

## Millscale

## 1.1.4

### What is Millscale?

**Millscale** is often present on raw steel and is frequently mistaken for a blue-coloured primer.

Millscale is a type of **iron oxide** that is formed on the surface of the steel during the hot-rolling process. The very high surface temperature combined with high roller pressures result in a smooth, bluish grey surface.

### Can I Paint Over Millscale?

If millscale were a uniformly well-adhered covering to the steel section, then it would make an ideal protective barrier.

**Unfortunately, millscale is not uniform, nor is it well-adhered.**

This latter item is of concern in that many projects have had high quality, expensive protective coatings applied directly over millscale and inadequately prepared steel only to have the entire structure and coating system fail within a very short period of time.

Millscale is less reactive (more “noble”) than the steel underneath, and consistent with the behaviour of two dissimilar metals when in contact, the more reactive metal (in this case steel) will oxidise (rust) at the expense of the less reactive metal (millscale).

The millscale in fact looks like a scale and it can “pop off” the surface, cracking the coating and allowing moisture to penetrate. This allows a “galvanic reaction” to occur which results in **pitting corrosion** (rust) to the base steel. This will result in a growth of the corrosion under the scale and produce further cracking to the coating and expose greater areas and thus more corrosion.

**All millscale must be removed** to present a **uniform** and **clean** surface.

### How Do I Remove Millscale?

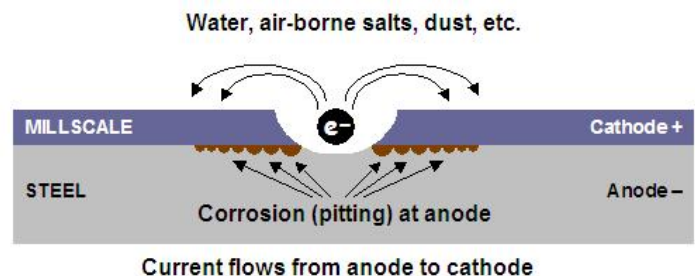
Removal of millscale is virtually impossible by hand, and extremely tedious and time-consuming using power tool cleaning methods. Neither gives a good base to start. Factory steel has no surface profile, which is most important to the overall adhesion strength and integrity of the coating system. The steel must be cleaned with AS1627.4 Class 2.5 (SA 2 ½, SSPC 10 or 6 depending on use) abrasive blast. This will remove the millscale and provide a surface profile that will give the system its design requirements. (For information regarding surface preparation and profiles, please see Dulux PC Tech Note 1.1.2 – Mild Steel Surface Preparation.)

Painting over millscale, however tempting, is a **futile exercise**, as the presence of millscale on the steel surface **accelerates the corrosion of the underlying steel**.

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



The photo clearly shows the blue-grey millscale causing red rusting of the steel below it and delamination of the heavy-duty coating above. The steel was painted only four years before!



**MECHANISM OF MILLSCALE-INDUCED CORROSION**