

## Polyurethanes

### 3.1.1

### What Are Polyurethanes?

A **polyurethane** results from the chemical reaction between a polyol **resin** (also known as the base, or the "**Part A**") and a **poly-isocyanate curing agent** (also known as the hardener, or the "**Part B**"). The resin type can be modified with polyester, polyether or acrylic. The polyurethane chemical structure is highly cross-linked and has a very large molecular weight.

In paint, the polyurethane polymer offers a tough and durable coating that is highly resistant to extremes of weather – intense sun, wind and precipitation. The polyurethane also allows the paint to be formulated to higher gloss levels, offering a beautiful and consistent finish. The higher gloss level also allows improved "self-cleaning" – that is, dirt and dust washes off during rain, and residual dirt can be easily removed by detergent and water. Graffiti can also be removed from the smooth surface using proprietary cleaning agents.

Therefore, a polyurethane based paint is generally the best option for the long-term protection and decoration of a wide range of substrates.

### Why Would I Use Polyurethanes?

Polyurethanes are selected for industrial and architectural coating systems as finish coats that are usually applied over primer and intermediate coats that together combine the individual coating features to produce long term protective coating systems. Suitable substrates include steelwork, cladding and concrete.

Polyurethane finish coats typically exhibit the following features and benefits: -

- High gloss colour finishes that resist loss of colour and gloss.
- Tough and abrasion-resistant even with constant handling – excellent in areas of high wear.
- Excellent weatherability – resistant to high levels of UV and extremes of weather.
- Suitable in a wide range of temperatures - suitable in situations up to around 110°C.
- Chemically resistant (is not softened or otherwise affected by a wide range of solvents) and is thus inherently resistant to solvent based spray paints (graffiti) and to the harsh graffiti-removing agents used to remove them (such as Dulux "Graffiti Eraser")
- Readily recoatable (after appropriate surface preparation) – they don't require removal or surface re-activation with solvents.



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### Where Should I Use Polyurethanes?

Polyurethane coatings have been used for many years as the finish coat in industries such as: automotive and commercial transport vehicles, offshore and onshore oil & gas structural steel, vessels, accommodation modules, pipeline externals, retail and commercial architectural and structural steelwork, panelling, furniture, balusters, infrastructure, including bridges and tunnels, and bulk storage tank externals

### Are Polyurethanes Safe To Use?

Paints generally contain a mixture of solvents and additives that can cause health problems if handled inappropriately. (See Tech Note 2.2 - Solvents.) Polyurethanes are cured using a **poly-isocyanate curing agent**, which contains a small proportion of **isocyanate monomer**, which is a small, but potentially significant hazard if handled inappropriately. (See Tech Note 2.1 - Isocyanates.) **If handled responsibly, like any solvent-borne paint**, polyurethane paints are quite safe to use.

### Brush and Roller Application

In brush and roller application, the hazards are largely limited to splash and spillage of paint directly onto unprotected areas of the body, and inhalation of solvent vapours, so protect the body with appropriate safety wear, and use appropriate face masks.

### Spray Application

Whenever spraying polyurethanes or any other type of paint, **avoid inhalation of spray mist** by the use of a well-fitting, positive-pressure, air-fed full-face respirator, and comply with all relevant provisions of your respective State Spray Painting Regulations (**Qld, NSW, ACT, Vic, Tas, SA, WA & NT**). Other items include overalls, safety shoes and solvent-resistant gloves.



### Which Polyurethanes Should I Use?

- **Durethane** - Two-pack polyester urethane available in high gloss colours and clear, and flat clear for spray application
- **Luxathane R** - Recoatable high gloss polyurethane finish for spray application
- **Quantum FX** - Recoatable metallic gloss polyurethane finish for spray application
- **Quantum** - Recoatable clear high gloss polyurethane finish for spray application over Quantum FX for a high gloss "wet look"
- **Weathermax HBR** - High build recoatable gloss polyurethane finish for brush and roller application



### SUMMARY

Polyurethane coatings offer vastly superior **durability** and **aesthetics** to most other types of paint, and should be considered in all cases where high aesthetic appeal and long-term protection of the substrate are important, and where significantly lower maintenance requirements are desired. Polyurethane coatings should also be considered on all high visibility graffiti-prone areas.

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