Listing and Technical Evaluation Report™

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NFPA 285 Tested Wall Assemblies Using Kingspan® GreenGuard® Insulation Boards and Kingspan® GreenGuard® Building Wraps in Exterior Walls of Buildings of Type I-IV Construction

Trade Secret Report Holder:

Kingspan® Insulation LLC

Phone: 678-589-4656 Website: www.kingspan.com Email: info@kingspanpanels.us

CSI Designations:

DIVISION: 07 00 00 - THERMAL AND MOISTURE PROTECTION

Section: 07 21 00 - Thermal Insulation

Section: 07 24 00 - Exterior Insulation and Finish Systems

Section: 07 25 00 - Water-Resistive Barriers/Weather Barriers

Section: 07 27 00 - Air Barriers

1 Innovative Products Evaluated[1]

1.1 Kingspan GreenGuard Insulation Board Products and Kingspan GreenGuard Building Wrap Products

1.1.1 Kingspan GreenGuard Extruded Polystyrene (XPS) Insulation Board products are identified as:

1.1.1.1 Kingspan GreenGuard® CM

1.1.1.2 Kingspan GreenGuard® LG CM

1.1.1.3 Kingspan GreenGuard® SL

1.1.1.4 Kingspan GreenGuard® LG SL

1.1.1.5 Kingspan GreenGuard® SB

1.1.1.6 Kingspan GreenGuard® LG SB

1.1.2 Products referred to as Kingspan GreenGuard Insulation Board in this report apply to any of the products listed in **Section 1.1.1**.

1.1.3 Kingspan GreenGuard Building Wrap products are identified as:

1.1.3.1 Kingspan GreenGuard® MAX™

1.1.3.2 Kingspan GreenGuard® RainDrop 3D

1.1.3.3 Kingspan GreenGuard® C2000

1.1.3.4 Kingspan GreenGuard® VW

1.1.3.5 Kingspan GreenGuard® HPW™ (High Performance Wrap)

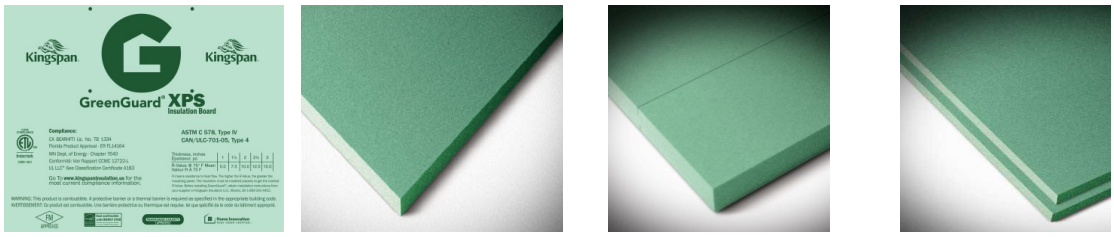
1.1.3.6 Kingspan GreenGuard® RainArmor™ Building Wrap

1.1.3.7 Everbilt™ Premium Non-Woven Housewrap

1.1.4 Products referred to as Kingspan GreenGuard Building Wrap in this report apply to any of the products listed in **Section 1.1.3**.

2 Product Description and Materials

2.1 An sample of the innovative products evaluated in this report are shown in **Figure 1**.



GreenGuard XPS Label **GreenGuard XPS CM** **GreenGuard XPS SB** **GreenGuard XPS SL**

Figure 1. GreenGuard XPS CM, SB and SL

2.2 Kingspan GreenGuard Insulation Board is:

2.2.1 A proprietary Foam Plastic Insulated Sheathing (FPIS) made from Extruded Polystyrene (XPS) in accordance with ASTM C578, Type IV.

2.2.1.1 Kingspan GreenGuard LG XPS has the same physical properties as the GreenGuard XPS, except it is produced with a lower Global Warming Potential (GWP) blowing agent formulation. All references in this report to GreenGuard Insulation Board include both the GreenGuard XPS and the GreenGuard LG XPS insulation board.

2.2.2 Available with various edge treatments and facers as follows:

2.2.2.1 Kingspan GreenGuard CM – square edges

2.2.2.2 Kingspan GreenGuard SB – scoreboard

2.2.2.3 Kingspan GreenGuard SL – shiplap edges

2.2.3 *Material Availability:*

2.2.3.1 *Thickness:*

2.2.3.1.1 $^1/_2$″ (13 mm) through 4″ (76 mm)

2.2.3.2 *Standard Product Width:*

2.2.3.2.1 48″ (1,219 mm)

2.3 Kingspan GreenGuard Building Wrap products are polyolefin materials of varying thicknesses, weights and coatings as shown in **Table 1** and are produced in various sized rolls.

Table 1. Kingspan GreenGuard Building Wrap Products

Product Name	Material Type	Coating Type	Thickness (in)	Weight (oz/yd²)	Water-Resistive Barrier	Air Barrier
Kingspan GreenGuard MAX	Cross woven, non-perforated polyolefin	Vapor permeable polyolefin	0.018	2.2	X	X
Kingspan GreenGuard RainDrop 3D			0.018	2.4	X	X
Kingspan GreenGuard C2000	Spun-bonded vapor permeable polyolefin	N/A	0.024	3.6	X	X
Kingspan GreenGuard VW	Cross-woven, micro perforated polyolefin	Polyolefin	0.004	1.9	X	
Kingspan GreenGuard HPW (High Performance Wrap)	Spun-bonded polypropylene non-woven material	N/A	0.012	3.0	X	X
Everbilt Premium Non-Woven Housewrap		N/A	0.012	3.0	X	X
Kingspan GreenGuard RainArmor Building Wrap	Spun-bond polypropylene building wrap with a non-perforated barrier layer	N/A	0.033	3.2	X	

SI: 1 in = 25.4 mm, 1 lb = 4.45 N, 1 lb/ft = 0.0146 kN/m
N/A = Not Applicable

2.4 As needed, review material properties for design in **Section 6** and to regulatory evaluation in **Section 8**.

3 Definitions

3.1 New Materials[2] are defined as building materials, equipment, appliances, systems or methods of construction not provided for by prescriptive and/or legislatively adopted regulations, known as alternative materials.[3] The design strengths and permissible stresses shall be established by tests[4] and/or engineering analysis.[5]

3.2 Duly authenticated reports[6] and research reports[7] are test reports and related engineering evaluations, which are written by an approved agency[8] and/or an approved source.[9]

3.2.1 These reports contain intellectual property and/or trade secrets, which are protected by the Defend Trade Secrets Act (DTSA).[10]

3.3 An approved agency is "approved" when it is ANAB ISO/IEC 17065 accredited. DrJ Engineering, LLC (DrJ) is listed in the ANAB directory.

3.4 An approved source is "approved" when a professional engineer (i.e., Registered Design Professional) is properly licensed to transact engineering commerce. The regulatory authority governing approved sources is the state legislature via its professional engineering regulations.[11]

3.5 Testing and/or inspections conducted for this duly authenticated report were performed by an ISO/IEC 17025 accredited testing laboratory, an ISO/IEC 17020 accredited inspection body and/or a licensed Registered Design Professional (RDP).

3.5.1 The Center for Building Innovation (CBI) is ANAB[12] ISO/IEC 17025 and ISO/IEC 17020 accredited.

3.6 The regulatory authority shall enforce[13] the specific provisions of each legislatively adopted regulation. If there is a non-conformance, the specific regulatory section and language of the non-conformance shall be provided in writing[14] stating the nonconformance and the path to its cure.

3.7 The regulatory authority shall accept duly authenticated reports from an approved agency and/or an approved source with respect to the quality and manner of use of new materials or assemblies as provided for in regulations regarding the use of alternative materials, designs, or methods of construction.[15]

3.8 ANAB is an International Accreditation Forum (IAF) Multilateral Recognition Arrangement (MLA) signatory where recognition of certificates, validation and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA with the appropriate scope, shall be approved.[16] Therefore, all ANAB ISO/IEC 17065 duly authenticated reports are approval equivalent.[17]

3.9 Approval equity is a fundamental commercial and legal principle.[18]

4 Applicable Standards for the Listing; Regulations for the Regulatory Evaluation[19]

4.1 *Standards*

4.1.1 *ANSI/AWC NDS: National Design Specification (NDS®) for Wood Construction*

4.1.2 *ASTM C518: Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus*

4.1.3 *ASTM C578: Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation*

4.1.4 *ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials*

4.1.5 *ASTM E119: Standard Test Methods for Fire Tests of Building Construction and Materials*

4.1.6 *ASTM E136: Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C*

4.1.7 *ASTM E331: Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference*

4.1.8 *ASTM E1354: Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter*

4.1.9 *ASTM E2178: Standard Test Method for Air Permeance of Building Materials*

4.1.10 *ASTM E2357: Standard Test Method for Determining Air Leakage Rate of Air Barrier Assemblies*

4.1.11 *NFPA 285: Standard Fire Test Method for the Evaluation of Fire Propagation Characteristics of Exterior Nonload-bearing Wall Assemblies Containing Combustible Components*

4.1.12 *NFPA 286: Standard Methods of Fire Test for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*

4.2 *Regulations*

4.2.1 *IBC – 15, 18, 21: International Building Code®*

4.2.2 *IRC – 15, 18, 21: International Residential Code®*

4.2.3 *IECC – 15, 18, 21: International Energy Conservation Code®*

5 Listed[20]

5.1 Equipment, materials, products or services included in a List published by a nationally recognized testing laboratory (i.e., CBI), approved agency (i.e., CBI and DrJ), and/or approved source (i.e., DrJ) or other organization concerned with product evaluation (i.e., DrJ) that maintains periodic inspection (i.e., CBI) of production of listed equipment or materials, and whose listing states either that the equipment or material meets nationally recognized standards or has been tested and found suitable for use in a specified manner.

6 Tabulated Properties Generated from Nationally Recognized Standards

6.1 Kingspan GreenGuard Insulation Board is FPIS complying with IBC Section 2603.

6.1.1 Kingspan GreenGuard Insulation Board is used in buildings of Type I through IV construction in accordance with IBC Section 2603.5.

6.2 The Kingspan GreenGuard Building Wrap products used as a Water-Resistive Barrier (WRB) in buildings of Type I through IV construction are in accordance with IBC Section 1402.5[21] and IBC Section 1403.2.[22]

6.3 Kingspan GreenGuard MAX, RainDrop 3D and C2000 are air barrier materials used as a component of air barrier assemblies in buildings of Type I through IV construction in accordance with IECC Section C402.5.1.

6.4 *Water-Resistive Barrier*

6.4.1 Kingspan GreenGuard Insulation Board may be used as a WRB as prescribed in IBC Section 1403.2[23] and IBC Section 1402.5.[24]

6.4.2 Kingspan GreenGuard Building Wrap may be used as a WRB as prescribed in IBC Section 1403.2.

6.4.3 Kingspan GreenGuard MAX, RainDrop 3D, C2000, VW, HPW and RainArmor building wraps have been tested in accordance with ASTM E1354 and ASTM E84 and meet the requirements of IBC Section 1402.5, Exception 2, for use in Type I, II, III or IV construction that are greater than 40 feet (12,192 mm) in height above grade plane when the WRB is the only combustible component without the need for NFPA 285 testing.

6.5 *Air Barrier*

6.5.1 Kingspan GreenGuard Insulation Board may be used as an air barrier material as prescribed in IECC Section R402.4.1.1 and IECC Section C402.5.1.

6.5.2 Kingspan GreenGuard MAX, RainDrop 3D, C2000, HPW and Everbilt Premium Non-Woven Housewrap may be used as an air barrier material as prescribed in IECC Section R402.4.1.1 and IECC Section C402.5.1.

6.6 *Thermal Resistance*

6.6.1 Kingspan GreenGuard Insulation Board has the thermal resistance as shown in **Table 2**.

Table 2. Thermal Resistance of Insulation Boards

Product Name	Thickness (in)	R-Value (°F ft² h/Btu)
Kingspan GreenGuard XPS[1]	1/2	3
	3/4	3.8
	1	5
	1 1/2	7.5
	2	10
	3	15
	4	20

SI: 1 in = 25.4 mm

1. Tested in accordance with ASTM C518 at 75° mean temperature.

6.7 *Thermal Barrier*

6.7.1 Industry testing on XPS insulation boards was evaluated in accordance with NFPA 286 for equivalence to the prescriptive ignition barriers in in accordance with IBC Section 2603.4.1.6. This testing met the acceptance criteria for use in attics and crawlspaces without a thermal barrier or ignition barrier.

6.7.2 In addition, engineering analysis was performed to compare Kingspan GreenGuard Insulation Board to the tested assembly with respect to its flammability characteristics.

6.7.3 Testing in accordance with the following test methods was compared to determine the similarities between the products:

6.7.3.1 *ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials*

6.7.3.2 *ASTM E1354: Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter*

6.7.4 Based on the similar performance of GreenGuard Insulation Boards and the tested XPS, Kingspan GreenGuard Insulation Board is approved for use without a thermal barrier or ignition barrier in attics and crawlspaces, where entry is made only for the service of utilities in accordance with IBC Section 2603.4.1.6.

6.8 *Potential Heat*

6.8.1 Kingspan GreenGuard Insulation Board was tested to assess the potential heat generated by the FPIS in accordance with IBC Section 2603.5.3 and are shown in **Table 3**.

Table 3. Potential Heat of Insulation Boards

Product Name	Potential Heat (Btu/lb)[1]
Kingspan GreenGuard XPS[1]	17,495

2. Tested in accordance with NFPA 259.

6.9 *Surface Burning Characteristics*

6.9.1 Flame spread and smoke developed indexes for Kingspan GreenGuard XPS are shown in **Table 4**.

Table 4. Fire Performance of Insulation Boards & Building Wraps

Product Name	Flame Spread	Smoke Developed
Kingspan GreenGuard XPS[1]	< 25	< 450
1. Foam core tested in accordance with ASTM E84.		

6.10 *Vertical and Lateral Fire Propagation*

6.10.1 Kingspan GreenGuard Insulation Boards and Kingspan GreenGuard Building Wraps were tested to assess their performance with regard to vertical and lateral fire propagation in accordance with NFPA 285 and IBC Section 2603.5.5.

6.10.1.1 Engineering analysis also was conducted to assess substitution of other products within the approved wall assemblies.

6.10.1.2 The wall assemblies listed in **Table 5** and **Table 6** are approved for use in buildings of Type I-IV construction.

Table 5. Approved NFPA 285 Wall Assemblies with up to 3″ Kingspan GreenGuard XPS Insulation[1]

Wall Component	Materials
Base Wall System Use any of these options	1. Concrete Wall 2. Concrete Masonry Wall 3. 20-gauge (min.) 3⅝″ depth (min.) steel studs spaced at a maximum of 16″ o.c. with lateral bracing every 4' vertically. a. 1 layer – ⅝″ thick Type X or ½″ thick Type X gypsum wallboard on interior
Floorline Firestopping	1. 4 lb/cu ft mineral wool (i.e., Thermafiber®) in each stud cavity at each floor line – attached with Z-clips or equivalent
Cavity Insulation Use any of these options	1. None 2. Any noncombustible insulation per ASTM E136 3. Fiberglass (Batt type Class A ASTM E84 faced or unfaced)
Exterior Sheathing Use any of these options	1. None 2. Minimum ½″ thick, exterior type gypsum sheathing 3. Minimum ⅝″ thick, Type X, exterior type gypsum sheathing
Air Barrier or Weather-Resistive Barrier Applied to Exterior Sheathing Use any of these options	1. None 2. BASF Enershield® HP 3. BASF Enershield® 1 4. Carlisle CCW-705FR w/Primers 5. Carlisle Barritech™ VP 6. Carlisle Barritech™ NP 7. Carlisle Barrithane VP 8. Carlisle 705 VP 9. Cosella-Dörken Delta®-Foxx 10. Cosella-Dörken Delta®-Foxx Plus 11. Cosella-Dörken Delta®-Fassade S 12. Cosella-Dörken Delta®-Vent S/Plus 13. Cosella-Dörken Delta®-Maxx Plus 14. Dow Weathermate™

Table 5. Approved NFPA 285 Wall Assemblies with up to 3″ Kingspan GreenGuard XPS Insulation[1]

Wall Component	Materials
	15. Dow Weathermate™ Plus 16. Dryvit Backstop® NT 17. Dupont™ Tyvek® CommercialWrap® 18. Dupont™ Tyvek® CommercialWrap® D 19. Dupont™ Tyvek® ThermaWrap™ 20. Dupont™ Tyvek® Fluid Applied Weather Barrier-nominal 25 mill (wet) thickness 21. Henry Air-Bloc® 17MR 22. Henry Air-Bloc® 32MR 23. Henry Air-Bloc® 31MR 24. Henry Air-Bloc® 33MR 25. Henry BlueskinVP ™ 160 26. Henry Air-Bloc® 21 FR 27. Henry Metal Clad ™ 28. Henry Foilskin® 29. Hohmann & Barnard Enviro-Barrier™ 30. Hohmann & Barnard Enviro-Barrier™ VP 31. Momentive Performance Materials GE SEC2500 SilShield AWB 32. Momentive Performance Materials GE SEC2600 SilShield AWB 33. Momentive Performance Materials GE SEC2600-R SilShield AWB 34. Kingspan® GreenGuard® Max™ Building Wrap 35. Kingspan® GreenGuard® VW 36. Kingspan® GreenGuard® Classic Wrap 37. Kingspan® GreenGuard® RainDrop® 3D 38. Kingspan® GreenGuard® C2000 39. Polyguard Airlok Flex® at 40 mils (wet) 40. Polyguard Airlok Flex® WG at 20 mils (wet) 41. Polyguard Airlok Flex® VP at 32 mils (wet) 42. Sto Corp Sto Gold Coat® with StoGuard Fabric 43. Sto Corp Sto Emerald Coat® with StoGuard Fabric 44. Sto Corp Sto ExtraSeal™ w/StoGuard Mesh 45. STS, Inc. Wall Guardian™ FW 100A 46. VaproShield WallShield® 47. VaproShield WrapShield® 48. VaproShield RevealShield™ 49. VaproShield RevealShield SA™ 50. W.R. Grace Perm-A-Barrier® Aluminum Wall Membrane 51. W.R. Grace Perm-A-Barrier® VPL 52. W.R. Grace Perm-A-Barrier® VPS 53. W.R. Grace Perm-A-Barrier® NPL 54. WR Meadows Air-Shield™ LMP (Gray) 55. WR Meadows Air-Shield™ LMP (Black) 56. WR Meadows Air-Shield™ TMP 57. WR Meadows Air-Shield™ LSR ***Note:*** All WRBs to be installed at the indicated or recommended application rates and per the manufacturer installation instructions.
Exterior Insulation	1. Kingspan GreenGuard XPS – $^1/_2$″ minimum and 3″ maximum Seal all insulation joints with maximum 4″ wide asphalt or Butyl based flashing tape.

Table 5. Approved NFPA 285 Wall Assemblies with up to 3″ Kingspan GreenGuard XPS Insulation[1]

Wall Component	Materials
WRB Over Exterior Insulation Use any option 1-13	1. None 2. Dow Weathermate™ 3. Dow Weathermate™ Plus 4. Dupont™ Tyvek® CommercialWrap® 5. Dupont™ Tyvek® CommercialWrap® D 6. Dupont™ Tyvek® ThermaWrap™ 7. Kingspan® GreenGuard® Max™ Building Wrap 8. Kingspan® GreenGuard® VW 9. Kingspan® GreenGuard® Classic Wrap 10. Kingspan® GreenGuard® RainDrop® 3D 11. Kingspan® GreenGuard® C2000 12. VaproShield RevealShield™ 13. VaproShield RevealShield SA™
Exterior Veneer Use any of these options	1. Brick a. Standard nominal 4" thick, clay brick b. Brick veneer anchors – standard types – installed maximum 24" o.c. vertically on each stud c. Maximum 2" air gap between exterior insulation and brick 2. Concrete a. Minimum 2" thick b. Maximum 2" air gap between exterior insulation and concrete 3. CMU-Concrete Masonry Units a. Minimum 4" thick b. Maximum 2" air gap between exterior insulation and CMU 4. Stone Veneer a. Minimum 2" thick limestone or natural stone veneer b. Minimum 1 1/2" thick cast artificial stone veneer c. Any standard non-open joint technique may be used (i.e., shiplap, etc.) 5. Terracotta cladding a. Minimum 1 1/4" thick b. Any standard non-open joint technique may be used (i.e., shiplap, etc.) 6. Portland cement-sand plaster (Stucco) over metal lath a. Minimum 3/4" thick b. 2 or 3-coat application c. No air gap between Stucco veneer and exterior insulation

SI: 1 in = 25.4 mm

1. See Header detail (**Figure 2**) for instructions on required treatment of window and door openings.

Table 6. Approved NFPA 285 Wall Assembly with up to 4" of GreenGuard XPS Insulation[1]

Wall Component	Materials
Base Wall System	1. 18-gauge 3 5/8" depth (min.) galvanized steel studs spaced at a maximum 24" o.c. a. One (1) layer 5/8" thick gypsum wallboard on interior
Cavity Insulation	1. Unfaced fiberglass batt insulation
Exterior Sheathing	1. One (1) layer 1/2" thick exterior type gypsum
Air Barrier and Weather-Resistive Barrier applied to exterior sheathing Use any of these options.	1. Tremco® ExoAir® 230 fluid applied, synthetic air & vapor permeable membrane 2. 3M™ Self-Adhered Air and Vapor Barrier 3015 3. BASF Senershield-R 4. BASF Senershield-VB 5. Carlisle CCW-705FR w/ Primers 6. Carlisle Barritech™ VP 7. Carlisle Barritech™ NP 8. Carlisle Barrithane VP 9. Carlisle 705 VP 10. Dörken Systems Delta®-Foxx 11. Dörken Systems Delta®-Foxx Plus 12. Dörken Systems Delta®-Fassade S 13. Dörken Systems Delta®-Vent S/Plus 14. Dörken Systems Delta®-Maxx Plus 15. Dow Chemical WeatherMate™ 16. Dow Chemical WeatherMate™ Plus 17. Dow Corning® Defend Air 200 18. Dryvit Backstop® NT 19. DuPont™ Tyvek® CommercialWrap® 20. DuPont™ Tyvek® CommercialWrap® D 21. DuPont™ Tyvek® ThermaWrap™ 22. DuPont® Tyvek® Fluid Applied WB+ (nominal 25 wet mil thickness) 23. Henry Company Air-Bloc® 21 FR 24. Henry Company Air-Bloc® 31MR 25. Henry Company Air-Block® 33MR 26. Henry Company Blueskin VP™ 160 27. Henry Company Blueskin® Metal Clad® 28. Henry Company Foilskin® 29. Hohmann & Barnard Enviro-Barrier™ VP 30. Grace Construction Products Perm-A-Barrier® Aluminum Wall Membrane 31. Grace Construction Products Perm-A-Barrier® VPL 32. Grace Construction Products Perm-A-Barrier® VPL LT 33. Grace Construction Products Perm-A-Barrier® VPS 34. JX Nippon ANCI, Inc. JX ALTA™ Commercial Wrap 35. JX Nippon ANCI, Inc. JX ALTA™ HP Wrap 36. JX Nippon ANCI, Inc. JX ALTA™ LP Wrap 37. Kingspan® GreenGuard® Max™ Building Wrap 38. Kingspan® GreenGuard® Classic Building Wrap 39. Kingspan® GreenGuard® C2000 Building Wrap 40. Kingspan® GreenGuard® Raindrop® 3D Building Wrap 41. Kingspan® GreenGuard® HPW™ Building Wrap 42. Kingspan® GreenGuard® RainArmor™ Building Wrap 43. Everbilt™ Premium Non-woven Housewrap 44. Momentive Performance Materials GE SEC2500 SilShield* AWB

Table 6. Approved NFPA 285 Wall Assembly with up to 4" of GreenGuard XPS Insulation[1]

Wall Component	Materials
	45. Momentive Performance Materials GE SEC2600 SilShield* AWB 46. Momentive Performance Materials GE SEC2600-r SilShield* AWB 47. Polyguard Products Airlok Flex® (applied at a maximum 50 mils WFT) 48. Polyguard Products Airlok Flex® WG (applied at a maximum 20 mils WFT) 49. Polyguard Products Airlok Flex® VP (applied at a maximum 32 mils WFT) 50. Prosoco CAT 5 51. Prosoco CAT 5 Rainscreen 52. Soprema Sopraseal Stick VP 53. Sto Corp Sto Gold Coat® with StoGuard Fabric 54. Sto Corp Sto Emerald Coat® with StoGuard Fabric 55. Sto Corp Sto ExtraSeal™ with StoGuard Mesh 56. Sto Corp StoGuard® VaproShield™ 57. STS, Inc. Wall Guardian™ FW-100A 58. Tremco, Inc. ExoAir 430 59. VaproShield Wallshield® 60. VaproShield WrapShield® 61. VaproShield WrapShield® SA™ 62. VaproShield RevealShield™ 63. VaproShield RevealShield SA™ 64. W.R. Meadows Air-Shield™ LMP (Gray) 65. W.R. Meadows Air-Shield™ LMP (Black) 66. W.R. Meadows Air-Shield™ TMP 67. W.R. Meadows Air-Shield™ LSR
Exterior Insulation	1. Kingspan® GreenGuard® XPS Insulation Board – 4" thickness
WRB Over Exterior Insulation	1. 10mm Keene Building Products Driwall™ Rainscreen drainage mat
Exterior Veneer	1. Glen-Gery Thin Veneer Brick a. First a layer of 1/2" thick PermaBase® cement board b. Laticrete MVIS Thin Brick Mortar applied to full surface of PermaBase® c. Thin Veneer Brick applied with Glen-Gery Mortar Blend Portland cement-line mortar as grout
1. See Header detail (**Figure 2**) for instructions on required treatment of window and door openings.	

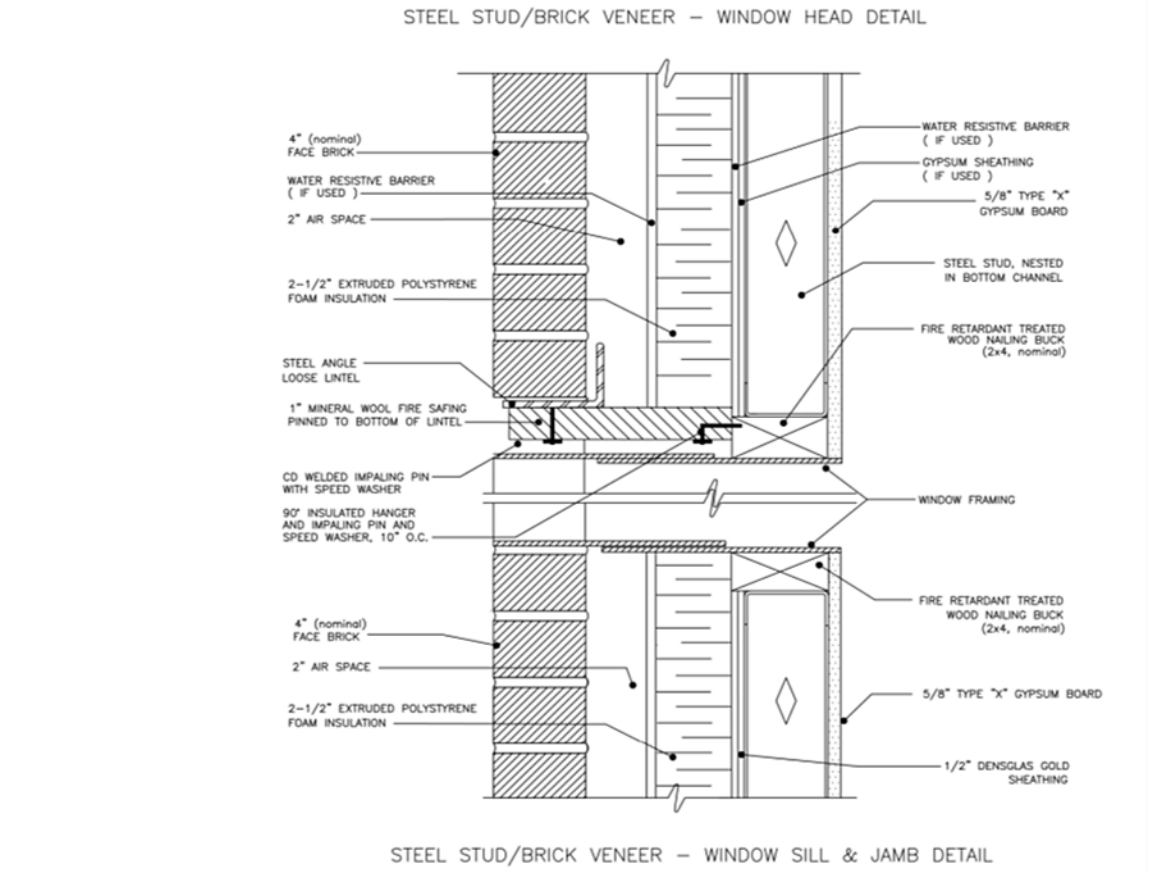


Figure 2. Header Detail for NFPA 285 Wall Assemblies (Brick Shown - Other Claddings Similar)

6.11 *Ignition*

6.11.1 Kingspan GreenGuard Insulation Boards were evaluated to assess performance with regard to ignition in accordance with IBC Section 2603.5.7.

6.11.1.1 Kingspan GreenGuard Insulation Boards comply with this section when the exterior side of the sheathing is protected with one of the following materials:

6.11.1.1.1 A thermal barrier complying with IBC Section 2603.4.

6.11.1.1.2 A minimum 1″ (25 mm) thickness of concrete or masonry.

6.11.1.1.3 Glass-fiber reinforced concrete panels of a minimum thickness of $^{3}/_{8}$″ (9.5 mm).

6.11.1.1.4 Metal-faced panels having a minimum 0.019″ thick (0.48 mm) aluminum or 0.016″ thick (0.41 mm) corrosion-resistant steel outer facings.

6.11.1.1.5 A minimum $^{7}/_{8}$″ (22.2 mm) thickness of stucco complying with IBC Section 2510.

6.11.1.1.6 A minimum $^{1}/_{4}$″ (6.4 mm) thickness fiber-cement lap, panel or shingle siding complying with IBC Section 1404.16.[25]

6.12 *Fire Resistance*

6.12.1 The exterior non-loading wall assembly described in **Table 7** was tested and evaluated in accordance with ASTM E119 and was found to have a one-hour fire-resistance rating from either side.

Table 7. One-hour Fire Resistance Rated Wall Assembly[1,2]

Wall Component	Material
Interior Cladding	One (1) layer of $^{5}/_{8}$" thick gypsum wallboard
Framing	18-gauge $3^{5}/_{8}$" depth galvanized steel studs spaced at a maximum 24" o.c.
Cavity Insulation	Unfaced fiberglass batt insulation, Type I
Exterior Sheathing	One (1) layer of $^{1}/_{2}$" thick exterior type gypsum
Water-Resistive Barrier	Tremco® ExoAir® 230 fluid applied, synthetic air & vapor permeable membrane
Exterior Insulation	Kingspan® GreenGuard® XPS insulation board – 4" thickness
WRB Over Insulation	10mm Keene Building Products Driwall™ Rainscreen drainage mat
Exterior Cladding	Glen-Gery Thin Veneer Brick First a layer of $^{1}/_{2}$" thick PermaBase® cement board Laticrete MVIS Thin Brick Mortar applied to full surface of PermaBase® Thin Veneer Brick applied with Glen-Gery Mortar Blend Portland cement-line mortar as grout

SI: 1 in = 25.4 mm

1. Tested in accordance with ASTM E119. One-hour rating is achieved with the fire exposure from either side.
2. Wall components listed from interior to exterior.

6.13 Where the application falls outside of the performance evaluation, conditions of use and/or installation requirements set forth herein, alternative techniques shall be permitted in accordance with accepted engineering practice and experience. This includes but is not limited to the following areas of engineering: mechanics or materials, structural, building science and fire science.

7 Certified Performance[26]

7.1 All construction methods shall conform to accepted engineering practices to ensure durable, livable, and safe construction and shall demonstrate acceptable workmanship reflecting journeyman quality of work of the various trades.[27]

7.2 The strength and rigidity of the component parts and/or the integrated structure shall be determined by engineering analysis or by suitable load tests to simulate the actual loads and conditions of application that occur.[28]

8 Regulatory Evaluation and Accepted Engineering Practice

8.1 Kingspan GreenGuard Insulation Board Products and Kingspan GreenGuard Building Wrap Products comply with the following legislatively adopted regulations and/or accepted engineering practice for the following reasons:

8.1.1 Kingspan GreenGuard Insulation Board products were evaluated to determine:

8.1.1.1 Material properties in accordance with ASTM C578.

8.1.1.2 Thermal resistance properties in accordance with IECC Section C402.

8.1.1.3 Use as a Water-Resistive Barrier (WRB) in accordance with IBC Section 1403.2.[29]

8.1.1.4 Use as an air barrier material in accordance with IECC Section C402.5.1.1.

8.1.1.5 Performance for use in buildings of Type I-IV construction in accordance with IBC Section 2603.5.

8.1.1.6 Performance in accordance with ASTM E84 for flame spread and smoke development ratings in accordance with IBC Section 2603.3 and IBC Section 2603.5.4.

8.1.1.7 Performance for use without a thermal barrier in accordance with IBC Section 2603.4 and IBC Section 2603.5.2.

8.1.1.8 Performance with regard to the potential heat generated by the FPIS in accordance with IBC Section 2603.5.3.

8.1.1.9 Performance with regard to vertical and lateral fire propagation in accordance with IBC Section 2603.5.5.

8.1.1.10 Performance with regard to ignition in accordance with IBC Section 2603.5.7.

8.1.1.11 Use as part of an NFPA 285 wall assembly in accordance with IBC Section 2603.5.5.

8.1.1.12 Fire resistance rating as part of an ASTM E119 wall assembly in accordance with IBC Section 703.

8.2 Kingspan GreenGuard Building Wrap products were evaluated for:

8.2.1 Use as a WRB in accordance with IBC Section 1403.2[30] and IBC Section 1402.5.[31]

8.2.2 Use as an air barrier material in accordance with IECC Section C402.5.1.1.

8.2.3 Use as part of an approved NFPA 285 wall assembly in accordance with IBC Section 2603.5.5.

8.3 Any building code, regulation and/or accepted engineering evaluations (i.e., research reports, duly authenticated reports, etc.) that are conducted for this Listing were performed by DrJ Engineering, LLC (DrJ), an ISO/IEC 17065 accredited certification body and a professional engineering company operated by RDP/approved sources. DrJ is qualified[32] to practice product and regulatory compliance services within its scope of accreditation and engineering expertise, respectively.

8.4 Engineering evaluations are conducted with DrJ's ANAB accredited ICS code scope of expertise, which are also its areas of professional engineering competence.

8.5 Any regulation specific issues not addressed in this section are outside the scope of this report.

9 Installation

9.1 Installation shall comply with the approved construction documents, the manufacturer installation instructions, this report and the applicable building code.

9.2 In the event of a conflict between the manufacturer installation instructions and this report, the more restrictive shall govern.

9.3 *Installation Procedure*

9.3.1 For Kingspan GreenGuard Insulation Board installation instructions, see DrJ Installation Instructions in Report Number 1410-09.

9.3.2 For commercial building wrap applications, see the Commercial Installation Guide for Kingspan GreenGuard Building Wraps.

9.4 See **Table 5** for NFPA 285-compliant wall assemblies using Kingspan GreenGuard Insulation Board and Kingspan GreenGuard Building Wraps with non-combustible veneers. See **Figure 2** for the "*Window/Door Opening Detail*" required for these assemblies.

10 Substantiating Data

10.1 Testing has been performed under the supervision of a professional engineer and/or under the requirements of ISO/IEC 17025 as follows:

10.1.1 Flame spread and smoke developed rating testing in accordance with ASTM E84/UL 273

10.1.2 Air barrier performance testing in accordance with ASTM E331

10.1.3 Air permeance testing in accordance with ASTM E2178

10.1.4 Water-resistive barrier performance testing in accordance with ASTM E2178

10.1.5 Water-resistive barrier performance testing in accordance with ASTM E331

10.1.6 Water-resistive properties testing in accordance with AATCC 127

10.1.7 Material properties testing in accordance with ASTM C578

10.1.8 Vertical and lateral flame spread testing in accordance with NFPA 285

10.1.9 Exclusion of thermal and ignition barriers in attics and crawlspaces testing in accordance with NFPA 286

10.1.10 Fire resistance characteristics testing in accordance with ASTM E119

10.1.11 Cone calorimeter testing in accordance with ASTM E1354

10.1.12 Surface burning characteristics testing in accordance with ASTM E84

10.2 Information contained herein may include the result of testing and/or data analysis by sources that are approved agencies, approved sources and/or RDPs. Accuracy of external test data and resulting analysis is relied upon.

10.3 Where applicable, testing and/or engineering analysis are based upon provisions that have been codified into law through state or local adoption of regulations and standards. The developers of these regulations and standards are responsible for the reliability of published content. DrJ's engineering practice may use a regulation-adopted provision as the control. A regulation-endorsed control versus a simulation of the conditions of application to occur establishes a new material as being equivalent to the regulatory provision in terms of quality, strength, effectiveness, fire resistance, durability and safety.

10.4 The accuracy of the provisions provided herein may be reliant upon the published properties of raw materials, which are defined by the grade mark, grade stamp, mill certificate or duly authenticated reports from approved agencies and/or approved sources provided by the supplier. These are presumed to be minimum properties and relied upon to be accurate. The reliability of DrJ's engineering practice, as contained in this duly authenticated report, may be dependent upon published design properties by others.

10.5 Testing and engineering analysis: The strength, rigidity, and/or general performance of component parts and/or the integrated structure are determined by suitable tests that simulate the actual conditions of application that occur and/or by accepted engineering practice and experience.[33]

10.6 Where additional condition of use and/or regulatory compliance information is required, please search for Kingspan GreenGuard Insulation Board Products and Kingspan GreenGuard Building Wrap Products on the DrJ Certification website.

11 Findings

11.1 As outlined in **Section 6**, Kingspan GreenGuard Insulation Board Products and Kingspan GreenGuard Building Wrap Products have performance characteristics that were tested and/or meet applicable regulations and are suitable for use pursuant to its specified purpose.

11.2 When used and installed in accordance with this duly authenticated report and the manufacturer installation instructions, Kingspan GreenGuard Insulation Board Products and Kingspan GreenGuard Building Wrap Products shall be approved for the following applications:

11.2.1 Kingspan GreenGuard Insulation Board Products and Kingspan GreenGuard Building Wrap Products are approved for use in exterior walls without a thermal barrier in accordance with IBC Section 2603.4 and IBC Section 2603.5.2.

11.2.2 Kingspan GreenGuard Insulation Board Products and Kingspan GreenGuard Building Wrap Products are approved for use in exterior walls of buildings of Type I-IV construction in accordance with IBC Section 2603.5.

11.2.3 Kingspan GreenGuard Insulation Board Products and Kingspan GreenGuard Building Wrap Products are approved for use in wall assemblies meeting the requirements of NFPA 285 testing when constructed in accordance with **Table 5**.

11.2.3.1 Kingspan GreenGuard MAX, GreenGuard RainDrop 3D, GreenGuard C2000, GreenGuard VW, GreenGuard HPW, GreenGuard RainArmor, and Everbilt Premium Non-Woven Housewrap building wraps have been tested in accordance with ASTM E1354 and ASTM E84 and meet the requirements of IBC Section 1402.5,[34] Exception 2, for use in Type I, II, III or IV construction that are greater than 40 feet (12,192 mm). As such, where these Kingspan building wraps are the only combustible products in the wall assembly, NFPA 285 testing is not required.

11.2.4 Wall assemblies containing Kingspan GreenGuard Insulation Boards up to 4″ in thickness are fire resistance rated for one hour when used as described in **Table 6**.

11.2.5 Kingspan GreenGuard Insulation Boards and Kingspan GreenGuard Building Wraps described in this report comply with, or are a suitable alternative to, the applicable sections of the codes listed in **Section 4**.

11.3 Unless exempt by state statute, when Kingspan GreenGuard Insulation Board Products and Kingspan GreenGuard Building Wrap Products are to be used as a structural and/or building envelope component in the design of a specific building, the design shall be performed by an RDP.

11.4 Any application specific issues not addressed herein can be engineered by an RDP. Assistance with engineering is available from Kingspan Insulation LLC.

11.5 IBC Section 104.11 (IRC Section R104.11 and IFC Section 104.10[35] are similar) in pertinent part 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. 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.

11.6 **Approved**:[36] Building regulations require that the building official shall accept duly authenticated reports.[37]

11.6.1 An approved agency is "approved" when it is ANAB ISO/IEC 17065 accredited.

11.6.2 An approved source is "approved" when an RDP is properly licensed to transact engineering commerce.

11.6.3 Federal law, Title 18 US Code Section 242, requires that where the alternative product, material, service, design, assembly and/or method of construction is not approved, the building official shall respond in writing, stating the reasons why the alternative was not approved. Denial without written reason deprives a protected right to free and fair competition in the marketplace.

11.7 DrJ is a licensed engineering company, employs licensed RDPs and is an ANAB-Accredited Product Certification Body – Accreditation #1131.

11.8 Through the IAF Multilateral Agreements (MLA), this duly authenticated report can be used to obtain product approval in any jurisdiction or country because all ANAB ISO/IEC 17065 duly authenticated reports are equivalent.[38]

12 Conditions of Use

12.1 Material properties shall not fall outside the boundaries defined in **Section 6**.

12.2 As defined in **Section 6**, where material and/or engineering mechanics properties are created for load resisting design purposes, the resistance to the applied load shall not exceed the ability of the defined properties to resist those loads using the principles of accepted engineering practice.

12.3 As listed herein, Kingspan GreenGuard Insulation Board Products and Kingspan GreenGuard Building Wrap Products shall not be used:

12.3.1 As a nailing base for claddings.

12.3.2 To resist lateral loads. Walls shall be braced by other materials in accordance with the applicable code. In addition, the exterior wall covering shall be capable of resisting the full design wind pressure.

12.4 When required by adopted legislation and enforced by the building official, also known as the authority having jurisdiction (AHJ) in which the project is to be constructed:

12.4.1 Any calculations incorporated into the construction documents shall conform to accepted engineering practice and, when prepared by an approved source, shall be approved when signed and sealed.

12.4.2 This report and the installation instructions shall be submitted at the time of permit application.

12.4.3 These innovative products have an internal quality control program and a third-party quality assurance program.

12.4.4 At a minimum, these innovative products shall be installed per **Section 9** of this report.

12.4.5 The review of this report by the AHJ shall comply with IBC Section 104 and IBC Section 105.4.

12.4.6 These innovative products have an internal quality control program and a third party quality assurance program in accordance with IBC Section 104.4, IBC Section 110.4, IBC Section 1703, IRC Section R104.4 and IRC Section R109.2.

12.4.7 The application of these innovative products in the context of this report is dependent upon the accuracy of the construction documents, implementation of installation instructions, inspection as required by IBC Section 110.3, IRC Section R109.2 and any other regulatory requirements that may apply.

12.5 The approval of this report by the AHJ shall comply with IBC Section 1707.1, where legislation states in part, "*the building official shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new material or assemblies as provided for in Section 104.11*," all of IBC Section 104, and IBC Section 105.4.

12.6 Design loads shall be determined in accordance with the regulations adopted by the jurisdiction in which the project is to be constructed and/or by the building designer (i.e., owner or RDP).

12.7 The actual design, suitability, and use of this report for any particular building, is the responsibility of the owner or the authorized agent of the owner.

13 Identification

13.1 The innovative products listed in **Section 1.1** are identified by a label on the board or packaging material bearing the manufacturer name, product name, this report number and other information to confirm code compliance.

13.2 Additional technical information can be found at www.kingspan.com.

14 Review Schedule

14.1 This report is subject to periodic review and revision. For the latest version, visit drjcertification.org.

14.2 For information on the status of this report, please contact DrJ Certification.

15 Approved for Use Pursuant to U.S. and International Legislation Defined in Appendix A

15.1 Kingspan GreenGuard Insulation Board Products and Kingspan GreenGuard Building Wrap Products are included in this report published by an approved agency that is concerned with evaluation of products or services, maintains periodic inspection of the production of listed materials or periodic evaluation of services. This report states either that the material, product or service meets recognized standards or has been tested and found suitable for a specified purpose. This report meets the legislative intent and definition of being acceptable to the AHJ.

Appendix A

1 Legislation that Authorizes AHJ Approval

1.1 **Fair Competition**: State legislatures have adopted Federal regulations for the examination and approval of building code referenced and alternative products, materials, designs, services, assemblies and/or methods of construction that:

1.1.1 Advance innovation

1.1.2 Promote competition so all businesses have the opportunity to compete on price and quality in an open market on a level playing field unhampered by anticompetitive constraints

1.1.3 Benefit consumers through lower prices, better quality, and greater choice

1.2 **Adopted Legislation**: The following local, state and federal regulations affirmatively authorize these innovative products to be approved by AHJs, delegates of building departments and/or delegates of an agency of the federal government:

1.2.1 Interstate commerce is governed by the Federal Department of Justice to encourage the use of innovative products, materials, designs, services, assemblies, and/or methods of construction. The goal is to "*protect economic freedom and opportunity by promoting free and fair competition in the marketplace*."

1.2.2 Title 18 US Code Section 242 affirms and regulates the right of individuals and businesses to freely and fairly have new products, materials, designs, services, assemblies and/or methods of construction approved for use in commerce. Disapproval of alternatives shall be based upon non-conformance with respect to specific provisions of adopted legislation and shall be provided in writing stating the reasons why the alternative was not approved, with reference to the specific legislation violated.

1.2.3 The federal government and each state have a public records act. In addition, each state also has legislation that mimics the federal Defend Trade Secrets Act 2016 (DTSA),[39] where providing test reports, engineering analysis and/or other related IP/TS is subject to prison of not more than ten years[40] and/or a $5,000,000 fine or 3 times the value of[41] the Intellectual Property (IP) and Trade Secrets (TS).

1.2.3.1 Compliance with public records and trade secret legislation requires approval through the use of Listings, certified reports, Technical Evaluation Reports, duly authenticated reports and/or research reports prepared by approved agencies and/or approved sources.

1.2.4 For new materials[42] that are not specifically provided for in any regulation, the design strengths and permissible stresses shall be established by tests, where suitable load tests simulate the actual loads and conditions of application that occur.

1.2.5 The design strengths and permissible stresses of any structural material shall conform to the specifications and methods of design using accepted engineering practice.[43]

1.2.6 The commerce of approved sources (i.e., registered PEs) is regulated by professional engineering legislation. Professional engineering commerce shall always be approved by AHJs, except where there is evidence provided in writing, that specific legislation have been violated by an individual registered PE.

1.2.7 The AHJ shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in IBC Section 104.11.[44]

1.3 **Approved**[45] **by Los Angeles**: The Los Angeles Municipal Code (LAMC) states in pertinent part that the provisions of LAMC are not intended to prevent the use of any material, device or method of construction not specifically prescribed by LAMC. The Department shall use Part III, Recognized Standards in addition to Part II, Uniform Building Code Standards of Division 35, Article 1, Chapter IX of the LAMC in evaluation of products for approval where such standard exists for the product or the material and may use other approved standards that apply. Whenever tests or certificates of any material or fabricated assembly are required by Chapter IX of the LAMC, such tests or certification shall be made by a testing agency approved by the Superintendent of Building to conduct such tests or provide such certifications. The testing agency shall publish the scope and limitation(s) of the listed material or fabricated assembly.[46] The Superintendent of Building Approved Testing Agency Roster is provided by the Los Angeles Department of Building and Safety (LADBS). The Center for Building Innovation (CBI) Certificate of Approval License is TA24945. Tests and certifications found in a DrJ Listing are LAMC approved. In addition, the Superintendent of Building shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in the California Building Code (CBC) Section 1707.1.[47]

1.4 **Approved by Chicago**: The Municipal Code of Chicago (MCC) states in pertinent part that an Approved Agency is a Nationally Recognized Testing Laboratory (NRTL) acting within its recognized scope and/or a certification body accredited by the American National Standards Institute (ANSI) acting within its accredited scope. Construction materials and test procedures shall conform to the applicable standards listed in the MCC. Sufficient technical data shall be submitted to the building official to substantiate the proposed use of any product, material, service, design, assembly and/or method of construction not specifically provided for in the MCC. This technical data shall consist of research reports from approved sources (i.e., MCC defined Approved Agencies).

1.5 **Approved by New York City**: The 2022 NYC Building Code (NYCBC) states in part that an approved agency shall be deemed[48] an approved testing agency via ISO/IEC 17025 accreditation, an approved inspection agency via ISO/IEC 17020 accreditation, and an approved product evaluation agency via ISO/IEC 17065 accreditation. Accrediting agencies, other than federal agencies, must be members of an internationally recognized cooperation of laboratory and inspection accreditation bodies subject to a mutual recognition agreement[49] (i.e., ANAB, International Accreditation Forum also known as IAF, etc.).

1.6 **Approved by Florida**: Statewide approval of products, methods or systems of construction shall be approved, without further evaluation by:

1.6.1 A certification mark or listing of an approved certification agency,

1.6.2 A test report from an approved testing laboratory,

1.6.3 A product evaluation report based upon testing or comparative or rational analysis, or a combination thereof, from an approved product evaluation entity, or

1.6.4 A product evaluation report based upon testing, comparative or rational analysis, or a combination thereof, developed, signed and sealed by a professional engineer or architect, licensed in Florida.

1.6.5 For local product approval, products or systems of construction shall demonstrate compliance with the structural wind load requirements of the Florida Building Code (FBC) through one of the following methods:

1.6.5.1 A certification mark, listing or label from a commission-approved certification agency indicating that the product complies with the code,

1.6.5.2 A test report from a commission-approved testing laboratory indicating that the product tested complies with the code,

1.6.5.3 A product-evaluation report based upon testing, comparative or rational analysis, or a combination thereof, from a commission-approved product evaluation entity which indicates that the product evaluated complies with the code,

1.6.5.4 A product-evaluation report or certification based upon testing or comparative or rational analysis, or a combination thereof, developed and signed and sealed by a Florida professional engineer or Florida registered architect, which indicates that the product complies with the code, or

1.6.5.5 A statewide product approval issued by the Florida Building Commission.

1.6.6 The Florida Department of Business and Professional Regulation (DBPR) website provides a listing of companies certified as a Product Evaluation Agency (i.e., EVLMiami 13692), a Product Certification Agency (i.e., CER10642), and as a Florida Registered Engineer (i.e., ANE13741).

1.7 **Approved by Miami-Dade County (i.e., Notice of Acceptance [NOA])**: A Florida statewide approval is an NOA. An NOA is a Florida local product approval. By Florida law, Miami-Dade County shall accept the statewide and local Florida Product Approval as provided for in Florida legislation 553.842 and 553.8425.

1.8 **Approved by New Jersey**: Pursuant to the 2018 Building Code of New Jersey in IBC Section 1707.1 General,[50] it states: "*In the absence of approved rules or other approved standards, the building official shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in the administrative provisions of the Uniform Construction Code (N.J.A.C. 5:23)*".[51] Furthermore N.J.A.C 5:23-3.7 states: "*Municipal approvals of alternative materials, equipment, or methods of construction*."

1.8.1 **Approvals**: Alternative materials, equipment or methods of construction shall be approved by the appropriate subcode official provided the proposed design is satisfactory and that the materials, equipment or methods of construction are suitable for the intended use and are at least the equivalent in quality, strength, effectiveness, fire resistance, durability and safety of those conforming with the requirements of the regulations.

1.8.1.1 A field evaluation label and report or letter issued by a nationally recognized testing laboratory verifying that the specific material, equipment or method of construction meets the identified standards or has been tested and found to be suitable for the intended use, shall be accepted by the appropriate subcode official as meeting the requirements of the above.

1.8.1.2 Reports of engineering findings issued by nationally recognized evaluation service programs such as but not limited to, the Building Officials and Code Administrators (BOCA), the International Conference of Building Officials (ICBO), the Southern Building Code Congress International (SBCCI), the International Code Council (ICC), and the National Evaluation Service, Inc., shall be accepted by the appropriate subcode official as meeting the requirements of the above.

1.8.2 The New Jersey Department of Community Affairs has confirmed that technical evaluation reports, from any accredited entity listed by ANAB, meets the requirements of item the previous paragraph, given that the listed entities are no longer in existence and/or do not provide "*reports of engineering findings*."

1.9 **Approved by the Code of Federal Regulations Manufactured Home Construction and Safety Standards**: Pursuant to Title 24, Subtitle B, Chapter XX, Part 3282.14[52] and Part 3280,[53] the Department encourages innovation and the use of new technology in manufactured homes. The design and construction of a manufactured home shall conform to the provisions of Part 3282 and Part 3280 where key approval provisions in mandatory language follow:

1.9.1 "*All construction methods shall be in conformance with accepted engineering practices*."

1.9.2 "*The strength and rigidity of the component parts and/or the integrated structure shall be determined by engineering analysis or by suitable load tests to simulate the actual loads and conditions of application that occur*."

1.9.3 "*The design stresses of all materials shall conform to accepted engineering practice*."

1.10 **Approval by US, Local and State Jurisdictions in General**: In all other local and state jurisdictions, the adopted building code legislation states in pertinent part that:

1.10.1 For new materials that are not specifically provided for in this code, the design strengths and permissible stresses shall be established by tests.[54]

1.10.2 For innovative alternatives and/or methods of construction, the building official shall accept duly authenticated reports from approved agencies with respect to the quality and manner of use of new materials or assemblies.[55]

1.10.2.1 An approved agency is "approved" when it is ANAB ISO/IEC 17065 accredited. DrJ Engineering, LLC (DrJ) is in the ANAB directory.

1.10.2.2 An approved source is "approved" when an RDP is properly licensed to transact engineering commerce. The regulatory authority governing approved sources is the state legislature via its professional engineering regulations.[56]

1.10.3 The design strengths and permissible stresses of any structural material…shall conform to the specifications and methods of design of accepted engineering practice performed by an approved source.[57]

1.11 **Approval by International Jurisdictions**: The USMCA and GATT agreements provide for approval of innovative materials, designs, services, and/or methods of construction through the Agreement on Technical Barriers to Trade and the IAF Multilateral Recognition Arrangement (MLA), where these agreements:

1.11.1 State that conformity assessment procedures (i.e., ISO/IEC 17020, 17025, 17065, etc.) are prepared, adopted, and applied so as to grant access for suppliers of like products originating in the territories of other Members under conditions no less favourable than those accorded to suppliers of like products of national origin or originating in any other country, in a comparable situation.

1.11.2 **Approved**: The purpose of the MLA is to ensure mutual recognition of accredited certification and validation/verification statements between signatories to the MLA and subsequently, acceptance of accredited certification and validation/verification statements in many markets based on one accreditation for the timely approval of innovative materials, designs, services, and/or methods of construction.

1.11.3 ANAB is an IAF-MLA signatory where recognition of certificates, validation, and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA, with the appropriate scope, shall be approved.[58]

1.11.4 Therefore, all ANAB ISO/IEC 17065 duly authenticated reports are approval equivalent.[59]

1.12 Approval equity is a fundamental commercial and legal principle.[60]

Notes

[1] For more information, visit drjcertification.org or call us at 608-310-6748.

[2] https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1702

[3] Alternative Materials, Design and Methods of Construction and Equipment: The provisions of any regulation code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by a regulation. Please review https://www.justice.gov/atr/mission and https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104.11

[4] https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706:~:text=the%20design%20strengths%20and%20permissible%20stresses%20shall%20be%20established%20by%20tests%20as

[5] The design strengths and permissible stresses of any structural material shall conform to the specifications and methods of design of accepted engineering practice. https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706:~:text=shall%20conform%20to%20the%20specifications%20and%20methods%20of%20design%20of%20accepted%20engineering%20practice

[6] https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1707.1:~:text=the%20building%20official%20shall%20accept%20duly%20authenticated%20reports%20from%20approved%20agencies

[7] https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1703.4.2

[8] https://up.codes/viewer/wyoming/ibc-2021/chapter/2/definitions#approved_agency

[9] https://up.codes/viewer/wyoming/ibc-2021/chapter/2/definitions#approved_source

[10] https://www.law.cornell.edu/uscode/text/18/1832 (b) Any organization that commits any offense described in subsection (a) shall be fined not more than the greater of $5,000,000 or 3 times the value of the stolen trade secret to the organization, including expenses for research and design and other costs of reproducing the trade secret that the organization has thereby avoided. The federal government and each state have a public records act. To follow DTSA and comply state public records and trade secret legislation requires approval through ANAB ISO/IEC 17065 accredited certification bodies or approved sources. For more information, please review this website: Intellectual Property and Trade Secrets.

[11] https://www.nspe.org/resources/issues-and-advocacy/professional-policies-and-position-statements/regulation-professional AND https://apassociation.org/list-of-engineering-boards-in-each-state-archive/

[12] https://www.cbitest.com/accreditation/

[13] https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104:~:text=to%20enforce%20the%20provisions%20of%20this%20code

[14] https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104.11:~:text=Where%20the%20alternative%20material%2C%20design%20or%20method%20of%20construction%20is%20not%20approved%2C%20the%20building%20official%20shall%20respond%20in%20writing%2C%20stating%20the%20reasons%20why%20the%20alternative%20was%20not%20approved AND https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#105.3.1:~:text=If%20the%20application%20or%20the%20construction%20documents%20do%20not%20conform%20to%20the%20requirements%20of%20pertinent%20laws%2C%20the%20building%20official%20shall%20reject%20such%20application%20in%20writing%2C%20stating%20the%20reasons%20therefore

[15] https://up.codes/viewer/colorado/ibc-2021/chapter/17/special-inspections-and-tests#1707.1:~:text=the%20building%20official%20shall%20accept%20duly%20authenticated%20reports%20from%20approved%20agencies%20in%20respect%20to%20the%20quality%20and%20manner%20of%20use%20of%20new%20materials%20or%20assemblies%20as%20provided%20for%20in%20Section%20104.11

[16] https://iaf.nu/en/about-iaf-mla/#:~:text=it%20is%20required%20to%20recognise%20certificates%20and%20validation%20and%20verification%20statements%20issued%20by%20conformity%20assessment%20bodies%20accredited%20by%20all%20other%20signatories%20of%20the%20IAF%20MLA%2C%20with%20the%20appropriate%20scope

[17] True for all ANAB accredited product evaluation agencies and all International Trade Agreements.

[18] https://www.justice.gov/crt/deprivation-rights-under-color-law AND https://www.justice.gov/atr/mission

[19] Unless otherwise noted, all references in this Listing are from the 2021 version of the codes and the standards referenced therein. This material, product, design, service and/or method of construction also complies with the 2000-2021 versions of the referenced codes and the standards referenced therein.

[20] https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#p-3280.2(Listed%20or%20certified); https://up.codes/viewer/colorado/ibc-2021/chapter/2/definitions#listed AND https://up.codes/viewer/colorado/ibc-2021/chapter/2/definitions#labeled

[21] 2015 IBC Section 1403.5

[22] 2015 IBC Section 1404.2

[23] 2015 IBC Section 1404.2

[24] 2015 IBC Section 1403.5

[25] 2015 IBC Section 1405.16

[26] https://up.codes/viewer/colorado/ibc-2021/chapter/17/special-inspections-and-tests#1703.4

[27] https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#:~:text=All%20construction%20methods%20shall%20be%20in%20conformance%20with%20accepted%20engineering%20practices%20to%20insure%20durable%2C%20livable%2C%20and%20safe%20housing%20and%20shall%20demonstrate%20acceptable%20workmanship%20reflecting%20journeyman%20quality%20of%20work%20of%20the%20various%20trades

[28] https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#:~:text=The%20strength%20and%20rigidity%20of%20the%20component%20parts%20and/or%20the%20integrated%20structure%20shall%20be%20determined%20by%20engineering%20analysis%20or%20by%20suitable%20load%20tests%20to%20simulate%20the%20actual%20loads%20and%20conditions%20of%20application%20that%20occur

[29] 2015 IBC Section 1404.2

[30] 2015 IBC Section 1404.2

31 2015 IBC Section 1403.5

32 Qualification is performed by a legislatively defined Accreditation Body. ANSI National Accreditation Board (ANAB) is the largest independent accreditation body in North America and provides services in more than 75 countries. DrJ is an ANAB accredited product certification body.

33 See Code of Federal Regulations (CFR) Title 24 Subtitle B Chapter XX Part 3280 for definition.

34 2015 IBC Section 1403.5

35 2018 IFC Section 104.9

36 Approved is an adjective that modifies the noun after it. For example, Approved Agency means that the Agency is accepted officially as being suitable in a particular situation. This example conforms to IBC/IRC/IFC Section 201.4 where the building code authorizes sentences to have an ordinarily accepted meaning such as the context implies.

37 https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1707.1

38 Multilateral approval is true for all ANAB accredited product evaluation agencies and all International Trade Agreements.

39 http://www.drjengineering.org/AppendixC AND https://www.drjcertification.org/cornell-2016-protection-trade-secrets

40 https://www.law.cornell.edu/uscode/text/18/1832#:~:text=imprisoned%20not%20more%20than%2010%20years

41 https://www.law.cornell.edu/uscode/text/18/1832#:~:text=Any%20organization%20that,has%20thereby%20avoided

42 https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706.2

43 IBC 2021, Section 1706.1 Conformance to Standards

44 IBC 2021, Section 1707 Alternative Test Procedure, 1707.1 General

45 See **Section 11** for the distilled building code definition of **Approved**

46 Los Angeles Municipal Code, SEC. 98.0503. TESTING AGENCIES

47 https://up.codes/viewer/california/ca-building-code-2022/chapter/17/special-inspections-and-tests#1707.1

48 New York City, The Rules of the City of New York, § 101-07 Approved Agencies

49 New York City, The Rules of the City of New York, § 101-07 Approved Agencies

50 https://up.codes/viewer/new_jersey/ibc-2018/chapter/17/special-inspections-and-tests#1707.1

51 https://www.nj.gov/dca/divisions/codes/codreg/ucc.html

52 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3282/subpart-A/section-3282.14

53 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280

54 IBC 2021, Section 1706 Design Strengths of Materials, 1706.2 New Materials. Adopted law pursuant to IBC model code language 1706.2.

55 IBC 2021, Section 1707 Alternative Test Procedure, 1707.1 General. Adopted law pursuant to IBC model code language 1707.1.

56 https://www.nspe.org/resources/issues-and-advocacy/professional-policies-and-position-statements/regulation-professional AND https://apassociation.org/list-of-engineering-boards-in-each-state-archive/

57 IBC 2021, Section 1706 Design Strengths of Materials, Section 1706.1 Conformance to Standards Adopted law pursuant to IBC model code language 1706.1.

58 https://iaf.nu/en/about-iaf-mla/#:~:text=it%20is%20required%20to%20recognise%20certificates%20and%20validation%20and%20verification%20statements%20issued%20by%20conformity%20assessment%20bodies%20accredited%20by%20all%20other%20signatories%20of%20the%20IAF%20MLA%2C%20with%20the%20appropriate%20scope

59 True for all ANAB accredited product evaluation agencies and all International Trade Agreements.

60 https://www.justice.gov/crt/deprivation-rights-under-color-law AND https://www.justice.gov/atr/mission