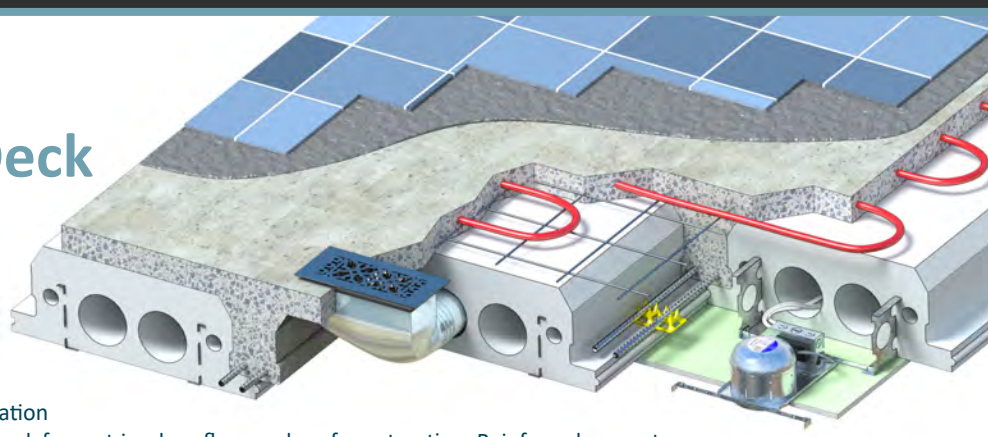


Building with Insul-Deck Floor & Roof System

What is Insul-Deck?

Insul-Deck panels are steel-reinforced, foam plastic insulation boards used as permanent, stay-in-place concrete formwork for cast-in-place floor and roof construction. Reinforced concrete joists are spaced at 24" [610mm] on center and poured monolithically with the slab to form a "one-way" joist construction/T-beam concrete slab.

Insul-Deck concrete forming panels are available in several thicknesses / joist-heights to allow varying spans and loads of the one-way concrete slabs. Each Insul-Deck panel is custom-cut to the exact length required and reinforced with two continuous, galvanized steel, Z-shaped metal strips (22 gauge [0.8mm thickness]), which serve as furring strips to attach ceiling finishes and as secondary shoring/formwork support. Primary shoring must be designed and erected as per shoring supplier, project engineer, or applicable building codes (see below).

Insul-Deck panels do not provide any permanent structural support. Structural support is provided by the reinforced concrete joists and slab topping only, which need to be designed by a licensed engineer in accordance with ACI 318, ACI 301, or other applicable standards.

Span and Floor Loads for Insul-Deck

Depending on live and dead loads assumed in the structural design, clear spans of up to 33 feet [10m] - measured from the center of the supporting elements - can be accomplished without modification to standard Insul-Deck profiles. Live loads of 100 psf (4.8 kN/m²) can be supported for shorter spans (see next page). Longer spans and/or higher loads may be achieved by: increasing the joist-height using extra foam Top Hats glued to the top of Insul-Deck panels; high-strength concrete, additional reinforcing steel, stirrups, post tensioning, and/or camber. Contact the Insul-Deck Technical Department for details. A licensed engineer has to provide the structural design for each building.

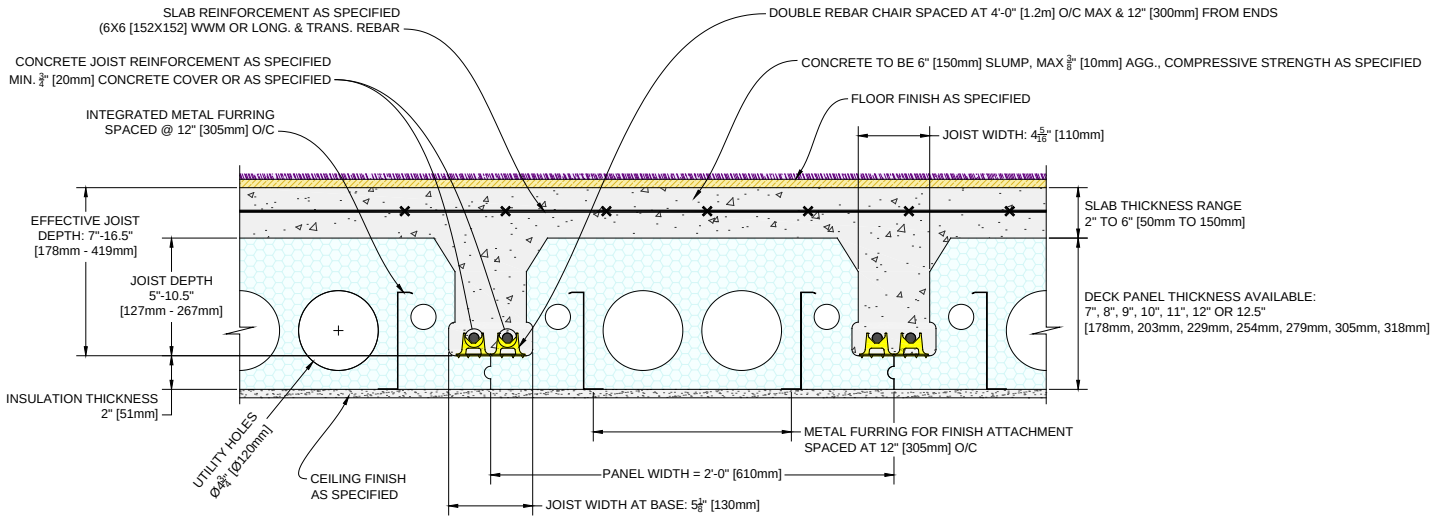
Reinforcement

Reinforcing requirements are a function of the desired span between supporting points and the load imposed on the structure. The size, grade, and frequency of reinforcing bar should be determined by a licensed engineer for each project. For estimating purposes, Insul-Deck provides span tables showing suggested reinforcement.

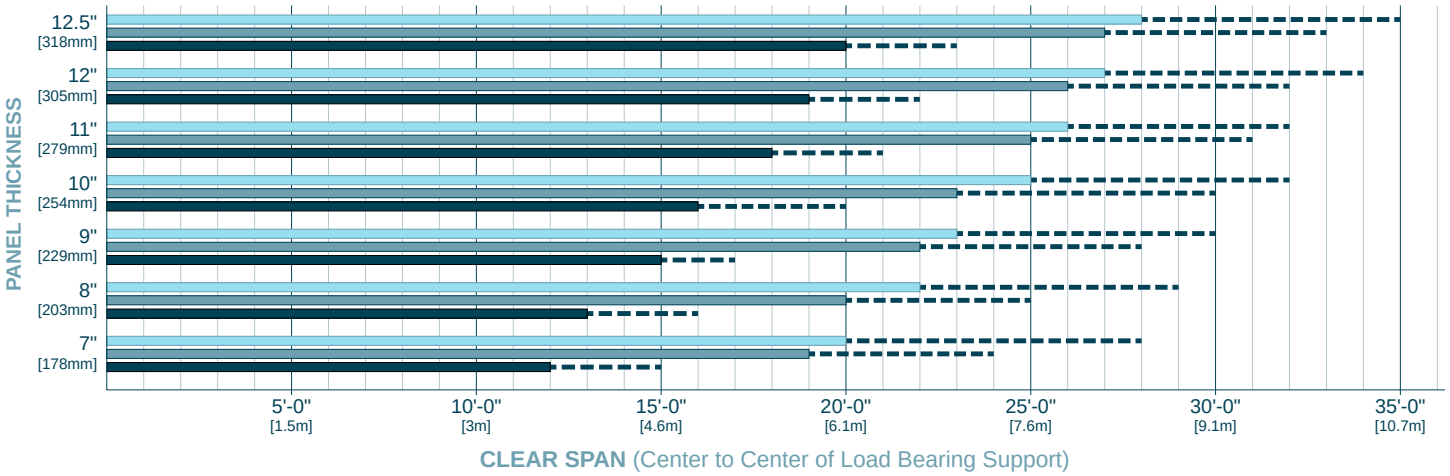
Typical minimum concrete cover as per ACI 318 or other applicable codes:

- Concrete for slabs, walls, joists not exposed to weather and not in contact with ground: ¾" [20mm]
- Concrete cast against and permanently exposed to earth: 3" [75mm]
- Concrete exposed to earth or weather, #6 [20M] and higher bars: 2" [50mm]; #5 [15M] bar, W31 or D31 [Ø16mm] wire, and smaller: 1½" [38mm]

The installer is responsible for placement of all reinforced concrete in accordance with ACI 318 “Building Code Requirements for Reinforced Concrete”. Any variance from these standards must be provided and certified in advance by the Engineer of Record.



Insul-Deck Spans (for estimating purposes only)



LEGEND

- 20 psf [0.95 kN/m²] Live Load, 3" [75mm] Slab Thickness, 3000 psi [21 mPa] Concrete, 2-#6 [2-20M] Rebar Bot.
- 40 psf [1.92 kN/m²] Live Load; 3" [75mm] Slab Thickness, 3000 psi [21 mPa] Concrete, 2-#6 [2-20M] Rebar Bot.
- 100 psf [4.77 kN/m²] Live Load; 3" [75mm] Slab Thickness, 3000 psi [21 mPa] Concrete, 2-#6 [2-20M] Rebar Bot.
- 4" [100mm] Slab Thickness, 4000 psi [28 mPa] Concrete, 2-#7 [2-22M] Rebar Bot. & 1-#6 [1-20M] Rebar Top

Slab Thickness

Because of the support provided by the reinforced concrete joists every 24 inches (610mm), a much thinner slab section is required. Slab sections between 2 and 6 inches (50 and 150mm), depending on live loads and other forces applied to the slab, are commonly used. This design results in 30 to 40% concrete savings in most jobs, and therefore eliminates 30 to 40% of the mass of the floor or roof reducing the need for greater bearing capacity of walls and/or footings. A 3" [75mm] slab thickness is common for most residential floors, 3-1/2" [89mm] for a 1-hour Fire Resistance Rating, and 5" [125mm] slab is recommended for areas with high point loads such as garage floors.

Construction Details

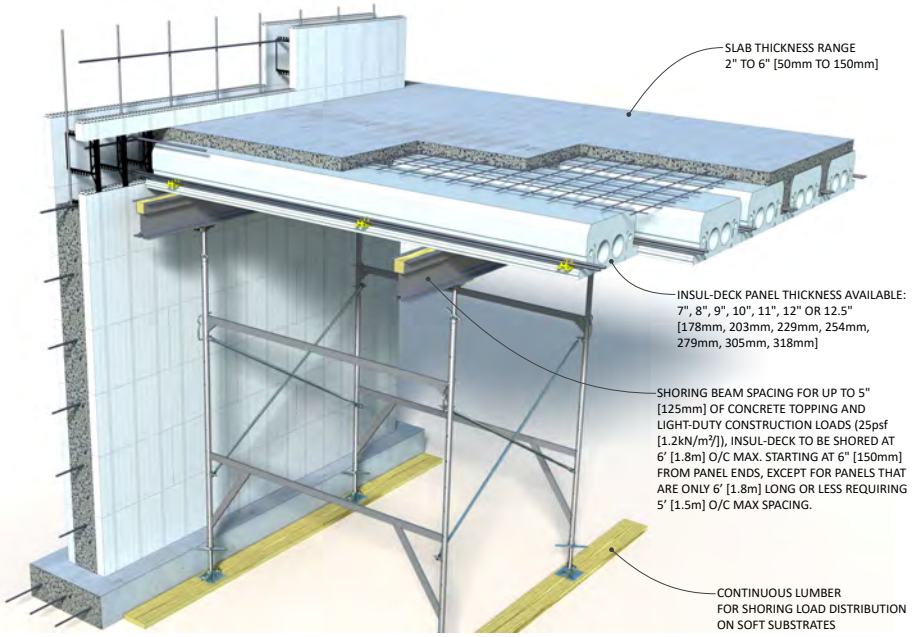
Typical construction details are available on the Insul-Deck website, www.insuldeck.com, and can be downloaded at no charge in PDF or DWG file formats. Many common design features are shown, including multiple story applications, pitched roofs, cantilevers and more.

Shoring & Bracing

Insul-Deck Panels require only primary shoring for support or, if required, camber. This means that less shoring is generally required, in most cases every 6' [1.8m] on center and perpendicular to Insul-Deck Panels. First and last shoring beams must start at maximum 6" [150mm] from panel ends. The installer is responsible for the design and correct installation of shoring for Insul-Deck forms in accordance with ACI (American Concrete Institute) 347.2R "Guide for Shoring/Reshoring of Concrete Multistory Buildings", Chapter 2, Design. It is recommended that an analysis of the shoring for each project be carried out by a qualified engineer (often provided by shoring suppliers), in addition to the design of the structure.

Shoring Removal

The concrete structure must be able to support its own weight (dead load) and the loads imposed during construction (construction load) without excessive deflection that will harm the structure. Preferred Method: Determination of the length of time required before removal of shoring (or re-shoring) should be made by the Engineer of Record, based on the compressive strength of the concrete and curing conditions. A ready-mixed concrete supplier can supply high-early-strength concrete for early removal of shoring. Alternate Method: If plans and contract documents contain no specification for minimum compressive strength of concrete at the time of formwork and shoring removal, ACI 347, Section 3.7 provides guidelines pertaining to one-way floor slabs and the removal of shoring. See standards list at the end of this bulletin.



Ceiling Finishes

Ceiling finish (1/2" GWB or approved equiv.) can be attached directly to the about 1" wide metal Z strips in the Insul-Deck panels. An approved thermal barrier is required over any exposed foam plastic insulation. Dropped ceilings can be installed for projects requiring more room for HVAC or other utilities, but some buildings/jurisdictions may still require the additional thermal barrier over the foam plastic in the plenum.

Independent tests (October 2008 Applied Technical Services) confirm the minimum ultimate load required to pull the Z strip from the Insul-Deck EPS at 366 pounds [166kg] per linear foot. With a factor of safety of 3, the allowable load is 122 pounds [55kg] per linear foot. Consult fastener manufacturer tables for pullout values of specific screw fasteners from Insul-Deck's 22 ga. [0.8mm] sheet steel strips.

EPS Board Type – ASTM C578, CAN/ULC-S701

Insul-Deck is manufactured from Expanded Polystyrene (EPS) at an average density of 1.25 lbs/cu. ft. [20 kg/m³]. The EPS material corresponds to Type VIII in the USA (ASTM C578) and Type 1 in Canada (CAN/ULC-S701). EPS is treated with a fire-retardant for use in building insulation. In most design scenarios, building codes require that exposed foam plastic insulation be covered with an approved thermal barrier such as minimum 1/2" GWB.

Thermal Barrier	Fastening	Confirmed By
½ in. non-fire rated GWB	Screwed to metal Z strips @ 12" o.c. w/#6 TEK	NFPA 286, ISO 9705

The raw material vendor's evaluation & test reports, and any reports referenced below, are available on request to engineers and building officials.

Surface Burning Characteristics – ASTM E84 (UL 723), CAN/ULC-S102.2 & NFPA 286

USA ASTM E84 (UL 723): Flame Spread Index ≤25, Smoke-Developed Index ≤450 (prior to floor ignition)
Canada CAN/ULC-S102.2: Flame-Spread Rating ≤295, Smoke Developed Classification over 500.

Independent NFPA 286 large-scale fire testing using ½" [13mm] GWB as described above confirm special approval under IBC 2603.9 and IRC R316.6 for Insul-Deck insulation panels up to 12.5" thick.

Fire Resistance Ratings

Fire resistance rated assemblies may be designed by the Engineer of Record for each project using prescriptive methods such as ACI 216.1, Table 4.2 "Fire resistance of single-layer concrete walls, floors, and roofs":

Aggregate Type	Insul-Deck Slab Thickness for Fire Resistance Rating				
	1 hr	1.5 hr	2 hr	3 hr	4 hr
Siliceous	3.5" [89mm]	4.3" [109mm]	5.0" [127mm]	6.2" [157mm]	7.0" [178mm]
Carbonate	3.2" [81mm]	4.0" [102mm]	4.6" [117mm]	5.7" [145mm]	6.6" [168mm]
Semi-lightweight	2.7" [69mm]	3.3" [84mm]	3.8" [97mm]	4.6" [117mm]	5.4" [137mm]
Lightweight	2.5" [64mm]	3.1" [79mm]	3.6" [91mm]	4.4" [112mm]	5.1" [130mm]

Insulation Values - ASTM C518

Refer to the Fact Sheet on R-values https://www.insuldeck.com/wp-content/uploads/2018/04/Insul-Deck-Fact-Sheet-on-R-Values.pdf for details. Excerpt:

		Insul-Deck Panel Thickness						
		7" [178mm]	8" [203mm]	9" [228mm]	10" [254mm]	11" [279mm]	12" [305mm]	12.5" [318mm]
Floor/Ceiling R-values (h•ft²•°F/BTU) - between joists for prescriptive path of USA codes (IRC, IBC and IECC)								
	at 75°F	18	22	26	30.5	34.5	38.5	40.5
Assembly Insulation Values - including the thermal bridging effect of the concrete joists								
USA R-values (h•ft²•°F/BTU)	**at 75°F** when cooling	16.2	18.3	20	21.6	23	24.4	24.7
	at 40°F when heating	17.4	20	21.9	23.4	25.2	26.5	27.1
Canada RSI (m²•°K/W)	**at 24°C** when cooling	2.85	3.22	3.53	3.8	4.06	4.29	4.36
	at 4°C when heating	3.07	3.53	3.85	4.12	4.43	4.66	4.77

STC Sound Tests

Results of Airborne Sound Transmission Loss Testing - ASTM E90 (Sound Transmission Classification):

Floor Type & Assembly	STC
12" [305mm] Insul-Deck & 4" [102mm] Concrete Slab, Rubber Underlayment & Tile Flooring and 1/2" [13mm] GWB ceiling finish	55
12" [305mm] Insul-Deck & 4" [102mm] Concrete Slab, Rubber Underlayment & Wood Flooring and 1/2" [13mm] GWB ceiling finish	54
9" [228mm] Insul-Deck & 3" [75mm] Concrete Slab, 2 layers 5/8" [16mm] GWB ceiling finish	53
9" [228mm] Insul-Deck & 3" [75mm] Concrete Slab, 1 layer 5/8" [16mm] GWB ceiling finish	49

IIC Sound Tests

Results for Impact Sound Tests - ASTM E1007-04 and ASTM E492 (Field Impact Insulation Class):

Floor Type & Assembly	(F)IIC
12" [305mm] Insul-Deck & 3" [75mm] Concrete Slab, 5/8" [16mm] Jute Carpet on floor and 1/2" [13mm] GWB ceiling finish	70
12" [305mm] Insul-Deck & 4" [102mm] Concrete Slab, Rubber Underlayment & Wood Flooring and 1/2" [13mm] GWB ceiling finish	52
12" [305mm] Insul-Deck & 4" [102mm] Concrete Slab, Rubber Underlayment & Tile Flooring and 1/2" [13mm] GWB ceiling finish	48
12" [305mm] Insul-Deck & 3" [75mm] Concrete Slab, 1/2" [13mm] tile on floor and 1/2" [13mm] GWB ceiling finish	26

Insul-Deck Floor Weights

Insul-Deck Floor Weights (lbs/sqft)

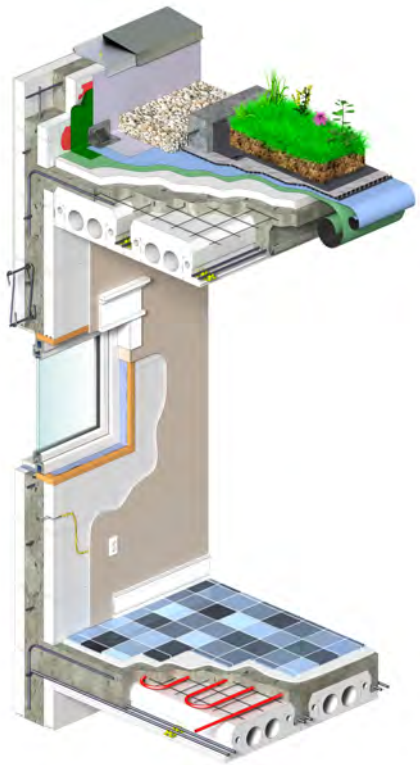
Insul-Deck Panel Thickness	Slab Thickness 2"	2.5"	3"	3.5"	4"	4.5"	5"
7" [178mm]	45.1	51.4	57.6	63.9	70.1	76.4	82.6
8" [203mm]	47.3	53.6	59.8	66.1	72.3	78.6	84.8
9" [228mm]	49.5	55.8	62.0	68.3	74.5	80.8	87.0
10" [254mm]	51.7	58.0	64.2	70.5	76.7	83.0	89.2
11" [279mm]	53.9	60.2	66.4	72.7	78.9	85.2	91.4
12" [305mm]	56.2	62.5	68.7	75.0	81.2	87.5	93.7
12.5" [318mm]	57.3	63.5	69.8	76.0	82.3	88.5	94.8

Notes: *The above are unfactored estimated weights which include concrete (150 lbs/cuft), reinforcement (3 lbs/sqft), Insul-Deck Panel (2 lbs/sqft) & misc. (2 lbs/sqft).*

Publications

More information, code requirements, and guidelines can be found in these publications:

Document	Title
ACI 216	Standard Method for Determining Fire Resistance of Concrete and Masonry Construction Assemblies
ACI 301	Specifications for Structural Concrete
ACI 318	Building Code Requirements for Structural Concrete
ACI 332	Guide to Residential Cast-in-Place Concrete Construction
ACI 347	Guide to Formwork of Concrete
ACI 347.2R	Guide for Shoring/Reshoring of Concrete Multistory Buildings
ANSI A10.9	American National Standard for Construction and Demolition Operations
ASCE 24	Flood Resistant Design and Construction
ASTM E84	Surface Burning Characteristics of Building Materials
ASTM E119	Standard Test Methods for Fire Tests of Building Construction and Materials
CAN/ULC S101	Fire Endurance Tests of Building Construction and Materials
CSA 23.1	Concrete Materials & Methods of Construction
CSA 23.2	Methods of Test and Standard Practices for Concrete
CSA 23.3	Designing Concrete Structures
CSA S269.1	Falsework for Construction (Reaffirmed 1998)
CSA S269.3-M92	Concrete Formwork
NFPA 286	Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth
OSHA 29 CFR	Construction Safety and Health Regulations for Construction
SEI/ASCE 37	Design Loads on Structures During Construction
UL 263	Standard for Fire Tests of Building Construction and Materials
UL 723	Surface Burning Characteristics of Building Materials



CAUTION: This product is combustible. Keep away from high heat and ignition sources.
A protective barrier or thermal barrier is required as specified in the appropriate building code.

Additional Information or a Free Estimate: www.insuldeck.com

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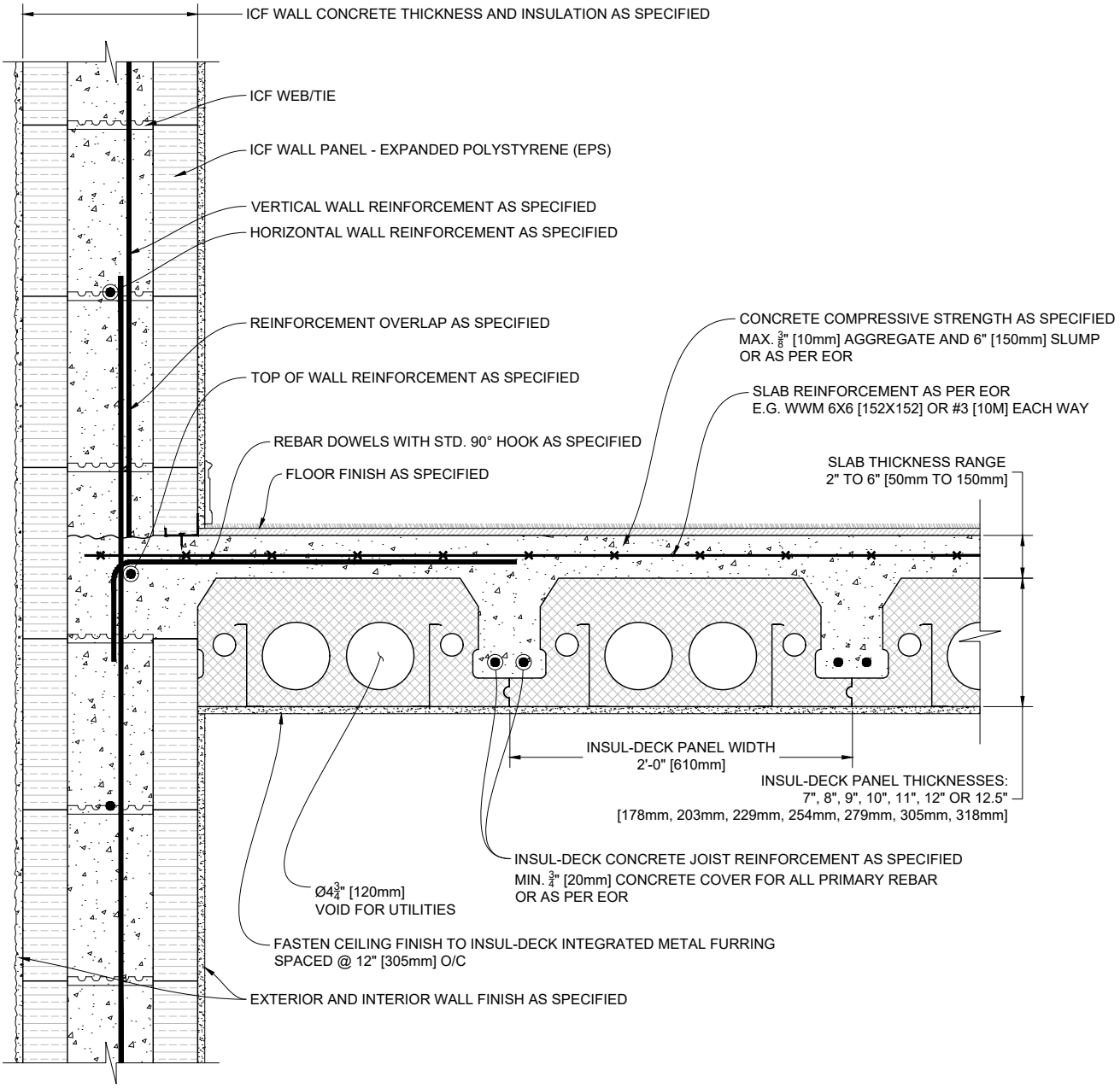

1 INSUL-DECK PANELS PARALLEL TO ICF WALL

Scale: N.T.S.

Plastbau® Technology

INSUL••DECK®

INSUL-DECK
65 Grady Knight Industrial Ct.
Villa Rica, GA 30180-2107

Phone: 800-475-6720
Fax: 727-216-7946
Email: insuldeck@insuldeck.com
Web: www.insuldeck.com

IT IS THE RESPONSIBILITY OF THE USER TO COMPLY WITH ALL APPLICABLE REGULATIONS AND BUILDING CODE REQUIREMENTS CONCERNING THE USE OF THESE PRODUCTS.

IT IS FURTHER THE RESPONSIBILITY OF THE USER TO RESEARCH AND UNDERSTAND SAFE METHODS OF USE AND HANDLING OF THESE PRODUCTS.

INSUL-DECK TO ICF WALL

DATE DRAWN:	2017-02-15	COMMENTS:	N/A
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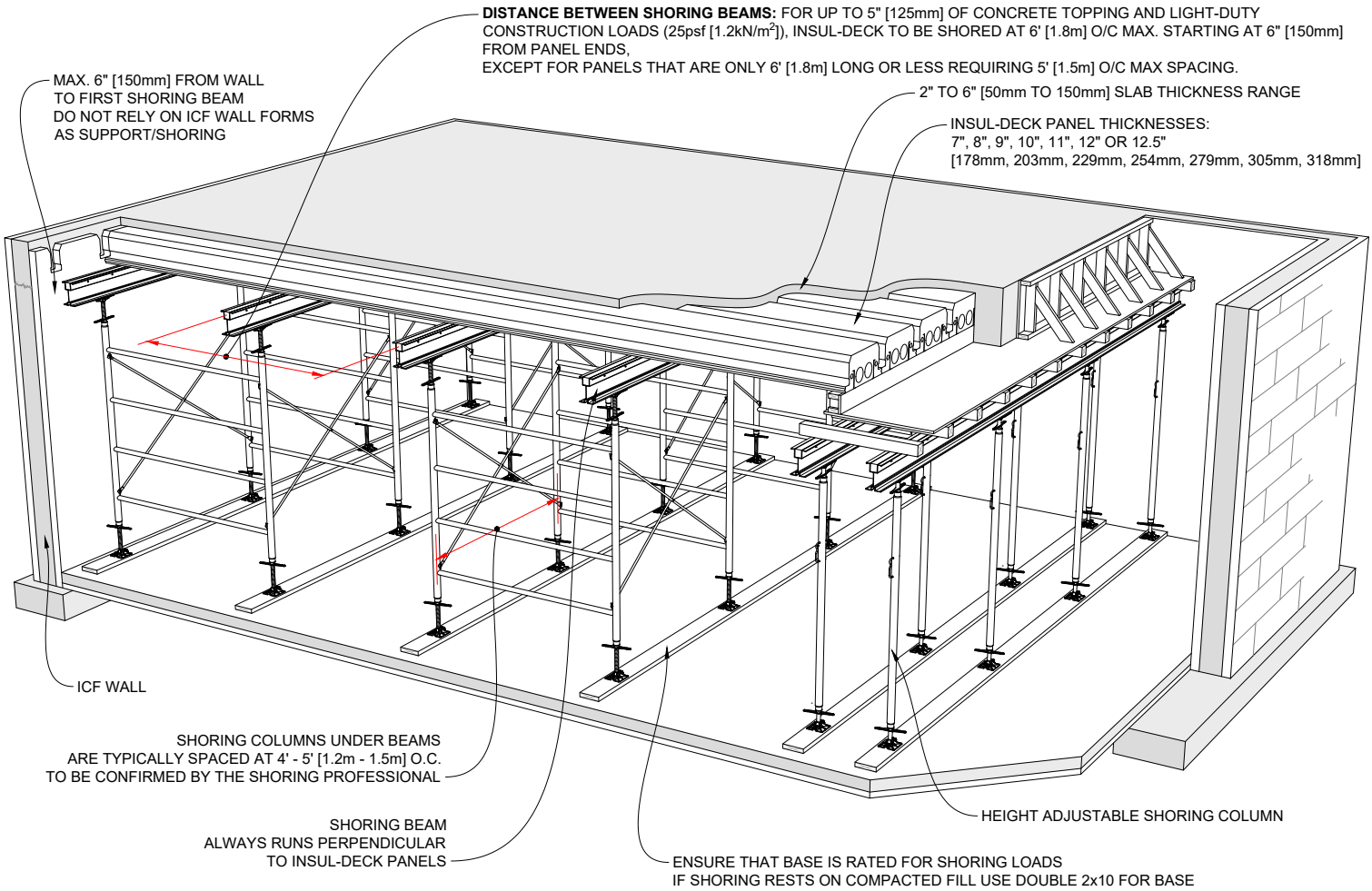
REVISION DATE:	2021-10-01	SCALE:	NOT TO SCALE
DRAWN BY:	TECHNICAL	APPROVED BY:	G. K.
DRAWING NO:	ID-202		



1 TYPICAL INSUL-DECK SHORING LAYOUT

REINFORCEMENT OMITTED FOR CLARITY

SHORING AND BRACING:
INSTALLER IS RESPONSIBLE FOR THE DESIGN AND CORRECT INSTALLATION OF SHORING OF INSUL-DECK FORMS IN ACCORDANCE WITH ACI (AMERICAN CONCRETE INSTITUTE) 347-04 "GUIDE TO FORMWORK FOR CONCRETE" OR CURRENT APPLICABLE CODES. ANY VARIANCE FROM THESE STANDARDS MUST BE PROVIDED AND CERTIFIED IN ADVANCE BY A QUALIFIED ENGINEER, LICENSED FOR THE JOBSITE LOCATION AND SPECIFICATIONS.

Insul-Deck Floor Weights (lb/sqft)

Insul-Deck Panel Thickness	Slab Thickness				
	2"	3"	3.5"	4"	5"
7"	45.1	57.6	63.9	70.1	82.6
8"	47.3	59.8	66.1	72.3	84.8
9"	49.5	62.0	68.3	74.5	87.0
10"	51.7	64.2	70.5	76.7	89.2
11"	53.9	66.4	72.7	78.9	91.4
12"	56.2	68.7	75.0	81.2	93.7
12.5"	57.3	69.8	76.1	82.3	94.8

Notes:
The above are unfactored estimated weights which include concrete (150pcf), reinforcement (3lb/sqft), Insul-Deck Panel (2lb/sqft) and misc. (2lb/sqft)

Insul-Deck Floor Weights (Kg/m²)

Insul-Deck Panel Thickness	Slab Thickness			
	50mm	75mm	100mm	125mm
178mm	218.8	278.8	338.8	398.8
203mm	229.6	289.6	349.6	409.6
228mm	240.4	300.4	360.4	420.4
254mm	251.2	311.2	371.2	431.2
279mm	262	322	382	442
305mm	272.8	332.8	392.8	452.8
318mm	278.2	338.2	398.2	458.2

Notes:
The above are unfactored estimated weights which include concrete (2400Kg/m³), reinforcement (15Kg/m²), Insul-Deck Panel (10Kg/m²) and misc. (10Kg/m²)

Plastbau® Technology
INSUL-DECK®

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Web: www.insuldeck.com

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INSUL-DECK SHORING DETAIL

DATE DRAWN: 2017-02-15		COMMENTS: N/A	
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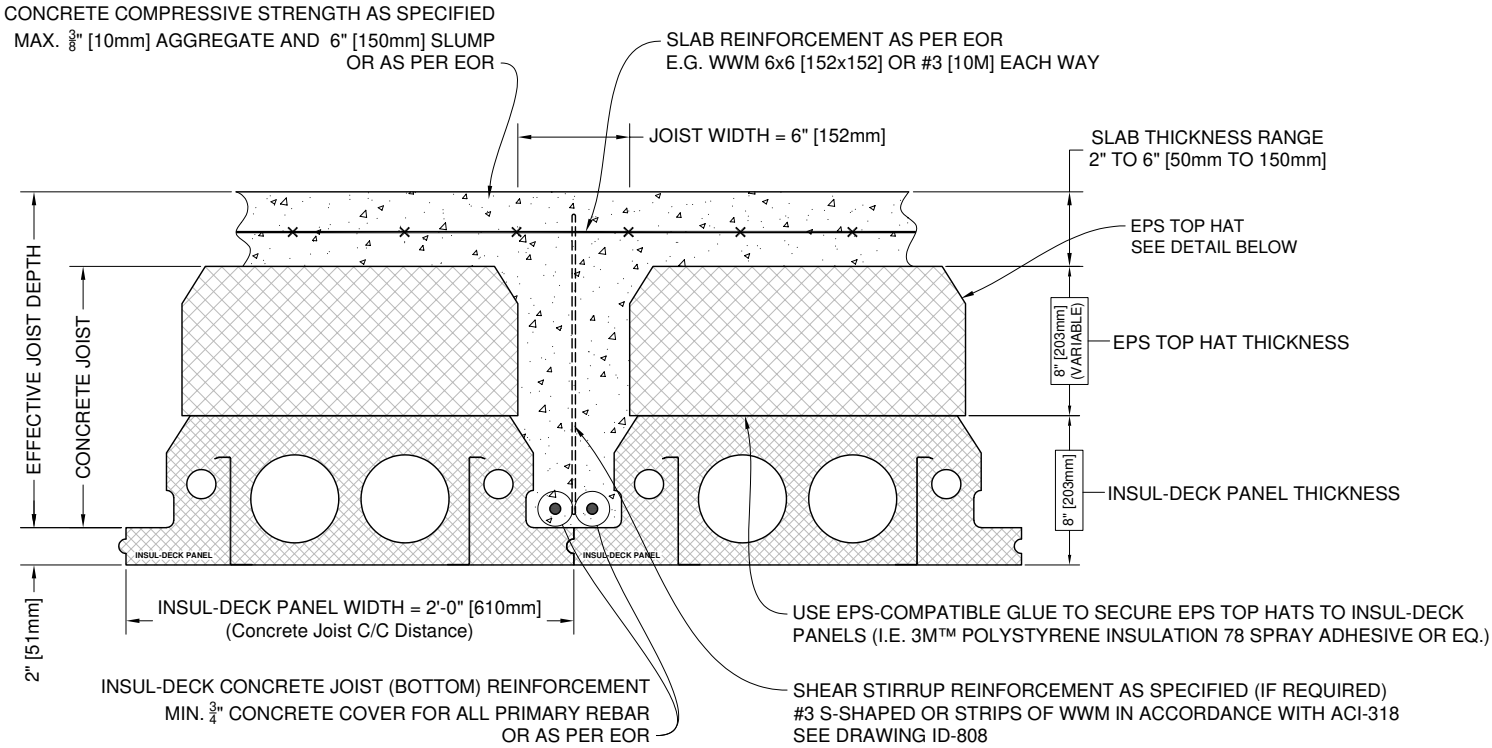
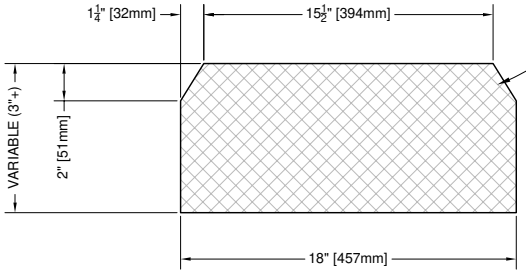
REVISION DATE: 2021-10-01		SCALE: NOT TO SCALE	DRAWING NO: ID-111
DRAWN BY: TECHNICAL		APPROVED BY: G. K.	

NOTES:

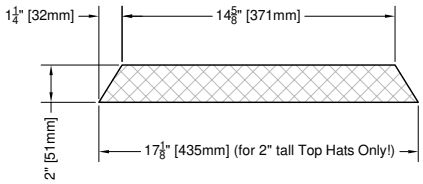
EPS TOP HATS INCREASE INSUL-DECK'S EFFECTIVE JOIST (T-BEAM) DEPTH WHICH IN TURN INCREASES LIVE LOAD CAPACITY AND CLEAR SPAN OF THE FLOOR SYSTEM

WHEN SELECTING TOP HAT THICKNESS, PAY ATTENTION TO MAXIMUM SLENDERNESS (HEIGHT TO WIDTH) RATIO FOR CONCRETE JOISTS





EPS TOP HAT - ID15-Fabricated
CUSTOM ORDERED IN ANY HEIGHT
COMES IN 4' OR 8' [1.22m OR 2.44m] LONG SECTIONS
MADE FROM MODIFIED EXPANDED POLYSTYRENE
(EPS - INCLUDES FLAME-RETARDANT)
DENSITY - REFER TO TABLE BELOW



Product	**U.S.** EPS Board Type (ASTM C578)	**Canada** EPS Board Type (CAN/ULC-S701)	Density	Thermal Conductance (per inch [25mm] thickness)
EPS Top Hats - ex Canada	Type II	Type 2	min. 1.35 pcf [21.6 kg/m^3]	R-4.00 ft.²•h•°F/Btu [RSI-0.7044 K·m²/W]
EPS Top Hats - ex Villa Rica, GA	Type VIII	Type 1	min. 1.15 pcf [18.4 kg/m^3]	R-3.80 ft.²•h•°F/Btu [RSI-0.6692 K·m²/W]
Insul-Deck	Type VIII	Type 1	avg. 1.25 pcf [20 kg/m^3]	R-3.80 ft.²•h•°F/Btu [RSI-0.6692 K·m²/W]

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EPS Top Hats

DATE DRAWN: 2017-02-15		COMMENTS: N/A	
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REVISION DATE: 2025-12-16		SCALE: NOT TO SCALE	DRAWING NO: ID-108
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