

DECKFORM® zinc-coated structural steel

INTRODUCTION

Since the mid 1960s concrete slab design has utilised various proprietary profiled steel sheeting systems that can act as both formwork and tensile reinforcement for composite structural elements. The compressive strength of concrete and the tensile strength of steel form a highly efficient and versatile system.

BlueScope Steel manufactures DECKFORM® zinc-coated structural steel, a steel product specifically designed for use in structural formwork applications.

Proper design, specification, installation and care of DECKFORM® steel will ensure many years of effective service. This Technical Bulletin provides general information regarding the use of DECKFORM® steel and is not a substitute for professional advice. BlueScope Steel recommends that you seek specific professional advice regarding the use of DECKFORM® steel in your project.

APPLICATIONS

Since 1986 BlueScope Steel has been researching the behaviour of composite slabs and formwork. Extensive testing of full-scale composite slabs has been performed and, as a result, it has been possible to gain a sound understanding of their physical behaviour. This information, coupled with corrosion studies of metallic coated products, enables BlueScope Steel to confidently recommend DECKFORM® steel for a variety of formwork and composite slab applications.

DECKFORM® steel is suitable for domestic applications such as home units and town houses, as well as commercial and industrial buildings.

DESIGN AND DURABILITY

As with all building materials, the performance and durability of DECKFORM® steel is dependent on building design, specification, detailing, construction and maintenance.

The expected service life of a structure is not typically the same as the durability

range of the individual components used to construct the structure, or the guarantee period of those components. This point is acknowledged in Australian/New Zealand Standard AS/NZS 2312:2002 *Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings*, Clause 1.6 *Durability Considerations*, which notes that the protection offered by coating systems is usually shorter than the expected service life of the structure. In order to achieve a nominated design life for a structure, due consideration must be given to the maintenance or renewal requirements of individual components at the planning and design stage. When components of the structure are not accessible for maintenance after assembly, it should be ensured that the corrosion protection system of those components remain effective for the design life of the structure.

The terms “durability” and “guarantee” should not be used interchangeably. These terms have distinct meanings. Clause 1.6 of AS/NZS 2312:2002 states:

- *“It is stressed that the durability range is not a ‘guarantee time’.”*
- *“Durability is expressed in terms of coating life to first major maintenance”*
- *“The guarantee time is usually shorter than the durability range. There are no rules that link the two periods of time.”*
- *“A guarantee should be provided to protect against a fault in the coating product, or its application, which would generally manifest itself within a relatively short period of time.”*

Effective inspections are the starting point to improve component durability. For example, if the underside of DECKFORM® steel is periodically inspected and recorded as stipulated in AS/NZS 2312:2002, Section 10 *Maintenance of Protective Coating Systems* (Clause 10.1), any potential corrosion issues can be addressed in the early stages.

DECKFORM® STEEL MAINTENANCE GUIDELINES AND EXPOSED SURFACE CONSIDERATIONS

Structural steel decking is used in a variety of external and internal environments. Typically, the top surface of DECKFORM® steel is encased in concrete while its reverse surface is exposed to the environment. As with other building materials, the environment to which the component is exposed must be taken into account when specifying a DECKFORM® steel product. Environmental considerations will also influence the most appropriate coating class, the frequency of maintenance and any additional corrosion protection which may be necessary. For specific advice on coating class specification, please contact BlueScope Steel Direct.

The maintenance requirements for DECKFORM® steel will vary depending on the local environment and whether the application is external or internal. External environments should be subject to a comprehensive maintenance regime while internal environments require infrequent maintenance due to a comparatively lower risk of corrosion. The maintenance guidelines in *Table 1* aim to prolong the life of DECKFORM® steel in service and avoid premature corrosion issues. The information provided in **Technical Bulletin TB-4 Maintenance of COLORBOND® steel and ZINCALUME® steel** is also of relevance to DECKFORM® steel.

In order to meet the design life of a structure, additional corrosion protection measures may be required in some service conditions. These additional measures typically involve the application of a suitable barrier system (refer AS/NZS 2312:2002, Section 6 *Paint Coating Systems for Corrosion Protection*) to the exposed surface of the DECKFORM® steel. In all cases, the life of DECKFORM® steel can be extended through a regular maintenance and cleaning regime.

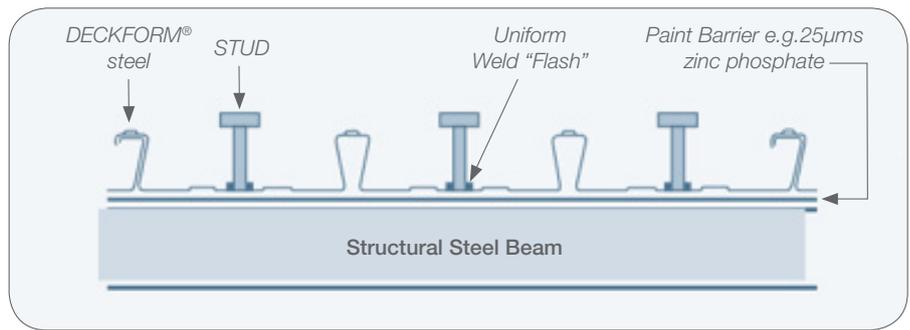
IMPORTANT: Application of a barrier system and/or adherence to maintenance routines does not negate the need for proper specification, installation and good detailing practice to prevent corrosion emanating from within the slab.

If a painted finish is required on the exposed surface for aesthetic reasons, pre-painted DECKFORM® steel with a BRITEWHITE™ colour finish on one side is available. This painted finish is essentially an aesthetic feature and is **NOT** a substitute for application of a suitable barrier system as described above. DECKFORM® steel with a BRITEWHITE™ finish is supplied with a removable plastic film, known as CORSTRIP®, which requires removal in-situ.

LOW GLARE COATED (LGC) DECKFORM® STEEL

A variant of DECKFORM® steel, known as LGC DECKFORM® steel, is available with a thin blue resin coating on one side only which substantially reduces reflected light and glare, whilst also trapping almost 90% of harmful UV-B. The resin coating is water-based and is resistant to many chemicals that may be found on construction sites. However, the resin can be removed with alcohol, some hydrocarbon solvents and petroleum products such as petrol and diesel. The resin coating can be

Figure 1: Schematic of steel composite decking incorporating DECKFORM® steel prior to concrete pour (image not to scale).



readily welded, and shear studs can be welded through the LGC DECKFORM® steel product in the same manner as regular DECKFORM® steel.

CONCRETE REQUIREMENTS

When using DECKFORM® steel, as with ply-wood formed concrete suspended floors, the upper surfaces must comply with conditions stipulated in Australian Standard AS 3600:2009 *Concrete structures*, which prescribes detailing such as concrete cover thickness, deflection limits, crack prevention and specified concrete quality and strength. All these elements are vital to prevent moisture ingress and protect the reinforcement and structural performance of any suspended floor. Conformance to AS 3600:2009 and prevention of water or corrosive media penetration from the top surface of the concrete deck is a condition of the DECKFORM® steel warranty*. It is recommended that the designing

structural engineer follow AS 3600:2009, Section 4 *Design for Durability* in their assessment of durability design.

BEAM SUPPORT REQUIREMENTS

When DECKFORM® steel is used in a steel composite slab construction, the sheeting is placed on top of structural beams. If an uncoated steel beam is used isolation from the DECKFORM® steel must be ensured; this can be achieved by the inclusion of a neutral protective barrier (for example, by pre-painting the beam). This is required to avoid the creation of a corrosion couple which would promote an attack of the zinc coating. In the case of steel composite decking, steel studs are then placed on top of the DECKFORM® steel sheet and welded through the sheeting, to the underlying beam, by using a proprietary stud-welding gun. It should be noted that zinc coating thickness, in conjunction with the paint thickness and type of paint used will affect the required current,

Table 1: Care and Maintenance Principles.

ELEMENT	ACTION	GUIDING PRINCIPLES
INSPECTIONS	Inspect for: <ul style="list-style-type: none"> • Detritus material; • Evidence of moisture; and • Signs of corrosion 	<ul style="list-style-type: none"> • Determine frequency of detritus build-up on product (e.g. salt, dirt, debris, pollutants). • Inspect for signs of moisture on all surfaces. Moisture may be constant, frequent or cyclic in nature. • Inspect with special attention to: <ul style="list-style-type: none"> – Unwashed areas – Crevices and edge detailing – Around penetrations and plumbing – White corrosion product (zinc oxide) indicates corrosion is underway and should be addressed immediately (contact BlueScope Steel Direct for recommendations)
CARE AND MAINTENANCE	<ul style="list-style-type: none"> • Regularly remove detritus material and prevent its build up; • Dry all moist areas promptly and ensure adequate ventilation; and • Prevent future contact with moisture. 	<ul style="list-style-type: none"> • Detritus material accelerates corrosion due to the potential for increased time of wetness (if allowed to get wet) or increased electrolytic potential. • Moisture is a key driver of corrosion; as the time of wetness increases so too does the corrosion rate. • Removal of detritus material will reduce the corrosion rate of the product and reduce the risk of white corrosion product. • If the frequency of detritus build-up is higher than can practicably be removed, a barrier coating should be used.
MAINTENANCE RECORDS	Retain records of: <ul style="list-style-type: none"> • Inspection observations; • Care and maintenance regime; and • Results of work carried out. 	<ul style="list-style-type: none"> • Retaining records enables assessment and understanding of maintenance requirements for a site. • Records are also useful for confirming compliance to warranty* terms and conditions in event of a claim.

NOTE: For guidance on maintenance please refer to [Technical Bulletin TB-4 Maintenance of COLORBOND® steel and ZINCALUME® steel](#).

time and plunge settings of the welding gun. The schematic in *Figure 1* shows DECKFORM® steel that has been stud welded to a prepainted structural steel beam prior to the concrete slab being poured. Isolation of the structural steel beam from the DECKFORM® steel is achieved by the use of a paint barrier.

The use of a neutral protective barrier between uncoated steel beams or timber formwork is a condition of the DECKFORM® steel warranty*.

ON-SITE INSPECTION AND TESTING OF WELDS

When welding to structural steel beams is required, the weld flash around the base of the stud should be inspected. Generally, a good weld is one that has a uniform flash around the whole circumference of the base of the stud (see *Figure 2*).

Stud weld qualification tests should be conducted in accordance with

Figure 2: Example of 360° Flash.



Australian/New Zealand Standard AS/NZS 1554.2:2003 *Structural steel welding – PART 2: Stud welding (steel studs to steel)*.

RELATED TECHNICAL BULLETINS

Technical Bulletin TB-4

Maintenance of COLORBOND® steel and ZINCALUME® steel

REFERENCED AUSTRALIAN STANDARDS

- **AS/NZS 1554.2:2003** – Structural steel welding – PART 2: Stud welding (steel studs to steel)
- **AS/NZS 2312:2002** – Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings
- **AS 3600:2009** – Concrete structures

NOTE:

All Australian and Australian/New Zealand Standards should be read to incorporate any and all amendments to the most recently published version.

If you have any questions regarding this Bulletin, please contact BlueScope Steel Direct on 1800 800 789.

To ensure you have the most current Technical Bulletin, please go to bluescopesteel.com.au.



* Warranty subject to application and eligibility criteria. Warranties are not available for all products and applications. The duration and terms and conditions of any available warranty will depend on product use and application. For full terms and conditions and to determine the eligibility of your project refer to www.bluescopesteel.com.au/warranties or call BlueScope Steel Direct on 1800 800 789.

The information and advice contained in this Technical Bulletin ('Bulletin') is of a general nature only and has not been prepared with your specific needs in mind. You should always obtain specialist advice to ensure that the materials, approach and techniques referred to in this Bulletin meet your specific requirements.



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