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# GUIDE TO AS/NZS 2312.1:2014

A guide to the protection of steel against atmospheric corrosion

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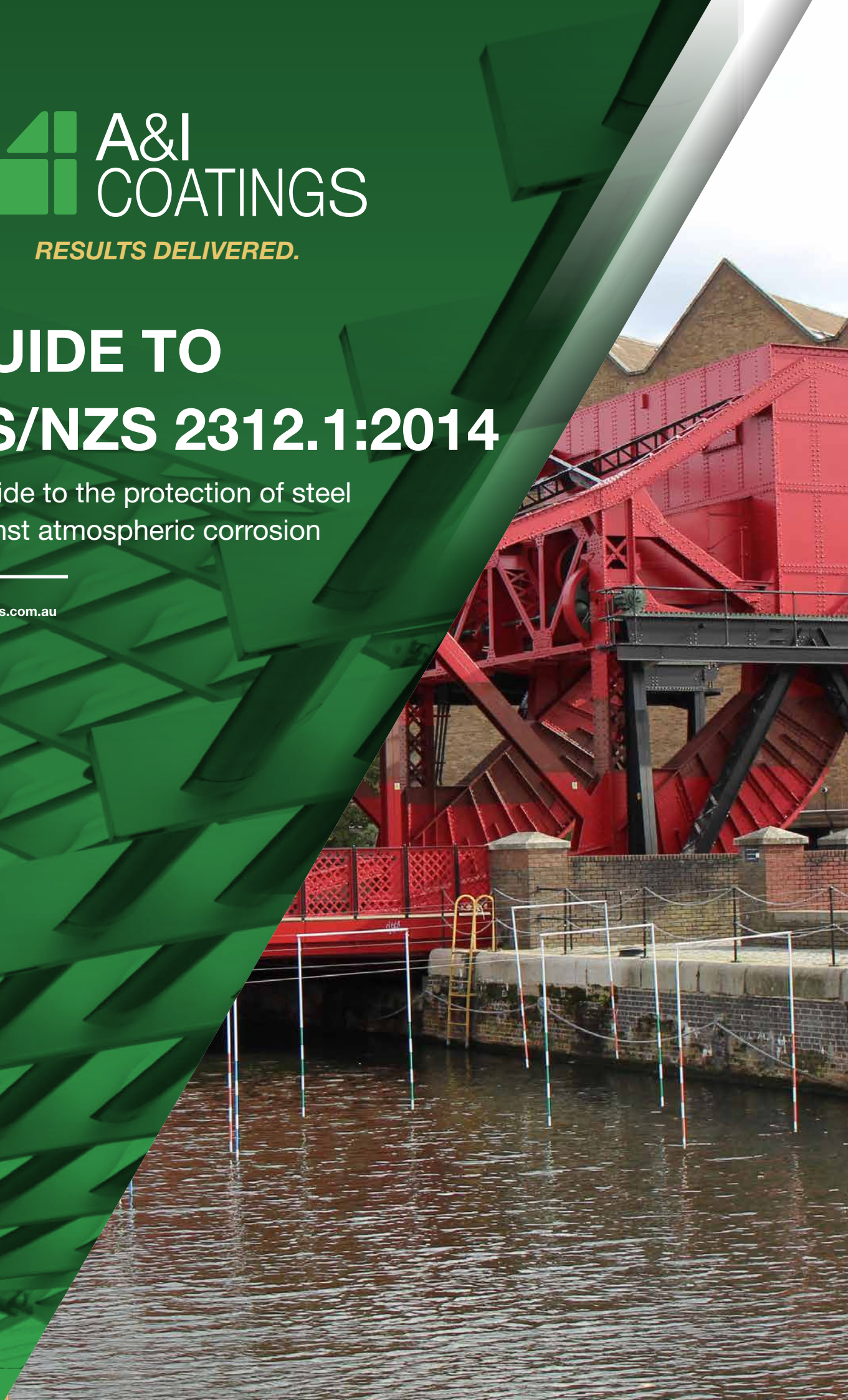


## About this guide

This guide is intended as supplementary document to AS/NZS 2312.1:2014 “Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings.” This guide is produced by A&I Coatings.

## The protection of steel

Steel is a widely used and very functional building material commonly used in the construction industry. Steel is very versatile, being easy to transport and erect and is easily recognisable in many of the world’s largest buildings and structures. Along with being very versatile, steel is a leading contributor to sustainability as it can generally be reused or recycled at the end of a building lifespan.

A coating over steel is still the most straightforward and economic way to prevent corrosion. Coatings over steel serve two purposes: to protect the substrate from corrosion and to provide specifiers with the opportunity to select a range of colours and finishes to distinguish their structure.

## The environment

The environment is the surrounding region in which elements of one or more corrosive agents are present.

**Atmospheric Corrosivity Categories Based on AS/NZS 2312.1:2014**

| Category | Corrosivity | Description* |
|---|---|---|
| C1 | Very Low | Environments in this category are most commonly found inside heated or air-conditioned buildings with clean atmospheres, such as most commercial buildings. They may also be found in semi-sheltered locations remote from marine or industrial influence and in unheated or non-airconditioned buildings |
| C2 | Low | Dry, rural areas and other regions remote from the coast or sources of pollution, and most areas of Australia and New Zealand beyond at least 50 km from the sea. Can extend as close as one kilometre from seas that are sheltered. Typical areas occur in arid and rural inland regions, most inland cities and towns, and suburbs of cities on sheltered bays. |
| C3 | Medium | Coastal areas with low salinity. Varies significantly with factors such as winds, topography, and vegetation. Extends beyond about 50 m from the shoreline to about one kilometre inland around sheltered seas. For less sheltered bays, this category extends from 100 m from the shoreline to about 3 to 6 km inland. |
| C4 | High | Coastal areas with moderate salinity. Extends from about 50 m to several kilometres inland around moderately sheltered seas. For less sheltered bays, this category extends from about 100 m to several kilometres inland. Typical areas occur in coastal cities and towns such as Sydney, Brisbane, Perth, and Auckland. |

* For full details on atmospheric corrosivity categories, refer to AS/NZS 2312.1.2014 section 2.0 and AS 4312.2019

**Atmospheric Corrosivity Categories Based on AS/NZS 2312.1:2014**

| Category | Corrosivity | Description |
|---|---|---|
| C5-I | Very High - Industrial | This classification can be located within highly active industrial zones, where the surroundings could be acidic, registering a pH below 5. Instances of dampness and/or contamination typically associated with Category C4 may occasionally overlap with this classification. |
| C5-M | Very High - Marine | Coastal areas with high salinity. Extends up to about 50 m inland around unsheltered seas or within surf zones. For less sheltered bays, this category extends up to about 100 m inland. Typical areas occur near beachfront and near chemical plants. |
| CX | Extreme | This classification is frequently observed in areas adjacent to coastal surf beaches, characterized by substantial salt accumulation or harsh acidic industrial settings. |
| T | Inland Tropical | The coastal regions of northern Queensland, the Northern Territory, northwestern Western Australia, Papua New Guinea, and the Pacific Islands are included, except for areas affected by salinity. Corrosiveness in inland areas typically remains low, akin to Category C2, yet the environment's propensity to degrade organic coatings implies reduced durability compared to Category C2. |

# Coatings overview

## 1st Coat: Primer

The purpose of a zinc primer for steel is primarily to provide corrosion protection. Zinc primers are applied to steel surfaces as a first layer before subsequent coatings or as a standalone coating. Zinc is known for its ability to sacrificially protect steel from corrosion through a process called galvanic protection. When the steel surface is exposed to moisture or other corrosive elements, the zinc primer corrodes preferentially, protecting the underlying steel from rust and other forms of corrosion.

Additionally, zinc primers often provide excellent adhesion to steel surfaces, promoting better bonding with subsequent layers of paint or coatings, thereby enhancing the overall durability and longevity of the coating system. This makes them a common choice in various industries such as automotive, marine, construction, and industrial applications where steel structures are exposed to harsh environmental conditions.

## 2nd Coat: Intermediate/Barrier coat

Intermediate or barrier coats form the 2nd coat of a 3coat system. The purpose of an intermediate coat is to provide additional protection and enhance the performance of the coating system. They are typically applied between a zinc primer and suitable UV resistant topcoat such as a Polyurethane. Intermediate/Barrier coats play a crucial role in enhancing corrosion protection, chemical resistance, and overall durability of the coating system. The specific requirements will depend on the environmental conditions, intended application and performance expectations for the steel structure.

## 3rd coat: Topcoat

Topcoats are necessary for steel to provide enhanced durability, aesthetic appeal, weather resistance, chemical resistance, easy maintenance, surface protection, and UV protection. They are a critical component of protective coating systems that help ensure the longterm performance and appearance of steel structures in various applications.

## Product selection guide for steel based on AS/NZS 2312.1:2014 Table 6.3

| Coating System Details | | | | | | | | | | | | | Durability - Years to first maintenance (note 3) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| System | ISO 129445 Designation (note 1) | Surface Preparation | 1st Coat | | | 2nd Coat | | | 3rd Coat | | | Total nom DFT µm | Atmospheric Corrosivity Category | | | | | | |
| | | | Type | PRN | Nom DFT µm | Type | PRN | Nom DFT µm | Type | PRN | Nom DFT µm | | CI Very low | C2 Low | C3 Med | C4 High | C5-I Very High Industrial | C5-M Very High Marine | T Inland Tropical |
| **ALKYD** | | | | | | | | | | | | | **ALKYD** | | | | | | |
| ALK1 | | St 3/Sa 2 | Vitrethane 445 | C05 | 40 | - | | - | - | - | - | 40 | 5+ | 0-5 | - | - | - | - | - |
| ALK2 | | St 3/Sa 2 | Vitrethane 445 | C05 | 75 | Vitrethane 406 | C20 | 402 | - | - | - | 115 | 10+ | 5-10 | 2-5 | - | - | - | 2-5 |
| ALK3 | | St 3/Sa 2 | Vitrethane 445 | C05 | 40 | Vitrethane 407 | C20 | 40 | Vitrethane 407 | C20 | 40 | 120 | 15+ | 10-15 | 5-10 | 2-5 | - | - | 5-10 |
| **EPOXY - Very High Build (DFT: 250 to 500 µm per coat)** | | | | | | | | | | | | | **EPOXY - Very High Build (DFT: 250 to 500 µm per coat)** | | | | | | |
| EVH1 | | Sa 2.5 | Vitrezone 425 | C13a | 250 | - | | - | - | - | - | 250 | 25+ | 15-25 | 10-15 | 5-10 | 2-5 | 2-5 | 5-10 |
| EVH2 | A1.26 | Sa 2.5 | Vitrezone 425 | C13a | 400 | - | | - | - | - | - | 400 | * | 25+ | 15-25 | 10-15 | 5-10 | 5-10 | 10-15 |
| EVH3 | | Sa 2.5 | Vitrephos 560 | C02 | 75 | Vitrezone 425 | C13a | 400 | - | - | - | 475 | * | 25+ | 15-25 | 10-15 | 5-10 | 5-10 | 10-15 |
| EHB3 | A1.21 | Sa 2.5 | Vitrephos 560 | C02 | 75 | Vitreset 419 | C32 | 200 | - | - | - | 275 | * | 15-25 | 10-15 | 5-10 | 2-5 | 2-5 | 5-10 |
| EHB4 | | Sa 2.5 | Vitrezinc 586 | C02 | 75 | Vitrezone 425<br>Vitreset 419 | C13a<br>C32 | 200 | - | - | - | 275 | * | 25+ | 15-25 | 10-15 | 5-10 | 5-10 | 10-15 |
| EHB5 | | Sa 2.5 | Vitrephos 560 | C02 | 75 | Vitreset 416 MIO<br>Vitreset 419 | C13<br>C32 | 125 | Vitreset 416 MIO | C13 | 125 | 325 | * | 25+ | 15-25 | 10-25 | 10-15 | 10-15 | 10-15 |
| EHB6 | | Sa 2.5 | Vitrezinc 586 | C02 | 75 | Vitreset 416 MIO<br>Vitreset 419 | C13<br>C32 | 125 | Vitreset 416 MIO | C13 | 125 | 325 | * | 25+ | 25+ | 25+ | 10-15 | 15-25 | 10-25 |
| **EPOXY MASTIC - Surface Tolerant** | | | | | | | | | | | | | **EPOXY MASTIC - Surface Tolerant** | | | | | | |
| EPM2 | | St 3 | Vitreset 419 | C32 | 75 | Vitreset 419 | C32 | 75 | - | - | - | 150 | 25+ | 10-25 | 5-10 | 2-5 | - | - | 5-10 |
| EPM3 | | St 3 | Vitreset 419 | C32 | 200 | Vitreset 419 | C32 | 200 | - | - | - | 400 | | 15-25 | 10-15 | 5-10 | 2-5 | 2-5 | 10-15 |
| **POLYSILOXANE** | | | | | | | | | | | | | **POLYSILOXANE** | | | | | | |
| PSL1 | | Sa 2.5 | Vitrezinc 586 | C02 | 75 | Vitreguard 840 | C37 | 125 | - | - | - | 200 | * | 12-25 | 15-25 | 10-15 | - | - | 15-25 |
| PSL2 | | Sa 2.5 | Vitrezinc 586 | C02 | 75 | Vitreset 416 MIO<br>Vitreset 419 | C13<br>C32 | 175 | Vitreguard 840 | C37 | 75 | 325 | * | 25+ | 25+ | 25+ | 15 | 15 | 25+ |
| PSL3 | | Sa 2.5 | Vitrephos 560 | C02 | 75 | Vitreset 416 MIO<br>Vitreset 419 | C13<br>C32 | 175 | Vitreguard 840 | C37 | 75 | 325 | * | 25+ | 25+ | 15-25 | 15-25 | 10-15 | 25+ |

## Product selection guide for steel based on AS/NZS 2312.1:2014 Table 6.3

| Coating System Details | | | | | | | | | | | | | | Durability - Years to first maintenance (note 3) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| System | ISO 129445 Designation (note 1) | Surface Preparation | 1st Coat | | | 2nd Coat | | | 3rd Coat | | | Total nom DFT µm | | Atmospheric Corrosivity Category | | | | | | |
| | | | Type | PRN | Nom DFT µm | Type | PRN | Nom DFT µm | Type | PRN | Nom DFT µm | | | CI Very low | C2 Low | C3 Med | C4 High | C5-I Very High Industrial | C5-M Very High Marine | T Inland Tropical |
| **POLYURETHANE - Two pack, solvent borne** | | | | | | | | | | | | | | **POLYURETHANE - Two pack, solvent borne** | | | | | | |
| PUR1 | | St3 | Vitreset 419 | C32 | 125 | Vitrethane 630 | C26 | 50[2] | - | - | - | 175 | | * | 10-15 | 5-10 | 2-5 | - | - | 5-15 |
| | | | | | | Vitrethane 470 | C15 | 75[2] | | | | 200 | | | | | | | | |
| PUR2 | A1.15 | Sa 2.5 | Vitrephos 560 | C02 | 75 | Vitrethane 630 | C26 | 50[2] | - | - | - | 125 | | 25+ | 10-15 | 5-10 | 2-5 | - | - | 5-15 |
| | | | | | | Vitrethane 470 | C15 | 75[2] | | | | 150 | | | | | | | | |
| PUR2a | A1.17 | Sa 2.5 | Vitrezinc 586 | C02 | 75 | Vitrethane 470 | C15 | 75 | - | - | - | 150 | | 25+ | 15-25 | 10-15 | 5-10 | 2-5 | 2-5 | 10-15 |
| PUR3 | A4.08 | Sa 2.5 | Vitrephos 560 | C02 | 75 | Vitreset 419 | C32 | 125 | Vitrethane 630 | C26 | 50[2] | 250 | | * | 25+ | 15-25 | 10-15 | 5-10 | 5-10 | 15-25 |
| | | | | | | Vitreset 416 MIO | C13 | | Vitrethane 470 | C15 | 75[2] | 275 | | | | | | | | |
| PUR4 | A1.20 | Sa 2.5 | Vitrezinc 586 | C02 | 75 | Vitreset 419 | C32 | 125 | Vitrethane 470 | C26 | 50[2] | 250 | | * | 25+ | 15-25 | 10-15 | 5-10 | 5-10 | 15-25 |
| | | | | | | Vitreset 416 MIO | C13 | | Vitrethane 470 | C15 | 75^ | 275 | | | | | | | | |
| PUR5 | A1.23 | Sa 2.5 | Vitrezinc 586 | C02 | 75 | Vitreset 419 | C32 | 200 | Vitrethane 470 | C15 | 50[2] | 325 | | * | 25+ | 25+ | 25+ | 15-25 | 15-25 | 25+ |
| PUR6 | | St 3 | Vitreset 419 | C32 | 75 | Vitreset 419 | C32 | 75 | Vitrethane 470 | C15 | 75[2] | 225 | | * | 15-25 | 10-15 | 5-10 | 2-5 | 2-5 | 5-15 |
| PUR7 | A1.19 | Sa 2.5 | Vitrezinc 586 | C02 | 75 | Vitreset 416 MIO | C13 | 75 | Vitrethane 470 | C15 | 75[2] | 225 | | * | 25+ | 15-25 | 10-15 | 5-10 | 5-10 | 10-15 |
| **FLUOROPOLYMER - Two pack, solvent borne** | | | | | | | | | | | | | | **FLUOROPOLYMER - Two pack, solvent borne** | | | | | | |
| FEVE1[4] | | Sa 2.5 | Vitrezinc 586 | C02 | 75 | Vitreflon 790^ ** | C15 | 125 | - | - | - | 200 | | 25+ | 25+ | 15-25 | 10-15 | 10-15 | 10-15 | 15-25 |
| FEVE2[4] | | Sa 2.5 | Vitrezinc 586 | C02 | 75 | Vitreset 416 MIO | C13 | 125 | Vitreflon 790^ ** | C15 | 75[2] | 275 | | * | * | 25+ | 25+ | 15-25 | 15-25 | 15-25 |
| FEVE3[4] | | Sa 2.5 | Vitrezinc 586 | C02 | 75 | Vitreset 416 MIO | C13 | 125 | Vitreflon 790^ ** | C15 | 75[2] | 350 | | * | * | 25+ | 25+ | 25+ | 25+ | 25+ |

** Whilst Vitreflon 790 Fluoropolymer topcoats fall in the Polyurethane category as per Appendix D in AS2123.1:2014, Fluoropolymers are superior in performance to all other Polyurethane and Polysiloxane topcoats. FEVE Fluoropolymer coatings have higher bond energy in the molecular structure compared to maximum UV energy. Projects around the world where FEVE Fluoropolymer has been used, show a recoat lifecycle of 40 - 50 years. The durability for this system is a variation to AS/NZS 2312.1:2014

* Whilst this system is highly durable in this corrosive category, it is deemed not to be economical
^ Extended durability offered for higher topcoat DFT achieved above that quoted on the table. Variation from AS2313.1:2014

**Notes to Table 6.3**
Note 1: ISO 12944-5:2007 equivalent designation (to within ±25 µm total DFT). The durability given in ISO 12944-5 of ISO equivalent may be different.
Note 2: Multiple coats may be required with some colours to achieve optimum opacity
Note 3: Durability is defined in AS/NZS 2312.1:2014 as "The time elapsed before the first major maintenance (recoating or patch repairs, see AS2312.1:2014 Section 8) of a coating system becomes necessary, to arrest corrosion".
Note 4: FEVE Systems listed are a variation to AS2312.1.2014.

**Abbreviations**
PRN: Paint reference number (see Appendix D in AS2123.1.2014)
DFT: Dry film thickness
Sa, St: See ISO 8501-1

## Paint reference numbers (PRN) and colour availability

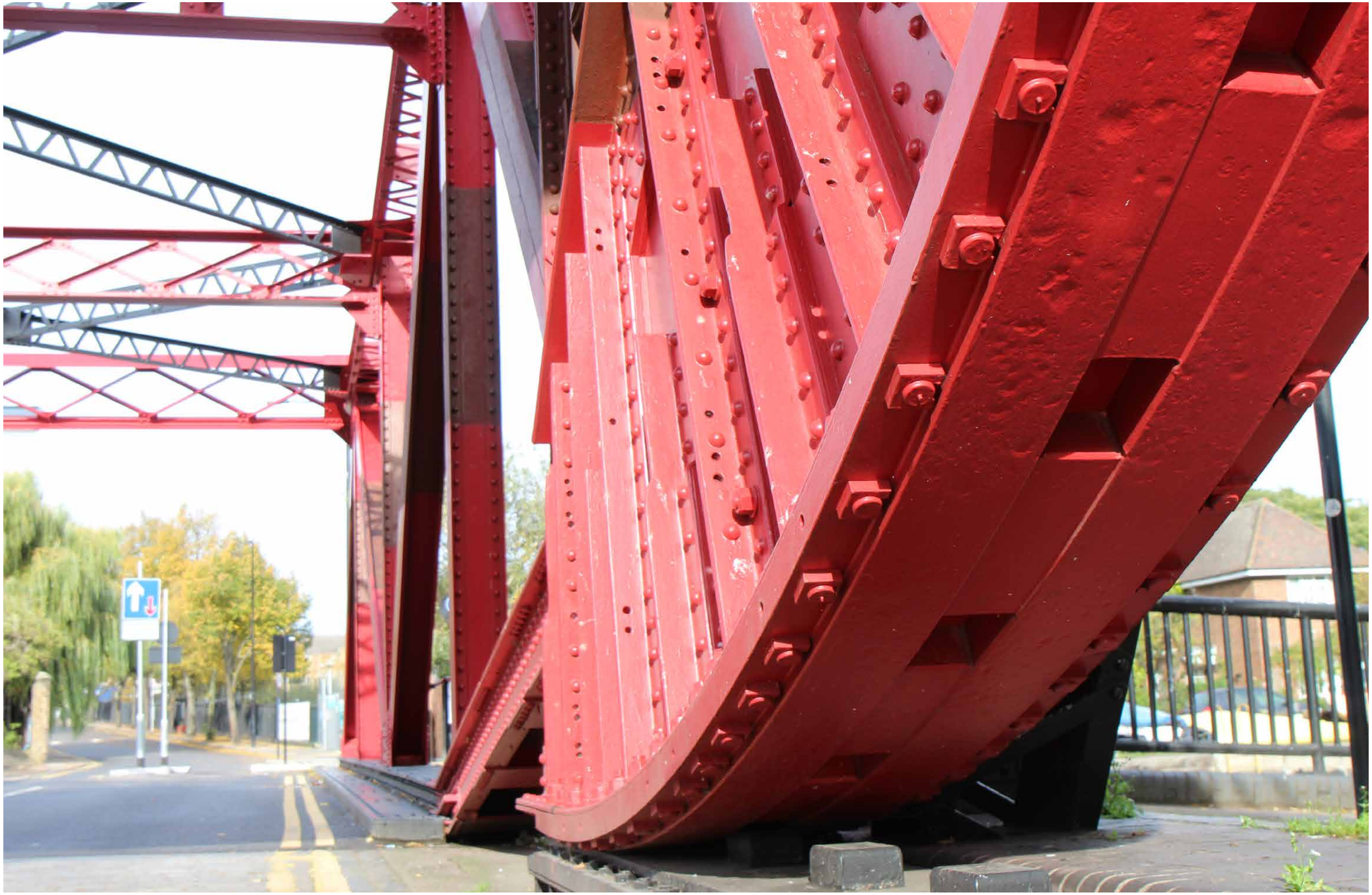
| Paint Ref No. (PRN) | Generic Description | Product Name | Data Sheet | Description | DFT Range | Colour Range |
|---|---|---|---|---|---|---|
| C02 | Organic Zinc | Vitrezinc 586 | 1001 | Two pack epoxy zinc rich primer | 4075 | |
| C05 | Alkyd Primer | Vitrethane 445 | 1098 | Fast drying high build anticorrosive primer for single pack applications | 4075 | |
| C13 | High-Build Epoxy (2 Pack) | Vitreset 416 | 123 | High build epoxy with micaceous iron oxide for superior protection | 200300 | |
| C13a | Very High-Build Epoxy (2 Pack) | Vitrezone 425 | 142 | Ceramic or Glass reinforced epoxy providing enhanced build and protection properties | 350500 | |
| C15 | High-Build Polyurethane | Vitrethane 470 | 1112 | High build polyurethane with brush and roll application properties | 50100 | |
| | | Vitreflon 790 | 1003 | Highly durable high build fluoropolymer with superior weathering and UV resistance | 50125 | |
| C20 | Gloss Alkyd Paint | Vitrethane 406 | 1095 | High gloss single pack alkyd enamel coating | 2550 | |
| | | Vitrethane 407 | | High gloss single pack alkyd enamel with anticorrosive pigment | 2550 | |
| C26 | Polyurethane Gloss (2 Pack) | Vitrethane 630 | 024 | Durable polyurethane topcoat | 50100 | |
| C32 | Epoxy Mastic | Vitreset 419 | 1031 | Two pack surface tolerant epoxy | 125250 | |
| C37 | Polysiloxane | Vitreguard 840 | 1069 | Durable topcoat with very good weathering and UV resistance | 75125 | |

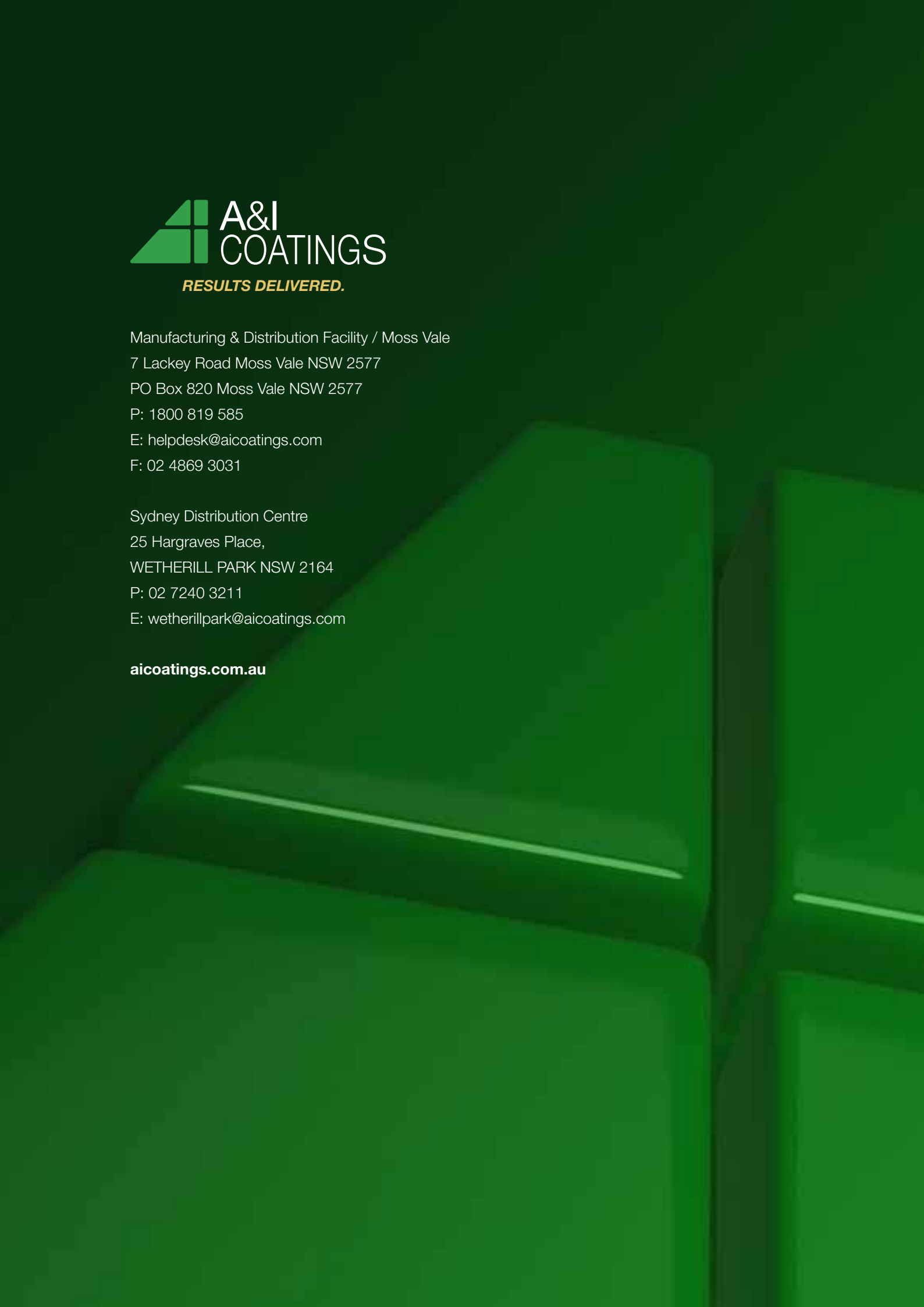
One colour only

Limited range of factory packaged colours

Available in the full range of colours

Limited range of colours - Contact A&I for colour availability





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