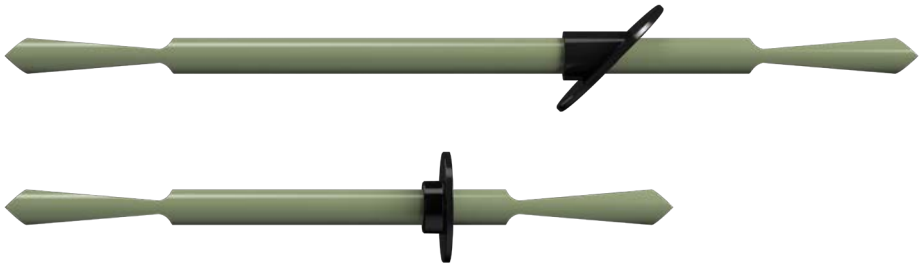
YETI-ANCHOR

MAGMATECH | YETI-ANCHOR
TECHNICAL DATASHEET

YETI-ANCHOR

Low Conductivity Anchors for Tilt-up & Precast Insulated Concrete Sandwich Panels

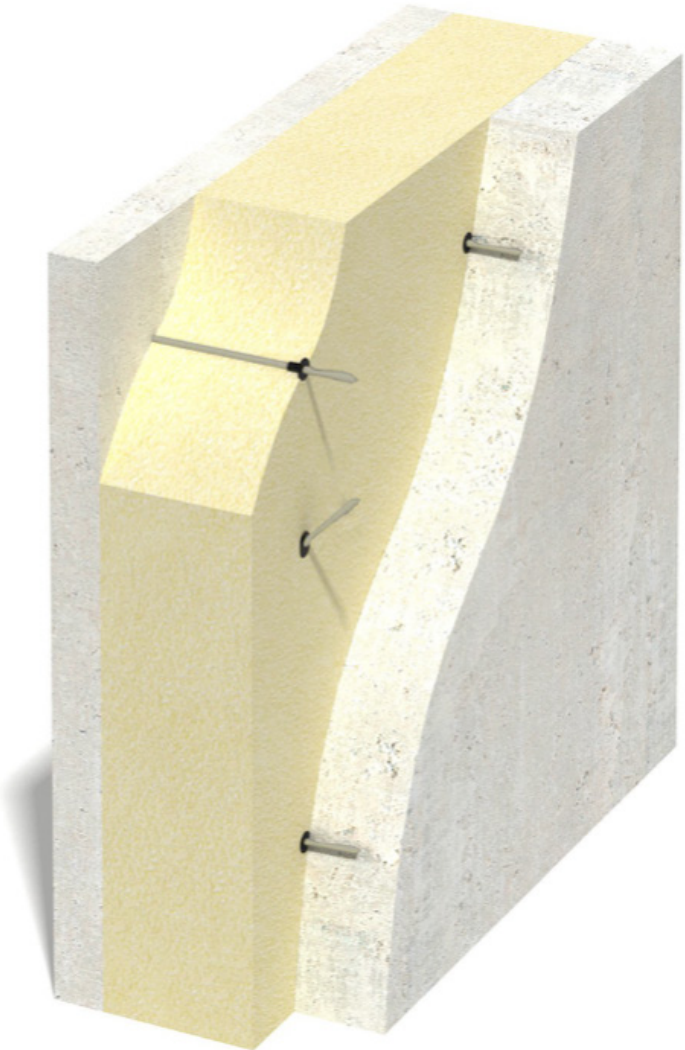


PRODUCT FEATURES

- Advanced thermally insulating glass fiber reinforced polymer material
- Improves thermal efficiency by eliminating thermal bridging
- Limits occurrence of interstitial condensation
- Combination of straight and diagonal anchors
- Unique dual tie system reduces number of anchors required
- Compatible with locally sourced insulation products
- Fast installation using standard workshop tools
- Advanced material is highly durable and resistant to corrosion
- Long length anchors available on request

ICC Evaluation Report ICC-ESR 3820

Fire tested in accordance with ASTM E119 (4 hour rating) and NFPA 285



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YETI-ANCHOR

ABOUT

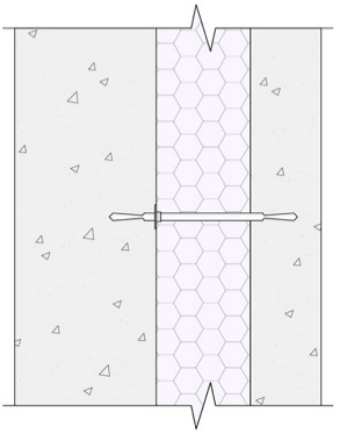
The Yeti-Anchor is designed specifically for application in tilt-up and precast insulated concrete sandwich panels with a horizontal pour. This guide details general concepts for specifying and installing the Yeti-Anchor.

Manufactured from high performance, continuous glass-fiber reinforced polymer, the Yeti-Anchor is strong, highly durable and thermally insulating. It is designed to be deployed in place of traditional heat conductive metallic connection products.

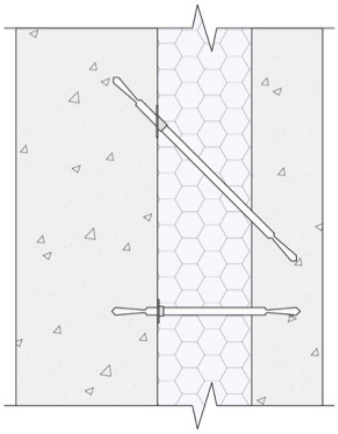
The Yeti-Anchor provides a cost effective, quick and efficient method for reducing the energy consumption of a building for the entirety of its service life. Variable anchor lengths are available to suit different insulation thicknesses. Anchor embedment depth is either 1.6 inches or 2 inches depending on wythe thickness.

The Yeti-Anchor can be combined in the following configurations:

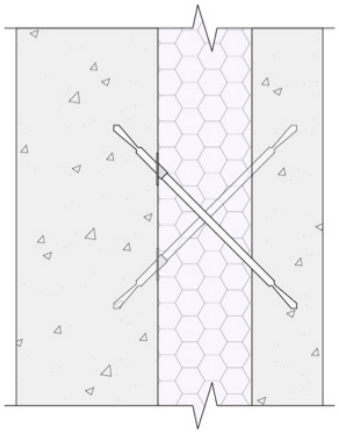
- Horizontal anchors; a simple solution for non-composite panels where the internal wythe is fully load supporting
- Horizontal and diagonal anchors; combination of horizontal and diagonal anchors allow for greater shear loads and thicker exterior wythes
- Double diagonal; diagonal anchors in an X configuration can be deployed to achieve partial composite action in the panel – more information available upon request



Horizontal Anchors



Horizontal and Diagonal



Double Diagonal

INSULATION

The Yeti-Anchor range is designed specifically for three layer sandwich panels that are insulated during casting.
The choice of the insulation type is flexible and insulation is not supplied by MagmaTech. The Yeti-Anchor is compatible for use with common insulation types when holes in the insulation are pre-drilled (see Installation Procedure).
A bespoke tool that allows the user to drill a hole in the insulation and install an anchor simultaneously is available.
See page 9 of this Technical Datasheet and check the Yeti-Anchor installation instructions for further information.

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YETI-ANCHOR

PHYSICAL AND MECHANICAL

	CUSTOMARY UNIT	SI UNIT
BAR DIAMETER	0.31 in.	8 mm
CROSS-SECTIONAL AREA	0.078 $in.^2$	50.3 mm^2
MOMENT OF INERTIA	0.000483 $in.^4$	201 mm^4
THERMAL CONDUCTIVITY	4.8 btu-in./hr ft^2	0.7 W/(m·K)
BENDING ELASTIC MODULUS ASTM D790	7,291,000 psi	50,200 MPa
TENSILE STRENGTH ASTM D3039/D3039M	200,000 psi	1,380 MPa

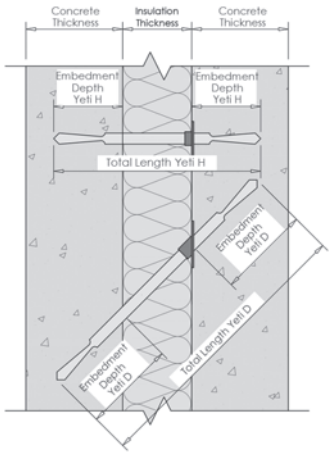
Fire tested successfully in accordance with ASTM E119 (4 hour rating) and NFPA 285

Product code explanation

YETI	40	H	130
Name of the product range	Embedment Depth in mm - embedment depth is either 1.6 in. (40mm) or 2 in. (50mm) depending on wythe thickness	Anchor orientation - H stands for Horizontal i.e. 90° D stands for diagonal i.e. 45°	Total anchor length in mm

SETTING DETAILS

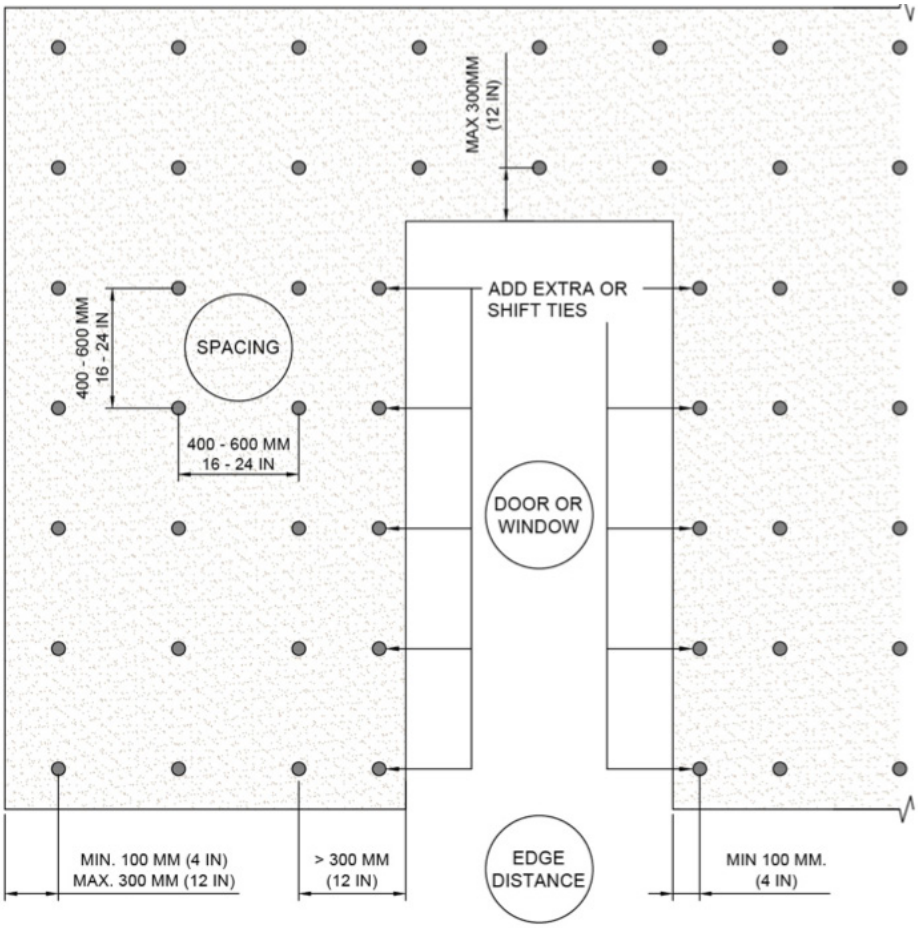
	YETI 40 H	YETI 40 D	YETI 50 S	YETI 50 D
WYTHE THICKNESS COMPATIBILITY	2 – 3 in. (50–75 mm)	2 – 3 in. (50–75 mm)	≥ 3 in. (≥ 75 mm)	≥ 3 in. (≥ 75 mm)
EMBEDMENT DEPTH AXIAL TO ANCHOR	1.6 in. (40 mm)	2.1 In. (54 mm)	2 in. (50 mm)	2.6 in. (67 mm)
EMBEDMENT DEPTH PERPENDICULAR TO PANEL	1.6 in. (40 mm)	1.5 in. (38 mm)	2 in. (50 mm)	1.8 in. (47 mm)
INSULATION HOLE DIAMETER	5/16 in. (8 mm)	5/16 in. (8 mm)	5/16 in. (8 mm)	5/16 in. (8 mm)
INSTALLATION ANGLE	90°	45°	90°	45°



LAYOUT DETAILS

	CUSTOMARY UNIT	SI UNIT
MINIMUM DISTANCE FROM EDGE OF PANEL	4 in.	100 mm
MAXIMUM DISTANCE FROM EDGE OF PANEL	12 in.	300 mm
MINIMUM ANCHOR SPACING	8 in.	200 mm
TYPICAL SPACING (VERTICAL & HORIZONTAL)	16 in.	400 mm
MINIMUM CONCRETE STRENGTH AT STRIPPING	2500 psi	C 16/20 MPa

MagmaTech offers a service to calculate the anchor spacing and configuration required for a given loading situation. It is possible to increase spacing of anchors to a maximum of 24 in. - please contact MagmaTech for more info.



The Yeti-Anchor is tested in accordance with ICC-ES AC320, Acceptance Criteria for Fiber-Reinforced Composite Anchors Anchored in Concrete.

YETI-ANCHOR

1.6” (40mm) ANCHOR EMBEDMENT ULTIMATE TENSION & SHEAR (ASTM E488)

	Concrete Compressive Strength							
	2500PSI (17MPA)	**3000PSI (21MPA)**	**3500PSI (24MPA)**	**4000PSI (28MPA)**	**4500PSI (31MPA)**	**5000PSI (34MPA)**	**5500PSI (38MPA)**	**6000PSI (41MPA)**
YETI 40 H STATIC TENSION	1222 lb (5.4 kN)	1402 lb (6.2 kN)	1585 lb (7.0 kN)	1767 lb (7.9 kN)	1853 lb (8.2 kN)	1938 lb (8.6 kN)	2023 lb (9.0 kN)	2108 lb (9.4 kN)
YETI 40 D STATIC TENSION (45° TO PANEL)	-	-	-	1421 lb (6.3 kN)	1813 lb (8.1kN)	2206 lb (9.9kN)	2599 lb (11.6kN)	2991 lb (13.3 kN)
YETI 40 H STATIC SHEAR	926 lb (4.1 kN)	926 lb (4.1 kN)	926 lb (4.1 kN)	926 lb (4.1 kN)	926 lb (4.1 kN)	926 lb (4.1 kN)	926 lb (4.1 kN)	926 lb (4.1 kN)

2” (50mm) ANCHOR EMBEDMENT ULTIMATE TENSION & SHEAR (ASTM E488)

	Concrete Compressive Strength							
	2500PSI (17MPA)	**3000PSI (21MPA)**	**3500PSI (24MPA)**	**4000PSI (28MPA)**	**4500PSI (31MPA)**	**5000PSI (34MPA)**	**5500PSI (38MPA)**	**6000PSI (41MPA)**
YETI 50 H STATIC TENSION	1844 lb (8.2 kN)	2381 lb (10.6 kN)	2918 lb (13 kN)	3455 lb (15.4 kN)	3465 lb (15.4 kN)	3474 lb (15.5 kN)	3483 lb (15.5 kN)	3491 lb (15.5 kN)
YETI 50 D STATIC TENSION (45° TO PANEL)	-	-	-	2401 lb (10.7kN)	2678 lb (11.9 kN)	2956 (13.1 kN)	3234 lb (14.4 kN)	3511 lb (15.6 kN)
YETI 50 H STATIC SHEAR	926 lb (4.1 kN)	926 lb (4.1 kN)	926 lb (4.1 kN)	926 lb (4.1 kN)	926 lb (4.1 kN)	926 lb (4.1 kN)	926 lb (4.1 kN)	926 lb (4.1 kN)

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YETI-ANCHOR

1.6” (40mm) ANCHOR EMBEDMENT ALLOWABLE TENSION & SHEAR (ASTM E488)

	Concrete Compressive Strength							
	2500PSI (17MPA)	**3000PSI (21MPA)**	**3500PSI (24MPA)**	**4000PSI (28MPA)**	**4500PSI (31MPA)**	**5000PSI (34MPA)**	**5500PSI (38MPA)**	**6000PSI (41MPA)**
YETI 40 H STATIC TENSION	305 lb (1.4 kN)	351 lb (1.6 kN)	396 lb (1.8 kN)	442 lb (2.0 kN)	463 lb (2.1 kN)	485 lb (2.2 kN)	506 lb (2.2 kN)	527 lb (2.3 kN)
YETI 40 D STATIC TENSION (45° TO PANEL)	-	-	-	355 lb (1.6 kN)	453 lb (2.0 kN)	552 lb (2.5 kN)	650 lb (2.9 kN)	748 lb (3.3 kN)
YETI 40 H STATIC SHEAR	232 lb (1.0 kN)	232 lb (1.0 kN)	232 lb (1.0 kN)	232 lb (1.0 kN)	232 lb (1.0 kN)	232 lb (1.0 kN)	232 lb (1.0 kN)	232 lb (1.0 kN)

2” (50mm) ANCHOR EMBEDMENT ALLOWABLE TENSION & SHEAR (ASTM E488)

	Concrete Compressive Strength							
	2500PSI (17MPA)	**3000PSI (21MPA)**	**3500PSI (24MPA)**	**4000PSI (28MPA)**	**4500PSI (31MPA)**	**5000PSI (34MPA)**	**5500PSI (38MPA)**	**6000PSI (41MPA)**
YETI 50 H STATIC TENSION	461 lb (2.1 kN)	595 lb (2.6 kN)	730 lb (3.2 kN)	864 lb (3.8 kN)	866 lb (3.9 kN)	869 lb (3.9 kN)	871 lb (3.9 kN)	873 lb (3.9 kN)
YETI 50 D STATIC TENSION (45° TO PANEL)	-	-	-	600 lb (2.7 kN)	670 lb (3.0 kN	739 lb (3.3 kN)	809 lb (3.6 kN)	878 lb (3.9 kN)
YETI 50 H STATIC SHEAR	232 lb (1.0 kN)	232 lb (1.0 kN)	232 lb (1.0 kN)	232 lb (1.0 kN)	232 lb (1.0 kN)	232 lb (1.0 kN)	232 lb (1.0 kN)	232 lb (1.0 kN)

Allowable loads found by applying a safety factor of 4 to ultimate loads

YETI-ANCHOR

ANCHORS COMPATIBLE FOR WYTHE THICKNESS 2-3”

	ANCHOR EMBEDMENT DEPTH	WYTHE THICKNESS	INSULATION THICKNESS	TOTAL ANCHOR LENGTH
YETI 40 H 5 **YETI 40 D 7**	1.6 in. 2.1 in.	2 – 3 in.	2 in.	5.2 in. 7.2 in.
YETI 40 H 6 **YETI 40 D 9**	1.6 in. 2.1 in.	2 – 3 in.	3 in.	6.1 in. 8.5 in.
YETI 40 H 7 **YETI 40 D 10**	1.6 in. 2.1 in.	2 – 3 in.	4 in.	7.2 in. 9.9 in.

ANCHORS COMPATIBLE FOR WYTHE THICKNESS ≥ 3”

	ANCHOR EMBEDMENT DEPTH	WYTHE THICKNESS	INSULATION THICKNESS	TOTAL ANCHOR LENGTH
YETI 50 H 6 **YETI 50 D 8**	2 in. 2.6 in.	≥ 3 in.	2 in.	6 in. 8.1 in.
YETI 50 H 7 **YETI 50 D 9**	2 in. 2.6 in.	≥ 3 in.	3 in.	7 in. 9.4 in.
YETI 50 H 8 **YETI 50 D 11**	2 in. 2.6 in.	≥ 3 in.	4 in.	8 in. 10.8 in.
YETI 50 H 9 **YETI 50 D 12**	2 in. 2.6 in.	≥ 3 in.	5 in.	9 in. 12.2 in.
YETI 50 H 10 **YETI 50 D 14**	2 in. 2.6 in.	≥ 3 in.	6 in.	10 in. 13.6 in.
YETI 50 H 11 **YETI 50 D 15**	2 in. 2.6 in.	≥ 3 in.	7 in.	11 in. 15 in.
YETI 50 H 12 **YETI 50 D 16**	2 in. 2.6 in.	≥ 3 in.	8 in.	12 in. 16.3 in.

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INSTALLATION

MagmaTech independently tested the self-drilling installation method of the Yeti-Anchor. In these tests a custom-made drill tool was used to rotate the Yeti-Anchor through 4 different types of insulation (without a pre-drilled hole) in to fresh concrete (the "self drill" installation method). Static tension (pull out) testing was conducted when the concrete reached a strength of 2800 psi (20 MPa).

The results are shown in table 1 below.

INDEPENDENT TEST RESULTS ON INSTALLATION METHODS

YETI-ANCHOR	INSTALLATION TYPE	INSULATION TYPE	CONCRETE STRENGTH (PSI)	ULTIMATE LOAD	
				(lbf)	(kN)
YETI-50	Pre-Drilled (control)	Owen Corning C-250 Foamular Extruded Polystyrene (XPS), 2"	2800	3249	14.45
YETI-50	Self-Drilled	Owen Corning C-250 Foamular Extruded Polystyrene (XPS), 2"	2800	3476	15.46
YETI-50	Self-Drilled	Durospan PlastiFab Expanded Polysyrene (EPS) with polymeric laminate facers 2"	2800	3311	14.73
YETI-50	Self-Drilled	Expanded Polysyrene (EPS) without film facing 2"	2800	3209	14.28
YETI-50	Self-Drilled	Johns Manville APTM Foil Faced Polyisocyanurate (PIR) 2"	2800	2837	12.62

Four different types of insulation were tested with the self-drilling method. A further batch of samples were used as a control sample where holes were pre-drilled in the insulation. Where foil or film was present on the face of the insulation board this face was placed face down in the layup; this was in order to simulate a worst scenario where the bond between the anchor tip and concrete is most disrupted.

The study proved, as illustrated in the table above, that installation using the self-drilling method yielded similar static tension results to the control sample.

The self-drilling method allows the panel makers to save considerable time. On the basis of this testing we recommend this method with the following guidance:

- Self-drilling should only be used with the Yeti-50 (50mm embedment minimum).
- Concrete consolidation should be checked by removing 10% of installed anchors (a minimum of 10) from the panel, observing the embedded end. See page 4 of installation procedures.

We do not recommend installation by pushing directly through insulation for the reasons shown in this video: https://youtu.be/MgbTiJ1HdgA

IMPORTANT

The concrete wall panel manufacturer is solely responsible for all building system panels, including the performance thereof. MagmaTech makes no representations to the performance of any panel fabricated with the Yeti-Anchor.

Our recommendations should not be taken as inducements to infringe on any patent or violate any law, safety code or insurance regulation.

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