

# DuraTherm Blue

# Insulated Foundation System

# In slab Installation

Version 1 – March 2024



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**TECHNICAL MANUAL** 

# General System Description

The **DuraTherm Blue** Insulated Foundation System is a proprietary slab-edge insulation **system** that provides insulation performance to comply with the requirements as per NZBC H1.

The **DuraTherm Blue** Insulation Panels can be installed inside the formwork prior to pouring the concrete slab or after the slab has been poured.

The **DuraTherm Blue** has an XPS core that is coated with a layer of high-strength fibreglassreinforced plaster on each side of the board. One side is smooth, with one side having a 2mm grooved surface to allow excellent connection against the concrete slab.

The **DuraTherm Blue** Insulated Foundation System is suitable for low, medium and highdensity housing use.

This system provides a quality slab-edge solution with the look of a concrete foundation at a significantly reduced cost.

### Terminology

Find below explanations of some of the acronyms used throughout this document.

For further information, refer to the Building Code Handbook for additional definitions. This can be found at the following link: https://www.building.govt.nz/building-code-compliance/ building-code-and-handbooks/building-code-handbook/

**AS** – Acceptable Solution

**AS** – Australia Standard

**BU** - Bracing Unit/s

**DPM** – Damp Proof Membrane, a sheet material, coating or vapour barrier, having a low water-vapour transmission and used to minimise water and water-vapour penetration into buildings. Usually applied against concrete in contact with the ground, sometimes referred to as the concrete underlay.

**kN** – kilo Newton/s

NZBC – New Zealand Building Code

NZS - New Zealand Standard

NZS3604:2011 - used to design most homes and other low-rise timber-framed buildings in New Zealand.

**PPE** – Personal Protective Equipment

**R-Value** – The thermal resistance rating. It is the measure used most commonly in the building and construction industry to determine a material's ability to resist the transfer of heat. The higher the R-value, the better the insulation the product will provide.

 $\textbf{SG} - Stress \ Grade$ 

**VM** – Verification Method

FFL - Finished Floor Level

WANZ - Window Association of New Zealand

**XPS** - Extruded Polystyrene

# Product Substitution

The **DuraTherm Blue** Insulated Foundation System is a proprietary system that has been carefully designed for New Zealand conditions. It has been independently tested and assessed to ensure that it meets the performance criteria outlined in the NZBC. It is imperative to use only Resene Construction Systems proprietary products where specified and that the design and construction of the slabedge system are followed so that the level of insulation performance has been achieved on site.

# What is the scope of use for the **DuraTherm Blue** Insulated Foundation System?

Resene Construction Systems recommends that the **DuraTherm Blue** be installed by a licensed building practitioner who has experience in installing insulated foundation systems. The success of each project requires the tradesperson to have a thorough technical knowledge of appropriate building design, conditions and client expectations to determine that this product fits the purpose intended for the project.

The **DuraTherm Blue** panels are the insulation component, and the concrete is the structural component.

Hold-down bolt positioning for some external bottom plates can limit the setup of the foundation. As with any slab, a bolt too close to the slab edge can spall the concrete edge. Consideration needs to be made for – closeness to the edge, fixing type and the location of the reinforcing steel.

The system can be used: -

• Where a thermal rating is required for the foundation

### Compliance with the NZBC

Designed to improve the insulation performance of a building, the **DuraTherm Blue** Insulated Foundation System meets the requirements of the New Zealand Building Code H1.

The different solutions offered as part of the **DuraTherm Blue** Insulated Foundation System have been calculated as per the NZBC H1 standard Verification Method H1/VM1 Appendix F, effective 29 Nov 2021 and as revised 4 Aug 2022.

There is a calculation tool available on the Resene Construction Systems website. This tool will generate a compliance schedule demonstrating how the slab meets the requirements set out in H1.

This calculator is available at:

https://reseneconstruction.co.nz/duratherm-insulated-foundation-system-calculator/

B2 – When installed in accordance with the system specifications and drawings, it will meet this performance requirement. Based on material properties and history of use, this product has been assessed to have a durability of at least 15 years when installed as part of a system. This product must be installed in accordance with the relevant system specifiations and drawings.

E2 – When installed in accordance with the system specifications and drawings, it will meet this performance requirement.

F2 – This product is safe when handled in accordance with its Technical and Safety DataSheet. Dust from sanding and mixing compounds may be a respiratory irritant and suitable respiratory protection is required. This product meets the requirements set out in F2 and will not present a health hazard to people once installed.

### Materials / Components



#### **DuraTherm Blue** Panels

- XPS board density: minimum 35KG/m3
- Thermal Resistance: 1.0m2K/W (ASTM C518)
- Thermal Conductivity: 0.0303 W/mK (Average 23°)
- Compressive Strength: 288KPa
- Substrate Thickness: 33mm (3mm extra to include coatings)
- Length: 2200mm
- Finished Surface: 1
   face smooth and 1
   face notched to ensure
   adhesion to the concrete
   foundation

### Typical Heights

#### 305 Series

300mm with a rebate, this product is suitable for a 220mm pod floor with an 85mm slab that allows 5mm tolerance for fitting inside the formwork

#### 385 Series

380mm with a rebate, this product is suitable for a 300mm pod floor with an 85mm slab that allows 5mm tolerance for fitting inside the formwork



#### Plaster Systems AAC Adhesive

#### Supplied in 20kg bags

 Used for bonding
 DuraTherm Blue Panels to a concrete foundation where the panels are being installed after the foundation has been poured (post-pour/ retrofit)



# **DuraTherm** Patch & Repair Mortar

- Supplied in a 1kg pot
- Used for patching DuraTherm Blue after the formwork has been removed or postconstruction damage occurs



#### **DuraTherm Blue** Inline Jointer

- Supplied in 2400mm lengths
- Cut to the height required for the foundation
- Generally used when casting the DuraTherm Blue panels into the foundation
- Used where two pieces of DuraTherm Blue are joined together



#### DuraTherm Blue

- External Corner Jointer • Supplied in 2400mm lengths
- Cut to the height required for the foundation
- Generally used when casting the DuraTherm Blue panels into the foundation
- Used where two pieces of DuraTherm Blue are meeting on an external corner



#### **DuraTherm Blue** Formwork Spacer > Supplied in 2400mm

- lengths
- Re-usable component
- Cut to suit foundation height
- Used where DuraTherm Blue is being cast into a foundation, the formwork spacer bridges the gap between the formwork and the DuraTherm Blue and helps prevent excess concrete slurry from flowing onto the external surface of the panels

#### **DuraTherm Blue** Vortex Screws

- ▶ 60mm Spring-style screw
- Used for additional connection into concrete
- Screwed into the DuraTherm Blue panels facing the concrete when the DuraTherm Blue is being cast into the slab
- These are not required as part of a typical install
- Used for additional holding power
- ▶ 100 per pack

# Components not supplied as part of the system

# Hold-Down Bolts for fixing bottom plates for non-bracing walls

Any bottom plates should be fixed to slab-on-ground floors using:

• cast-in anchors consisting of M12 bolts that are cast into the concrete and either  $50 \times 50 \times 3$  mm square washers or  $55 \times 3$  mm round washers in accordance with NZS3604:2011 - 7.5.12.1

• proprietary anchors that are inserted in the concrete once it has sufficiently cured, tested in accordance with NZS3604:2011 - 7.5.12.2

Both of these options need to meet the following requirements:

#### INTERNAL WALLS

(a) Horizontal loads in the plane of the wall 2 kN(b) Horizontal loads out of the plane of the wall 2 kN

#### EXTERNAL WALLS

(a) Horizontal loads in the plane of the wall 2 kN
(b) Horizontal loads out of the plane of the wall 3 kN
(c) Vertical loads in axial tension of the fastener 7 kN

# System Variations

• Where the foundation is higher than the standard sizes of **DuraTherm Blue**, then sheets can be joined together for a higher foundation

• The **DuraTherm Blue** Inline jointers do not have to be used. Instead, the panels can be tightly fitted together, and the panel joins sealed. (These areas will need to be maintained).

• The joins can be reinforced with plaster and mesh before a decorative texture

coat is applied to the surface. This solution is used where a more uniform finish is required.

#### Hold-Down Bolts for fixing bottom plates for bracing walls

Proprietary anchors may be used as hold-downs for walls containing bracing but require additional uplift capacity depending on the bracing unit (BU) ratings:

Typically this is 15 kN for 150 bracing units per metre. Some fasteners are rated at less than 15 kN, e.g. 12 kN for 120 bracing units per metre.

Proprietary anchors should also have test results to demonstrate that they meet NZS 3604:2011 requirements for the intended use.

# Fasteners for securing **DuraTherm Blue** to the formwork

• 12gx75mm Galvanised Screw - Used to secure the **DuraTherm Blue** Panels to the formwork from the outside. The screws must be removed prior to removing the formwork, and any holes will require patching.

# Adhesive for attaching jointers to the **Duratherm Blue**

- Use a General construction adhesive
- Ensure that it is Polystyrene Safe
- Suitable products are Bostik Tuf as Nails Original or Soudal Gorilla Grab Construction Adhesive.

# Sealant for finishing internal corners to the **Duratherm Blue**

- Use an exterior-grade construction sealant
- Ensure that it is Polystyrene Safe
- Ensure that it is a grey sealant

• Suitable products are Bostik Safe Seal or Soudal Gorilla MS Sealant.

• **DuraTherm Blue** Vortex screws are not required, they can be used if a contractor wants to get an even better connection between concrete and the notched surface of the **DuraTherm Blue**.

• The Installation Guidelines show the **DuraTherm Blue** being installed prior to the concrete slab being poured. The **DuraTherm Blue** can also be installed after a slab has been poured. In this instance, Plaster Systems AAC Adhesive should be used to adhere the **DuraTherm Blue** against the foundation.

### Installation guidelines for a facade that overhangs the foundation

#### **STEP 1**

#### Setting up the site

**DuraTherm Blue** does not affect bearing pressures. Earthworks, fill and bearing checks remain as per NZS3604:2011 or a specifically engineered design.



Image 1 - Overall site with base course

#### **STEP 2**

#### Setting up the formwork

Establish the position of the bottom plate in relation to the finished edge of the concrete.

Allow for the thickness of the **DuraTherm Blue** to be set inside the formwork so that once the framing is installed, the bottom plate sits in the correct location. This means the formwork needs to be blown up to allow for the additional depth of the **DuraTherm Blue**.

Perimeter Formwork shall be set to profiles or string lines with the top edge at the finished floor level (FFL). All joins in the formwork should be fitted tightly together.

Perimeter Formwork should be braced to prevent movement under a full load of wet vibrated concrete and construction loadings.



Image 2 - Cross section of bottom plate set out in relation to the formwork



Image 3 - Overall image of the site showing the setting up of formwork

#### **STEP 3**

#### Setting up the Damp Proof Membrane

Ensure the Damp Proof Membrane is installed in accordance with the requirements of NZS3604:2011 and laid on a properly prepared base as required by NZS3604:2011 Section 7.5.3 to 7.5.6.2.

The Damp Proof Membrane should be laid neatly on a smooth surface, with as many ripples as possible eliminated.

Return the Damp Proof Membrane up the side of the formwork at least 50mm.

Set out the pods according to the design and specifications.



Image 4 - Close-up of polythene being installed and wrapped up on the side of the formwork

#### STEP 4

Install the **DuraTherm blue** to an external corner inside the formwork

Cut a **DuraTherm Blue** External Corner Jointer to size and install this to the edge of the **DuraTherm Blue** panels.

Starting from an external corner, install the **DuraTherm Blue** to fit tightly against the formwork.

Ensure the **DuraTherm Blue** is sitting at the same height as the finished formwork.

To help locate the formwork at the correct height, screw through the formwork and into the **DuraTherm Blue**. Install the screws towards the top or bottom of the panels to limit any holes in the visible areas of the finished product.

Screws at the bottom of the formwork will prevent the **DuraTherm Blue** from trying to rise away fr**om the formwork** as the concrete is poured.

The **DuraTherm Blue** Jointers are angled so that they grip onto the panels, an adhesive can be used along the edge of the panels to ensure the jointer is well secured.

If an adhesive is used to glue the jointers to the **DuraTherm Blue**, ensure this is polystyrene-safe adhesive.





Image 5 - External Corner jointer being placed in the corner with the first **DuraTherm Blue** board being installed



Image 6 - Screw through the formwork to hold the **DuraTherm Blue** in place

#### **STEP 5**

**Install the DuraTherm to the remainder of the formwork DuraTherm Blue** Inline Jointers should be used to join one sheet to the next.

If **Duratherm** jointers are not being used then the joins between the panels can be patched with an exterior render. Ensure the panels are secure in the formwork so that the panels remain in place when the concrete is poured.



Image 7 - Inline Joint with an adjacent board being installed

#### **STEP 6**

#### Internal Corners

Where an internal corner is being formed, ensure there are no gaps for the concrete to escape. There are several solutions to finishing the internal corners:

1. Mitre the two corners

2. Blocking the gap at the top of the  $\ensuremath{\textbf{DuraTherm Blue}}$  Panel where the rebate is

3. Create a template so that one board runs tightly into the other

Cutting the boards to the shape of the other board using a template is the easiest method, as shown in the image below.





Image 8 - Internal Corner (ie, one board running into the other board)

#### **STEP 7**

#### Installing the Formwork Spacer

The **DuraTherm Blue** Formwork Spacer is a reusable item that is installed prior to the concrete being poured and is removed afterwards to be used on the next project.

The **DuraTherm Blue** Formwork Spacer is designed to bridge the gap between the rebate at the top of the **DuraTherm Blue** and the formwork. This will ensure the small section at the top of the panels is secure as the concrete is poured. The spacer also has a small tag that caps the **DuraTherm Blue** panels and the formwork, this ensures that no concrete will run between the **DuraTherm Blue** Panels and the formwork.



Image 9 - Formwork Spacer being installed between the formwork and the **DuraTherm Blue** 

#### **STEP 8**

#### Allowing for WANZ support bars

Depending on the joinery type being used on the project, make sure an allowance has been made for WANZ bars to be installed directly into the concrete.

The easiest method is to remove a section of the **DuraTherm Blue** panel prior to pouring the concrete. A piece of timber the width of the **DuraTherm Blue** panel is then attached to the formwork to fill this gap. The **DuraTherm Blue** Formwork Spacer can run either side of this timber blocking.



Image 10 - Close-up blocking out for WANZ bars

#### **STEP 9**

#### Garage Doors

Take care when installing **DuraTherm Blue** panels under a garage door. Check with the designer whether insulation is required under the garage door.

If slab-edge insulation is required then you will need to remove a section of the **DuraTherm Blue** panels so that any vehicles are not driving over the insulation.

If no insulation is required at this location, terminate the **DuraTherm Blue** on either side of the garage door opening.

#### **STEP 10**

#### Pour the concrete for your foundation slab

After all the **DuraTherm Blue** Formwork Spacers have been installed and provisions have been made for WANZ bars, any under-slab insulation, pods or reinforcing bars/mesh can be installed.

Once all this is in place, then the slab can be poured.

Try to limit the amount of concrete that is immediately poured against the **DuraTherm Blue**, this will ensure that there isn't too much pressure being applied to the bottom of the **DuraTherm Blue** and won't force it off the formwork.

Take care when vibrating and Kelly floating the concrete so the **DuraTherm Blue** isn't damaged.



Image 11 - Steel placement around the foundation, including the installation of the reinforcing mesh



Image 12 - Concrete Placed

#### **STEP 11**

#### Removing the formwork

Formwork should only be removed when the concrete has hardened to the point that it can support its own load and loads placed upon it, otherwise it could shift or collapse without support.

Many factors can affect concrete formwork removal times, including:

- Grade of concrete/cement
- Type of cement
- Temperature
- Size of formwork

The first step when removing the formwork is to ensure all the screws that were used to secure the **DuraTherm Blue** have been removed. If the screw holes are going to be visible after landscaping, then use a small amount of Resene Construction Systems **DuraTherm** Patch & Repair Mortar to patch these.

Remove the **DuraTherm Blue** Formwork Spacers.

Remove the formwork from the slab edge.

Inspect the **DuraTherm Blue** for any damage or concrete overflow.

Run a small bead of Grey Exterior Grade MS Sealant to the internal corner join and around any pipe penetrations, this will finish these junctions.

Areas at either end of the WANZ bar rebate will need a small amount of plaster to finish the exposed ends of the **DuraTherm Blue.** 

Any tidy-ups to the **DuraTherm Blue** can be completed using Resene Construction Systems **DuraTherm** Patch & Repair Mortar.



Image 13 - Formwork removed

#### **STEP 12**

#### Installing the timber framing

Locate the timber framing as designed. Typically this would mean the bottom plate is located over the top of the **DuraTherm Blue** rebated edge. Some designs may show a 6mm overhang, where the bottom plate extends past the line of the insulation by 6mm. This is only required where a direct-fixed cladding is being installed, or a wood-based or gypsum-based rigid sheathing is being used.

The further the bottom plate has been extended past the slab-edge, the less room there is to install the hold-down bolts. If the framing has been extended too far this may cause load-path issues. If there is doubt about how far the framing can overhang the foundation, consult the designer or engineer for the project who can clarify the installation set out. Refer to the designer's details for hold-down bolt locations and spacings.

Follow the design the designer or engineer has created as they will often specify the set out of the bolts to avoid interference with the structural steel.

If the clearances are within 50mm from the external face of the concrete, then there are options for other bolts to be used. However consultation with a bolt manufacturer to ensure the values set out in the section earlier in this document titled "Components not supplied – Hold-Down Bolts", are still being met.



Image 14 - Bottom plate hold-down bolt location



Image 15 - Close-up of WANZ bar



Image 16 - Framing installed

### Finishing

Damage or holes in the finished **DuraTherm Blue** face can be patched using Resene Construction Systems **DuraTherm** Patch & Repair Mortar

Apply 2×coats of Resene X200 paint to the faces of the **DuraTherm Blue** boards to ensure long-term durability and performance.

Care must be taken when using hand and power tools on the **DuraTherm Blue** to avoid damage to the finished surface. Avoid standing on the top of **DuraTherm Blue** panels as this may cause damage to the finished surface.

In order to get the best drainage results, the surrounding landscaping should slope away from the foundation.

If possible, create a porous soakway with stone against the foundation this will mean any water sinks to a lower level reducing any harm to the building/insulation ratings.

Ensure that the DPM wraps up the outside of the **DuraTherm Blue** this will give an added layer of protection to the slab edge.

### Maintenance

Take into consideration the type of work that is required, and the time of year the foundation is being installed. Most external maintenance is completed in the summer as this is generally the best weather for drying and general outside work such as gardening.

It can become complex and costly if maintenance is never undertaken. Other issues may have arisen that could have been acted upon sooner through regular general maintenance.

Check the slab-edge insulation periodically to ensure that there has been no damage to the surface.

If it has been damaged, then this can be patched with Resene Construction Systems **DuraTherm** Patch & Repair Mortar. If the **DuraTherm Blue** has been painted, then the length of **DuraTherm Blue** where the patch has been undertaken will need to be repainted, this will ensure no colour variances along that section of the foundation.

If the damage to the **DuraTherm Blue** is more extensive than a patch, contact a Resene Construction Systems Registered Plasterer to repair it. The plasterer can either remove the **DuraTherm Blue** and replace it with a new section or can replaster the area that has been damaged.

The finished **DuraTherm Blue** Insulated Foundation System should be cleaned every 12-18 months. Use Resene Paint Prep and House Wash liquid concentrate for the best results. Apply a diluted solution with a pressure sprayer and use a soft broom for difficult-to-remove dirt. Then wash with a low-pressure wash to remove the residue. Most detergents have a detrimental effect on aquatic life, so avoid letting the washings run off into the stormwater system. DO NOT use harsh solvent-based cleaners.

### Notes

NO	TES
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For all other information see our website or call one of our team to assist.

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