Code Compliance Research Report
CCRR-1066

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DIVISION: 07 00 00 – THERMAL AND MOISTURE PROTECTION
Section: 07 21 00 – Thermal Insulation

REPORT HOLDER:
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REPORT SUBJECT:
Kooltherm® Insulation Boards:
K15 Rainscreen Board
K8 Cavity Board
K7 Pitched Roof Board
K12 Framing Board
K10 FM Soffit Board
K20 Tilt Up Concrete Board
K5 External Wall Board
K3 Floor Board

1.0 SCOPE OF EVALUATION

This Research Report addresses compliance with the following Codes:

- 2015 and 2012 *International Building Code* (IBC)
- 2015 and 2012 *International Residential Code* (IRC)
- 2015 and 2012 *International Energy Conservation Code* (IECC)

Kooltherm® Insulation Boards have been evaluated for the following properties:

- Physical properties
- Surface-burning characteristics
- Thermal resistance
- Attic and crawl space installation
- Air permeance
- Exterior walls of Types I, II, III, or IV construction

See Table 1 for applicable Code sections related to these properties.

NOTE: This report references 2015 Code sections with [2012] Code sections shown in brackets where they differ.

2.0 USES

Kooltherm® Insulation Boards are used for non-structural thermal insulation in ceiling and floor assemblies, and door cavities in all Types of construction. In wall assemblies, the insulation boards are limited to Type V construction, except when used on exterior walls of one-story buildings complying with IBC Section 2603.4.1.4 or as described in Section 4.3 for use in Types I, II, II, and IV construction.

Kooltherm® K10 Insulation Boards may also be used in attic and crawl spaces without an ignition barrier when installed as per Section 4.2.

The insulation boards may be used as an above grade exterior insulation on concrete slab edges, foundation walls, and may be used under flat concrete slab-on-grade construction, except in areas where termite exposure, as defined in IBC section 2603.8 [2603.9] and IRC section R318.4, is "very heavy".

The insulation boards may be used as an air barrier material in accordance with IECC Section 402.5.1.2.1.

3.0 DESCRIPTION

3.1 General:

Kooltherm® K15, K8, K7, and K12 Insulation Boards are phenolic foam core insulation boards with composite foil facers on both surfaces.

Kooltherm® K10 Insulation Boards are phenolic foam core insulation boards with a glass fiber tissue-based facing on the back surface and a composite foil facer on the exterior surface.

Kooltherm® K20, K5, and K3 Insulation Boards are phenolic foam core insulation boards with a glass fiber tissue-based facing on both surfaces.

The Kooltherm® insulation boards are supplied with a nominal core density of 2.0 lb/ft^3, in thicknesses ranging from 25mm to 120mm.

3.2 Performance Characteristics:

3.2.1 Surface Burning Characteristics: Kooltherm® Insulation Boards have a flame spread index of 25 or less and a smoke developed index of 450 or less when tested in accordance with UL 723 (ASTM E84).

3.2.2 Thermal Resistance: Kooltherm® Insulation Boards have thermal resistance values as listed in Table 2.

3.2.3 Air Permeability: Kooltherm® Insulation Boards have an air leakage rate as listed in Table 3 when tested in accordance with ASTM E2178.

3.2.4 Wall assemblies constructed in accordance with Intertek Design Number KIL/BI 30-01 and Section 4.3 comply with NFPA 285.

4.0 INSTALLATION

4.1 General:

Kooltherm® Insulation Boards must be installed in accordance with the manufacturer's published installation instructions, the applicable Code, and this Research Report. The manufacturer's published installation instructions and this Research Report must be strictly adhered to, and a copy of the instructions must be available on the jobsite during installation.

Kooltherm® Insulation Boards must be separated from the interior of the building by a thermal barrier complying with IBC Section 2603.4 or IRC Section R316.4 as applicable.

4.2 Attic and Crawl Spaces:

Kooltherm® K10 Insulation Boards, installed with glass fiber tissue facing the interior of the attic or crawl space, may be used for walls and ceilings of attic or crawl spaces without the ignition barrier required by IBC Section 2603.4.1.6, or IRC Sections R316.5.3 or R316.5.4, when all of the following conditions are met:

a. Entry to the attic or crawl space is only to service utilities and no storage is permitted. Utilities include, but are not limited to, mechanical equipment, electrical wiring, fans, and gas or electric hot water heaters and furnaces.
b. There are no interconnected attic or basement areas.
c. Air in the attic or crawl space is not circulated to other parts of the building.
d. Attic ventilation is provided when required by IBC Section 1203.2 or IRC Section R806, as applicable.
e. Under-floor (crawl space) ventilation is provided that complies with IBC Sections 1203.3 or IRC Section R408.1, as applicable.
f. Combustion air is provided in accordance with IMC (*International Mechanical Code*) Section 701.
g. The insulation is limited to a maximum thickness of 120mm.

4.3 Exterior Walls of Type I, II, III, or IV Construction:

Kooltherm® Insulation Boards, to a maximum thickness of 120mm (4-3/4 in.) with a nominal core density of 2.0 lb/ft^3, may be installed on exterior walls of buildings of Type I, II, III, or IV construction complying with IBC Section 2603.5 and as described in this section. Intertek Design Listing KIL/BI 30-01 describes the assemblies tested and certified by Intertek as complying with NFPA 285. The test wall assemblies were extended to include various wall constructions described in Table 4 through a third-party engineering analysis.

5.0 CONDITIONS OF USE

The Kooltherm® Insulation Boards described in this Research Report comply with, or are suitable alternatives to, what is specified in those Codes listed in Sections 1.0 and 2.0 of this report, subject to the following conditions:

5.1 Installation must comply with this Research Report, the manufacturer's published installation instructions, and the applicable Code. In the event of a conflict between the manufacturer's instructions and this report, this report governs.

5.2 Exterior walls must be protected by a water-resistive barrier complying with IBC Section 1404.2 or IRC Section R703.2, and by wall coverings that provide the necessary structural wind and seismic resistance.

5.3 Insulation boards must not be used as a nailing base for siding materials. All fasteners must penetrate through the insulation into the existing wall framing or structural sheathing as required by the wall covering manufacturer's instructions or the applicable Code.

5.4 Use of Kooltherm® Insulation Boards in Types I, II, III, and IV construction must be as described in Section 4.3.

5.5 Kooltherm® Insulation Boards are manufactured in Pembridge, Leominster, Herefordshire, UK, under a quality control program with inspections by Intertek Testing Services NA, Inc. (AA-647).

6.0 SUPPORTING EVIDENCE

6.1 Reports of tests in accordance with ASTM C1126-15, ASTM E2178-13, UL 723 (2010), and NFPA 285 (2012).

6.2 Data in accordance with the ICC-ES Acceptance Criteria for Foam Plastic Insulation (AC12), dated June 2012 (revised January 2015).

6.3 Analysis and technical justification from Jensen Hughes, Inc. relating to NFPA 285 (2012) extensions.

6.4 Intertek Listing Report "Kingspan - Kooltherm Phenolic Insulation Boards".

7.0 IDENTIFICATION

Kooltherm® Insulation Boards are identified on the packaging by a marking bearing the report holder's name (Kingspan), the product name, the manufacturing location, the Intertek Mark, the Code Compliance Research Report number (CCRR-1066), thermal resistance value, flame spread index, and smoke developed index.

8.0 OTHER CODES

This section does not apply.

9.0 CODE COMPLIANCE RESEARCH REPORT USE

9.1 Approval of building products and/or materials can only be granted by a building official having legal authority in the specific jurisdiction where approval is sought.

9.2 Code Compliance Research Reports shall not be used in any manner that implies an endorsement of the product by Intertek.

9.3 Reference to the Intertek Directory of Building Products at https://bpdirectory.intertek.com is recommended to ascertain the current version and status of this report.

TABLE 1 – PROPERTIES EVALUATED

PROPERTY	IBC SECTION[1]	IRC SECTION[1]	IECC SECTION[1]
Physical properties	NA	NA	NA
Surface burning characteristics	2603.3	R316.3	NA
Thermal resistance	1301	N1101.10 [N1101.12], N1102	C303.1.1, C303.1.4, R303.1.1, R303.1.4
Thermal barrier/ignition barrier	2603.4	R316.4	NA
Air Permeance	NA	NA	C402.5.1.2.1

[1] Section numbers in parentheses refer to the 2012 Code if different

TABLE 2 – THERMAL RESISTANCE

Kooltherm® Product	Product Thickness (mm)	R-VALUE (RSI) @ 75°F (24°C) Mean Temperature
K15, K8, K7, and K12	25mm	**6.3** ft²▪h▪°F/BTU
	75mm	**23.8** ft2▪h▪oF/BTU
K10	25mm	**6.4** ft2▪h▪oF/BTU
	75mm	**24.5** ft2▪h▪oF/BTU
K20, K5, and K3	25mm	**6.6** ft2▪h▪oF/BTU
	75mm	**24.9** ft2▪h▪oF/BTU

TABLE 3 – AIR PERMEANCE RATING

Kooltherm® Product	Minimum Product Thickness (mm)	Air Leakage (L/s/m²)
K15, K8, K7, and K12	25mm	< 0.02
K10	25mm	< 0.02
K20, K5, K3	25mm	< 0.02

TABLE 4 – NFPA 285 COMPLYING WALL WITH KOOLTHERM® INSULATION BOARDS

WALL COMPONENTS	MATERIALS
Base Wall System Use either 1, 2 or 3	1. Steel Studs — Min 3-5/8 in. (92mm) deep, formed of min 20 GA galvanized steel spaced max 24 in. (406mm) oc 2. Cast concrete walls 3. Concrete masonry units (CMU) concrete walls
Floorline Firestopping	Mineral wool (4.0 lb/ft^3 density) friction in each stud cavity and at each floorline
Cavity Insulation	Mineral Wool or Glass Fiber Stud Cavity Insulation for partial or full stud cavity fill
Interior Sheathing	5/8 in. thick Type X gypsum wallboard
Exterior Insulation	One layer of Kooltherm® Insulation Board to a maximum thickness of 4-3/4 in. (120mm) and a nominal core density of 2.0 lb/ft^3 installed on the exterior side of exterior sheathing
Exterior Sheathing	5/8 in. thick Type X exterior gypsum sheathing meeting ASTM C1177
Air/Water Resistive Barrier Use either 1 or 2	1. Soprema Inc. Sopraseal Stick 1100T Air Vapor Barrier applied at nominal thickness of 0.04 in. and 0.2 lb/ft^2 area coverage 2. Air/water resistive barriers with lower flammability properties than Sopraseal Stick 1100T based on cone calorimeter testing data in accordance with ASTM-E1354
Steel Lintel	Nominal 4 by 4 in. (102 by 102mm) by min. 1/4 in. (6.4mm) thick steel angle supporting brick veneer at header at top of window opening and extending min 8 in. (204mm) beyond each side of the window opening into the brick veneer mortar joints
Exterior Wall Coverings Use either 1, 2, 3, 4, 5, or 6	1. Brick – Nominal 3-5/8 in. thick clay brick offset to provide a nominal 2 in. (51mm) air gap between foam insulation and brick veneer with Hohmann and Barnard 2-SealTM Thermal Wing Nut Anchors with 2-Seal Byna-Lok wire tie masonry veneer anchors 2. Concrete – Min. 2 in. (51mm) thick with max. 2 in. (51mm) air gap between exterior wall insulation and concrete 3. Concrete Masonry Units – Min. 2 in. (51mm) thick with max. 2 in. (51mm) air gap between exterior wall insulation and concrete masonry units 4. Stone Veneer – Min. 2 in. (51mm) thick natural stone veneer with any standard non-open joint installation technique 5. Terracotta Cladding – Min. 1-1/4 in. (32mm) thick with any standard non-open joint installation technique such as ship lap 6. Stucco – Min. 3/4 in. (19mm) thick exterior cement plaster lath