GreenStuf®

INSULATION H1 COMPLIANCE TOOLKIT

A STEP IN THE RIGHT DIRECTION

The Ministry of Business, Innovation and Employment (MBIE) has signalled an intention to shift towards buildings with improved energy efficiency and reduced carbon emissions. As a result, the Building for Climate Change (BfCC) programme has been set up to reduce greenhouse gas emissions from the building and construction sector, which is a significant contributor. Embodied carbon and operational costs are two areas of initial focus. The BfCC will evaluate eight clauses in the Building Code over the next five years, beginning with H1 Energy Efficiency. The changes for housing and small buildings (<300m^2) have been made to reduce 40% of the energy required for heating and cooling. Large buildings (<300m^2) aim to reduce by 23%.

To make buildings warmer, drier, healthier, and more energy-efficient, MBIE considered increasing the minimum insulation levels for roofs, windows, walls and floors for new housing and small buildings. As a result, MBIE announced changes to clause H1 Energy Efficiency which took effect on the 29th November 2021 with a transition period of one year ending 3rd November 2022.

The following document explains the background of the changes and MBIE's vision for the future. It also provides guidelines on meeting the new requirements with GreenStuf Insulation. The solutions are based on systems supported by calculation and modelling methods for compliance verification, which look at overall building performance. The new systems give you a choice to design good, better, best options for your clients, allowing them to choose high-performance walls and ceilings to maximise energy efficiency and reduce carbon.

CONTENTS

CHANGE IN CLIMATE ZONES

New Zealand has diverse climates—from subtropic in Northland to sub Antarctic in Invercargill. For H1 purposes, New Zealand has six climate zones that reflect their different temperatures.

Climate zone 1

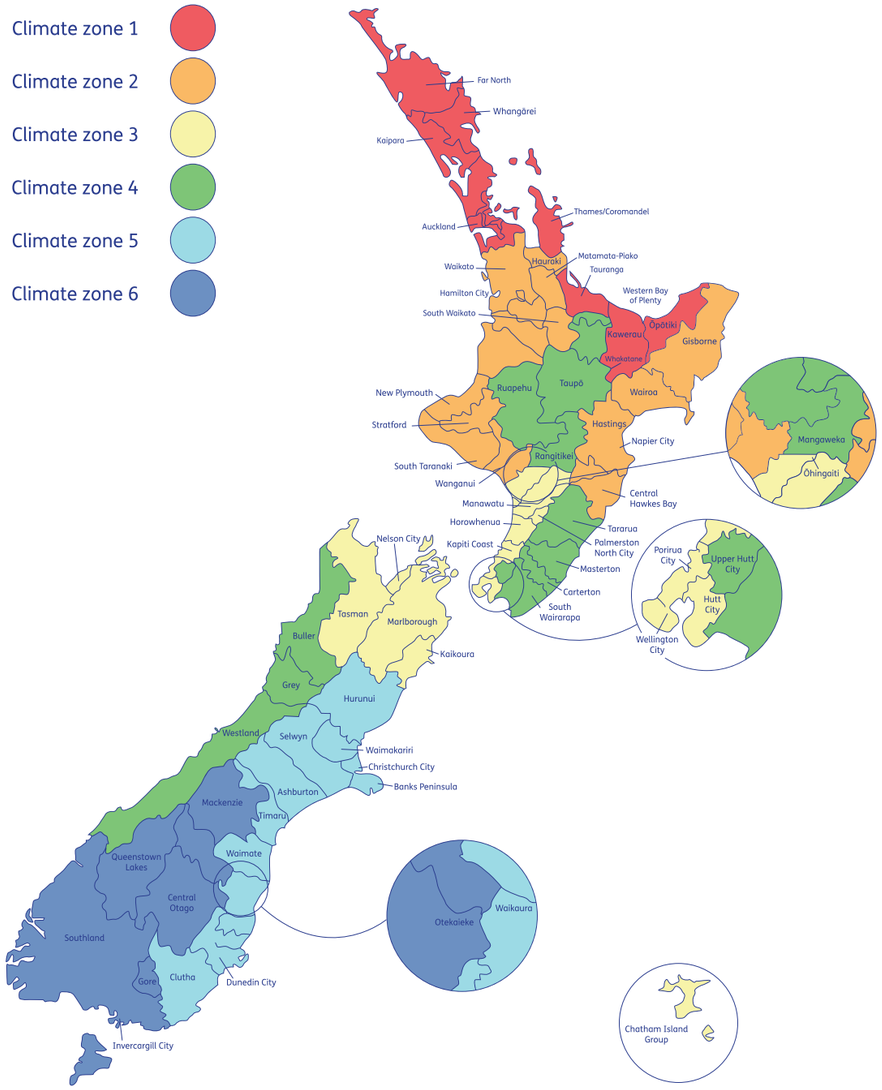
Climate zone 2

Climate zone 3

Climate zone 4

Climate zone 5

Climate zone 6



NEW H1 BUILDING CODE STANDARDS

The new standards are set depending on building type. All residential (including apartments and wharenui) and other buildings under 300m² of lettable area refer to Table 1. For any non-residential buildings over 300m² that are not industrial warehouses or hangers, the new standards are reflected in Table 2.

H1/AS1 FOR ALL RESIDENTIAL AND COMMERCIAL BUILDINGS UNDER 300m²

Table 2.1.2.2B: Minimum construction R-values for building elements that do not contain embedded heating systems Paragraphs 2.1.2.2 b), 2.1.3.1

BUILDING ELEMENT	CONSTRUCTION R-VALUES (M² K/W)					
	CLIMATE ZONE 1	CLIMATE ZONE 2	CLIMATE ZONE 3	CLIMATE ZONE 4	CLIMATE ZONE 5	CLIMATE ZONE 6
Roof	R6.6	R6.6	R6.6	R6.6	R6.6	R6.6
Wall	R2.0	R2.0	R2.0	R2.0	R2.0	R2.0
Floor slab-on-ground floors	R1.5	R1.5	R1.5	R1.5	R1.6	R1.7
Floor other than slab-on-ground floors	R2.5	R2.5	R2.5	R2.8	R3.0	R3.0
Skylights	R0.46	R0.46	R0.54	R0.54	R0.62	R0.62
Windows and doors	R0.46	R0.46	R0.46	R0.46	R0.50	R0.50

H1/AS2 FOR ALL NON-RESIDENTIAL BUILDINGS WITH OVER 300m² LETTABLE FLOOR AREA

Table 2.1.2.2B: Minimum construction R-values for building elements that do not contain embedded heating systems Paragraphs 2.1.2.2 b), 2.1.3.11

BUILDING ELEMENT	CONSTRUCTION R-VALUES (M² K/W)					
	CLIMATE ZONE 1	CLIMATE ZONE 2	CLIMATE ZONE 3	CLIMATE ZONE 4	CLIMATE ZONE 5	CLIMATE ZONE 6
Roof	R3.5	R4.0	R5.0	R5.4	R6.0	R7.0
Wall	R2.2	R2.4	R2.7	R3.0	R3.0	R3.2
Floor	R2.2	R2.2	R2.2	R2.4	R2.5	R2.6
Skylights	R0.42	R0.42	R0.46	R0.46	R0.49	R0.51
Windows and doors	R0.33	R0.33	R0.37	R0.37	R0.40	R0.42

DEMONSTRATING COMPLIANCE

Providing evidence of compliance can be achieved in three ways, schedule, calculation and modelling methods. Under the new guidelines, these compliance pathways remain unchanged. The GreenStuf team provide free schedule and calculation H1's for specifiers.

SCHEDULE METHOD H1/AS1

**Provided for free from GreenStuf*

This method is for construction that falls within specific limits for the glazed area. If the glazed area is more than 30% of the total wall area, the calculation or modelling methods must be used.

Glazing <30%

CALCULATION METHOD H1/AS1

**Provided for free from GreenStuf*

This method allows for a building with different elements to be assessed as a whole, with some adjustments being made between elements.

Glazing <40%

MODELLING METHOD H1/VM1

Energy use of the proposed building design does not exceed the energy use of the reference building using computer modelling

COMPLIANCE ACHIEVED

GREENSTUF PRODUCT RANGE

The GreenStuf product range is set out below. Our simplified range gives you options to use individual products or combinations to build up performance. The outcome is a high performance, thermally efficient construction that provides a lifelong return on investment to the building owners.

All GreenStuf products are made from 100% polyester with a high percentage of recycled materials that meet a selection of environmental credentials and best practices.

NAME	THICKNESS	WIDTH	PADS/ROLL/SLAB	M2/BALE
R1.0	45mm	580mm	Blanket	30
R1.3	45mm	580mm x 2400mm	Pad	8.35
R2.0	70mm	560mm	Pad	6.5
R2.5	90mm	560mm x 1160mm	Pad	6.5
R2.6	140mm	580mm x 8620mm	Roll	20
R2.9	140mm	580mm x 7330mm	Roll	17
R3.2	140mm	560mm x 1160mm	Pad	7.8
R3.4	140mm	870mm x 6000mm	Roll	10.44
R3.6	140mm	560mm x 1160mm	Pad	5.2
R3.6	140mm	870mm	Blanket	6.26
R3.6	210mm	870mm x 8050mm	Roll	14
R4.1	210mm	870mm x 8700mm	Roll	8.7

FREQUENTLY ASKED QUESTIONS

WHY IS GREENSTUF® MORE EXPENSIVE THAN FIBREGLASS?

Put simply, you get what you pay for. The raw material, chemicals, and processes used to manufacture fibreglass are reflected in the price. However, that cheaper material comes at a big cost to performance, health, and the environment.

Unlike most fibreglass insulation, GreenStuf will not deteriorate, slump, or break down over time.

ARE THERE ANY ADDED CHEMICALS USED IN THE GREENSTUF MANUFACTURING PROCESS?

No, we use heat to bind the fibres that form the structure of GreenStuf. Some manufacturers of fibreglass insulation still use formaldehyde based binders. Formaldehyde is a known and classified human carcinogen.

WHAT IS POLYESTER?

Polyester is a synthetic fibre made from polyethylene terephthalate (PET)—the same material used to make plastic drink bottles. GreenStuf contains as much as 92% of recycled polyester fibre from previously used PET drink bottles, keeping them out of landfills.

WHAT DOES 'R-VALUE' MEAN?

The R-Value of insulation is the industry standard measurement of thermal resistance. The higher the R-Value the greater the performance.

CAN I INSTALL INSULATION MYSELF?

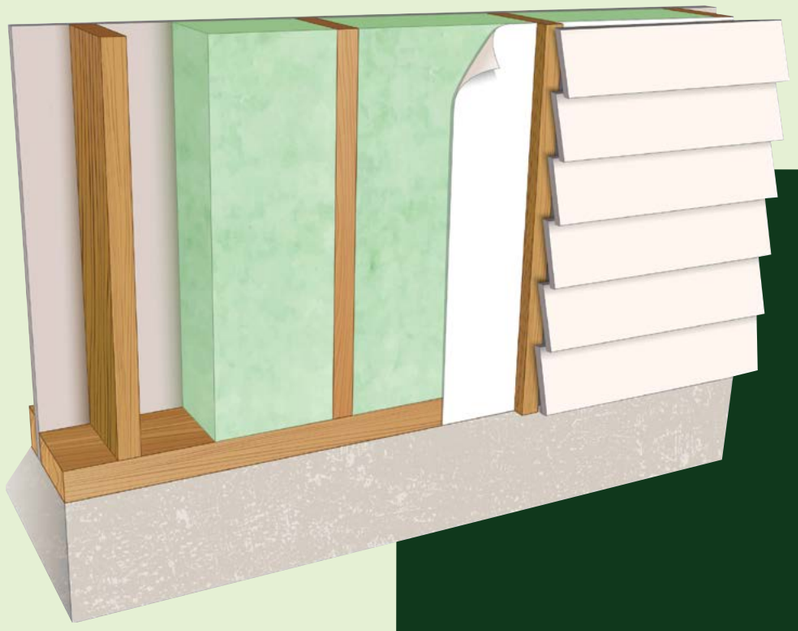
Yes, installing GreenStuf is easy. Installation instructions are included with all of our products. Easy to follow ceiling and underfloor installation videos are also available online.

TECHNICAL INFORMATION

90MM TIMBER FRAMING

COMPLIANT IN ZONES	1	2	3	4	5	6
H1/AS1 - Housing and buildings under 300m²	✔	✔	✔	✔	✔	✔
H1/AS1 - Non-housing and building above 300m² lettable space	✔					

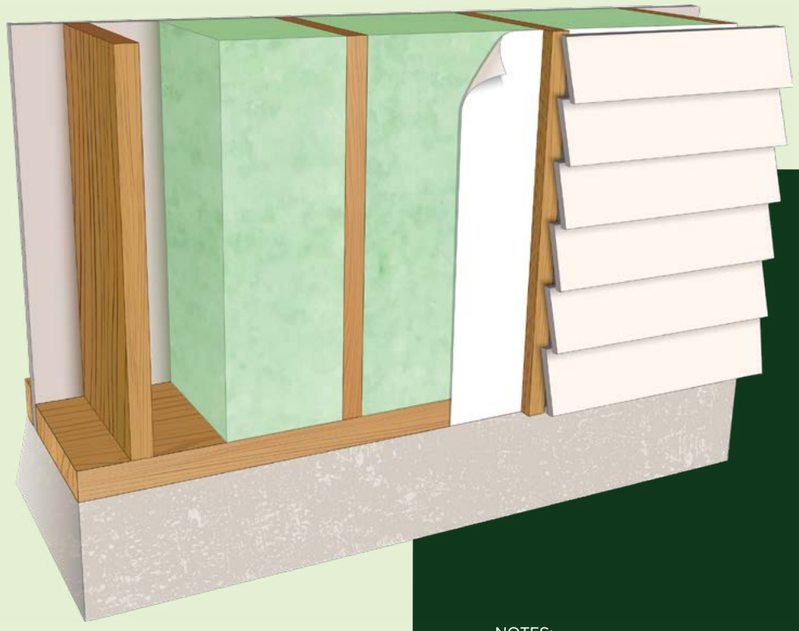
PRODUCT	CONSTRUCTION R-VALUE
GreenStuf R2.5 90mm Wall Pad	R2.2



140MM TIMBER FRAMING

COMPLIANT IN ZONES	1	2	3	4	5	6
H1/AS1 - Housing and buildings under 300m²	✔	✔	✔	✔	✔	✔
H1/AS1 - Non-housing and building above 300m² lettable space	✔	✔	✔	✔	✔	

PRODUCT	CONSTRUCTION R-VALUE
GreenStuf R2.5 90mm Pads	R2.5
GreenStuf R2.6 140mm Roll Form	R2.5
GreenStuf R2.9 140mm Roll Form	R2.7
GreenStuf R3.2 140mm Pads	R2.9
GreenStuf R3.6 140mm Pads	R3.0



NOTES:

- With thicker insulation, consider using an optional air/vapour control layer (AVCL).

90MM TIMBER FRAMING WITH AN INSULATED 45MM SERVICE CAVITY

COMPLIANT IN ZONES	1	2	3	4	5	6
H1/AS1 - Housing and buildings under 300m²	✔	✔	✔	✔	✔	✔
H1/AS1 - Non-housing and building above 300m² lettable space	✔	✔	✔	✔	✔	✔

PRODUCT	CONSTRUCTION R-VALUE
GreenStuf R2.5 90mm Pads	R3.2
GreenStuf R1.3 45mm Pads	

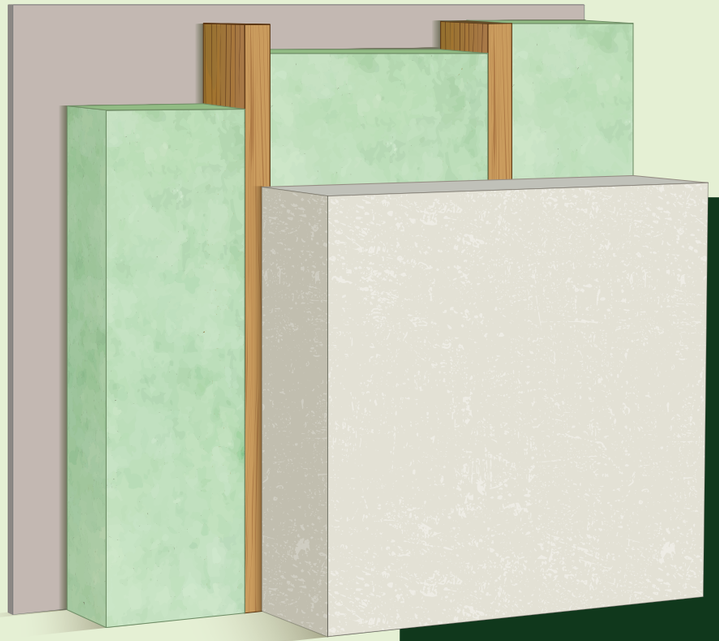
NOTES:

- With double layer framing a recommended AVCL between stud and service cavity framing will mitigate moisture issues in the wall.

150MM CONCRETE SLAB WITH 90MM TIMBER STUDS

COMPLIANT IN ZONES	1	2	3	4	5	6
H1/AS1 - Housing and buildings under 300m²	✔	✔	✔	✔	✔	✔
H1/AS1 - Non-housing and building above 300m² lettable space	✔					

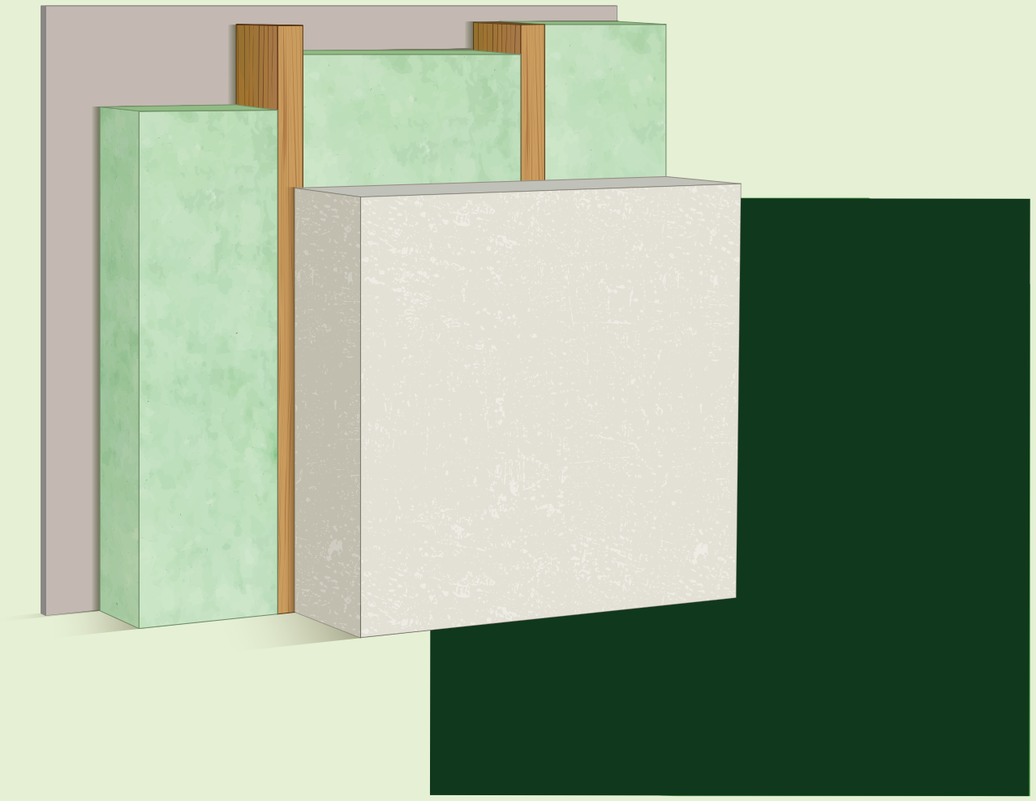
PRODUCT	CONSTRUCTION R-VALUE
GreenStuf R2.5 90mm Pads	R2.2



150MM CONCRETE SLAB WITH 140MM TIMBER STUDS

COMPLIANT IN ZONES	1	2	3	4	5	6
H1/AS1 - Housing and buildings under 300m²	✔	✔	✔	✔	✔	✔
H1/AS1 - Non-housing and building above 300m² lettable space	✔	✔	✔	✔	✔	

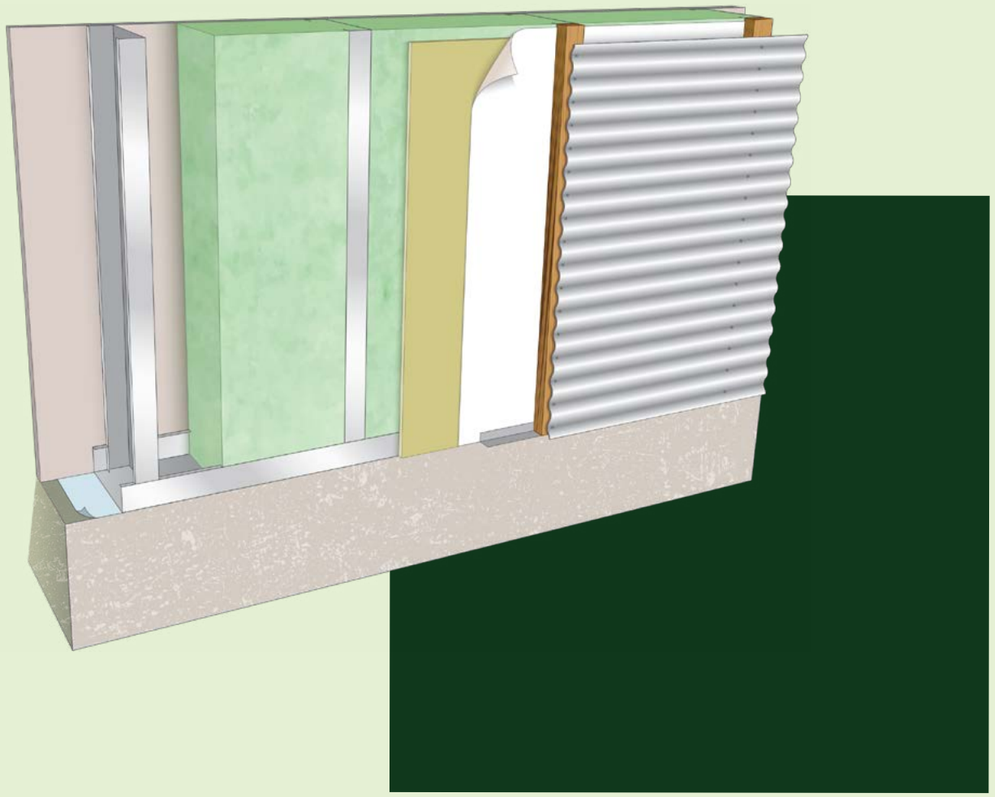
PRODUCT	CONSTRUCTION R-VALUE
GreenStuf R3.6 140mm Pads	R3.1



90/92MM STEEL STUDS

COMPLIANT IN ZONES	1	2	3	4	5	6
H1/AS1 - Housing and buildings under 300m²	✔	✔	✔	✔	✔	✔
H1/AS1 - Non-housing and building above 300m² lettable space						

PRODUCT	CONSTRUCTION R-VALUE
GreenStuf R2.5 90mm Pads	R2.0



140/150MM STEEL STUDS

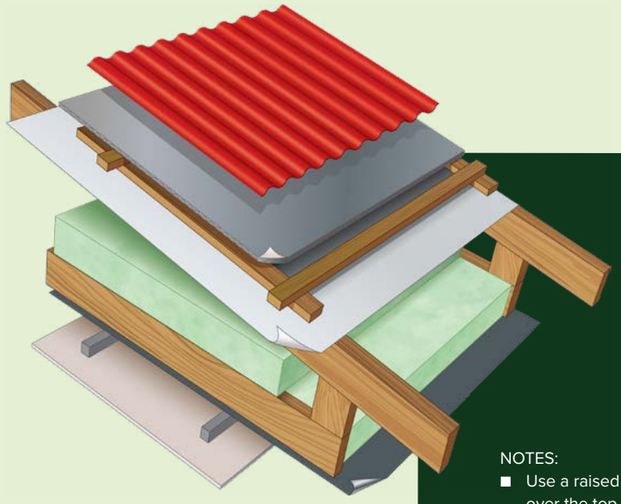
COMPLIANT IN ZONES	1	2	3	4	5	6
H1/AS1 - Housing and buildings under 300m²	✔	✔	✔	✔	✔	✔
H1/AS1 - Non-housing and building above 300m² lettable space	✔	✔	✔			

PRODUCT	CONSTRUCTION R-VALUE
GreenStuf R3.6 140mm Pads	R2.7

TRUSSED ROOF WITH INSULATION BETWEEN TRUSSES AND UNINSULATED SERVICE CAVITY

COMPLIANT IN ZONES	1	2	3	4	5	6
H1/AS1 - Housing and buildings under 300m²	✔	✔	✔	✔	✔	✔
H1/AS1 - Non-housing and building above 300m² lettable space	✔	✔	✔	✔	✔	✔

PRODUCT	CONSTRUCTION R-VALUE
GreenStuf R3.4 140mm Roll (Double layer)	R6.7
GreenStuf R3.6 140mm Roll (Double layer)	R7.0



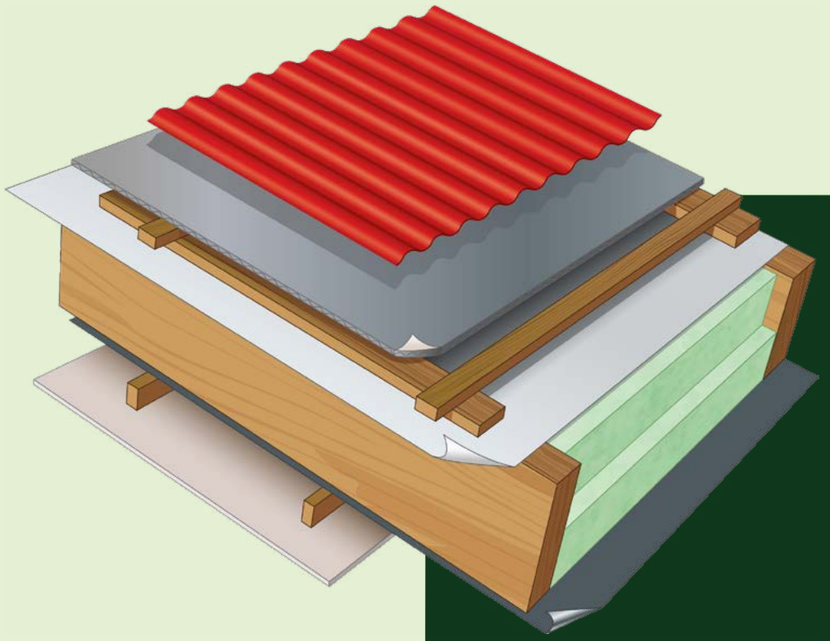
NOTES:

- Use a raised heel to allow space for insulation over the top plate.
- A single layer of R3.4 Roll Form insulation is allowed 500mm from the top plate.
- The top layer of insulation must cover the top chord negating gaps between the insulation. Use a perpendicular second layer of insulation or a wider insulation for the second layer i.e. 900mm wide.
- With thicker insulation, consider using an optional AVCL.

SKILLION ROOF

COMPLIANT IN ZONES	1	2	3	4	5	6
H1/AS1 - Housing and buildings under 300m²	✔	✔	✔	✔	✔	✔
H1/AS1 - Non-housing and building above 300m² lettable space	✔	✔	✔	✔	✔	✔

PRODUCT	CONSTRUCTION R-VALUE
GreenStuf R3.4 140mm Roll (Double layer)	R6.6
GreenStuf R3.6 140mm (double layer)	R7.0



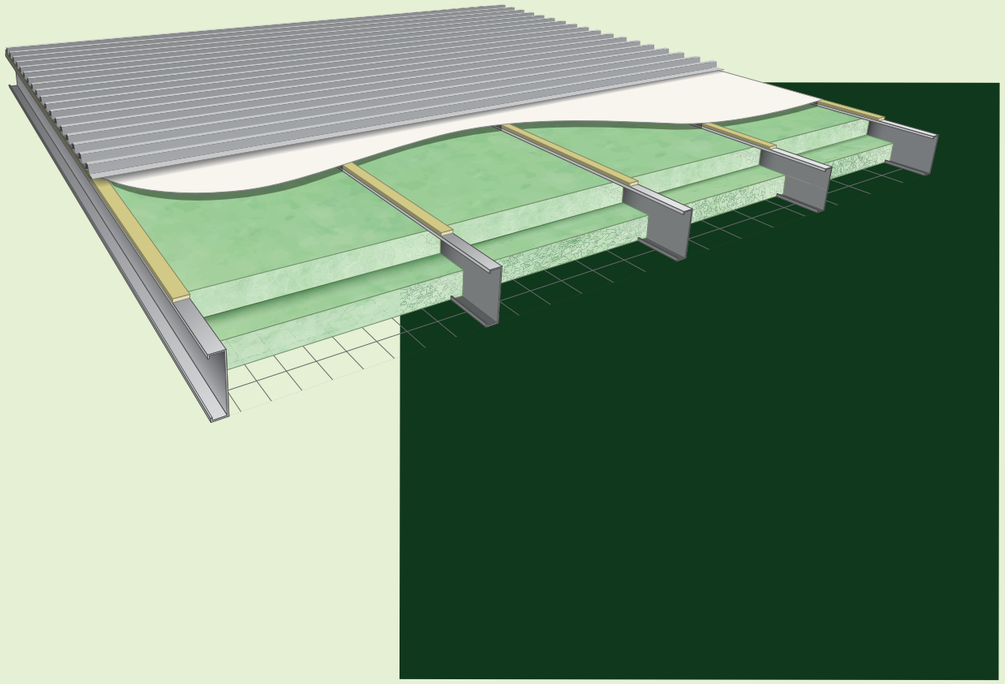
NOTES:

- With thicker insulation, consider using an optional AVCL.

300MM DHS PURLINS WITH INSULATION BETWEEN

COMPLIANT IN ZONES	1	2	3	4	5	6
H1/AS1 - Housing and buildings under 300m²						
H1/AS1 - Non-housing and building above 300m² lettable space	✔	✔				

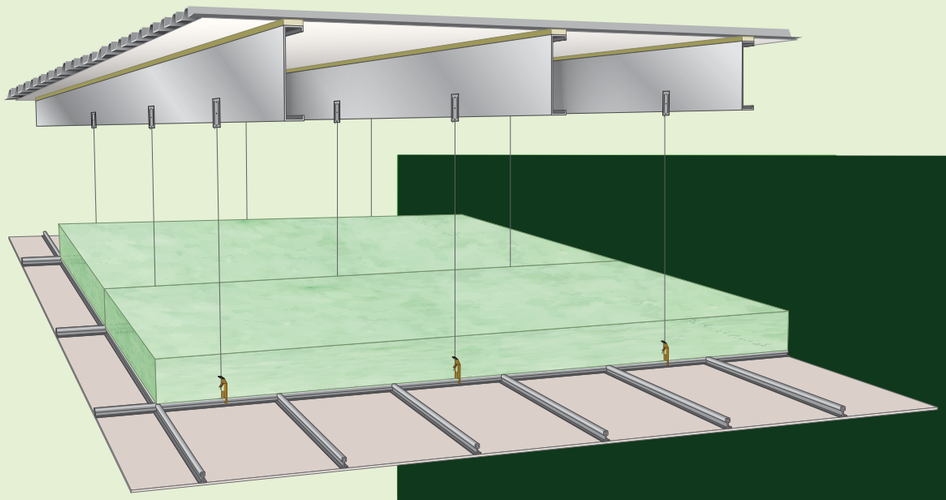
PRODUCT	CONSTRUCTION R-VALUE
GreenStuf R3.4 140mm Roll (Double layer)	R4.1



SUSPENDED CEILING WITH UNVENTILATED CAVITY

COMPLIANT IN ZONES	1	2	3	4	5	6
H1/AS1 - Housing and buildings under 300m²	✔	✔	✔	✔	✔	✔
H1/AS1 - Non-housing and building above 300m² lettable space	✔	✔	✔	✔	✔	

PRODUCT	CONSTRUCTION R-VALUE
GreenStuf R4.1 210mm Roll Form	R4.4*
GreenStuf R3.4 140mm Roll (Double layer)	R7.1



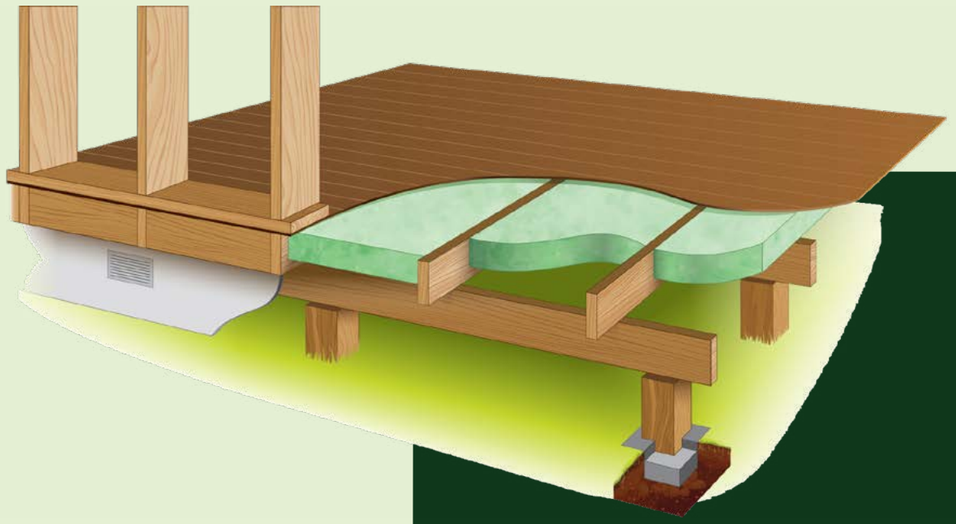
NOTES:

- Unventilated plenum space.
- Ensure there are no gaps between insulation.
- Double layer of R3.4 insulation puts an additional load of 5.7 kg/m² to the ceiling grid. Before specifying double layer insulation on a suspended ceiling grid, check with the ceiling grid manufacturer for the allowable ceiling load.

190MM TIMBER JOISTS

COMPLIANT IN ZONES	1	2	3	4	5	6
H1/AS1 - Housing and buildings under 300m²	✔	✔	✔	✔	✔	✔
H1/AS1 - Non-housing and building above 300m² lettable space	✔	✔	✔	✔	✔	✔

PRODUCT	CONSTRUCTION R-VALUE
GreenStuf R2.9 140mm Roll	R3.0



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GS_NZ_BR_H1 Compliance Toolkit_Specifiers_Feb25_CS