

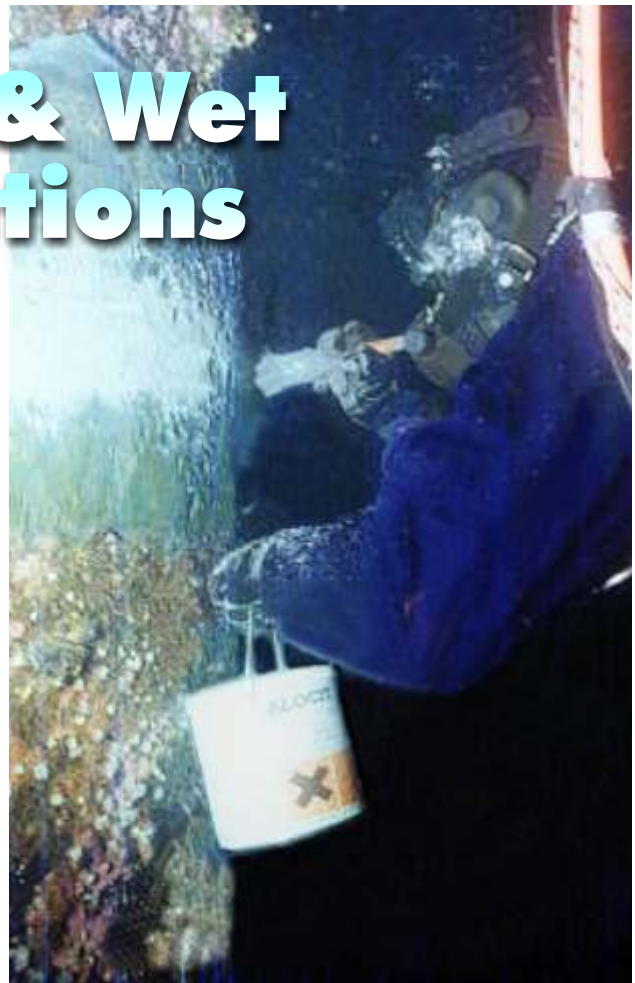
Alocit 28 Series Coatings

Underwater & Wet Area Applications

The most common reaction to the concept of coating surfaces underwater is first to express amazement that it is possible and then to ask why anyone would want to. As for 'why', we will come to that later but when it comes to 'how', the answer is simple - Alocit Systems.

What is amazing about using the Alocit 28 series underwater is the ease with which it can be applied. You can even apply it straight from the can with a simple hand brush or, if you have large areas to cover, cost-effective pumped systems can be utilised. On wet areas too, such as splash zones and sweating pipes, Alocit products make coating easy, adhering strongly and providing excellent anti-corrosion protection - they can even be applied to oily surfaces!

These pages deal with some of the background to sub-sea and wet area application: areas of use, surface preparation, equipment issues, techniques and frequently asked questions.



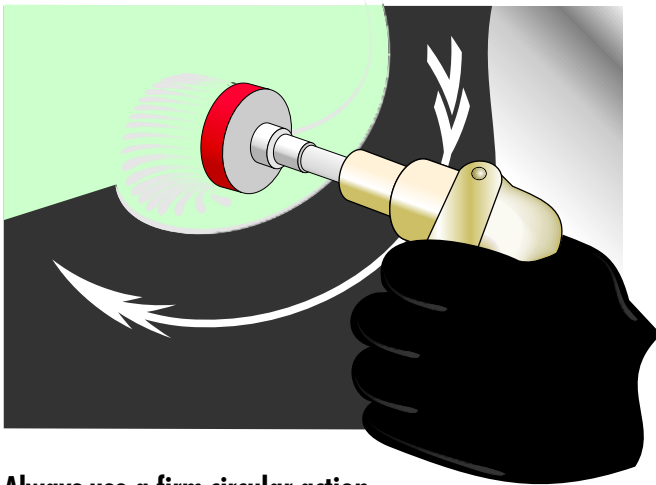
Above: In deep water off Argentina, using a hand brush to apply the mixed material straight from the can!

Below: Applying Alocit to pipes using a pumped brush system

- **Underwater • Splash Zones**
- **No Heavy Metals • Zero VOCs**
- **Wet or Dry Steel and Concrete**
- **Oil Contaminated Surfaces**
- **Sweating Pipes • Steel Piles**
- **Hulls • Bilges • Tanks • Tunnels**
- **Cost-effective • Durable**
- **Protects against MIC/ALWC**
- **Manual or Pumped Systems**

www.ae-sys.com

ALOCIT  **SYSTEMS**
HIGH PERFORMANCE
PAINTS AND COATINGS



Always use a firm circular action when applying underwater using a minimum two-coat index system

BASIC FACTS

How does it work? The Alocit 28 series is specially engineered to displace water and oil; consequently, application underwater requires a firm circular motion in order to obtain maximum adhesion.

How does it bond? The material does not form a chemical bond with the substrate but bonds mechanically to the surface profile.

What about surface prep? Proper surface preparation (a brief outline is given below) is the key to successful application.

How is it applied? Alocit can be applied underwater using a hand or pumped brush; equipment details are provided later in this document.

How hard is it to use? Not hard at all; Alocit material goes on as easily under water as it does above.

What about salt water? Applications in salt or fresh water are equally effective.

SURFACE PREPARATION ON STEEL

Remove surface contamination; corrosion deposits, marine growths etc., to reveal a clean steel substrate with a surface profile of a minimum 50 microns/2 mil using:

- High pressure water blast (15-20,000psi)
- UHP hydroblasting (30/40,000psi)
- Blasting with Grit or Garnet

Notes: UHP and High Pressure water blasting may be employed with added abrasive. Stains of rust, paint or mill scale remaining on the surface do not present a problem providing minimum surface profile criteria are met

SURFACE PREPARATION ON CONCRETE

The substrate should be free from high levels of laitence, oil contamination, large surface voids etc. Use hydroblasting for large areas. Large cracks/surface voids should be repaired prior to coating.



Above: Brush application in the splash zone

Won't the salt be trapped on the surface?

Dissolved salt will be displaced with the water during application. Low levels of residual salt will be encapsulated by the material and present no problem. Proper surface preparation is needed to remove the high levels of salt contamination sometimes found in old steel piles, for example.

Is it effective against MIC and ALWC?

Alocit has proved to be extremely effective in preventing microbially induced corrosion and accelerated low water corrosion.

How long will it last? Properly prepared and applied, Alocit should provide a minimum of 10 years protection. Records show applications remaining in good condition for over thirty years!

Why do I need to paint underwater? There are many reasons. Sheet piles, for example, can lose as much as 5mm a year from ALWC. Coating repairs to installations such as offshore platforms must be completed in situ which will involve subsea applications and repairs to coating damage on ships can be completed without dry-docking.

CASE STUDY - TEXAS

With severe corrosion conditions in constantly sweating low-temperature pipes on one of the largest refineries in the US, solutions were sought from a number of coatings suppliers. Following the selection of a short list, coatings companies were invited by the operators to complete a series of comparative tests on pipes with substrate temps down to 2°C, streaming with condensation in the warm and humid conditions.

Alocit 28.15 handled the conditions with ease, emerging the clear leader and was subsequently specified for use on sweating areas.



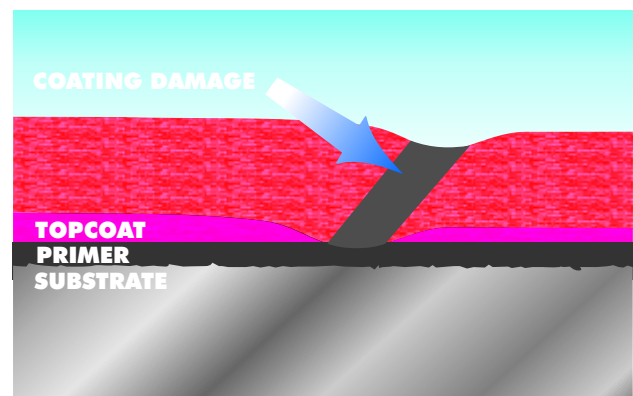
Why do I need two coats? During the application of any coating 'holidays', small holes in the coating film, will inevitably occur. A multi-coat system ensures that nowhere will this effect coating integrity. Alocit recommends a minimum two-coat index system of 600 microns (24 mil) DFT.



What is an 'index system'? An index system involves the use of a different colour for the base and top coats. This ensures that the second coat is properly applied and provides a visual warning if wear or abrasion penetrates the top coat, allowing remedial action to take place before system failure.

Left: A diver applies a second coat to a two-colour index system on sheet piling.

Below: With an index system, missed sections or wear and damage to topcoat are immediately visible



CASE STUDY - MEDITERRANEAN

After construction, this gas platform required extra coating at and beneath the splash zone. The areas were blasted clean (below left) and a two-coat Alocit 28.15 system was applied, black as the first coat, followed by a colour matched top coat (below and right).





CASE STUDY - SBM

Significant cost savings were achieved on this Single Buoy Mooring through the use of Alocit coatings



Above: old coatings and marine growths were removed by water-jetting. As Alocit could be applied immediately after preparation, there was no need to dry the substrate and coating work was able to continue without interruption - even during the night!

Above: DFT and adhesion tests were carried out at all stages. These showed that, despite the constant humidity and water from the preparation process, adherence of the Alocit coating was unaffected with readings between 750 and 1200 p.s.i.

Right: The SBM nears completion with a time saving of more than 25% because of Alocit's ability to be applied on wet surfaces.





AREAS OF USE

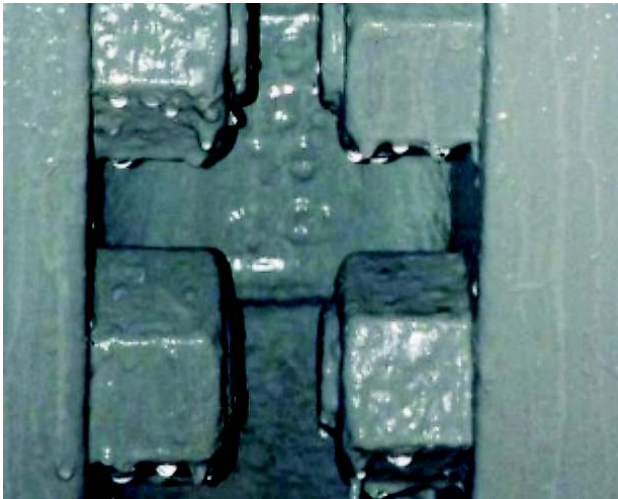
Alocit coatings can be used in almost any environment, tropical or temperate, above and below salt or fresh water, in the splash zone, on damp or 'sweating' surfaces - even through running water!

Alocit products have been applied at nuclear plants, on ship's hulls and rudders, to sheet piling, concrete piling, piping, tanks and offshore platforms. It can even be applied to oily surfaces underwater as the photograph above left shows!

For more information on product or application issues, please contact us or visit our website, www.ae-sys.com, which has a range of technical information.

Above: This photograph shows Alocit 28.15 being applied underwater onto oil-contaminated concrete

Left: On this project Alocit coatings were applied through running condensation



CASE STUDY - DURABILITY

The sample shown below is from a test by an agency of the German government. Samples were coated underwater and left submerged under the North Sea for several years. Despite having to hammer off the barnacles and marine growth, the Alocit coating emerged completely undamaged - still firmly adhering to the concrete substrate.



CASE STUDY - NEW YORK

Alocit has a long history of applications in and around New York harbour with applications at La Guardia and Brooklyn Bridge, for example. The photo above shows the underwater hand application of Alocit to sheet steel piles in the harbour.

APPLICATION EQUIPMENT



Above: The Specially Adapted Power Brush



Above: A K1 Applicator



Right: An Air-powered Pumping Unit



Above: A Standard Alocit Round Hand Brush

Independent Testing

Alocit products have undertaken many tests but these two examples are from US and Dutch Navy tests which show how well Alocit adheres even on submerged surfaces. With all but one of the tests separation was either due to glueline or substrate failure.

Adhesion Tests

US DEPARTMENT OF THE NAVY

The underwater-coated steel specimens were removed from the water after curing overnight and allowed to dry for 8 hours. Dumbbell-shaped steel probes with ends 1 sq cm in surface area were then bonded onto the coated surfaces with Hysol EA 9309 adhesive and allowed to remain overnight. The following day they were pulled to failure in an Instron Model 1122 testing machine.

RESULTS

Pull strengths and mechanisms of failure of coated steel panels.

Pull strength in kg/sq cm;

Failure mechanism

[A]=adhesive [C]=cohesive

[S] exposed steel

STEEL SURFACE ALOCIT COATING

Dry	38 [A]	66 [A]
Wetted	36 [A]	41 [A]
FWS Blast	51 [S]	33 [A]

Note: 50 kg/sq cm = 711 p.s.i

Adhesion Tests DUTCH NAVY

TEST #1

SUBSTRATE: Grid blasted steel, but dusty and dirty

APPLICATION: Underwater by brush

MATERIAL: Alocit 28.14

TEST EQUIPMENT: P.A.T. (Precision Adhesion Testing Equipment) direct vertical pull by hydraulic system. After seven days, dollies with Araldite glue were applied.

RESULTS:

16-18 N/mm (2320-2610 p.s.i.)

Breakage in the glue

No damage to 28.14

TEST #2

SUBSTRATE: Sand-stone soaked in water until totally wet

APPLICATION: Brush onto wet stone

MATERIAL: Alocit 28.95

TEST EQUIPMENT:

P.A.T. as above. After one week dollies with Araldite glue applied

RESULT

9 - 10 N/mm² (1305-1450 p.s.i.)

Substrate failure - no damage to 28.95

In further tests 28.14 and 28.15 were applied successfully on bilge areas and divers successfully applied 28.14 and 28.15 underwater in the port.

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