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| **Section** | |
| **Name** | Underwater Surface Preparation. |
| **Last Updated** | 11/14 |
| **Aim** | Document recommended underwater surface preparation methods for Scubapoxy products. |
| **Scope** | Covers concrete and metal. |
| **References** | |

# Underwater Surface Preparation

This is obviously a very broad question that could fill a text book when answered fully. The aim of this document is to cut through all the confusing theory and provide a useful preparation summary, including why surface preparation is done in the first place.

## 1 Why prepare the surface?

The reason surface preparation exists is to help coatings stick better. It does this in three ways –

1. Removes physical barriers to adhesion – contaminants such as oils, greases, rust etc. can get in the way of the coating as it tries to bond to the surface.

2. Removes threats to adhesion – materials such as salts can be a big problem if left on the surface, causing defects and coating failure.

3. Increases surface area – roughening the surface increases the area available for bonding to take place.

Achieving these goals in an underwater or wet environment can be a big challenge for divers. Not only is cleaning and profiling the surface often difficult, but keeping it clean before application begins can also cause headaches.

## 2 Underwater Preparation Methods

While surfaces may be underwater, the overall objective remains the same: remove barriers to adhesion (marine growth, slime, loose coatings, rust etc.) and establish a clean, sound surface with a mechanical profile. Also, the same rules apply to the condition of the surface with regards to existing coatings and damaged substrate: strongly adherent, sound coatings can be coated over, while any damaged substrate will need to be repaired with a product such as Scubapoxy 1725.

The biggest difference for preparation underwater relates to the presence of electrical currents and the window of application after preparation.

Stray electrical currents through steel pilings or hulls will prevent the epoxy from adhering and will need to be de-commissioned prior to preparation. Such currents are commonly caused by active galvanic protection systems, nearby anodes, shipboard arc-welding operations etc., and can usually be isolated.

# U/WATER PREPARATION

The window of application is significantly reduced when working underwater and it's important to apply within 40 minutes of blasting, otherwise the cleaned surface will become re-contaminated with marine settlement. After preparation the surface should feel gritty and granular, while a slimy feel to the fingertip is not acceptable.

Below is a list of the underwater surface preparation methods with comments on their effectiveness:

- Wire brushing (concrete and metal) – is not recommended except in the smallest areas where vigorous brushing is the only way to achieve some form of contamination removal.

- Grinding (concrete and metal) – can work well in small areas provided sufficient attention can be afforded to all areas receiving the coating. Grinding is useful in localised repairs above or below water.

- Needle gunning (concrete and metal) – has been used successfully above and below water provided the area is small enough to receive complete attention.

- High-pressure water blasting (concrete and metal) – is effective provided the water pressure is high enough to remove all contamination. Pressures of 34MPa/5,000psi will be required to remove tight contamination such as marine growth on steel and concrete. The nozzle must be held close in to ensure effectiveness since its efficiency falls off rapidly as it leaves the surface.

- Abrasive blasting with high-pressure water (metal only) – is the preferred method of preparation. Abrasive blasting with high-pressure water is particularly effective underwater and may be accomplished with most commercial equipment down to 24MPa/3,500psi units with venturi sand injection. Conventional air/abrasive blasting works well for small areas, however tends to produce uneven results – where the jet of air and abrasive strikes the surface there will be a "white-metal" blast, however the cleaning only 2-3mm/0.1" away may be poor. Water-jetting tends to deliver a much broader and more uniform effect.

  As a rule of thumb, on open flat surfaces, allow for a surface preparation rate of $18m^2/192ft^2$ per hour per nozzle for pressure cleaning. It's recommended to work in "boxes" – marked out sections to be cleaned and applied at a time – and progressively work through these.