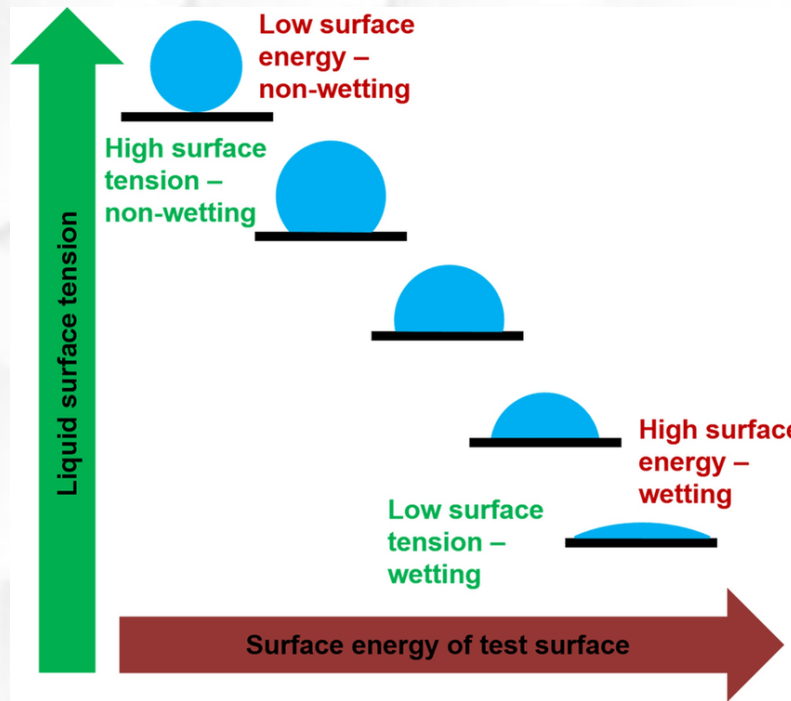
GRAPHENE NANOTUBES

Standard anti-corrosion paints in the markets are pigmented and contain fillers which turn the coating opaque.

With the use of Graphene, Aegis is transparent. The coating efficiency is also improved by 3x.



SURFACE TENSION & ENERGY

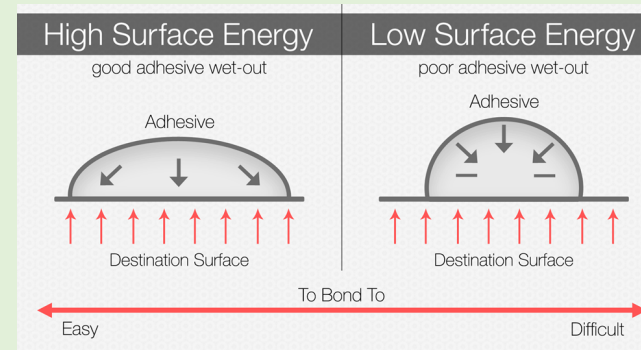


High surface energy (HSE) means a strong molecular attraction, therefore **easier to bond**.

Low surface energy (LSE) means a weak molecular attraction, therefore **harder to bond**.

Imagine trying to paint a wall. LSE means the paint will repel and not stick on the surface. HSE means it will stick well onto the surface.

What is Low Surface Energy?



PRODUCT & DETAILS



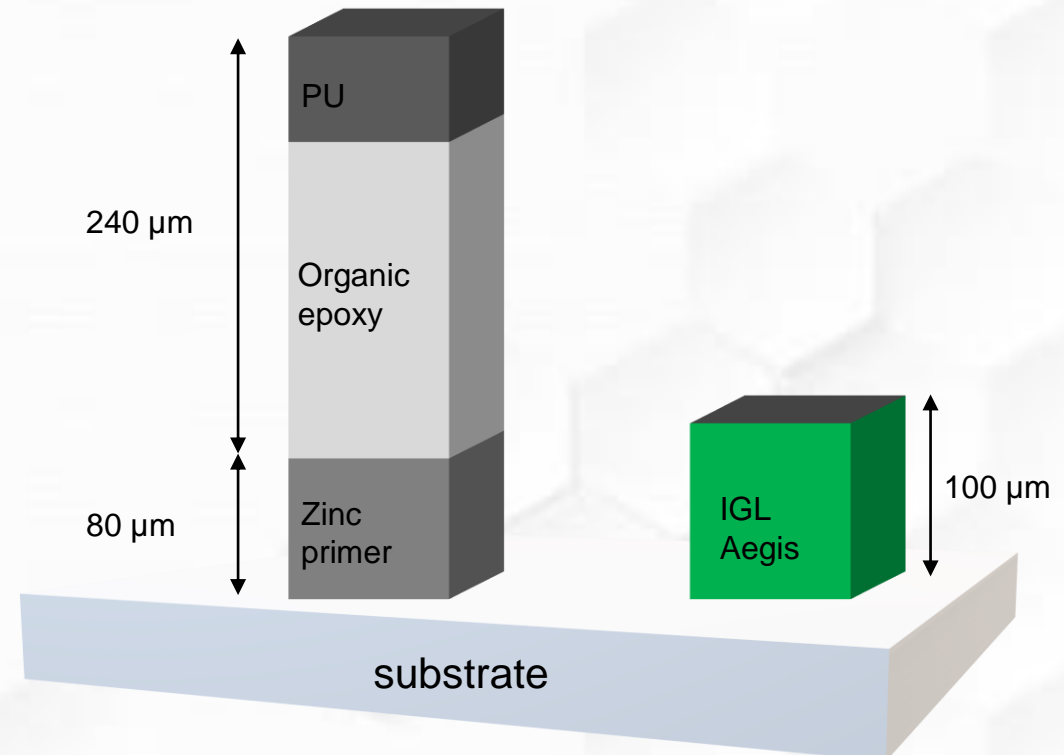
Compliant with import regulations TSCA (USA), AICS (Australia), ECHA (EU), and KECL (South Korea).

TECHNICAL DETAILS

- ✓ Temperature Service Range: <150 °C
- ✓ Dry-to-touch: 4-6 hours
- ✓ Through dry: 6-8 hours
- ✓ Maximum wet thickness: 50 µm (1 Layer)
- ✓ Coverage: 25 g per sq. ft.
- ✓ VOC content: 147 g/L
- ✓ Chemical resistant
- ✓ Weather resistant
- ✓ Easy-to-clean
- ✓ High gloss

WHY IS AEGIS SPECIAL

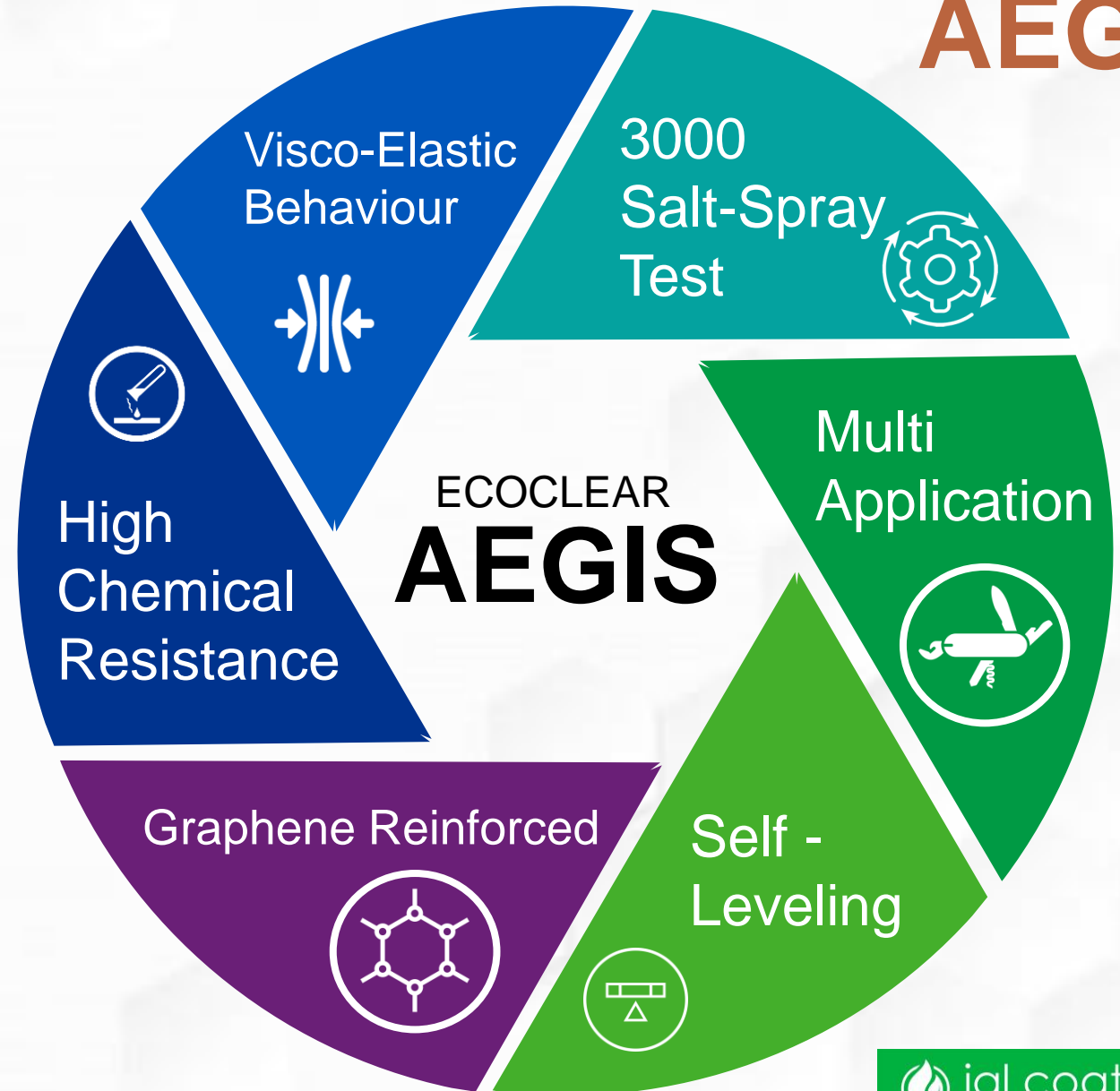
- Free from Toxic Heavy Metals (Zn, Cr, Pb)
- Transparent
- Thinner, Lighter



FEATURES

Advantages:

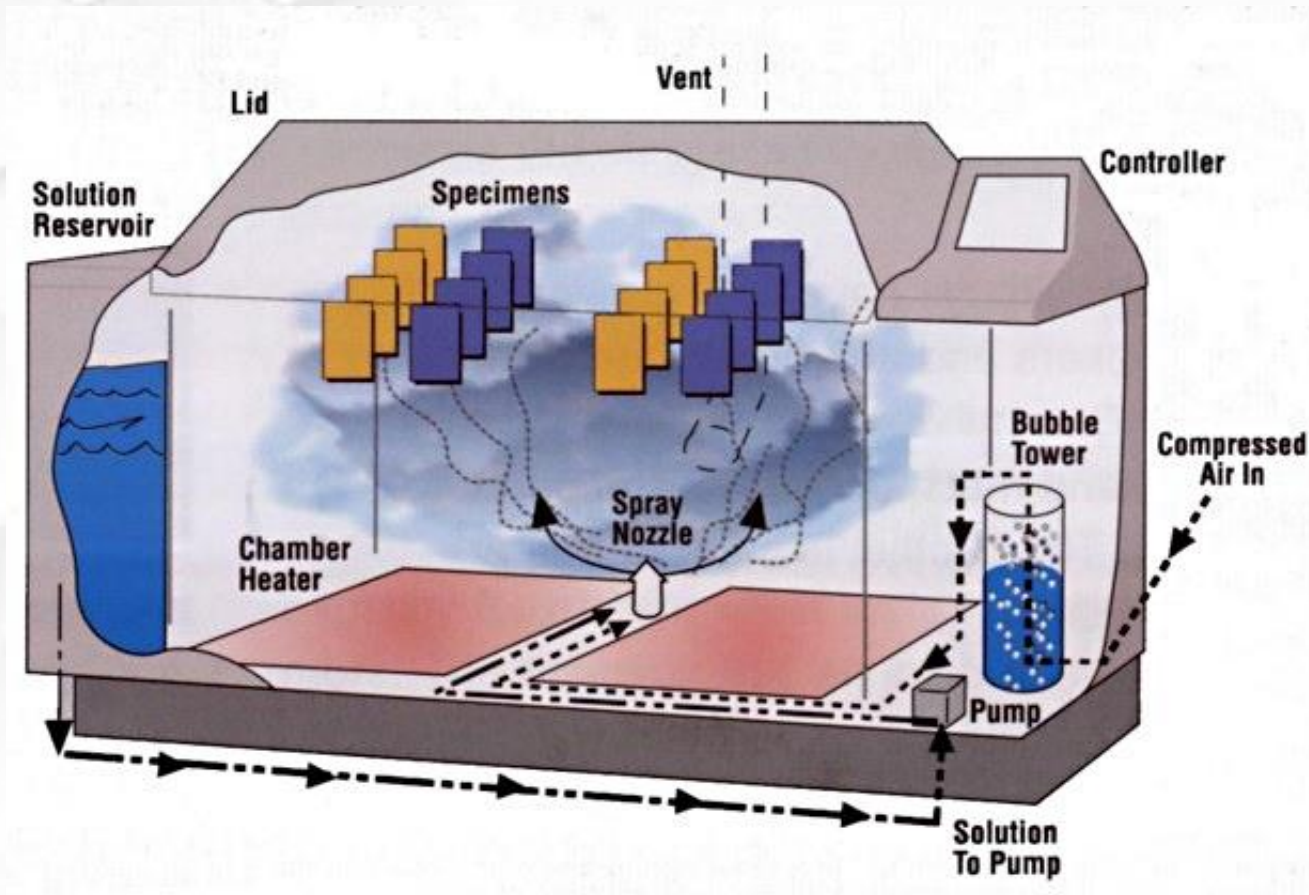
- Low surface energy and smooth surface (easy-to-clean, repels water)
- Environmental-friendly (ultra high solids, low VOC)
- Safer for applicators (toluene-free, xylene-free, lead-free, isocyanate-free)
- Good adhesion on a wide range of substrates (steel, concrete, glass, etc)
- Transparent (visual detection of creeping corrosion)
- Provides visco-elastic behavior
- Can be applied using brush or spray method
- Direct-to-metal system (no primers needed)



TESTS

Test	Values	Standard
Adhesion, Cross-Cut Tape Test	5B	ASTM D 3359
Impact Test	8.9 J	ASTM D 2794
Durometer Hardness Test	D/63.5/1	ASTM D 2240
Salt Spray Test	3000 hours	ASTM B 117, D 610, D 714
Heat Resistance, 155°C	Pass	ASTM D 2485
Methyl Ethyl Ketone (MEK) Rub Test	50 rubs, no effect	ASTM D 4752
Chemical Resistance, Spot Test, Uncovered	Prolonged exposure (24 hours) to butyl acetate, MEK and ecoclean Delete may damage the coating	ASTM D 1308
QUV-A Weathering	2000 hours	ASTM G154 Cycle 1
Rust at Inscribe, Corrosive Environment Test	Rating 7	ASTM D 1654
Water Resistance	168 hours	ASTM D 870
Water Contact Angle	87.8°	ASTM D 7334

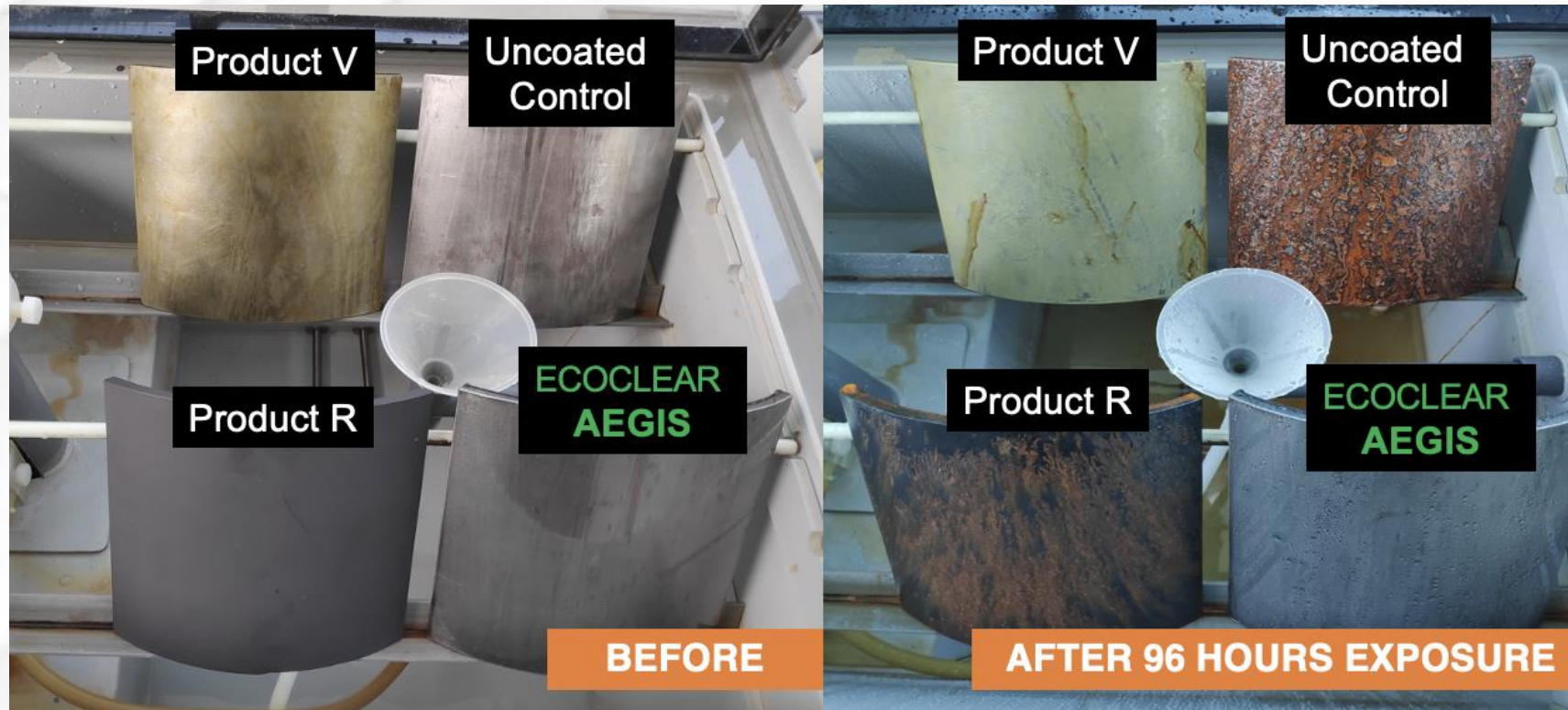
SALT SPRAY TESTS



Salt spray testing is a laboratory simulation of a corrosive saline environment. It is used as an accelerated means of testing the ability of surface coatings to withstand atmospheric corrosion.

The salt spray test is a standardized and popular corrosion test method, used to check corrosion resistance of materials and surface coatings. Usually, the materials to be tested are metallic and finished with a surface coating which is intended to provide a degree of corrosion protection to the underlying metal.

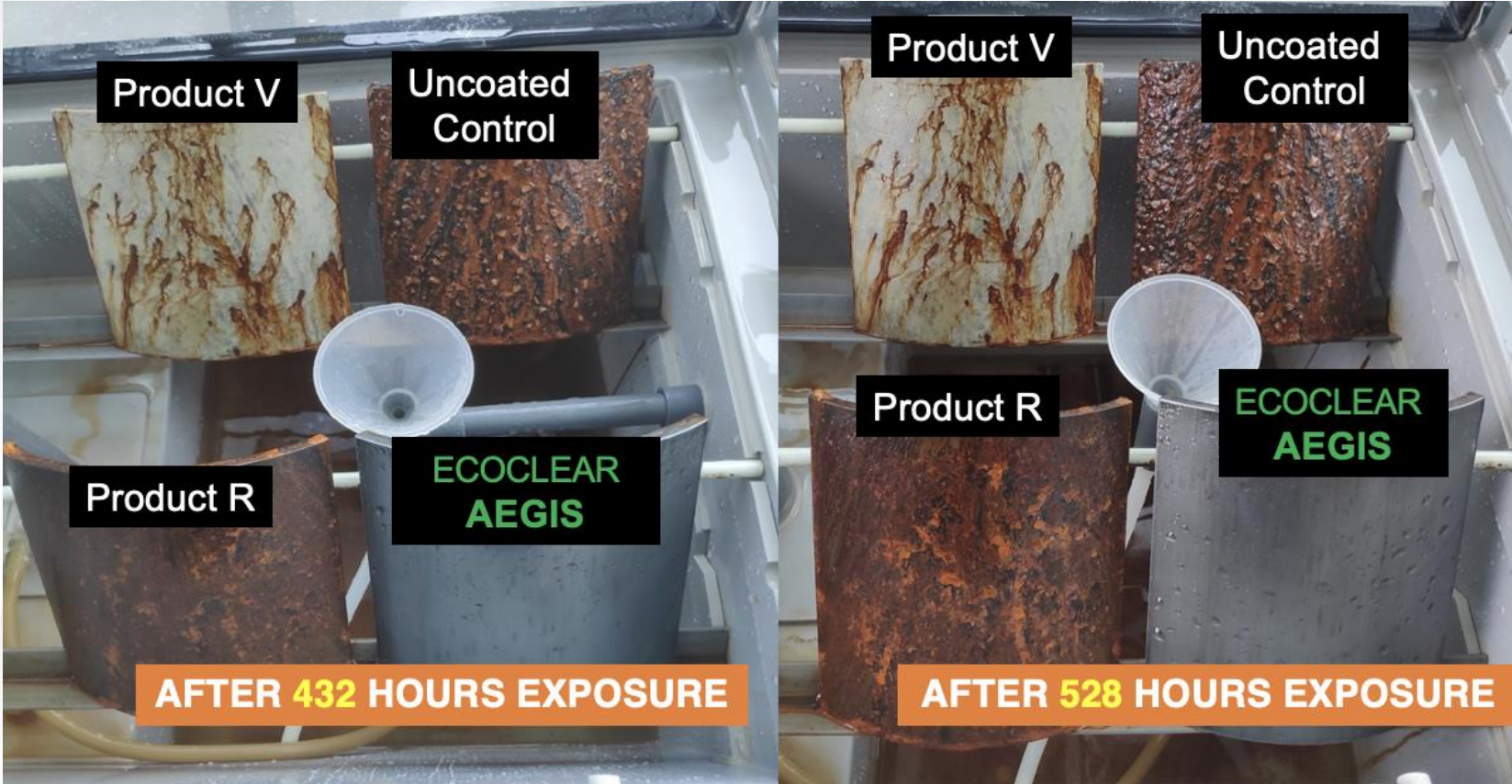
SALT SPRAY TESTS



*The test results after **96 hours** of exposure. With the control panel registering a rust grade of 0, Product R - 5S, Product V - 7S, and Aegis at 10.*

2 layers of Aegis at 100 μ m

SALT SPRAY TESTS



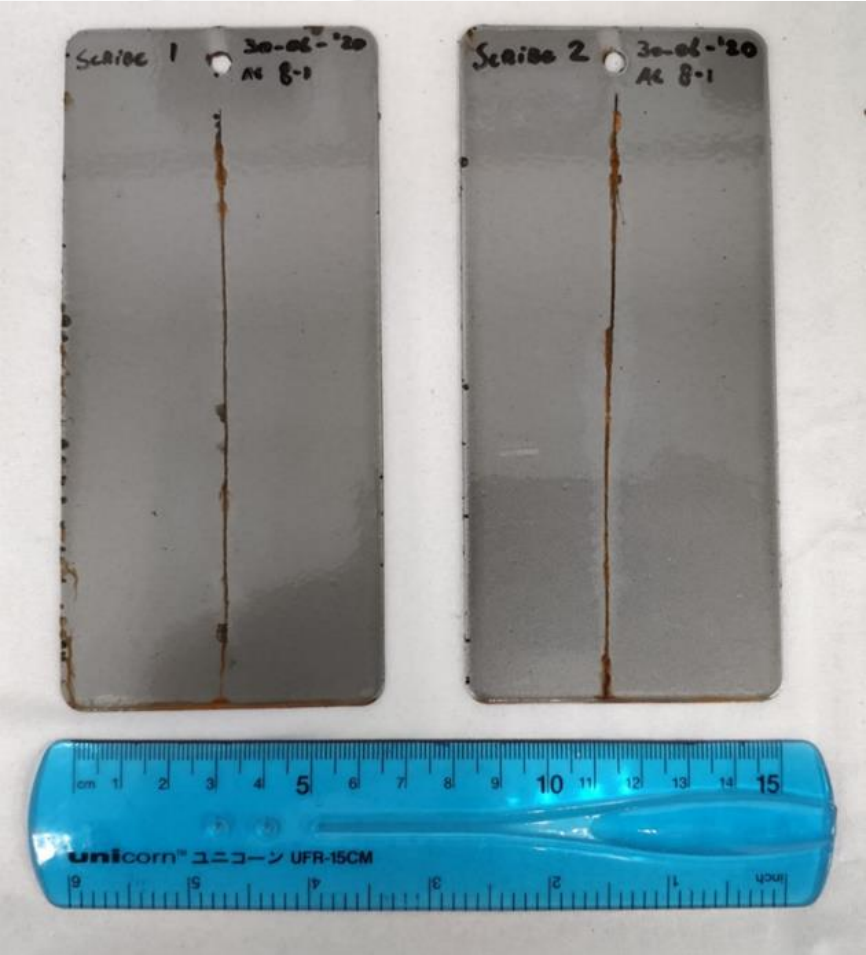
After 528 Hours, testing for control and Product R was halted. Testing for Product V and Ecoclear Aegis continue.

SALT SPRAY TESTS



After 3,000 hours, the panels were cleaned and left to dry for 24 hours. Evaluation of panels were done according to ASTM D1654 with Ecoclear Aegis showing slight degree of rusting (9-S), without any blistering.

INSCRIBE SALT SPRAY



The inscribe salt spray test was carried out on 2 panels. The average coating thickness on the substrate was 91.6 μm for Panel 1 and 89.9 μm for Panel 2. The inscribes on the panels were created with a Stanley knife. The inscribe length was 120 mm, the inscribe width was 0.5 mm. The panels were subjected to 168 hours of salt spray before evaluation.

Panel	Longest rust creepage from scribe (mm)	Longest rust creepage on scribe (mm)	Rating according to ASTM D1654
Panel 1	2	4	7
Panel 2	2	2	7

THANK YOU

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