

Mild Steel – Preparation Using UHPWJ

1.1.8

Mild Steel Surface Preparation

The standard Dulux[®] Protective Coatings recommendation for the preparation of new steel prior to coating application is **abrasive blast cleaning** according to AS1627.4 Class 2½ “Near White Metal” blast cleanliness, to replicate visual standard Sa 2½ in AS1627.9, and to generate an angular surface profile of 30 to 60 microns. Details of this process, and the reasons for doing so are described in Dulux[®] Protective Coatings Tech Note 1.1.2 Mild Steel – Surface Preparation. Suffice to say that this method consistently results in a clean and well-profiled steel surface, providing a near-perfect base for just about any heavy-duty two-pack system to adhere to.

If, however, the steel is to be cleaned to remove all traces of existing coatings and surface rust, and recoated, and if abrasive blast cleaning is not convenient, then **UHPWJ** in conjunction with **Dulux[®] Luxepoxy[®] Sealer** is certainly a tried and tested alternative.

UHPWJ – What is it?

UHPWJ stands for **Ultra High Pressure Water Jet**, which is the process of cleaning a surface using water under very high pressure (around 35,000 psi).

The pressure of the **UHPWJ** can be adjusted to provide sufficient force to remove all surface contaminants, including tightly adhering surface rust, leaving the surface completely clean.

To ensure that the surface is in fact sufficiently clean to receive a coating system, a visual assessment may be made by comparing the cleaned surface with a **series of photographic standards** issued by either **NACE** (National Association of Corrosion Engineers) or **SSPC** (Steel Structures Painting Council, now Society for Protective Coatings).



Can UHPWJ Replace Abrasive Blast Cleaning For New Work?

The answer is **no**, because abrasive blast cleaning is just about the only method that consistently removes **millscale**, and it provides a good surface profile, whereas **UHPWJ does not remove millscale nor create a surface profile**.

The performance of a coating system largely depends on bond strength between the clean steel substrate and the first coat (or primer). Coating **failure** sometimes occurs at the **steel – primer interface**, hence the importance of giving the surface a profile to maximise the bond area. The greater the profile, the greater the surface area and the stronger the **mechanical and chemical bond**.

If the surface of the steel is smooth, however, then **adhesion** of the coating is entirely dependent on **a chemical bond**, which can **vary enormously** from product to product. Whilst abrasive blast cleaning provides a good surface profile, **UHPWJ does not create a profile at all**.



If any millscale is present, then delamination is also very likely to occur. For more information about millscale, please refer to Dulux[®] Protective Coatings Tech Note 1.1.4 Millscale.

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Can UHPWJ Replace Abrasive Blast Cleaning For Maintenance?

The answer is **yes, mostly**, for maintenance and repaint work over steel that had **originally been abrasive blast cleaned** and you intend to prime the steel with **Dulux® Luxepoxy® Sealer**. Here's why.

Steel that had been **originally blast cleaned** and painted, can be **UHPWJ cleaned** to remove all the existing coating and surface contaminants because it effectively removes contaminants and reveals the **original profile**, which will be just as suitable for painting as it was when originally blast cleaned. Therefore, the all-important profile is already there ready for the new coating system to key into.

Use of Dulux® Luxepoxy® Sealer

Independent tests¹ have shown that the **bond strength** of **Luxepoxy® Sealer** to **UHPWJ cleaned steel** consistently **exceeds** the minimum recommended for epoxies to newly **blast cleaned steel**.

The adhesion test results of **Luxepoxy® Sealer**, applied at 20 microns, alone and as part of two different coating systems are summarised in the table below.

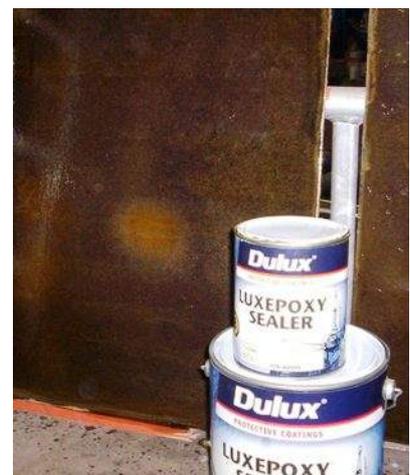
Description	Bond Strength (MPa)	Bond Strength (psi)
Luxepoxy® Sealer @ 20 µm	15.5	2,330
Luxepoxy® Sealer @ 20 µm plus Durebild® STE Glass Flake at 200 µm	13.5	1,980
Luxepoxy® Sealer @ 20 µm plus Durebild® STE Glass Flake at 200 µm plus Weathermax® HBR at 65 µm	12.7	1,850

Adhesion values in excess of **3 MPa** are generally considered to be **good** for epoxies applied to newly **blast-cleaned steel**.

The adhesion values for the **Luxepoxy® Sealer** coating systems to **UHPWJ**-cleaned steel in this test averaged **15.5 MPa** (2,250 psi), demonstrating that **UHPWJ** in combination with **Luxepoxy® Sealer** is a **viable alternative** to abrasive blast cleaning in maintenance situations.

This is handy information for maintenance projects where **UHPWJ** would be more practical than abrasive blast cleaning, and the steel requires the application of a high performance coating system.

For more information, please contact the Dulux Protective Coatings Technical Consultant in your state.



¹ CTI Consultants Report No. C10547, CTI Job 2085, 12 January 2008.