

Alocit 28 Series Coatings

Underwater & Wet Area Applications

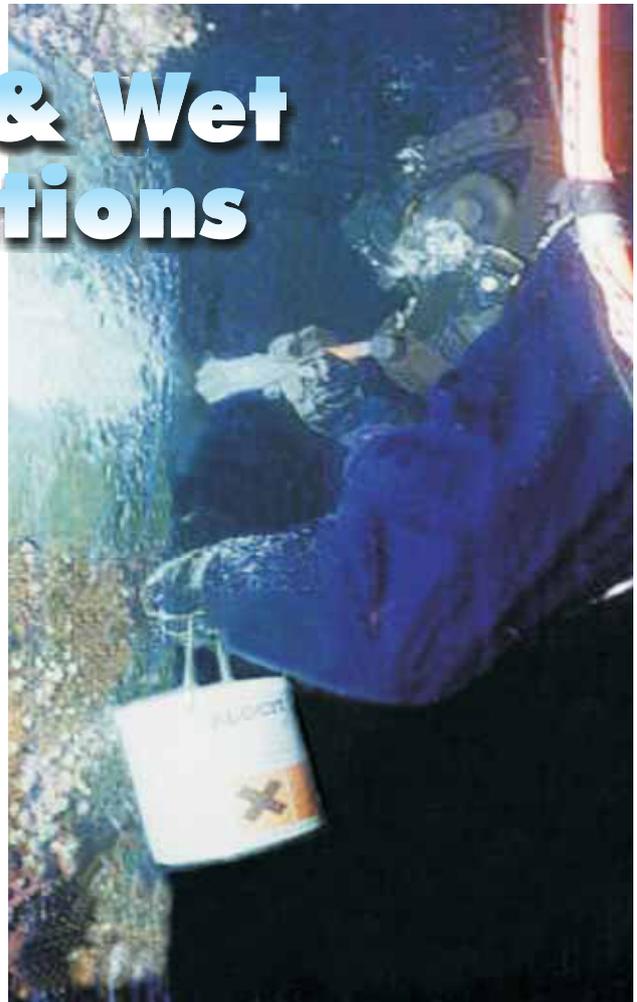
The most common reaction to the concept of coating surfaces underwater is first to express amazement that it is possible and then to ask why anyone would want to. As for 'why', we will come to that later but when it comes to 'how', the answer is simple - Alocit Systems.

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.

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

Below: Applying Alocit to pipes underwater 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

ALOCIT SYSTEMS
HIGH PERFORMANCE
PAINTS AND COATINGS

SALES & DISTRIBUTION - Trinidad & Latin America
Offshore Technology Solutions Ltd. / Cocoon Ltd.
Tropical Marine Building, 106 Western Main Rd.
Chaguaramas, Trinidad, West Indies.
Telephone: (1) 868 - 634 -2214 --2216.
Fax: (1) 868 - 634 - 4449. Email: info@otsl.biz
WWW.otsl.biz



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 - good surface profile is the secret of success in wet area applications.

How is it applied? Alocit can be applied underwater with a hand or pumped brush using a firm, circular motion.

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

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



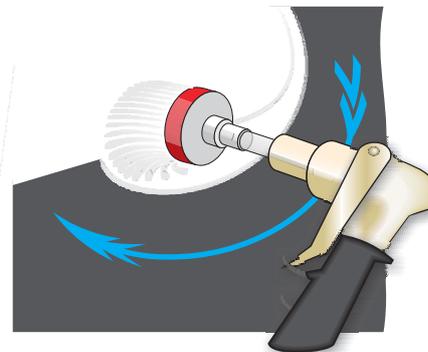
Above: The specially adapted power brush and the Alocit round hand brush



Above: The K1 applicator

Right: An air-powered pumping unit

APPLICATION EQUIPMENT



Always use a firm circular action when applying underwater or on to wet surfaces

SURFACE PREPARATION ON STEEL

Remove surface contamination, corrosion deposits, marine growths etc., to reveal a clean steel substrate with a surface profile of minimum 50 microns/2 mil using: High pressure water blast (15-20,000psi), UHP hydroblasting (30/40,000psi) or blasting with grit or garnet.

Note: UHP and high pressure water blasting may be used with added abrasive. Stains of rust, paint or mill scale 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!

Below: Concrete castings for the Singapore MRT tunnel were still wet when coated within minutes of leaving their steam-curing moulds using Alocit.



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 to paint underwater? There are many reasons. Sheet piles, for example, can lose as much as 5mm a year from ALWC. Coating repairs to marine installations such as offshore platforms often involve subsea and splash zone applications and repairs to coating damage on ships can be completed without dry-docking.

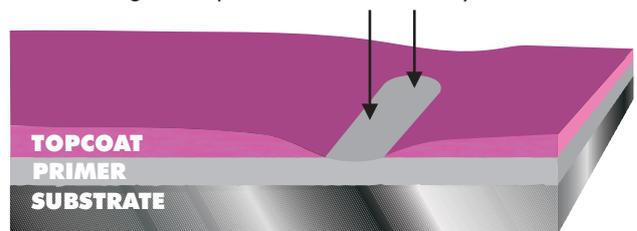
Why do I need multiple coats? During the application of any coating 'pinholes' or 'holidays' in the coating film, will inevitably occur as well as variations in film thickness. A multi-coat system eliminates the possibility of pinholes as well as significantly reducing variations in DFT. This is particularly important for applications in wet areas. 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.



Above: 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

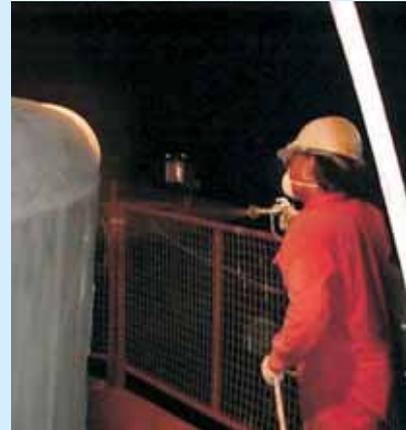
After construction, this gas platform required extra coating at and beneath the splash zone. The areas were blasted clean (below left) and a two-coat Alocit 28.15 system was applied, black as the first coat, followed by a colour matched top coat (below and right).





CASE STUDY - SBM

Commissioning engineers calculated that at least 25% cost savings were achieved on this Single Buoy Mooring, using Alocit coatings in conjunction with preparation by water jetting.



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 significant time savings because of Alocit's ability to be applied on wet surfaces.





Above: Alocit coatings were applied through running condensation on pipes carrying cooling water under the Petronas Towers in Kuala Lumpur

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

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 your nearest office (see back page) or visit our website, www.alocitgroup.com.



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 New York harbour with applications at La Guardia and under Brooklyn Bridge, for example. The photograph above is a frame from a contractor's video, showing the hand application, underwater, of coating to sheet steel piles in the harbour.

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. Ballast tank testing by DNV gave Alocit the highest possible rating (B1). This included application on pre-rusted and steel wire brushed/high pressure washed, pre-rusted & hydro-jetted as well as moist test panels. Alocit 28.15 is one of only three coatings listed by USACE as meeting its criteria for use in wet areas and, in tests commissioned by a US water jetting company, Alocit showed nearly twice the adhesion of its nearest competitor after coating on steel prepared using water jetting.

DUTCH NAVY Adhesion Tests

TEST #1 - 28.14

SUBSTRATE: Dusty and dirty grit-blasted steel

APPLICATION: Underwater by brush

TEST EQUIPMENT: P .A.T. 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.)

Glue failure

No damage to 28.14

TEST #2 - 28.95

SUBSTRATE: Sand-stone soaked in water until totally wet

APPLICATION: Brush onto wet stone

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.

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 strength in kg/sq cm
50 kg/sq cm = 711 p.s.i.

Failure mechanism: [A]=dolly 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] |



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