



CERTIFICATION



Approved. Sealed. Code Compliant.

Technical Evaluation Report

TER 1910-03

InSoFast® Insulation Panel Products

InSoFast, LLC

Product:

**InSoFast® UX 2.0 Panels
InSoFast® EXi 2.5 Panels
InSoFast® EXe 2.5 Panels
InSoFast® CX44 Panels
InSoFast® CX LowPro SW
Studded Insert**

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April 1, 2021

COMPANY
INFORMATION:

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DIVISION: 07 00 00 - THERMAL AND MOISTURE PROTECTION
SECTION: 07 21 00 - Thermal Insulation
SECTION: 07 21 13 - Foam Board Insulation

1 PRODUCTS EVALUATED¹

- 1.1 InSoFast® UX 2.0 Panels
- InSoFast® EXi 2.5 Panels
- InSoFast® EXe 2.5 Panels
- InSoFast® CX44 Panels
- InSoFast® CX LowPro SW Studded Insert

2 APPLICABLE CODES AND STANDARDS^{2,3}

- 2.1 *Codes*
 - 2.1.1 *IBC—12, 15, 18: International Building Code®*
 - 2.1.2 *IRC—12, 15, 18: International Residential Code®*
- 2.2 *Standards and Referenced Documents*
 - 2.2.1 *ASTM C203: Standard Test Methods for Breaking Load and Flexural Properties of Block-Type Thermal Insulation*
 - 2.2.2 *ASTM C518: Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus*
 - 2.2.3 *ASTM C578: Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation*
 - 2.2.4 *ASTM D1621: Standard Test Method for Compressive Properties of Rigid Cellular Plastics*
 - 2.2.5 *ASTM D1622: Standard Test Method for Apparent Density of Rigid Cellular Plastics*

¹ Building codes require data from valid [research reports](#) be obtained from [approved sources](#). Agencies who are accredited through ISO/IEC 17065 have met the [code requirements](#) for approval by the [building official](#). DrJ is an ISO/IEC 17065 ANSI-Accredited Product Certification Body – Accreditation #1131.

Through ANSI accreditation and the [IAF MLA](#), DrJ certification can be used to obtain product approval in any [jurisdiction](#) or country that has [IAF MLA Members & Signatories](#) to meet the [Purpose of the MLA](#) – “certified once, accepted everywhere.”

Building official approval of a licensed [registered design professional](#) (RDP) is performed by verifying the RDP and/or their business entity complies with all professional engineering laws of the relevant [jurisdiction](#). Therefore, the work of licensed RDPs is accepted by [building officials](#), except when plan (i.e. peer) review finds an error with respect to a specific section of the code. Where this TER is not approved, the [building official](#) responds in writing stating the reasons for [disapproval](#).

For more information on any of these topics or our mission, product evaluation policies, product approval process, and engineering law, visit drjcertification.org or call us at 608-310-6748.

² Unless otherwise noted, all references in this TER are from the 2018 version of the codes and the standards referenced therein (e.g., *ASCE 7*, *NDS*, *ASTM*). This material, design, or method of construction also complies with the 2000-2015 versions of the referenced codes and the standards referenced therein.

³ All terms defined in the applicable building codes are italicized.

- 2.2.6 *ASTM D1761: Standard Test Methods for Mechanical Fasteners in Wood*
- 2.2.7 *ASTM E2273: Standard Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies*
- 2.2.8 *ASTM E330: Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference*
- 2.2.9 *ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials*
- 2.2.10 *CAN/ULC-S701: Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering*
- 2.2.11 *NFPA 285: Standard Fire Test Method for the Evaluation of Fire Propagation Characteristics of Exterior Nonload-bearing Wall Assemblies Containing Combustible Components*
- 2.2.12 *NFPA 286: Standard Methods of Fire Test for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*

3 PERFORMANCE EVALUATION

- 3.1 InSoFast® UX 2.0, InSoFast® EXi 2.5, and InSoFast® Exe 2.5 Panels were evaluated to determine the following:
 - 3.1.1 Physical properties (compressive, density, flexural, thermal transmission)
 - 3.1.2 Drainage efficiency
 - 3.1.3 Performance in accordance with *ASTM E84* for flame spread and smoke development ratings in accordance with [*IBC Section 2603.3*](#) and [*2603.5.4*](#) and [*IRC Section R302.9*](#)
 - 3.1.4 Performance regarding vertical and lateral fire propagation in accordance with [*IBC Section 2603.5.5*](#)
 - 3.1.5 Wind load resistance in accordance with [*IBC Section 1609*](#)
- 3.2 InSoFast® UX 2.0, InSoFast® EXi 2.5 Panels, and InSoFast® EXe 2.5 Panels were evaluated for use as an interior insulation and an exterior insulation.
- 3.3 InSoFast® CX44 Panels and InSoFast® CX LowPro SW Studded Insert were evaluated for use as an interior insulation and an exterior insulation for shipping container applications.
 - 3.3.1 Physical properties (compressive, density, flexural, thermal transmission)
 - 3.3.2 Performance in accordance with *ASTM E84* for flame spread and smoke development ratings in accordance with [*IBC Section 2603.3*](#) and [*2603.5.4*](#) and [*IRC Section R302.9*](#)
- 3.4 Use in fire resistance-rated construction is outside the scope of this TER.
- 3.5 Any code compliance issues not specifically addressed in this section are outside the scope of this TER.
- 3.6 Any engineering evaluation conducted for this TER was performed on the dates provided in this TER and within Dr.J's professional scope of work.

4 PRODUCT DESCRIPTION AND MATERIALS

- 4.1 InSoFast® UX 2.0 Panels are formed from closed-cell, injection-molded 2-inch-thick EPS foam with built-in polypropylene studs, tongue and groove interlocking edges, and electrical raceways (Figure 1).



FIGURE 1. INSOFAST® UX 2.0 PANELS

- 4.2 InSoFast® EXi 2.5 Panels are formed from closed cell, injection-molded 2.5-inch-thick EPS foam with built-in polypropylene studs, tongue and groove interlocking edges, and electrical raceways (Figure 2).
- 4.3 InSoFast® EXe 2.5 Panels are formed from closed cell, injection-molded 2.5-inch-thick EPS foam with built-in polypropylene studs and tongue and groove interlocking edges.

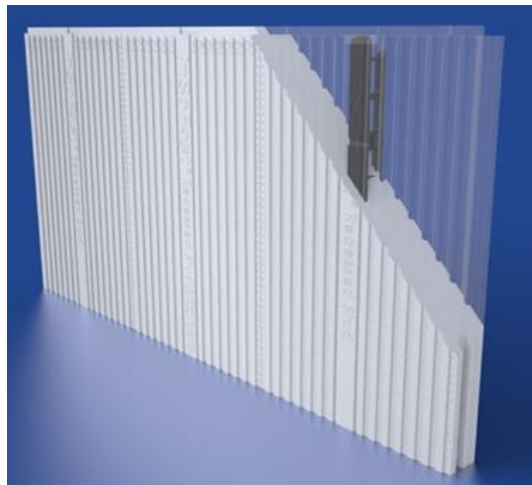


FIGURE 2. INSOFAST® EX 2.5 PANELS

- 4.4 InSoFast® CX44 Panels are formed from closed cell, injection-molded EPS foam of varying thickness with built-in polypropylene studs, tongue and groove interlocking edges, and electrical raceways (Figure 3).



FIGURE 3. INSoFAST® CX44 PANELS

- 4.5 InSoFast® CX LowPro SW Studded Inserts are formed from closed cell, injection-molded 2-inch-thick EPS foam with built-in polypropylene studs (Figure 4).



FIGURE 4. INSoFAST® CX LOWPRO SW STUDDED INSERTS

- 4.6 The closed-cell, injection-molded EPS foam complies with *ASTM C578* Type VIII and *CAN/ULC S701* Type 2 and has a density of 1.35 pounds per cubic foot.

4.7 *Material Availability*

4.7.1 *Width:*

- 4.7.1.1 InSoFast® UX 2.0 Panels: 4' (1219 mm)
- 4.7.1.2 InSoFast® EXi 2.5 and InSoFast® EXe 2.5 Panels: 4' (1219 mm)
- 4.7.1.3 InSoFast® CX44 Panels: 3.67' (1118 mm)
- 4.7.1.4 InSoFast® CX LowPro SW Studded Insert: 7" (178 mm)

- 4.7.2 Standard Product Length: 2' (609 mm)

4.7.3 Thickness:

- 4.7.3.1 InSoFast® UX 2.0 Panels: 2" (50 mm)
- 4.7.3.2 InSoFast® EXi 2.5 and InSoFast® EXe 2.5 Panels: 2.5" (63 mm)
- 4.7.3.3 InSoFast® CX44 Panels: 2" (50 mm) – 3.23" (76 mm)
- 4.7.3.4 InSoFast® CX LowPro SW Studded Insert: 2" (50 mm)

5 APPLICATIONS

- 5.1 InSoFast® UX 2.0 Panels, InSoFast® EXi 2.5 Panels, and InSoFast® EXe 2.5 Panels are used as thermal insulation on the interior or exterior walls, floors, and ceiling surfaces of buildings in Types I-V construction.
- 5.2 InSoFast® CX44 Panels and InSoFast® CX LowPro SW Studded Inserts are used on the interior or exterior of shipping container wall surfaces.
- 5.3 Where the application exceeds the limitations set forth herein, design shall be permitted in accordance with accepted engineering procedures, experience, and technical judgment.
- 5.4 *Drainage Efficiency*
 - 5.4.1 InSoFast® UX 2.0 Panels, InSoFast® EXi 2.5 Panels, and InSoFast® EXe 2.5 Panels have obtained a drainage efficiency rating of 96% when tested in accordance with *ASTM E2273*.
- 5.5 *Thermal Resistance (R-Value)*
 - 5.5.1 InSoFast® UX 2.0 Panels, InSoFast® EXi 2.5 Panels, InSoFast® EXe 2.5 Panels, InSoFast® CX44 Panels, and InSoFast® CX LowPro SW Studded Inserts have the thermal resistances shown in
 - 5.5.2 Table 1.

TABLE 1. THERMAL RESISTANCE VALUES¹

Product	Thickness (in)	R-Value (h ² ft ² °F/Btu)
InSoFast® UX 2.0 Panel	2.0	8.5
InSoFast® EXi 2.5 Panel	2.5	10.6
InSoFast® EXe 2.5 Panel	2.5	10.6
InSoFast® CX44 Panel ²	2.0 - 3.23 (Average 2.62)	11.0
InSoFast® CX LowPro SW Studded Insert	2.0	8.5

SI: 1 in = 25.4 mm

1. Tested in accordance with *ASTM C518*.

2. R-Value for the CX44 Panel based on average thickness of panel.

5.6 Surface Burning Characteristics

- 5.6.1 InSoFast® UX 2.0 Panels, InSoFast® EXi 2.5 Panels, and InSoFast® EXe 2.5 Panels have the flame spread and smoke developed ratings shown in Table 2 when tested in accordance with *ASTM E84* per *IBC Section 2603.3* and *IRC Section R316.3*.

TABLE 2. SURFACE BURNING CHARACTERISTICS¹

Product	Flame Spread	Smoke Developed
InSoFast® UX 2.0 Panel	< 75	< 450
InSoFast® EXi 2.5 Panel	< 75	< 450
InSoFast® EXe 2.5 Panel	< 75	< 450

1. *ASTM E84* results based on EPS manufacturer evaluation reports.

5.7 Vertical and Lateral Fire Propagation

- 5.7.1 InSoFast® UX 2.0 Panels, InSoFast® EXi 2.5 Panels, and InSoFast® EXe 2.5 Panels were tested to assess performance with regard to vertical and lateral fire propagation in accordance with *NFPA 285* per [IBC Section 2603.5.5](#).
- 5.7.2 The wall assemblies listed in Table 3 are approved for use in buildings of Type I-IV construction.

TABLE 3. *NFPA 285* APPROVED EXTERIOR WALL ASSEMBLIES

Wall Component	Materials
Base Wall Use either 1, 2, or 3	<ol style="list-style-type: none"> 1. Cast concrete walls 2. CMU concrete walls 3. 20 GA (min.) 3/8 in (min.) steel studs spaced 24 in o.c. (max.) with 5/8 in (min.) type X Special Fire Resistant Gypsum Wallboard Interior
Fire-Stopping in Stud Cavity at Floor Lines	<ol style="list-style-type: none"> 1. 4 pcf mineral fiber insulation installed
Cavity Insulation Use either 1, 2, 3, or 4	<ol style="list-style-type: none"> 1. None 2. Any noncombustible insulation per <i>ASTM E136</i> 3. Any Mineral Fiber (Board type Class A <i>ASTM E84</i> faced or unfaced) 4. Any Fiberglass (Batt Type Class A <i>ASTM E84</i> faced or unfaced)
Exterior Sheathing For base wall system 3	<ol style="list-style-type: none"> 1. 1/2 in or thicker exterior glass matt gypsum sheathing meeting <i>ASTM C1177</i>
WRB over Sheathing Any item 1-57	<ol style="list-style-type: none"> 1. None 2. BASF MasterSeal AWB 660 3. Carlisle (CCW) Fire Resist 705FR-A 4. Carlisle (CCW) Fire Resist Barritech NP 5. Carlisle (CCW) Fire Resist Barritech VP (or VP LT) 6. Carlisle (CCW) 705 7. Carlisle (CCW) 705VP 8. GE Momentive Elemax 2600 9. Henry Air-Bloc 32MR 10. Henry Air-Bloc 31MR 11. Henry EnviroCap 108 12. Henry Air-Bloc 33MR 13. Henry Air-Bloc 21 FR 14. Henry Blueskin VP 160 15. Henry Air-Bloc 21S 16. Henry Air-Bloc 17MR 17. Henry BlueSkin SA 18. Henry Air-Bloc 16MR 19. Henry FoilSkin 20. Henry MetalClad 21. Polyguard Air Lok Flex 22. Polyguard Air Lok Flex VP 23. Polyguard FlexGuard 24. Polyguard Air Lok Sheet 400 NP 25. Polyguard Air Lok Sheet UV400 NP 26. Dorken Delta Vent SA 27. Dorken Delta Vent S/Plus 28. Dorken Delta Fassade S 29. Dorken Delta Foxx/Plus 30. Dorken Delta Maxx/Plus 31. Soprema Sopraseal Stick VP 32. Soprema Soprasolin HD 33. Soprema LM 204 VP

Wall Component	Materials
	34. Soprema 1100T 35. Prosoco Spraywrap MVP 36. Prosoco R-Guard VB 37. Prosoco R-Guard Cat 5 38. Prosoco R-Guard Cat 5 Rain Screen 39. Vaproshield Revealshield SA 40. Vaproshield Wrapshield SA 41. GCP (Grace) PAB NPL 10 42. GCP (Grace) PAB NPS 43. GCP (Grace) PAB NPL 44. GCP (Grace) PAB VCL 45. GCP (Grace) PAB VPL LT 46. GCP (Grace) PAB VPS 47. GCP (Grace) PAD AWM 48. GCP (Grace) VPL 50 49. WR Meadows Air-Shield LMP (Gray) 50. WR Meadows Air-Shield LMP (Black) 51. WR Meadows Air-Shield TMP 52. WR Meadows Air-Shield LSR 53. Siga Majavest 54. Siga Majavest 500 SA 55. Tremoco ExoAir 230 56. Tremco ExoAir 130 57. DuPont™ Tyvek® CommercialWrap®
Adhesive Use item 1 or 2 with Base Wall 1 or 2	1. ¾ in beads of Loctite PL premium adhesive 16 in o.c. 2. <i>NFPA 285</i> approved EIFS “mud”
Exterior Insulation Use either 1 or 2 adhered with adhesive or mechanically attached	1. InSoFast® UX 2.0 Panels (with or without raceways) 2. InSoFast® EX 2.5 Panels (with or without raceways)
Cladding Use either 1 or 2	1. ½ in (min.) generic cement board mechanically attached to InSoFast® interior frame strips with screws 8 in o.c. in the field and 12 in o.c. on panel edges 2. ½ in (min.) Glass matt board (such as Densglass) mechanically attached to InSoFast® interior frame strips with screws 8 in o.c. in the field and 12 in o.c. on panel edges
WRB Over Cladding	1. Any WRB that has been tested or approved to be used in an <i>NFPA 285</i> compliant assembly paired with the outer coverings listed below Note: The WRB must be approved for use directly under cladding or <u>over</u> combustible insulation. WRBs allowed <u>under</u> combustible insulation are protected by the insulation and do not qualify as WRBs for this location.
Outer Covering Use any item 1-7 Where aluminum is listed, this means aluminum sheet metal panels – not aluminum composite panels.	1. EIFS coatings that are <i>NFPA 285</i> approved for applications over cement board 2. Adhered thin brick (with noncombustible mortar) 3. Adhered stone (with noncombustible mortar) 4. Fiber cement lap or panels (or any non-combustible cladding) mechanically fastened through the cladding directly to the InSoFast studs 5. Fiber cement lap or panels (or any non-combustible cladding) mechanically fastened to metal hat channels or mounting element fastened through the cladding into the InSoFast® studs 6. Vertical or horizontal steel or aluminum cladding mechanically fastened through the cladding into the InSoFast® studs 7. Vertical or horizontal steel or aluminum cladding mechanically fastened to metal hat channels or non-combustible mounting element fastened through the cladding into the InSoFast® studs

Wall Component	Materials
1. The assemblies and combinations herein and the various substitutions of products are based on testing and professional thermal engineering analysis by Priest & Associates Consulting, LLC. 2. Note: window headers/jambes for all constructions shall incorporate 25 Ga. L flashing and 2 in of mineral wool above the opening and on both sides.	

5.8 Thermal Barrier Requirements

- 5.8.1 InSoFast® panels shall be separated from the interior of a building by an approved thermal barrier in accordance with IBC Section 2603.4 and IRC Section R316.4. Fasteners attaching the thermal barrier to the InSoFast® panels shall be installed at a maximum of 12" on center.

5.9 Attachment Methods

- 5.9.1 Table 4 provides the maximum allowable capacities of mechanical fasteners when fastened to the InSoFast® studs.

TABLE 4. ALLOWABLE LOAD CAPACITIES FOR MECHANICAL ATTACHMENT

Application	Fastening Method	Allowable Load Capacity (lb) per Fastener	
		Withdrawal	Lateral
Attaching wall covering or cladding to InSoFast® studs ¹	No. 6 by 1½" coarse type W screw	65	95
Attaching InSoFast® studs to structural wall ¹	No. 9 by 3½" long type W screw	95	35
Attaching InSoFast® studs to steel ²	No. 10 by 3½" cement board sheathing screw	15	21
Attaching InSoFast® studs to masonry wall ^{3,4}	Tapcon® ⅜" (dia.) by 3½" (min. length) Blue, White, and Stainless concrete screw anchors	55	100

SI: 1 in = 25.4 mm, 1 lb = 4.45 N

- Fasteners tested in accordance with *ASTM D1761*.
- Fastener calculations performed in accordance with *AISI* Chapter E. Studs shall have a minimum thickness of 0.058" and a minimum tensile strength of 50 ksi.
- Concrete screw anchor must provide 1" minimum penetration into masonry substrate.
- Load capacities in accordance with Tapcon® evaluation reports and product specifications.
- All screws and anchors shall be countersunk into 2.5" thick EX panels until fastener head is flush with polypropylene stud.

5.9.2 Table 5 provides the maximum allowable capacities of adhesive when applied to the InSoFast® studs.

TABLE 5. ALLOWABLE LOAD CAPACITIES FOR ADHESIVE ATTACHMENT

Application	Fastening Method	Allowable Load Capacity ¹ (psf)	
		Withdrawal	Lateral
Attaching InSoFast® studs to wood framed structural wall ²	¾" bead of PL Premium 3x construction adhesive	35	50
Attaching InSoFast® studs to concrete structural wall ²		40	50
Attaching InSoFast® studs to steel framed structural wall ²		30	40

SI: 1 in = 25.4 mm, 1 lb = 4.45 N
 1. Pounds per square foot of InSoFast® panel
 2. Testing performed by SBCRI following a modified ASTM D1761 procedure

6 INSTALLATION

6.1 Installation shall comply with the manufacturer's installation instructions and this TER. In the event of a conflict between the manufacturer's installation instructions and this TER, the more restrictive shall govern.

6.2 Installation Procedure using Mechanical Attachment

6.2.1 Exterior Installation over Above Grade Framed Walls:

- 6.2.1.1 InSoFast® UX 2.0 Panels, InSoFast® EXi 2.5 Panels, and InSoFast® EXe 2.5 Panels may be installed over framed walls.
- 6.2.1.2 Use indicator markings on the panel and attach panels with recommended fasteners 12" o.c. along InSoFast® studs.
- 6.2.1.3 For 16" framing, install the first panel so that the built-in studs line up with the wall studs and attach using recommended fasteners.
- 6.2.1.4 For 24" framing, a screwable structural sheathing (such as OSB or plywood) is required. The number of recommended fasteners to be used is dependent on wind load requirements.
- 6.2.1.5 Panels may be mechanically attached to concrete, masonry walls, or framed walls with structural sheathing with recommended fasteners placed 12" o.c. along the InSoFast® studs.
- 6.2.1.6 See manufacturer's installation instructions for more information and installation procedures for surrounding openings, installing in corners, installing on non-level surfaces, etc.

6.2.2 Interior Installation over Existing Framed Walls:

- 6.2.2.1 Prior to installation, remove baseboard, window trim, electrical outlet covers, etc.
- 6.2.2.2 Mark existing stud locations on the wall and align InSoFast® studs with framing.
- 6.2.2.3 The recommended screw pattern is 12" o.c. with a fastener length sufficient to penetrate existing framing.
- 6.2.2.4 Adhesive is used in corners for additional support.
- 6.2.2.5 Other suitable interior or exterior substrates for the adhesive application are wood sheathing, lath and plaster, masonry, metal siding, and concrete. Use the adhesive method outlined below.
- 6.2.2.6 See manufacturer's installation instructions for more information and installation procedures for surrounding openings, installing in corners, installing on non-level surfaces, etc.

6.3 Installation Procedure using Adhesive Attachment

6.3.1 General Procedure using PL Premium 3X Construction Adhesive:

- 6.3.1.1 Surfaces must be clean and free of frost, standing water, grease, dust, and other contaminants. Pre-fit all materials and protect finished surfaces.
- 6.3.1.2 Apply a $\frac{3}{8}$ " bead of PL Premium 3x construction adhesive on the ribbed surface of the studs.
- 6.3.1.3 Apply additional adhesive to the foam along any cuts.
- 6.3.1.4 The panels/studs may be repositioned within 30 minutes after applying the adhesive.
- 6.3.1.5 Climatic conditions during installation:
 - 6.3.1.5.1 When bonding InSoFast® panels/studs, avoid cure and surface temperatures below 40°F (4°C) and above 90°F (32°C).
 - 6.3.1.5.2 In arid (dry) conditions or non-porous surfaces (such as metal or fiberglass), add water in the form of a light mist to the adhesive extruded on the stud. This accelerates the adhesive's set time.

6.3.2 Adhesive Installation over Below Grade Concrete or Masonry Walls:

- 6.3.2.1 InSoFast® UX 2.0 Panels, InSoFast® EXi 2.5 Panels, and InSoFast® EXe 2.5 Panels may be installed over below grade concrete or masonry walls.
- 6.3.2.2 Prior to installation, clean and remove dirt, debris, or loose paint from walls that may affect adhesive bond.
- 6.3.2.3 Start InSoFast® Panel installation at a corner.
- 6.3.2.4 Apply a $\frac{3}{8}$ " bead of PL Premium 3x construction adhesive along the ribbed dovetailed surface of the plastic studs on the back of the wall panel. Apply a bead of adhesive directly to the foam within 2" of the corner of the wall.
- 6.3.2.5 Set panel on floor and press it against wall.
- 6.3.2.6 To start second row of panels, cut panel to create running bond pattern, ensuring that studs line up but vertical seams do not.
- 6.3.2.7 Continue installing panels to the next corner.
- 6.3.2.8 See manufacturer's installation instructions for further information on completing corners, intersecting walls, surrounding windows, etc.

6.3.3 Adhesive Installation over Exterior Above Grade Concrete or Masonry Walls:

- 6.3.3.1 InSoFast® UX 2.0 Panels, InSoFast® EXi 2.5 Panels, and InSoFast® EXe 2.5 Panels may be installed over above grade concrete or masonry walls.
- 6.3.3.2 On the back of the InSoFast® Panels, apply a $\frac{3}{8}$ " bead of PL Premium 3x construction adhesive along the dovetailed ribbing of each InSoFast® stud.
- 6.3.3.3 Press panels firmly into place against the wall. If application conditions are particularly windy, supplemental bracing or mechanical attachment may be required to secure panels until the adhesive has set.
- 6.3.3.4 See manufacturer's installation instructions for further information on completing corners, intersecting walls, surrounding windows, etc.

6.3.4 Adhesive Installation over Metal Surfaces:

- 6.3.4.1 InSoFast® UX 2.0 Panels, InSoFast® EXi 2.5 Panels, InSoFast® EXe Panels, InSoFast® CX44 panels, and InSoFast® CX LowPro SW studded inserts may be installed on metal surfaces such as shipping container walls.
- 6.3.4.2 Lay out first row of InSoFast® panels alongside sidewall of shipping container to determine the fit. Variations in shipping container may require panels to be trimmed or spaced out slightly.

- 6.3.4.3 Apply PL Premium 3x adhesive in a 3/8" bead on the backside of the InSoFast® studs on the backside of the studs.
 - 6.3.4.3.1 Add water in the form of a light mist to the adhesive extruded on the stud. This accelerates the adhesive's set time.
 - 6.3.4.3.2 When bonding InSoFast® panels/studs, avoid cure and surface temperatures below 40°F (4°C) and above 90°F (32°C) on non-porous metal surfaces.
- 6.3.4.4 Add an additional bead of PL Premium 3x adhesive at the start and end of each wall.
- 6.3.4.5 Apply a continuous bead of adhesive or spray foam along the bottom of the container wall.
- 6.3.4.6 Press panel into place and verify that adhesive has spread out to width of the stud.
- 6.3.4.7 To start the second row, cut panel in center with long snap off blade utility knife to start the running bond or staggered pattern.
- 6.3.4.8 At the top of second row, run a bead of spray foam on the backside of the panel or directly to the container wall.
- 6.3.4.9 See manufacturer's installation instructions for further details and instructions for installing InSoFast® CX44 Panels around windows and doors.
 - 6.3.4.9.1 InSoFast® panels installed on a metal ceiling are meant for drywall finish only.
- 6.3.5 *InSoFast® CX LowPro SW Studded Inserts:*
 - 6.3.5.1 Apply a 3/8" bead of PL Premium 3x construction adhesive to the dovetailed ribbing of each stud, then apply a bead horizontally across the top over the backside of the stud to form a "T".
 - 6.3.5.2 Apply additional horizontal adhesive along the base of the first row to secure the bottom edge of the LowPro Stud.
 - 6.3.5.3 Install the LowPro inserts into container wall corrugations.
 - 6.3.5.4 Apply an additional horizontal bead of adhesive along the top of the upper most LowPro stud to secure to the top of the container.
 - 6.3.5.5 For additional installation instructions and alterations to provide higher insulation R-values, see manufacturer's installation instructions.
- 6.3.6 *Installation over Concrete Ceilings:*
 - 6.3.6.1 InSoFast® UX 2.0 Panels, InSoFast® EXi 2.5 Panels, and InSoFast® EXe 2.5 Panels may be installed over concrete ceilings.
 - 6.3.6.2 For mechanical attachment, install fasteners 12" o.c. into the recessed attachment points on the InSoFast® stud that penetrate the concrete 1".
 - 6.3.6.3 For adhesive attachment:
 - 6.3.6.3.1 Apply a 3/8" bead of PL Premium 3x construction adhesive on the ribbed surface of the studs. Apply additional adhesive to the foam along any cuts.
 - 6.3.6.3.2 Install one mechanical fastener in the center recessed attachment point to hold the panel in place until the adhesive has set.
 - 6.3.6.4 See manufacturer's installation instructions for further information on completing corners, intersecting walls, surrounding windows, etc.
 - 6.3.6.4.1 InSoFast® panels installed on a concrete ceiling are meant for drywall finish only.
- 6.3.7 *Installation over Concrete Floor:*
 - 6.3.7.1 InSoFast® UX 2.0 Panels, InSoFast® EXi 2.5 Panels, and InSoFast® EXe 2.5 panels may be installed over concrete floors.
 - 6.3.7.2 If installing InSoFast® panels on both walls and floor, install panels on the wall first.

- 6.3.7.3 Floating installation method:
 - 6.3.7.3.1 This method is recommended for carpet, laminate, and wood floors.
 - 6.3.7.3.2 Place panels directly on concrete without any adhesive. Interlock panels together with tongue and grooved edges in a staggered or running-bond pattern.
- 6.3.7.4 Glue down installation method:
 - 6.3.7.4.1 This method is recommended for carpet, laminate, and wood floors.
 - 6.3.7.4.2 Apply a $\frac{3}{8}$ " bead of PL Premium 3X construction adhesive to the dovetailed ribbing of each stud and install panels in a staggered or running-bond pattern.
- 6.3.7.5 Screw down installation method:
 - 6.3.7.5.1 This method is recommended for any flooring type.
 - 6.3.7.5.2 Attach InSoFast® panels to the concrete floor by installing concrete screws through the studs.
- 6.3.7.6 Fully adhered installation method:
 - 6.3.7.6.1 This method is recommended for tiled areas.
 - 6.3.7.6.2 InSoFast® panels should be set in a bed of thin set tile adhesive with a notched trowel.
- 6.3.7.7 See manufacturer's installation instructions for more information and installation procedures for surrounding openings, installing in corners, installing on non-level surfaces, etc.

7 TEST ENGINEERING SUBSTANTIATING DATA

- 7.1 Wind loading testing in accordance with *ASTM E330* conducted by Intertek
- 7.2 EPS properties testing in accordance with *ASTM C578* conducted by Intertek
- 7.3 Drainage efficiency testing in accordance with *ASTM E2273* conducted by Intertek
- 7.4 Physical properties testing conducted by Intertek:
 - 7.4.1 Compressive strength in accordance with *ASTM D1621*
 - 7.4.2 Density in accordance with *ASTM D1622*
 - 7.4.3 Flexural strength in accordance with *ASTM C203*
- 7.5 Thermal resistance testing in accordance with *ASTM C518* conducted by Element Materials Technology (formerly Stork Twin City Testing)
- 7.6 Fire testing in accordance with *NFPA 286* conducted by Intertek
- 7.7 Vertical and lateral flame propagation testing in accordance with *NFPA 285* conducted by Intertek
- 7.8 Engineering analysis for *NFPA 285* test results performed by Priest & Associates Consulting, LLC
- 7.9 EPS foam flame spread and smoke developed indexes provided by manufacturer evaluation reports
- 7.10 Withdrawal and lateral load fastener testing in accordance with *ASTM D1761* conducted by Intertek
- 7.11 Withdrawal and lateral load adhesive testing with modified *ASTM D1761* procedure conducted by SBCRI
- 7.12 Some information contained herein is the result of testing and/or data analysis by other sources which conform to [*IBC Section 1703*](#) and relevant [professional engineering law](#). DrJ relies on accurate data from these sources to perform engineering analysis. DrJ has reviewed and found the data provided by other professional sources to be credible.
- 7.13 Where appropriate, DrJ's analysis is based on design values that have been codified into law through codes and standards (e.g., *IBC*, *IRC*, *NDS®*, and *SDPWS*). This includes review of code provisions and any related test data that aids in comparative analysis or provides support for equivalency to an intended end-use application. Where the accuracy of design values provided herein is reliant upon the published properties of commodity materials (e.g., lumber, steel, and concrete), DrJ relies upon the grade mark, stamp, and/or design values provided by raw material suppliers to be accurate and conforming to the mechanical properties defined in the relevant material standard.

8 FINDINGS

- 8.1 When used and installed in accordance with this TER and the manufacturer's installation instructions, the product(s) listed in Section 1.1 are approved for the following:
- 8.1.1 InSoFast® EXe 2.5 Panels are approved for use in exterior walls of buildings Type I-IV and Type V in accordance with IBC Section 2603.5.
 - 8.1.2 InSoFast® UX 2.0, InSoFast® EXi 2.5, and InSoFast® Exe 2.5 Panels are approved for use as part of a *NFPA 285* approved wall assembly in accordance with IBC Section 2603.5.5.
 - 8.1.3 InSoFast® UX 2.0 and InSoFast® EXi 2.5 Panels are approved for use as an interior insulation.
 - 8.1.4 InSoFast® CX44 Panels and InSoFast® CX LowPro SW Studded Insert are approved for use as an interior insulation and an exterior insulation for shipping container applications.
- 8.2 IBC Section 104.11 (IRC Section R104.11 and IFC Section 104.9 are similar) states:

104.11 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. An alternative material, design or method of construction shall be *approved* where the *building official* finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, not less than the equivalent of that prescribed in this code...Where the alternative material, design or method of construction is not *approved*, the *building official* shall respond in writing, stating the reasons the alternative was not *approved*.

- 8.3 This product has been evaluated in the context of the codes listed in Section 2 and is compliant with all known state and local building codes. Where there are known variations in state or local codes applicable to this evaluation, they are listed here.
- 8.3.1 No known variations

9 CONDITIONS OF USE

- 9.1 Use in fire resistance-rated construction is outside the scope of this TER.
- 9.2 InSoFast® panels shall be separated from the interior of a building by an approved thermal barrier in accordance with IBC Section 2603.4 and IRC Section R316.4.
- 9.3 A vapor retarder shall be installed in accordance with IBC Section 1404.3⁴ and IRC Section R702.7 when required in the construction of walls in framed construction, above-grade. For masonry construction and shipping containers, a vapor retarder is not required.
- 9.4 In areas where the probability of termite infestation is "very heavy", as defined by IBC Section 2603.8, installation of InSoFast® panels shall follow the requirements of IBC Section 2603.8 and IRC Section R316.7.
- 9.5 Where required by the *building official*, also known as the authority having jurisdiction (AHJ) in which the project is to be constructed, this TER and the installation instructions shall be submitted at the time of *permit* application.
- 9.6 Any generally accepted engineering calculations needed to show compliance with this TER shall be submitted to the AHJ for review and approval.
- 9.7 Design loads shall be determined in accordance with the building code adopted by the *jurisdiction* in which the project is to be constructed and/or by the Building Designer (e.g., *owner* or *registered design professional*).
- 9.8 At a minimum, this product shall be installed per Section 6 of this TER.
- 9.9 This product is manufactured under a third-party quality control program in accordance with IBC Section 104.4 and 110.4 and IRC Section R104.4 and R109.2.
- 9.10 The actual design, suitability, and use of this TER, for any particular building, is the responsibility of the *owner* or the owner's authorized agent. Therefore, the TER shall be reviewed for code compliance by the *building official* for acceptance.

⁴ 2015 IBC Section 1405.3

- 9.11 The use of this TER is dependent on the manufacturer's in-plant QC, the ISO/IEC 17020 third-party quality assurance program and procedures, proper installation per the manufacturer's instructions, the building official's inspection, and any other code requirements that may apply to demonstrate and verify compliance with the applicable building code.

10 IDENTIFICATION

- 10.1 The product(s) listed in Section 1.1 are identified by a label on the board or packaging material bearing the manufacturer's name, product name, TER number, and other information to confirm code compliance.
- 10.2 Additional technical information can be found at www.insofast.com.

11 REVIEW SCHEDULE

- 11.1 This TER is subject to periodic review and revision. For the most recent version of this TER, visit drjcertification.org.
- 11.2 For information on the current status of this TER, contact [DrJ Certification](#).