

Steel building frames

INTRODUCTION

This bulletin has been written to assist designers, builders and homeowners to realise the benefits of frames made from TRUECORE® steel.

Whilst the information provided in this bulletin is targeted for TRUECORE® steel framing it is also applicable to other metal components contained within roof and wall cavities, such as fascia brackets, nail plates, strap bracing and wall ties.

The general information provided in this bulletin is not a substitute for professional advice. BlueScope Steel recommends that you seek specific advice regarding the needs of your project.

ENVIRONMENT

This TB provides guidance on practices to separate the frame from the environment in relation to the distance from different marine conditions – see Table 1.

HANDLING AND SITE STORAGE

As with all building materials, care must be exercised when handling and storing frames and trusses made from TRUECORE® steel.

Suitable gloves must always be worn when handling framing material. Framing material must be handled in a manner suitable to protect the coating and to avoid any adverse effects on product performance.

Minor scratches are unlikely to affect product performance, however if the coating is accidentally damaged and needs repair, the affected area can be treated by the application of a zinc rich paint designed for this purpose. Refer to **Technical Bulletin TB-10** *Cut Edge Protection of next generation ZINCALUME® aluminium/zinc/magnesium alloy-coated steel and COLORBOND® prepainted steel with Activate® technology*, and **Technical Bulletin TB-2** *Overpainting and Restoration of Exterior BlueScope Steel Products*.

Frames and trusses must be stored on a flat, even surface and other loads not placed on top. This will reduce the risk of the frame being structurally damaged prior to erection.

It is good practice to minimise exposure of the frame to the weather during the building process. Prolonged exposure of the frame to the weather increases the risk of depositing salts or other corrosive materials onto the frame which can affect both the warranty and service life of the frame. This is most easily addressed by ensuring the cladding is installed as soon as possible after the frame is erected.

NASH PUBLICATIONS

The National Association of Steel-framed Housing (NASH) has produced several fact sheets that outline some of the benefits of steel frames. These can be found on the NASH website under Publications. They cover the following areas:-

- Fire
- Durability
- Movement
- Electrical Safety
- The Environment
- Termites



WALL FRAMES

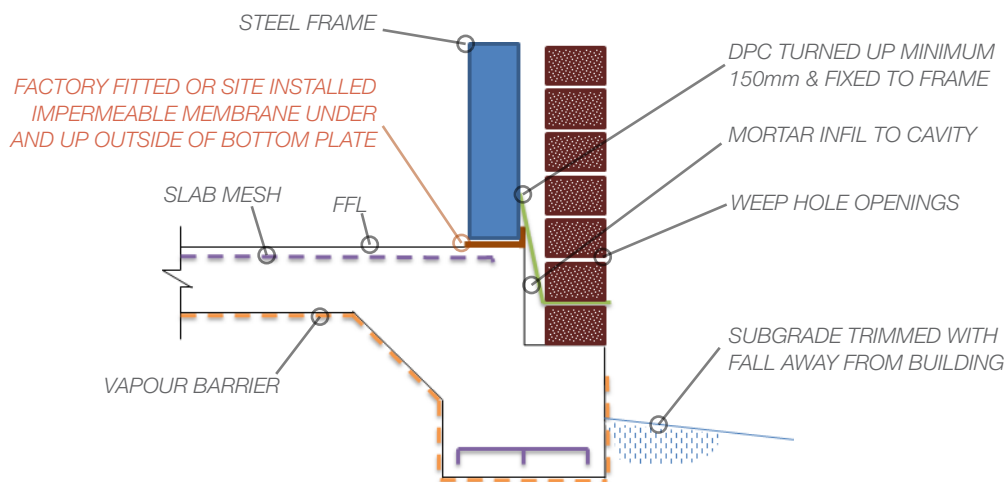
Use a Membrane

An impermeable membrane should be installed under all perimeter bottom plates fixed to concrete slabs on ground. The membrane should also extend up the weather side flange of the bottom plate (see Figures 1 and 2).

Suitable impermeable membranes include, but are not limited to:

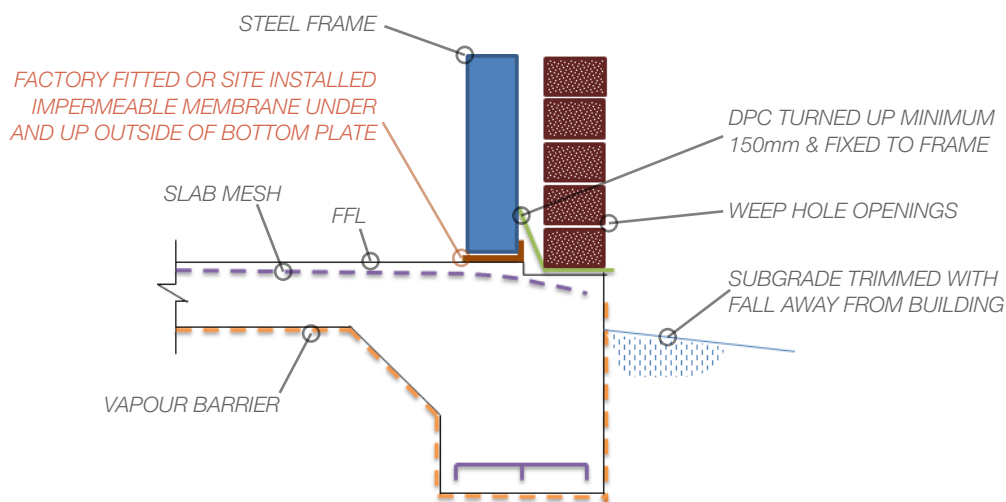
- Bitustik/Bituthene® 2000 by Grace Construction Products,
- Polyethylene and other compatible products as mentioned in Australian/New Zealand Standard AS/NZS 2904-1995: *Damp-proof courses and flashings*
- Brushable Hydroseal from Tremco
- Kordon Termite Barrier

Figure 1: Deep Edge Rebates



PROPOSED REBATE SYSTEM Note: Beam reinforcement shall be designed to suit soil classification.

Figure 2: Shallow Edge Rebates



PROPOSED REBATE SYSTEM Note: Beam reinforcement shall be designed to suit soil classification.

The protection of the weather side flange (see Figure 1) is necessary because this part of the frame is subject to moist air movement from the lower parts of the cavity as it tries to evaporate and move past the masonry damp-proof course.

The protection of internal bottom plates is not considered necessary.

For “wet areas” refer to Australian Standard AS 3740-2010: Waterproofing of Domestic Wet Areas. The type of membrane used must be “impermeable to moisture”.

Wall Sarking

Wall sarking may be installed at the outer face of the framing. It has the potential to provide several benefits, including providing secondary weather protection from moisture and salt-laden air and allowing the frame to be quickly wrapped and protected from the external environment. Wall sarking also

improves the performance of insulation minimising the downgrading impact of wind and has inherent insulation when it includes a reflective surface facing an air-gap. Wall sarking can also minimise the potential impact of mortar splash on brick ties and frame causing corrosion; see “INCOMPATIBLE MATERIALS” section of this Technical Bulletin.

Wall Insulation

Framing made from TRUECORE® steel offers many advantages, including tight dimensional tolerances, which can assist in achieving good insulation. One example of how tight tolerances can help is by reducing air leakage between the frame and insulating materials when heating a building in a cool climate.

When insulating steel wall frames in cold climates or when building with cladding materials with low thermal resistance,

such as metal, plastic or fibre-cement sheeting, then rigid board or sheathing-type insulation products are recommended. These products are not bridged by the frame so do not lose any of their insulating properties. The NCC should be consulted for installation guidance where bulk insulation is used with steel frames and lightweight cladding

Wall Ties

Sometimes a forgotten structural component, the choice of wall ties can be important to the structural performance of a building frame. Galvanized wall ties are suitable for use with steel framing in most situations, although more durable ties may be needed within 1km from breaking surf and heavy industrial areas; refer to Australian Standard AS 3700-2011: Masonry Structures.

Polymer wall ties are now available and must provide good performance with a steel building frame in all environments.

Stainless steel wall ties, if used, must be electrically isolated from the steel framing material to avoid the possibility of corrosion resulting from the use of incompatible dissimilar metals.

ROOF TRUSSES

Roof trusses should be enclosed within the building envelope to minimise the ingress of any salt-laden or moist air into the roof space, particularly for buildings in close proximity to surf or exposed marine influences. In these environments, roof design should aim to tightly seal the roof so as to minimise uncontrolled ingress of air. Installation of roof sarking, reflective foil or insulation blanket and foil is beneficial to prevent excessive ingress of air into the roof space at ridge, valleys and gutter as well as providing other benefits. For better protection the roof sarking or reflective foil should extend over the fascia, ridges and hips and extend into valley gutters; noting that for blanket and foil the blanket should terminate prior to the gutters/valley gutters to avoid wicking of moisture – refer to Figure 3.

An alternative approach to blocking ingress into the roof space in these regions may also be achieved through the use of profile closure strips made of a durable material such as EPDM or similar compatible material. Any gaps between the wall and fascia or eaves must be sealed, such as by using appropriate storm mouldings or durable profile closure strips.

Where roof space ventilators or vents are used they must be placed at locations where corrosive aerosol influence is minimized, e.g. leeward side of prevailing marine influences. High roof space ventilation in marine or industrial environments must also be avoided, which is in line with explanatory information of the NCC Vol.2 Clause 3.12.1.2(b)*.

Avoid areas of exposed but unwashed framing material (see **Corrosion Technical Bulletin CTB-8 Building Applications**).

* The explanatory information of NCC Volume 2 provides caution around the ingress of air to the building cavity from high ventilation, 'Compliance with the ventilation provisions in 3.12.1.2(b)(ii) may result in the ingress of wind driven rain, fine dust, corrosive aerosols, or stimulate the growth of mould or fungus in the roof enclosure. Consideration must therefore be given to the surrounding environmental features, including exposure to marine or industrial environments, prior to adopting this as an alternative to the roof insulation provisions in 3.12.1.2(b)(i).'

EARTH THE FRAME

For safety reasons, your frame made from TRUECORE® steel must be earthed in accordance with the NCC Volume 2, Clause 3.4.2.2, Australian Standard AS 3000-2007: Wiring Rules, and any other state, local or electricity requirements or regulations.

PHONE / RADIO RECEPTION

A steel frame should not affect your telephone, wireless computer network, radio, mobile phone or television reception.

Figure 3. Sarking extending to the gutter for metal roofing

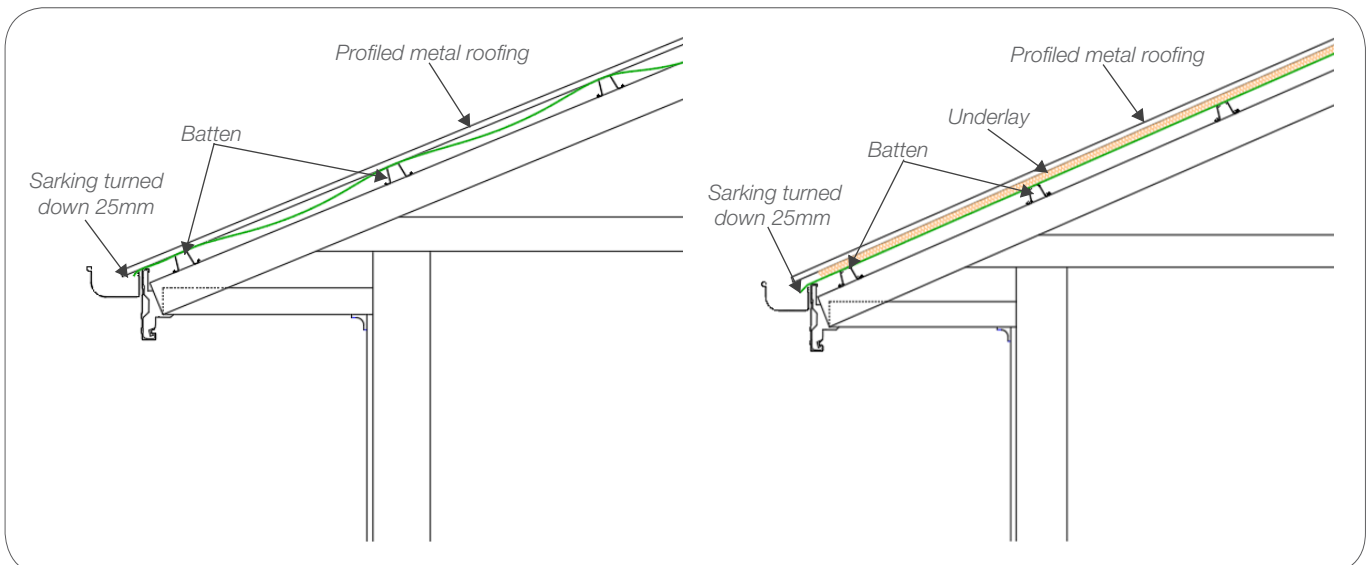


Table 1: This table recommends methods of separating the frame from the external environment over the life of the building, with level of isolation depending on the corrosive nature of the site. In marine zones, a greater level of isolation from the external environment is required to prevent salt laden air from contacting the TRUECORE® steel frame.

| MARINE ZONE | |
|---|---|
| <2KM FROM SURF OR <1KM FROM EXPOSED MARINE** | <1KM FROM SURF** |
| ALL ROOF TYPES | |
| <ul style="list-style-type: none"> The gap at the top of the wall between the fascia, bargeboard and soffit linings, is adequately sealed such as by using appropriate storm mouldings. <p>AND</p> <ul style="list-style-type: none"> The building has lined eaves | <p>As per marine zone <2km, plus:</p> <ul style="list-style-type: none"> Wall sarking is installed at the outer face of the frame, in accordance with Australian Standard AS 4200.2: Pliable building membranes and underlays - Installation requirements, as soon as practicable after the frame is erected and for brick veneer walls, inclusion of mesh on windward side of surf marine influence at vents, weep holes and gaps. <p>AND</p> <p>Where roof space ventilators or vents are used:</p> <ul style="list-style-type: none"> They are not placed on the windward side of surf marine influence, and They reduce aerosol ingress by including filter mesh <2mm hole size, eg. sand fly mesh; or creating a convoluted inlet path. |
| METAL ROOFS | |
| <ul style="list-style-type: none"> A pliable membrane is installed beneath the roof, such as reflective foil laminate or similar, in accordance with AS4200.2-1994. In addition, the membrane extends over the fascia by at least 25mm and is turned down over the fascia or into the gutters, extends and is turned down into the valley gutters, extends over ridges and extends to barge ends (see <i>Figure 3</i>); <p>OR</p> <ul style="list-style-type: none"> A blanket and foil is installed immediately beneath the roof. The foil extends over the fascia by at least 25mm and is turned down over fascia or into the gutters, extends and is turned down into the valley gutters, extends over ridges and extends to barge ends. <p>To avoid wicking of moisture: the blanket must be cut back to terminate prior to the gutters/valley gutters or alternatively a single course of membrane (eg reflective foil laminate or similar) may be separately installed along the gutter/valley gutter perimeter prior to installing the blanket and foil.</p> <p>OR</p> <ul style="list-style-type: none"> Closure of entry points is achieved via durable profile closure strips (or other equivalent performing solution) at fascia, ridge, hip or valley as appropriate. | <p>As per marine zone <2km</p> |
| TILED ROOFS | |
| <p>Sarking is installed beneath the roof in accordance with AS4200.2-1994.</p> | <p>As per marine zone <2km</p> |

** Refer [Technical Bulletin TB-35 Australian Salt Marine Classifications](#) for definitions and some examples.

INCOMPATIBLE MATERIALS

Materials considered incompatible in direct contact with framing components made from TRUECORE® steel include:

- Copper
- Lead
- Brass
- Stainless steel
- Treated timber, green timber and other timber capable of retaining moisture.
- Washers containing significant amounts of carbon black eg. Neoprene.

In general, mortar splashes don't pose corrosion problems if kept dry. However, if the mortar forms a continuous bridge between the brick veneer wall or slab and the TRUECORE® steel frame, it may lead to corrosion of the steel frame via moisture "wicking".

Incompatible components must be isolated from frames or trusses.

NOTE:

Frames made from TRUECORE® steel must be isolated from contact with treated, green or moist timber unless specific written advice has been obtained from BlueScope Steel.

FASTENERS

The correct choice of fastener is critical to long-term performance when fixing premium steel products. Fasteners used to fix your steel framing must be suitable for the corrosivity environment category 3 as per ISO 9223: Corrosion of metals and alloys - Corrosivity of atmospheres - Classification, determination and estimation.

Fasteners used to secure framing made from TRUECORE® steel must conform to relevant standards, be compatible with and have equivalent durability to TRUECORE® steel.

NOTE:

Welded areas must be treated by the application of a zinc rich paint to ensure weld affected area has equivalent performance to the remainder of the TRUECORE® steel frame.

NOISE

A study published by CSIRO (G A King, Dr. M Ridge and G S Walker – in Building Materials and Equipment, Vol. 17 No.1) has concluded that steel framed houses are no “noisier” than houses with other types of frames. Whether a steel frame is mechanically jointed or welded, movement caused by changes in temperature should not cause significant noise in a properly constructed and insulated building.

LIGHTNING

As mentioned previously, steel frames are earthed and therefore this provides a direct path for the energy in the unlikely event of a lightning strike.

WARRANTY

A warranty may be available upon application, subject to eligibility, for framing made from TRUECORE® steel. Warranty eligibility criteria include (but are not limited to) the following:

1. Framing must be separated from ground moisture. As a minimum an impermeable membrane must be installed under all perimeter bottom plates fixed to concrete slabs on the ground. The membrane must extend up the weather side flange of the bottom plate (see *Figures 1 and 2*). Suitable impermeable membranes are listed within this Technical Bulletin.
2. Fasteners used must be compatible with TRUECORE® steel, offer similar corrosion performance to the frame and comply with the guidelines in this Technical Bulletin.
3. Framing must be effectively separated from the external environment over the life of the building and appropriately installed and maintained. Methods for separating a TRUECORE® steel frame from the external environment are outlined in *Table 1*. Alternative methods may also be suitable provided they result in the effective separation of the frame from the external environment.

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

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RELATED BLUESCOPE STEEL TECHNICAL BULLETINS

Technical Bulletin TB-10

Cut Edge Protection of next generation ZINCALUME® aluminium/zinc/magnesium alloy-coated steel and COLORBOND® prepainted steel with Activate® technology

Technical Bulletin TB-2

Overpainting and Restoration of Exterior BlueScope Steel Products

Technical Bulletin TB-16

Fasteners For Roofing, Walling and Accessory Product – Selection Guide

Technical Bulletin TB-35

Australian Salt Marine Classifications

Corrosion Technical Bulletin CTB-8

Building Applications

Corrosion Technical Bulletin CTB-12

Dissimilar Metals

Corrosion Technical Bulletin CTB-13

Contact with Timber

REFERENCED AUSTRALIAN STANDARDS

- **AS/NZS 2904-1995** *Damp-proof courses and flashings*
- **AS 3000-2007** *Wiring Rules*
- **AS 3740-2010** *Waterproofing of domestic wet areas*
- **AS 3700-2011** *Masonry structures*
- **AS 4200.2-1994** *Pliable building membranes and underlays – Installation requirements*

REFERENCED INTERNATIONAL STANDARDS

- **ISO 9223** *Corrosion of metals and alloys - Corrosivity of atmospheres - Classification, determination and estimation.*

NOTE:

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



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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