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## NATIONAL EVALUATION REPORT

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### SIDING AND SOFFIT BOARDS, LINING BOARD AND UNDERLAYMENT, AND SUBFLOOR PANELS

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#### 3.0 DESCRIPTION

##### 3.1 GENERAL

The exterior siding and soffit boards, interior lining and underlayment, and subfloor panels are single-faced, cellulose fiber-reinforced cement (fiber-cement) building boards. The Titan™-FR panel is a composite panel composed of a 1/8 inch (3.2 mm) thick fiber-cement skin laminated to 1/2 inch (12.7 mm) thick proprietary Type X gypsum board.

All fiber-cement planks and panels are produced from the same components and differ in surface treatments and board configurations. Exterior siding and soffit boards are identified as Hardiplank® (Hardihome™, Sentry™, Colonial Smooth®, Colonial Roughsawn®, and Shingleside® Heritage™), Hardiflex™, Hardipanel®, Harditex® base-board, Hardisoffit® boards, Shingleside® Heritage™ panel and Hardie® Shingleside® cladding. Interior lining boards and underlayments are identified as Titan™ (tapered edge), Hardibacker® (square edge), Hardibacker® (Multilay®), and Titan™-FR panel. Subfloor panels are identified as Compressed Sheet. The planks, panels, and shingles are manufactured by the Hatschek process and cured by high-pressure steam autoclaving. All products are cut to shape on-site by the score-and-snap method using a tool available from the manufacturer, a hand guillotine or a handsaw utilizing a carbide blade.

The fiber-cement products have a flame-spread index of 0 and a smoke developed index of 5 when tested in accordance with ASTM E84. The products are classified as noncombustible when tested in accordance with ASTM E136. The siding and soffit products comply with ASTM C1186, *Standard Specification for Grade II, Type A, Non-Asbestos Fiber-Cement Flat Sheets*. The subfloor panels comply with ASTM C1186, *Standard Specification for Grade IV, Type A, Non-Asbestos Fiber-Cement Flat Sheets*. The interior lining products, Hardibacker and Titan, comply with ASTM C1288, *Standard Specification for Grade II Discrete Non-Asbestos Fiber-Cement Interior Substrate Sheets*. The interior lining product Hardibacker 500® complies with ASTM C1288, *Standard Specification for Grade I Discrete Non-Asbestos Fiber-Cement Interior Substrate Sheets*. All interior lining boards comply with ANSI A118.9 as cementitious backer units. When tested in accordance with ASTM C177, "K" and "R" values for the products are as shown in Table 4 of this report. When tested in accordance with ASTM E96, products with a thickness of 1/4 inch (6.4 mm) or greater have demonstrated the permeance values given in Table 5 of this report.

*This report is limited to the specific product and data and test reports submitted by the applicant in its application requesting this report. No independent tests were performed by the National Evaluation Service, Inc. (NES), and NES specifically does not make any warranty, either expressed or implied, as to any finding or other matter in this report or as to any product covered by this report. This disclaimer includes, but is not limited to, merchantability. This report is also subject to the limitation listed herein.*

### 3.1.1 James Hardie Trade Names

Hardiplank®	Hardihome™
Sentry™	Hardipanel®
Colonial Smooth®	Hardiflex™
Colonial Woodgrain®	Harditex®
Hardisoffit®	Hardie®
Shingleside®	James Hardie®
Heritage™	Titan™-FR
Hardibacker®	Multilay®
Titan™	Max "C"™
Hardirock®	Hardibacker 500®

## 3.2 SIDING AND SOFFIT BOARDS

Hardiplank®, Hardiflex™, Hardipanel®, Harditex® baseboard, Shingleside® Heritage™ panels, Hardie® Shingleside cladding, and Hardisoffit® boards are used as siding on exterior walls and soffits. The exterior siding and soffit products are supplied sealed with an acrylic sealer for subsequent application of a compatible primer and exterior-grade topcoat(s).

Nominal dimensions are noted in Table 1 of this report, maximum basic wind speeds in Table 2a, 2b, 6, 7, 8, and 9 of this report, and maximum shear values in Table 3 of this report.

### 3.2.1 Hardiplank® (Hardihome™, Sentry™, Colonial Smooth®, Colonial Roughsawn®, and Shingleside® Heritage™) Lap Siding

**3.2.1.1 General:** Lap siding is available in various finish textures. The siding is applied horizontally commencing from the bottom course of a wall with minimum 1 1/4 inch (32 mm) wide laps at the top edge. Vertical joints butt over studs except where the "off-stud splice device" is utilized as described in Section 3.2.1.2 of this report, or where the planks are installed over solid panel sheathing.

When installed on wood-framing members, the siding shall be fastened either through the overlapping planks (face nailed) or through the top edge of single planks (blind nailed) with corrosion-resistant nails into each wood-framing member. The lap conceals the fasteners in the previous course when blind nailed. When attached to metal framing members, the siding is fastened either through the overlapping planks with 1 5/8 inch (41 mm) long No. 8-18 by 0.323 inch (8.2 mm) HD Hi-Lo® or S-12™, self-drilling, corrosion-resistant, ribbed buglehead screws or with 0.100 in. (2.54 mm) shank by 0.25 in. (6.4 mm) HD by 1 1/2 in. (38 mm) long ET & F brand pin fasteners at each metal framing member, or through the top edge of single planks with minimum 1 1/4 inch (32 mm) long No. 8-18 by 0.375 inch (9.5 mm) HD Hi-Lo® or S-12™, self-drilling, corrosion-resistant, ribbed Phillips waferhead screws or with 0.100 in. (2.54 mm) shank by 0.25 in. (6.4 mm) HD by 1 1/2 in. (38 mm) long ET & F Panelfast brand fasteners at each metal framing member. Planks may also be fastened to a wall constructed of concrete masonry units complying with ASTM C90 with 0.14 in. (3.5 mm) shank by 0.300 in. (7.6 mm) HD by 1 1/4 in. (32 mm) long ET & F brand Stud Nails. The lap conceals the fasteners in the previous course.

**3.2.1.2 Off-Stud Splice Device:** Vertical joints of the planks shall butt over framing members or between the framing members when an "off-stud splice device" is placed on each plank end. The splice device's bottom lip is placed over the adjacent solid course of planks. The plank is then fastened to the framing. The abutting plank is positioned and fastened into place ensuring that the lower edges of the

two planks align. The metal device is located centrally over the joint. Restrictions on the "off-stud splice device" locations are as follows:

- Splices shall be located a minimum of two stud cavities from wall corners.
- Successive splices within the same plank course shall be located no closer than 48 inches (1219 mm) from one another.
- Splices shall be staggered at minimum 24 inch (610 mm) intervals when located in the same wall cavity.
- Splices shall be at least one stud cavity away from door or window openings.

Where a specified level of wind resistance is required, plank lap siding shall be attached to solid panel sheathing or framing members, appropriately spaced, with fastener types, lengths, and spacing described in Tables 2b and 9 of this report.

### 3.2.2 Hardiflex™ Siding (Hardipanel® Smooth)

Hardiflex™ siding is used as an exterior wall cladding. The siding has a smooth unsanded surface. Dimensions are as noted in Table 1 of this report. Fasteners are installed with a minimum 3/8 inch (9.5 mm) edge distance and a minimum 2 inch (51 mm) clearance from corners. Joints are fastened at abutting sheet edges and optionally protected by polyvinyl chloride (PVC) joint treatment, lumber battens or sealant.

Where a specified level of wind resistance or shear resistance is required, the Hardiflex™ panel is attached to framing members, appropriately spaced, with fastener types, lengths, and spacing described in Table 2a and Table 3 of this report.

### 3.2.3 Hardipanel® Siding

Hardipanel® siding is available in various surface textures including smooth. Dimensions are noted in Table 1 of this report. Fasteners are installed with a minimum 3/8 inch (9.5 mm) edge distance and a minimum 2 inch (51 mm) clearance from corners. Joints are fastened at abutting sheet edges and optionally covered by polyvinyl chloride (PVC) joint treatment, lumber battens or sealant.

Where a specified level of wind resistance or shear resistance is required, the Hardipanel® siding is attached to framing members, appropriately spaced, with fastener types, lengths, and spacing described in Table 2a and 3 of this report.

### 3.2.4 Harditex® Baseboard

Harditex® baseboard is for exterior applications to walls and soffits. Dimensions are noted in Table 1 of this report. Harditex® baseboard has a smooth finish and is available with either tapered edges on the two long sides for joint treatment or all square edges. Harditex® baseboard is supplied either sealed or unsealed for the subsequent application of a primer or sealer by the end user as a component in an exterior coating or finish system. Joints shall be sealed with a sealant specified by the coating manufacturer. Other installation details are in accordance with Section 3.2.2 of this report. Harditex® baseboard has been evaluated for water-resistive qualities but its use as an alternative to a weather-resistive barrier is outside the scope of this report, see Section 7.4 of this report.

Where a specified level of wind resistance or shear resistance is required, the Harditex® baseboard is attached to framing members, appropriately spaced, with fastener types, lengths, and spacing described in Table 2a or 3 of this report.

### 3.2.5 Hardisoffit® Board

Hardisoffit® board is for use as exterior vented or unvented soffits. Hardisoffit® board is available with either a wood-grain texture or a smooth unsanded surface. Vented Hardisoffit® provides 5 square inches of net free ventilation per lineal foot of soffit. Dimensions are noted in Table 1 of this report. All Hardisoffit® board edges are supported by framing with fasteners installed with a minimum 3/8 inch (9.5 mm) edge distance and minimum 2 inch (51 mm) clearance from corners. Hardisoffit® boards are attached to framing members with fastener types, lengths, and spacings described in Table 2a and 3 of this report.

### 3.2.6 Hardie® Shingleside® Cladding

Hardie® Shingleside® cladding shall be installed over solid wall sheathing which complies with the applicable code. Dimensions are as noted in Table 1 of this report. The wall sheathing shall be protected by a weather-resistive barrier which complies with the applicable code.

When Hardie® Shingleside® cladding is installed over minimum 15/32 inch (11.9 mm) thick plywood complying with the applicable code, **with two corrosion resistant roofing nails** [0.121 inch (3.1 mm) shank diameter by 0.371 inch (9.4 mm) head diameter by 1 1/4 inch (32 mm) long] spaced a maximum of 1 inch (25.4 mm) from each edge and the nails positioned to be covered 1 inch (25.4 mm) nominally by the succeeding course, the maximum allowable wind loads, building heights, and exposure categories for the systems installed with 8, 7, and 6 inch (203, 178, and 152 mm) weather exposures, shall be as indicated in Table 6A, 6B, and 6C of this report. Nails shall secure siding but shall not be overdriven.

When Hardie® Shingleside® cladding is installed over minimum 7/16 inch (11.1 mm) thick Oriented Strand Board (OSB), complying with the applicable code, **with two corrosion resistant siding nails** [0.091 inch (2.3 mm) shank diameter by 0.221 inch (5.5 mm) head diameter by 1 1/2 inch (38 mm) long] spaced a maximum of 1 inch (25.4 mm) from each edge and the nails positioned to be covered 1 inch (25.4 mm) nominally by the succeeding course, the maximum allowable wind loads, building heights, and exposure categories for the systems installed with 8, 7, and 6 inch (203, 178, and 152 mm) weather exposures, shall be as indicated in Table 7A, 7B, and 7C of this report. Nails shall secure siding but shall not be overdriven.

When Hardie® Shingleside® cladding is installed over minimum 7/16 inch (11.1 mm) thick Oriented Strand Board (OSB), complying with the applicable code, **with three corrosion resistant siding nails** [0.091 inch (2.3 mm) shank diameter by 0.221 inch (5.5 mm) head diameter by 1 1/2 inch (38 mm) long] **for 12 inch (305 mm) wide shingles and two corrosion resistant siding nails for 6 and 8 inch (152 mm and 203 mm) wide shingles**, the maximum allowable wind loads, building heights, and exposure categories for the systems installed with 8, 7, and 6 inch (203, 178, and 152 mm) weather exposures, shall be as indicated in Table 8A, 8B, and 8C of this report. One siding nail shall be spaced a maximum of 1 inch (25.4 mm) from each edge on the panel, with the third siding nail installed midspan of the 12 inch (305 mm) wide shingles. All nails shall be covered 1 inch (25.4 mm) nominally by the succeeding course. Nails shall secure siding but shall not be overdriven.

### 3.2.7 Shingleside® Heritage™ Panels

Shingleside® Heritage™ panels have a woodgrain texture and are available in three configurations: half-round®, staggered-edge®, and square-edge®. Dimensions are as

noted in Table 1 of this report. The siding is applied horizontally to braced wall framing complying with the applicable code commencing from the bottom course of a wall. Install Shingleside® Heritage™ panels with joints in moderate contact. Due to the overlapping of the panels, joint sealant is not required. Fasteners are a minimum 0.083 inch (2.1 mm) shank by 0.187 inch (4.7 mm) HD by 1 1/2 inch (33 mm) long corrosion-resistant siding nail. For application to open braced framing, vertical joints butt over studs.

Where a specified level of wind resistance is required, Heritage panel sidings are attached to framing members appropriately spaced or to solid wall sheathing, with fastener types, lengths, and spacing described in Table 2 of this report.

Secure a 1/4 inch (6.4 mm) thick lath strip and a minimum 9 1/4 inch (235 mm) wide Hardiplank® starter course. Trim the first panel so the end aligns with the furthest stud. Allow trimmed panel 1/8 inch (3.2 mm) from the trim board for caulk and secure above keyways [approximately 8 inches (203 mm) clearance from butt edge of panel] on 16 inch (406 mm) or 24 inch (310 mm) centers [13 3/4 inch (349 mm) centers maximum for application only to minimum 7/16 inch (11.1 mm) thick APA rated Oriented Strand Board sheathing]. Work across the wall allowing 1/8 inch (3.2 mm) gap from trim.

Start the second course, and every following even number course (i.e. fourth, sixth) by moving the equivalent of one full stud cavity from the straight edge end (the left side). Save this piece for the other end of the wall. Secure the beginning panel leaving 1/8 inch (3.2 mm) clearance from the trim board for caulking. Position nails to penetrate through the previous course and into the framing members or Oriented Strand Board.

When a course is broken by a window or doorway, continue the application as if the wall was complete. Trimming for the opening and using the resulting piece may throw off the spacing above the break.

### 3.2.8 Hardipanel® Shiplap Panel Siding

Hardipanel® Shiplap panel siding is used as an exterior wall cladding. The siding is available in various surface textures including smooth. Dimensions are noted in Table 1 of this report. Fasteners are installed with a minimum 3/8 inch (9.5 mm) edge distance and a minimum 2 inch (51 mm) clearance from corners.

Where a specified level of wind resistance or shear resistance is required, the Shiplap panel siding is attached to framing members, appropriately spaced, with fastener types, lengths, and spacing described in Table 2a and 3 of this report.

## 3.3 LINING BOARD AND UNDERLAYMENT

Titan™ (tapered-edge) panel, Hardibacker® (square edge), Hardibacker 500® (square edge), and Hardibacker® (Multilay®) underlayments are used as wet or dry area lining/underlayment substrates applied to the interior of buildings. Titan™-FR (tapered-edge) panel is only intended for dry interior wall and ceiling applications.

### 3.3.1 Titan™ (Tapered Edge) Panel

Titan™ (tapered-edge) panel is only intended for interior walls and ceilings including shower and bath areas. Subsequent finishing using paint, wallpaper or tile is required as indicated in Sections 3.3.1.1 and 3.3.1.2 of this report. The panel has a smooth finish with tapered edges on the two long dimensions for joint treatment. Dimensions are noted in Table 1 of this report. Maximum shear values are noted in Table 3 of this report.

**3.3.1.1 Paint or Wallpaper Finish:** Titan™ (tapered-edge) panel is installed with the long dimension either vertical or horizontal to nominal 2 x 4 wood framing members or minimum No. 20 gage (0.0329 inch) steel framing members, spaced a maximum of 24 inches (610 mm) on center with end joints staggered from adjacent courses in both vertical and horizontal applications. To fasten to wood framing members, minimum 1 3/8 inch (35 mm) long gypsum board nails or minimum 1 inch (25.4 mm) long No. 8-18 by 0.323 inch (8.2 mm) HD Hi-Lo® S®, self-drilling, corrosion-resistant, ribbed buglehead screws are used and spaced a maximum of 8 inches (203 mm) on center at all supports. To fasten to metal framing members, minimum 1 inch (25.4 mm) long No. 8-18 by 0.323 inch (8.2 mm) HD Hi-Lo® S® or S-12™, self-drilling, corrosion-resistant, ribbed buglehead screws are used and spaced a maximum of 6 inches (152 mm) on center at all supports. Fasteners shall be located at least 3/8 inch (9.5 mm) from board edges, and 2 inches (51 mm), minimum, from lining board corners. Panels are placed with a minimum 1/4 inch (6.4 mm) clearance from the floor surface. Metal or PVC corner angles are attached with the above described nails or screws placed approximately 12 inches (305 mm) on center.

A flush-joint procedure is permitted on Titan™ (tapered-edge) panels. Gypsum board joint compounds, complying with ASTM C474 and C475, shall be troweled into the joints. Paper joint tape is embedded into the wet joint compound and allowed to dry thoroughly. A second coat of joint compound, approximately 8 inches (203 mm) wide, is then applied across the joint and allowed to dry. A third coat of topping compound, 10 inches (254 mm) wide, is applied across the joint. Topping compound shall also be applied over all fastener heads in intermediate locations.

Internal corners are finished by filling with joint compound, working the joint tape into the joint, and applying a second coat of joint compound. A third coat of topping compound is applied over the area.

External corners are treated by filling the joint with joint compound and allowing it to thoroughly dry. Corrosion-resistant metal or PVC corner angles are then fastened to the corner, followed by a second coat of joint compound. When the second coat is completely dry, a third coat of topping compound is applied over the area. Topping compound is also applied over all fastener heads in intermediate locations.

**3.3.1.2 Tile Finish:** Titan™ (tapered-edge) panel is installed with the long dimension either vertical or horizontal to nominal 2 x 4 wood-framing members or minimum No. 20 gage (0.0329 inch, 0.84 mm) metal framing members spaced 24 inches (610 mm) on center, maximum, with end joints staggered from adjacent courses in both vertical and horizontal applications. To comply with ANSI A108.11, framing members are spaced 16 inches (406 mm) on center, maximum. To fasten to wood framing members, minimum 1 1/4 inch (32 mm) long, corrosion-resistant (galvanized or stainless steel) roofing nails, or 1 1/4 inch (32 mm) long No. 8-18 by 0.375 inch (9.5 mm) HD Hi-Lo® S®, self-drilling, corrosion-resistant, ribbed Phillips waferhead screws are used and spaced a maximum of 6 inches (152 mm) on center at all supports. To fasten to metal framing members, minimum 1 1/4 inch (32 mm) long No. 8-18 by 0.375 inch (9.5 mm) HD Hi-Lo® S® or S-12™, self-drilling, corrosion-resistant, ribbed Phillips waferhead screws are used and spaced a maximum of 6 inches (152 mm) on center at all supports. Fasteners are located at least 3/8 inch (9.5 mm) from board edges, and 2 inches (51 mm), minimum, from board corners. Corner gaps are filled with a flexible, silicone sealant compatible with fiber-cement. Panels are placed with a minimum 1/4 inch (6.4 mm)

clearance from the floor surface. This gap shall be free of adhesive and grout and filled with a flexible sealant. On large tiled areas, movement joints are provided in the walls in accordance with ANSI A108, Section AN-3.7.

A flush-joint procedure is permitted on Titan™ (tapered-edge) panel. The same type of tile adhesive or mortar used to set the tiles shall be troweled into joints as a joint compound. Joints shall be reinforced with 2 inch (51 mm) wide, high-strength, coated, alkali-resistant, glass fiber reinforcing joint tape embedded into the wet tile adhesive and allowed to dry thoroughly.

Internal corners are finished by filling with tile adhesive, working the reinforcing joint tape into the joint, and applying a second coat of tile adhesive and allowing it to dry thoroughly.

External corners are treated by filling the joint with tile adhesive and allowing it to dry thoroughly. Corrosion-resistant metal or PVC corner angles are then fastened in place, followed by a second coat of tile adhesive. Tile adhesive is also applied over all fastener heads in intermediate locations.

Wall tiles complying with ANSI A137.1 are attached to the board with flexible Type I, mastic adhesives complying with ANSI A136.1, or acrylic or latex-modified thinset mortars complying with ANSI A118.4, in accordance with ANSI A108. The same adhesives are permitted to fill and level the sheet joints.

### 3.3.2 Hardibacker® (Square Edge) and Hardibacker 500® (Square Edge)

Hardibacker® (square-edge) underlayment is only intended for interior walls and floors, including shower and bath areas (excluding the shower floor). Hardibacker 500® (square-edge) underlayment is only intended for interior walls, including shower and bath areas. Subsequent finishing with tile is required. The square-edge underlayment has a smooth-finished surface and square edges for closely butted joints. Dimensions are noted in Table 1 of this report. Maximum shear values are noted in Table 3 of this report.

**3.3.2.1 Floors:** When Hardibacker® (square-edge) underlayment is used on floors, the subfloor assembly shall consist of a minimum 5/8 inch (15.9 mm) thick, Exterior Grade, Group 2 or 3 species plywood or equivalent thickness of subfloor and shall be designed such that the maximum deflection in a plane, including live and dead loads, is  $L/360$  of the span, in accordance with the applicable code. Movement joints shall be provided where existing structural joints (building control joints) occur and where changes in direction occur such as in "L"-shaped rooms. For large tiled areas, movement joints are provided in accordance with ANSI A108, Section AN-3.7.

The subfloor is then covered with a minimum 3/32 inch (2.4 mm) thick latex, or acrylic-modified thinset setting material. Hardibacker (square-edge) underlayment is then installed in a staggered brick pattern at right angles to the subfloor and fastened before the setting material films over.

The underlayment is fastened with 1 1/4 inch (32 mm) long, corrosion-resistant (galvanized or stainless steel) roofing nails or 1 inch (25.4 mm) long No. 8-18 by 0.323 inch (8.2 mm) HD Hi-Lo® S®, self-drilling, corrosion-resistant, ribbed buglehead screws. To meet the requirements of ANSI A108.11, minimum 1 1/4 inch (32 mm) long No. 8-18 by 0.375 inch (9.5 mm) HD Hi-Lo® S®, self-drilling, corrosion-resistant ribbed Phillips waferhead screws are used. Fasteners shall be located a maximum of 8 inches (203 mm) on center around the perimeter and in the field. Fasteners shall be located a minimum of 3/8 inch (9.5 mm)

and a maximum of 3/4 inch (19.1 mm) from the underlayment edges, and 2 inches (51 mm) minimum, from underlayment corners. For latex or acrylic modified thinset mortars, the joints shall be reinforced with 2 inch (51 mm) wide, high-strength, coated, alkali-resistant, glass fiber reinforcing tape embedded into the wet mortar and allowed to dry thoroughly.

Floor tiles complying with ANSI A137.1 are attached to the board with flexible Type I mastic adhesives complying with ANSI A136.1, or acrylic or latex-modified thinset mortars complying with ANSI A118.4, in accordance with ANSI A108. The same adhesives are also used to fill and level the sheet joints.

**3.3.2.2 Walls:** Hardibacker® (square-edge) and Hardibacker 500® (square edge) underlayments are installed with the long dimension either vertical or horizontal to nominal 2 x 4 wood framing members or minimum No. 20 gage (0.0329 inch, 0.84 mm) metal framing members spaced a maximum of 24 inches (610 mm) on center with end joints staggered from adjacent courses in both vertical and horizontal applications. To comply with ANSI A108.11, framing members shall be spaced a maximum of 16 inches (406 mm) on center. To fasten to wood framing members, minimum 1 1/4 inch (32 mm) long, corrosion-resistant (galvanized or stainless steel) roofing nails or 1 1/4 inch (32 mm) long No. 8-18 by 0.375 inch (9.5 mm) HD Hi-Lo® S®, self-drilling, corrosion-resistant, ribbed Phillips waferhead screws are used and spaced a maximum of 8 inches (152 mm) on center at all supports. To fasten to metal framing members, minimum 1 1/4 inch (32 mm) long No. 8-18 by 0.375 inch (9.5 mm) HD Hi-Lo® S® or S-12™, self-drilling, corrosion-resistant ribbed Phillips waferhead screws are used and spaced a maximum of 8 inches (152 mm) on center at all supports. Fasteners are located at least 3/8 inch (9.5 mm) from board edges and 2 inches (51 mm), minimum, from board corners. Corner gaps are filled with a silicone sealant compatible with fiber-cement underlayments. Underlayments are placed with a minimum 1/4 inch (6.4 mm) clearance from the floor surfaces and other horizontal tile termination locations, such as above tub edges. This gap shall be free of adhesive and grout and filled with a flexible sealant. For large tiled areas, movement joints are provided in accordance with ANSI A108, Section AN-3.7.

Wall tiles complying with ANSI A137.1 are attached to the underlayment with flexible Type I mastic adhesives complying with ANSI A136.1, or acrylic or latex-modified thinset mortars complying with ANSI A118.4, in accordance with ANSI A108. The same adhesives are used to fill and level the sheet joints. Joints shall be reinforced with 2 inch (51 mm) wide, high-strength, coated, alkali-resistant, glass fiber reinforcing tape embedded into the wet mastic or modified thinset mortar and allowed to dry thoroughly.

### 3.3.3 Hardibacker® (Multilay®)

Hardibacker® (Multilay®) underlayment is only intended for interior floors including shower and bath areas (excluding the shower floor). Subsequent finishing with resilient floor coverings or tile is required. The underlayment face has a smooth (sanded) surface, an opaque acrylic seal coat and square edges for close-butted joints. The face of the sheet is identified for resilient flooring. The reverse side of the underlayment has a smooth (unsanded) surface, is unsealed and has square edges for close-butted joints. The reverse side of the sheet is identified for tile. Dimensions are noted in Table 1 of this report.

The underlayment shall be installed over a structurally sound subfloor assembly designed to limit the maximum deflection in a plane, including live and dead loads, to  $L/360$  of the span, in accordance with the applicable code.

When the underlayment is installed on existing floor construction, floor finishes and subflooring shall be repaired,

removed and/or replaced as necessary to create a smooth and level surface. The ability of the existing floor structure and subfloor to support the additional loads of the underlayment and new floor finish shall be substantiated. Alterations shall comply with applicable codes.

The underlayment boards are laid in a staggered end joint pattern at right angles to the subflooring. Joints are offset 1/8 inch (3.2 mm) from walls and cabinet bases and cut edges turned to the outside, wherever possible.

**3.3.3.1 Resilient Flooring:** With the side marked for resilient flooring face up, Hardibacker® (Multilay®) underlayment is placed over the prepared subflooring and fastened to support framing with either 3d, corrosion-resistant, ring-shank nails, or No. 18 gage, (0.0475 inch) corrosion-resistant staples with a 1/4 inch (6.4 mm) crown, located a maximum of 3 inches (76 mm) on center around the board perimeter and 6 inches (152 mm) on center in the field. Fasteners shall be located at least 3/8 inch (9.5 mm) from the underlayment edges and 2 inches (51 mm), minimum, from underlayment corners. Fastener heads shall be flush with the surface. Fasteners shall be of sufficient length to penetrate at least 1 inch (25.4 mm) into sound subflooring or framing.

To minimize the possibility of surface irregularities in the underlayment and fastener heads penetrating through the resilient flooring, the boards shall be installed flush and level. Height variations are treated by filling joints, gouges and low spots with a water-resistant, cementitious leveling compound recommended by the floor-covering manufacturer. After the leveling compound has dried, filled areas are sanded level to the surrounding subfloor.

Prior to the application of the resilient flooring, the prepared surfaces shall be free of dust, grease and other foreign material.

Finish floor coverings are installed in accordance with the flooring material manufacturer's published instructions, which shall include application procedures, compatible adhesives and recommended accessories.

**3.3.3.2 Tile:** With the side marked for tile face up, follow the additional instructions described in Section 3.3.2.1 of this report.

### 3.3.4 Titan™-FR Panel

Titan™-FR (tapered-edge) panel is only intended for dry interior wall and ceiling applications. The panel has a smooth finish with tapered edges on the two long dimensions for joint treatment. Dimensions are as noted in Table 1 of this report.

**3.3.4.1 Paint or Wallpaper Finish:** Titan™-FR tapered-edge panel is installed with the long dimension either vertical or horizontal to nominal 2 x 4 wood framing members or minimum No. 20 gage (0.0329 inch, 0.84 mm) steel framing members, spaced a maximum of 24 inches (610 mm) on center with end joints staggered from adjacent courses in both vertical and horizontal applications. To fasten to wood framing members, minimum 1 7/8 inch (47.6 mm) long gypsum board nails or minimum 1 1/2 inch (38 mm) long, Type W, gypsum board screws are used and spaced a maximum of 8 inches (203 mm) on center at all supports. To fasten to metal framing members, minimum 1 inch (25.4 mm) long, Type S or S-12, self-drilling gypsum board screws are used and spaced a maximum of 12 inches (305 mm) on center at all supports. Fasteners shall be located at least 3/8 inch (9.5 mm) from board edges, and 2 inches (51 mm), minimum, from board corners. wall panels are placed with a minimum 1/4 inch (6.4 mm) clearance from the floor surface. Metal or PVC corner angles are attached with the above described nails or screws placed approximately 12 inches (305 mm) on center.

A flush-joint procedure is permitted on Titan™-FR (tapered-edge) panels. Gypsum board joint compounds, complying with ASTM C474 and C475, shall be troweled into the joints. Paper joint tape or equivalent is embedded into the wet joint compound and allowed to dry thoroughly. A second coat of joint compound, approximately 8 inches (203 mm) wide, is then applied across the joint and allowed to dry. A third coat of topping compound, 10 inches (254 mm) wide, is applied across the joint. Topping compound shall also be applied over all fastener heads in intermediate locations.

Internal corners are finished by filling with joint compound, working the joint tape into the joint, and applying a second coat of joint compound. A third coat of topping compound is applied over the area.

External corners are treated by filling the joint with joint compound and allowing it to dry thoroughly. Corrosion-resistant metal or PVC corner angles are then fastened to the corner, followed by a second coat of joint compound. When the second coat is completely dry, a third coat of topping compound is applied over the area. Joint compound is also applied over all fastener heads in intermediate locations.

### 3.4 SUBFLOOR PANELS

Compressed sheet is used as subflooring over complying wood or metal floor joists spaced a maximum of 24 inches (610 mm) on center. The panels have a smooth unsanded surface. Cutouts for plumbing and electrical shall be oversized. Floor opening penetrations shall be protected in accordance with the applicable code. Dimensions are noted in Table 1 of this report.

Panels are installed over two or more spans, with the long dimension perpendicular to supports. The sheets are fastened to wood framing members by counterstriking minimum No. 10 by 0.350 inch (8.9 mm) HD wood screws spaced a maximum of 12 inches (305 mm) on center at all supports. The sheets are fastened to metal framing members by counterstriking minimum No. 9-18 by 0.350 inch (8.9 mm) HD S-12™, self-drilling, corrosion-resistant ribbed buglehead screws spaced a maximum of 6 inches (152 mm) on center around the sheet perimeter and 12 inches (305 mm) on center at immediate joist locations. Fasteners shall be of sufficient length to penetrate at least 1 inch (25.4 mm) into wood framing members or 1/4 inch (6.4 mm) into metal framing members. Holes are drilled in compressed sheet with a masonry bit, allowing a 0.04 inch (1.02 mm) clearance over diameter of screw to be used. Fasteners are located a minimum of 3/8 inch (9.5 mm) and a maximum of 3/4 inch (19.1 mm) from sheet edges, and 2 inches (51 mm) minimum from sheet corners. Fastener heads are flush with the surface. Edges shall be blocked or the panels shall be covered with minimum 1/4 inch (6.4 mm) thick underlayment or 3/4 inch (19.1 mm) thick wood strip finish flooring.

As an alternative, sheets are field glued in conjunction with mechanical fastening with a structural adhesive (APA/HUD AFG-01) applied to joints. Framing members shall be free of surface moisture, dirt, cement and other foreign materials prior to application of the adhesive. Adhesives shall be applied in accordance with the adhesive manufacturer's instructions. The application rate shall be a 1/4 inch (6.4 mm) diameter bead applied to each joist or blocking member, except two 1/4 inch (6.4 mm) diameter beads are applied where sheets abut on a joist. Installation of the sheets shall be within the time limit designated by the adhesive manufacturer.

Where more than one sheet is used, an effective seal shall be provided between sheets. The bonded surfaces shall be clean and an approved structural adhesive (APA/HUD AGF-01) shall be used. Edges of the sheets to be joined shall be thoroughly cleaned and the dust removed. A layer

of adhesive is "battered" to the leading edge of the first installed sheet and the next sheet laid against it ensuring that an adequate film of adhesive is present. Forcing adhesive into the joint after the sheets have been fastened is not permitted. After the joint is filled, any excess adhesive shall be removed from the surface of the sheet.

Use as a diaphragm is outside the scope of this report.

Allowable loads are as follows:

#### ALLOWABLE UNIFORM LOAD AT DEFLECTION LIMIT = $L/360$ <sup>1</sup>

PRODUCT	JOIST SPACING	
	16 inches o.c.	24 inches o.c.
Compressed Sheet II (1/2 and 5/8 inch thick)	190 psf	105 psf
Compressed Sheet II (3/4 inch thick)	300 psf	145 psf

For SI: 1 inch = 25.4 mm, 1 psf = 47.88 Pa

1.  $L$  = length of span (inches)

### 3.5 FIRE-RESISTANCE RATED ASSEMBLIES

#### 3.5.1 Assembly 1

The nonsymmetrical nonloadbearing, 1 hour, fire-resistance rated wall assembly consists of minimum 3 5/8 inch (92 mm) deep, No. 20 gage (0.0359 inch, 0.91 mm), steel "C" studs at 24 inches (610 mm) on center with corresponding top and bottom tracks. One layer of 5/8 inch (15.9 mm) thick Type "X" gypsum board, 48 inches (1219 mm) wide, is applied vertically to the studs and secured with 1 1/4 inch (32 mm) long, Type S, gypsum board screws, spaced 8 inches (203 mm) on center at board edges and 12 inches (305 mm) on center at intermediate framing members. The 5/8 inch (15.9 mm) thick gypsum board joints and screw heads require treatment consisting of joint compound followed by joint tape and a second layer of joint compound. The opposite face of the wall is covered with one layer of 1/2 inch (12.7 mm) thick Hardirock® Max "C"™ (Type "X") gypsum board, followed by one layer of either 1/4 inch (6.4 mm) thick Titan™ (tapered-edge), Hardibacker® (square-edge), or Harditex® board. Boards are applied vertically to framing members with vertical edges staggered 24 inches (610 mm). The 1/2 inch (12.7 mm) thick Hardirock® Max "C"™ (Type "X") gypsum board is fastened to the framing members with 1 1/4 inch (32 mm) long, Type S, gypsum board screws spaced 24 inches (610 mm) on center. Titan™, Hardibacker® or Harditex® boards are fastened through the gypsum board to the framing members with minimum 1 5/8 inch (41 mm) long by minimum 0.323 inch (8.2 mm) HD Hi-Lo® S® or S-12™ self-drilling, corrosion-resistant, ribbed buglehead or ribbed Phillips waferhead screws located a maximum of 8 inches (203 mm) on center. Board joints and fasteners require treatment similar to that described in Sections 3.3.1.1, 3.3.1.2, 3.3.2.2 and 3.2.4 of this report.

#### 3.5.2 Assembly 2

The nonsymmetrical nonload bearing, 1 hour, fire-resistant rated wall assembly consists of minimum 3 5/8 inch (92 mm) deep, No. 25 gage (0.0209 inch, 0.53 mm), steel "C" studs at 16 inches (406 mm) on center with corresponding top and bottom tracks. One layer of 5/8 inch (15.9 mm) thick Type "X" gypsum board, 48 inches (1219 mm) wide, is applied vertically to the studs and secured with minimum 1 inch (25.4 mm) long, Type S, gypsum board screws, spaced 8 inches (203 mm) on center at board edges and 12 inches (305 mm) on center at intermediate framing members. The 5/8 inch (15.9 mm) thick Type "X" gypsum board joints and screw heads require treatment consisting of joint compound followed by joint tape and a second layer of joint compound. The stud cavities are insulated with

minimum 3 inch (76 mm) thick, 3 pcf (48 kg/m<sup>3</sup>), unfaced, friction-fit, mineral fiber insulation complying with ASTM C665, Type I. The opposite face of the wall is covered with one layer of 7/16 inch (11.1 mm) thick Hardibacker® (square edge) or Titan™ (tapered edge) or Harditex® boards. The boards are applied vertically to framing members with vertical edges staggered 16 inches (406 mm). Hardibacker®, Titan™ or Harditex® boards are fastened through to the framing members with minimum 1 inch (25.4 mm) long No. 8-18 by 0.323 inch (8.2 mm) HD self-drilling, corrosion-resistant, Hi-Lo® S® ribbed buglehead (or equivalent) screws located a maximum of 6 inches (152 mm) on center. Board joints and fasteners require treatment similar to that described in Sections 3.3.1.1, 3.3.1.2 or 3.3.2.2 of this report, and using the glass fiber reinforcing tape.

### 3.5.3 Assembly 3

The nonsymmetrical limited loadbearing, 1 hour fire-resistant rated wall assembly consists of nominal 2 x 4 wood studs at 16 inches (406 mm) on center with two top plates and a single bottom plate. The lesser of 800 pounds per stud or 31 percent of full design load is permitted to be superimposed, provided structural consideration for axial, flexural and bearing perpendicular-to-grain stresses are resolved in accordance with Part III of the *National Design Specification*, 1997 edition, published by the American Forest & Paper Association. One layer of 5/8 inch (15.9 mm) thick Type "X" gypsum board, 48 inches (1219 mm) wide, is applied vertically to the studs and secured with minimum 1 7/8 inch (22 mm) long cup-head gypsum board nails, spaced 7 inches (178 mm) on center at board edges and intermediate framing members. The 5/8 inch (15.9 mm) thick Type "X" gypsum board joints and nail heads require treatment consisting of joint compound followed by joint tape and a second layer of joint compound. The stud cavities are insulated with minimum 3 inch (76 mm) thick, 3 pcf, unfaced, friction-fit, mineral fiber insulation complying with ASTM C665, Type I. The opposite face of the wall is covered with one layer of 7/16 inch (11.1 mm) thick Titan™ (tapered-edge) or Hardibacker® (square-edge) fiber-cement underlayment. The fiber cement board is applied vertically to framing members with vertical edges staggered 16 inches (406 mm) from the gypsum board edges. Boards are fastened through to the framing members with minimum 1 1/2 inch (38 mm) long, corrosion-resistant roofing nails located a maximum of 6 inches (152 mm) on center. Board joints and fasteners require treatment similar to that described in Section 3.3.2.2 of this report. The side of the wall clad with fiber-cement board is covered with standard grade ceramic tile, nominal 1/4 inch (6.4 mm) thick. Tiles, any expansion or control joints, and grout are installed in accordance with ANSI A108.4 when Type I organic adhesive is used, or ANSI A108.5 if dry set, acrylic-modified or latex-modified portland cement mortar is used.

### 3.5.4 Assembly 4

The nonsymmetrical loadbearing 1 hour fire-resistant rated wall assembly consists of nominal 2 x 4 wood studs at 24 inches (610 mm) on center with two top plates and a single bottom plate. Full design loads are permitted to be superimposed, provided structural consideration for axial flexural and bearing perpendicular-to-grain stresses are resolved in accordance with Part III of the *National Design Specification*, 1997 Edition, published by the American Forest & Paper Association. One layer of 5/8 inch (15.9 mm) thick Type "X" gypsum board, 48 inches (1219 mm) wide, is applied vertically to the studs and secured with minimum 1 3/4 inch (44 mm) long cup-head gypsum board nails, spaced 7 inches (178 mm) on center at board edges and intermediate framing members. The 5/8 inch (15.9 mm) thick Type "X" gypsum board joints and nail heads require treatment consisting of joint compound followed by joint tape and a second layer of joint compound. The stud cavities are either insulated or uninsulated. The opposite face of the wall is covered with one layer of 1/2 inch (12.7 mm) thick Type "X"

water-resistant core gypsum sheathing and one layer of maximum 12 inch (305 mm) wide Hardiplank® lap siding lapped a minimum of 1 1/4 inches (32 mm). The 1/2 inch (12.7 mm) thick Type "X" water-resistant core gypsum sheathing is applied vertically to framing members with vertical edges staggered 24 inches (610 mm) from the joints on the opposite side. The 1/2 inch (12.7 mm) thick Type "X" water-resistant core gypsum sheathing is fastened to the framing members with 1 3/4 inch (44 mm) long roofing nails spaced 7 inches (178 mm) on center in the field and 4 inches (102 mm) on center along the perimeter of each board. An outer layer of 5/16 inch (7.5 mm) thick, 12 inch (305 mm) wide Hardiplank® lap siding is applied over the 1/2 inch (12.7 mm) thick Type "X" water-resistant core gypsum sheathing by attaching a 1 1/2 inch (38 mm) wide Hardiplank® starter strip attached through the gypsum sheathing into the bottom plate and 12 inch (305 mm) wide Hardiplank® lap siding applied horizontally with a minimum nominal 1 1/4 inch (32 mm) headlap and fastened with a single 6d corrosion resistant common nail driven through the lapped planks at each stud.

### 3.5.5 Assembly 5

The symmetrical nonload bearing, 1 hour, fire-resistant rated wall assembly consists of minimum 3 5/8 inch (92 mm) deep, No. 20 gage (0.0359 inch, 0.91 mm), steel "C" studs at 24 inches (610 mm) on center with corresponding top and bottom tracks. Both sides of the wall are covered with one layer of 1/2 inch (12.7 mm) thick Hardirock® Max "C"™ (Type "X") gypsum board, followed by one layer of either 1/4 inch (6.4 mm) thick Titan™ (tapered-edge), Hardibacker® (square-edge), or Harditex® boards. Boards are applied either perpendicular (horizontally) or parallel (vertically) to framing members. Base layer and face layer board joints of both wall sides are offset by 24 inches (610 mm). The 1/2 inch (12.7 mm) thick Hardirock® Max "C"™ (Type "X") gypsum board is fastened to the framing members with minimum 1 inch (25.4 mm) long, Type S, gypsum board screws spaced 24 inches (610 mm) on center. Titan™, Hardibacker® or Harditex® boards are fastened through the gypsum board to the framing members with minimum 1 5/8 inch (41 mm) long by minimum 0.323 inch (8.2 mm) HD Hi-Lo® S® or S-12™ self-drilling, corrosion-resistant, ribbed buglehead or ribbed Phillips waferhead screws located a maximum of 8 inches (203 mm) on center. Board joints and fasteners require finish treatment similar to that described in Sections 3.3.1.1, 3.3.1.2, 3.3.2.2, or 3.2.4 and of this report.

### 3.5.6 Assembly 6

The symmetrical nonload bearing, 1 hour, fire-resistant rated wall assembly consists of minimum 3 5/8 inch (92 mm) deep, No. 20 gage (0.0359 inch, 0.91 mm), steel "C" studs at 24 inches (610 mm) on center with corresponding top and bottom tracks. Both sides of the wall are covered with one layer of 5/8 inch (15.9 mm) thick Titan™-FR panel. Boards are applied either perpendicular (horizontally) or parallel (vertically) to framing members. Panel joints are offset by 24 inches (610 mm). The 5/8 inch (15.9 mm) thick Titan™-FR panel is fastened to the framing members with minimum 1 inch (25.4 mm) long, Type S, gypsum board screws spaced 12 inches (305 mm) on center. Board joints and fasteners require finish treatment similar to that described in Sections 3.3.1.1 or 3.3.1.2 of this report.

## 4.0 INSTALLATION

Installation shall comply with this report and a copy of this report shall be available at all times on the jobsite during installation. Additional details are in the applicable manufacturer's product information sheets issued December 1993. Where non-editorial differences occur between the manufacturer's product information sheets and this report, this report shall be null and void.

## 5.0 IDENTIFICATION

James Hardie Building Products, Inc., Hardiflex®, Hardipanel® and Hardisoffit® boards; Harditex® baseboards; Titan™, Titan™-FR, Hardibacker®, Hardibacker 500® and Multilay® lining boards and underlayments; Compressed Sheet subflooring; pallets of Hardiplank® lap siding; Hardie® Shingleside® cladding and Shingleside® Heritage™ panels shall bear a label identifying the manufacturer's name and telephone number, the product name, and the name of the quality control agency, Intertek Testing Services, Inc. (NER-QA219), and this report number (NER-405) for field identification.

## 6.0 EVIDENCE SUBMITTED

6.1 The following test reports issued by the Building Research Association of New Zealand (BRANZ) in accordance with ASTM E72, Conducting Strength Test of Panels of Building Construction, Section 9, Transverse Load, and Section 14, Racking Load:

Report No.	Date	ASTM Standard Section
S100	June, 1984	9
S101	June, 1984	9
S102	June, 1984	9
S103	June, 1984	9
S104	June, 1984	9
S105	June, 1984	14
S106	June, 1984	14
S109	July, 1984	9
S112	August, 1984	14
S113	August, 1984	9
STR122	April, 1985	9
STR123	April, 1985	14
STR127	April, 1985	9
STR128	May, 1985	14
STR131	May, 1985	9
STR132	May, 1985	14

6.2 The following test reports issued by the Building Research Association of New Zealand (BRANZ) in accordance with the weatherability test procedures noted:

Report No.	Date	Procedure
MTR658	November, 1983	U.B.C. Standard 32-12
MTR662	November, 1983	Freeze/Thaw
MTR709	June, 1984	Percolation Test
MTR723	May, 1984	ASTM G26, D2616, FD-714
MTR778	June, 1985	NSZ3204; Wet/Dry Cycling
MTR787	June, 1985	U.B.C. Standard 47-17
T176	June, 1984	ASTM E96
T177	June, 1984	ASTM E96

6.3 Quality control procedural manual signed by James Hardie and Company (November 5, 1993), and ETL Testing Laboratories (November 8, 1993).

6.4 Manufacturer's descriptive literature

6.5 United States Testing Company, Test Report No. LA 50049-1, dated February 7, 1985, containing testing in accordance with ASTM E84, *Test of Surface Burning Characteristic of Building Materials*.

6.6 Ramtech Laboratories, Inc., Test Report No. 8047-87, dated April 6, 1987, containing testing in accordance with ASTM E72, *Conducting Strength Tests of Panels for Building Construction* — Section 9, Transverse Load; and Section 14, Racking Load.

6.7 Structural Calculations for "Determination of Wind Speed" by Ronald I. Ogawa, P.E., in accordance with Section 1205 of the 1988 Standard Building Code.

6.8 The following test reports were issued by Inspection Concepts for "Transverse Load Tests" of panels:

Report No.	Date
IC-1021-88	May, 1988
IC-1022-88	May, 1988
IC-1042-88	February, 1989
IC-1054-89	September, 1989
IC-1055-89	September, 1989
IC-1121A-91	March 20, 1991
IC-1121B-91	March 20, 1991
IC-1201-92	January 22, 1993
IC-1203-92	January 22, 1993
IC-1228-93	July 2, 1993
IC-1270-94	April 20, 1994
IC-1271-94	April 20, 1994

6.9 The following test reports were issued by Inspection Concepts for "Racking Tests" of panels:

Report No.	Date
IC-1013-88	January, 1988
IC-1014-88	January, 1988
IC-1030-88	September, 1988
IC-1032-88	September, 1988
IC-1037-88	November, 1988
IC-1038-88	November, 1988
IC-1057-89	September, 1989
IC-1062-89	November, 1989
IC-1100-90	October 30, 1990
IC-1107-91	January 5, 1991
IC-1108-91	January 6, 1991
IC-1109-91	January 8, 1991
IC-1110-91	January 8, 1991
IC-1120A-91	March 20, 1991
IC-1120B-91	March 20, 1991
IC-1120C-91	March 20, 1991
IC-1120D-91	March 20, 1991
IC-1202-92	January 22, 1993
IC-1202-92	January 22, 1993
IC-1237-93	August 5, 1993
IC-1273-94	April 20, 1994
IC-1274-94	April 29, 1994

6.10 The following test reports were issued by Inspection Concepts for "Transverse Load Tests" of planks:

Report No.	Date
IC-1020-88	May, 1988
IC-1011-88	January, 1988
IC-1034-88	October, 1988
IC-1035-88	October, 1988

6.11 The following test reports were issued by Southwest Research Institute for "1 hour Fireresistant Assemblies":

Report No.	Date
01-2602-802	March, 1989
01-2602-803	March, 1989



- 6.12** Structural calculations verifying design values for Table 2 and 3 of this report, prepared by Inspection Concepts dated March 7, 1990, signed and sealed by Ronald I. Ogawa, P.E.
- 6.13** Inspection Concepts, Test Report No. IC-1093A-90, dated October 18, 1990, in accordance with ASTM E136.
- 6.14** Smith-Emery Company, Test Report No. L-87-1732, dated October 8, 1987, in accordance with ANSI A118.9.
- 6.15** United States Testing Company, Inc., Test Report No. 176842, dated September 14, 1990, in accordance with ASTM D1037.
- 6.16** Truesdail Laboratories, Inc., Test Report No. 30240-1, dated March 1, 1989, revised March 28, 1991, in accordance with ASTM G21.
- 6.17** Truesdail Laboratories, Inc., Test Report No. 30240-2, dated March 1, 1989, revised March 28, 1991, in accordance with ASTM G22.
- 6.18** Inspection Concepts, Report No. IC-1131-91, dated May 8, 1991, in accordance with ASTM C947, C666 Procedure B, and ANSI-136-1.
- 6.19** ETL Testing Laboratories, Report No. 497742, dated March 5, 1990, in accordance with ASTM E84.
- 6.20** Inspection Concepts, Report No. IC-1039-89, dated January 6, 1989, revised May 11, 1990, containing comparative fastener pullout and pull-through testing results.
- 6.21** James Hardie Building Products, Inc. product information sheets issued October 1991.
- 6.22** Structural calculations verifying design values for Table 2 and 3 of this report, prepared by Inspection Concepts dated October 20, 1993, signed by Ronald I. Ogawa, P.E.
- 6.23** Letter correcting structural calculations for BRANZ Reports S106 and STR128 prepared by Inspection Concepts dated February 14, 1993, signed and sealed by Ronald I. Ogawa, P.E.
- 6.24** Letter reviewing "Racking Tests" and "Transverse Load Tests" for Group III wood species verification for Table 2 and 3 of this report, prepared by Inspection Concepts dated October 14, 1993, signed and sealed by Ronald I. Ogawa, P.E.
- 6.25** The following test reports were issued by Omega Point Laboratories for "1 hour Fireresistant Assemblies":

Report No.	Date
11710-92783	February 13, 1992
11710-92851	September 9, 1992
11710-98414	May 1, 1995
11710-105198	August 2, 1999
11710-105199	August 3, 1999

- 6.26** Ramtech Laboratories, Inc., Test Report No. 8108A-87, dated May 20, 1987, in accordance with ASTM C725 for flexural strength tests conducted on 1/2 inch and 3/4 inch thick compressed sheet panels.
- 6.27** Ramtech Laboratories, Inc., Test Report No. 8108B-87, dated May 26, 1987, in accordance with ASTM E72, Section 18, concentrated load on 1/2 inch and 3/4 inch thick compressed sheet panels.
- 6.28** Ramtech Laboratories, Inc., Test Report No. 8108C-87, dated June 24, 1987, in accordance with ASTM E72, Section 9, transverse load on 1/2 inch and 3/4 inch thick compressed sheet panels.
- 6.29** Inspection Concepts, Test Report No. IC-1257-94, dated January 13, 1994, in accordance with ASTM E331 for water penetration of 1/4 inch thick Hardipanel® vertical siding.
- 6.30** Inspection Concepts, Test Report No. IC-1243-93, dated August 26, 1993, in accordance with ASTM E228 for linear-thermal expansion of 1/4 inch thick James Hardie fiber cement products.
- 6.31** Ramtech Laboratories, Inc., Laboratory No. 9778-93, IC-1225-93, dated June 4, 1993. The Hardibacker board was tested in accordance with ASTM C177 *Test for Steady-State Thermal Transmission Properties by Means of the Guarded Hot Plate*. The results are listed in Table 4 of this report.
- 6.32** Ramtech Laboratories, Inc., Test Report No. IC-1230-93, Laboratory No. 9778-93, dated June 1993. The Hardibacker® board materials were tested in accordance with ASTM E96-90 to determine the water vapor transmission properties. The average permance (perms) of the panels are shown in Table 5 of this report.
- 6.33** Ramtech Laboratories, Inc. Laboratory No. 10367A-95/1363, dated September 18, 1995. The 7 1/2 inch and 9 1/2 inch wide Hardiplank® lap sidings were tested in accordance with ASTM E330 Transverse Load Test. The panels were installed on nominal 2 x 4 wood structural members spaced 16 inches on center (o.c.).
- 6.34** Structural Calculations verifying design values for Table 3 of this report, prepared by Inspection Concepts dated October 6, 1995, signed by Ronald I. Ogawa, P.E.
- 6.35** Wind analysis and calculations for Hardishingle and Hardislate roofing and Hardie® Shingleside® cladding installed with 8, 7, and 6 inch weather exposures. Analysis and calculations conducted by Ronald I. Ogawa, P.E. dated March 28, 1997; March 31, 1997; and April 2, 1997.
- 6.36** Structural calculations to determine design wind load on 8.25 Hardiplank®, dated October 24, 1996, signed and sealed by Ronald I. Ogawa, P.E. of Inspection Concepts Inc..
- 6.37** Structural calculations to determine design values for Table 2a, 2b, and 3 of this report, prepared by Inspection Concepts dated July 16, 1997, July 19, 1997, and August 19, 1997, signed and sealed by Ronald I. Ogawa, P.E.
- 6.38** Ramtech Laboratories, Inc., Report Lab. No. 10868-97/1475, dated June 26, 1997. The report contains results of testing in accordance with ASTM E72 and ASTM E330 on 5/16 inch thick Hardipanel.
- 6.39** Ramtech Laboratories, Inc., Report Lab. No. 10869-97/1482, dated July 14, 1997 containing results of transverse load testing in accordance with ASTM E72 on 9 1/2 inch wide Hardiplank® lap siding.
- 6.40** Applied Research Laboratories, Lab No. 29278-UD1, dated September 1, 1994, containing reports of tensile pull-out testing of fasteners.
- 6.41** Structural calculations to determine the allowable fastener spacing based on a wind speed of 110 mph, Exposure Category C, prepared by Inspection Concepts, dated November 2, 1994, signed and sealed by Ronald I. Ogawa, P.E.

- 6.42** Ramtech Laboratories, Inc., Laboratory Number 10794-97/1458, dated March 13, 1997, containing results of an Uplift Resistance Test of 18 inch long by 12 inch wide by 1/4 inch thick Hardishingle™ roofing installed on 15/32 inch thick, 4 ply, 3 layer CDX plywood.
- 6.43** Ramtech Laboratories, Inc., Laboratory Number 10794-97/1460, dated March 13, 1997, containing results of an Uplift Resistance Test of 18 inch long by 12 inch wide by 1/4 inch thick Hardie® Shingleside® as siding roofing installed on 7/16 inch thick Oriented Strand Board utilizing 2 siding nails per 12 inch wide panel.
- 6.44** Ramtech Laboratories, Inc., Laboratory Number 10794-97/1464, dated March 13, 1997, containing results of an Uplift Resistance Test of 18 inch long by 12 inch wide by 1/4 inch thick Hardie® Shingleside® as siding roofing installed on 7/16 inch thick Oriented Strand Board utilizing 3 siding nails per 12 inch wide panel.
- 6.45** Ramtech Laboratories, Inc., Laboratory Number 11149-98/1554, dated October 7, 1998, containing results of an ASTM E330 Transverse Load Test of 6 1/4 inch wide Hardiplank® siding installed on 20 ga. metal framing members spaced at 16 inch and 24 inch centers and fastened with ET & F pin fasteners through the lap to each stud.
- 6.46** Ramtech Laboratories, Inc., Laboratory Number 11149-98/1554A, dated October 7, 1998, containing results of an ASTM E330 Transverse Load Test of 12 inch wide Hardiplank® siding installed on 20 ga. metal framing members spaced at 16 inch and 24 inch centers and fastened with ET & F pin fasteners through the lap to each stud.
- 6.47** Ramtech Laboratories, Inc., Laboratory Number 11149-98/1554B, dated October 7, 1998, containing results of an ASTM E330 Transverse Load Test of 8 1/4 inch wide Hardiplank® siding installed on 20 ga. metal framing members spaced at 16 inch and 24 inch centers and fastened with ET & F pin fasteners blind nailed to each stud.
- 6.48** Ramtech Laboratories, Inc., Laboratory Number 11284-99/1580, dated April 15, 1999, containing results of an ASTM E72 Racking Shear Test of 5/16 inch thick x 48 inch wide x 96 inch long Hardipanel® siding installed on 20 ga. metal framing members spaced at 16 inch and 24 inch centers and fastened with ET & F pin fasteners spaced at 4 inches o.c. perimeter and 8 inches o.c. intermediate framing members.
- 6.49** Ramtech Laboratories, Inc., Laboratory Number 11149-98/1554D, dated September 14, 1998, containing results of an ASTM E330 Transverse Load Test of 5/16 inch thick x 48 inch wide x 96 inch long Hardipanel® siding installed on 20 ga. metal framing members spaced at 16 inch and 24 inch centers and fastened with ET & F pin fasteners spaced at 4 inches o.c. perimeter and 8 inches o.c. intermediate framing members.
- 6.50** Wind analysis and calculations for Hardipanel® panels for exposure categories B, C, and D. Analysis and calculations signed and sealed by Ronald I. Ogawa, P.E., dated March 26, 2000.
- 6.51** Ramtech Laboratories, Inc., Laboratory Number 11552/1636, dated April 20, 2000, containing results of an ASTM E330 Uplift Resistance Test of 1/4 inch thick x 24 inch wide vented Hardisoffit® panel installed on nominal 2 x 4 framing members spaced at 24 inch centers and fastened with 1 1/2 inch long x 0.083 inch shank x 0.187 inch HD nails spaced at 8 inches o.c. perimeter and intermediate framing members.
- 6.52** Wind analysis and calculations for 24 inch wide vented Hardisoffit® panel for exposure categories B, C, and D. Analysis and calculations signed and sealed by Ronald I. Ogawa, P.E., dated May 4, 2000.
- 6.53** Ramtech Laboratories, Inc., Laboratory Number 11436-99/1602, dated October 29, 1999, containing results of an ASTM E330 Transverse Load Test of 1/4 inch thick x 19 inch long x 48 inch wide Heritage™ (half round) panel siding installed on 7/16 inch thick APA rated Oriented Strand Board sheathing only with 1 1/2 inch long x 0.083 inch shank x 0.187 inch HD nails spaced at 13 3/4 inch o.c.
- 6.54** Ramtech Laboratories, Inc., Laboratory Number 11436-99/1603, dated October 27, 1999, containing results of an ASTM E330 Transverse Load Test of 1/4 inch thick x 19 inch long x 48 inch wide Heritage™ (half round) panel siding installed on nominal 2 x 4 framing members spaced at 16 inch centers and fastened with 1 1/2 inch long x 0.083 inch shank x 0.187 inch HD nails to each framing member.
- 6.55** Ramtech Laboratories, Inc., Laboratory Number 11436-99/1604, dated October 28, 1999, containing results of an ASTM E330 Transverse Load Test of 1/4 inch thick x 19 inch long x 48 inch wide Heritage™ (half round) panel siding installed on nominal 2 x 4 framing members spaced at 24 inch centers and fastened with 1 1/2 inch long x 0.083 inch shank x 0.187 inch HD nails to each framing member.
- 6.56** Letter justifying horizontal application of panels in accordance with Table 3 of this report, based on Table 23-II-I-1 of the 1997 *Uniform Building Code* and similar tables in the *BOCA National Building Code/1999* and *1999 Standard Building Code*, prepared by Inspection Concepts Inc., dated October 20, 1999, and signed and sealed by Ronald I. Ogawa, P.E.
- 6.57** Wind analysis and calculations for Hardiplank® lap siding installed with ET & F pin fasteners for exposure categories B, C, and D. Analysis and calculations signed and sealed by Ronald I. Ogawa, P.E., dated December 14, 1998.
- 6.58** Wind analysis and calculations for Hardiplank® lap siding based on various test reports of installations with nail and screw fasteners. Analysis and calculations signed and sealed by Ronald I. Ogawa, P.E., dated July 7, 1998.
- 6.59** Underwriters Laboratories Inc. letter, dated May 29, 1997, recognizing James Hardie Gypsum's 1/2 inch thick Hardirock® Max "C"™ gypsum board as an alternative to Super Fire X gypsum board.
- 6.60** Underwriters Laboratories Inc. letter, dated February 23, 2000, recognizing James Hardie® Gypsum's 1/2 inch thick Hardirock® Max "C"™ gypsum board as an alternative to Super Fire X gypsum board.
- 6.61** Underwriters Laboratories, Inc., File R8701, Project 96NK16606, dated December 19, 1996, containing results of ANSI/UL 263 (ASTM E119, NFPA 251), *Fire Tests of Building Construction and Materials*, for 1/2 inch thick x 8 feet long x 4 feet wide gypsum board installed on steel columns of 25 MSG steel studs spaced at 12 inch centers and fastened with 3 inch long Type S self-drilling, self-tapping board screws spaced at 12 inch centers in a UL G512 assembly.

- 6.62** Underwriters Laboratories, Inc., File R8701, Project 96NK35820, dated July 23, 1997, containing results of ANSI/UL 263 (ASTM E119, NFPA 251), *Fire Tests of Building Construction and Materials*, for 5/8 inch thick x 144 inch long x 48 inch wide gypsum board installed in a UL X515 floor-ceiling assembly.
- 6.63** Wind analysis and calculations for Shingleside® Heritage™ panels for exposure categories B, C, and D. Analysis and calculations signed and sealed by Ronald I. Ogawa, P.E., dated December 3, 1999.
- 6.64** Ramtech Laboratories, Inc., Laboratory Number 11436-99/1612, dated December 20, 1999, containing results of an ASTM E72 Racking Shear Test of 5/16 inch thick x 48 inch wide x 96 inch long Hardipanel® Shiplap siding installed on nominal 2 x 4 wood framing members spaced at 16 inch centers and fastened with 0.092 inch shank by 0.225 inch HD by 2 inch long nails spaced at 3 inches o.c. perimeter and 8 inches o.c. intermediate framing members.
- 6.65** Ramtech Laboratories, Inc., Laboratory Number 11436-99/1616, dated December 27, 1999, containing results of an ASTM E72 Racking Shear Test of 5/16 inch thick x 48 inch wide x 96 inch long Hardipanel® Shiplap siding installed on nominal 2 x 4 wood framing members spaced at 16 inch centers and fastened with 0.092 inch shank by 0.225 inch HD by 2 inch long nails spaced at 8 inches o.c. perimeter and 8 inches o.c. intermediate framing members.
- 6.66** Wind analysis and calculations of Ramtech Laboratories, Inc., Test Reports Laboratory Number 11436-99/1612 and 11436/1616, prepared by Inspection Concepts dated January 14, 2000, signed and sealed by Ronald I. Ogawa, P.E.
- 6.67** Wind analysis and calculations for Hardipanel® installed on steel studs spaced 16 and 24 inches o.c. Analysis and calculations signed and sealed by Ronald I. Ogawa, P.E., dated June 15, 1999.
- 6.68** Ramtech Laboratories, Inc., Laboratory Number 11436-99/1619, dated January 19, 2000, containing results of a Uniform Negative Transverse Load Test of 5/16 inch thick x 48 inch wide x 96 inch long Hardipanel® Shiplap Panel installed on nominal 2 x 4 wood framing members spaced at 16 inch centers and fastened with 0.092 inch shank by 0.225 inch HD by 2 inch long ring shank nails spaced at 3 inches and 8 inches o.c. perimeter and 8 inches o.c. field.
- 6.69** Wind analysis and calculations of Ramtech Laboratories, Inc., Test Report Laboratory Number 11436-99/1619, prepared by Inspection Concepts dated February 4, 2000, signed and sealed by Ronald I. Ogawa, P.E.
- 6.70** Ramtech Laboratories, Inc., Laboratory Number 11443/1613, dated February 10, 2000, containing results of testing, in accordance with ASTM C36, of 5/8 inch thick x 48 inch wide x 120 inch long Titan™-FR panel consisting of 1/2 inch thick Hardirock® Max "C"™ gypsum board and 3/32 inch thick Hardie® fiber-cement board adhered with PVA adhesive.
- 6.71** Ramtech Laboratories, Inc., Laboratory Number 11443/1613, dated March 25, 2000, revision to report to additionally show compliance with ASTM C1278.
- 6.72** Ramtech Laboratories, Inc., Laboratory Number 11443/1629, dated March 22, 2000, containing testing of Hardibacker 500® in accordance with ASTM C1288, *Standard Specification for Discrete Non-Asbestos Fiber-Cement Interior Substrate Sheets*.
- 6.73** Omega Point Laboratories, Report Number 11710-106315, dated March 7, 2000, containing results of surface burning characteristic testing, indicating compliance with ASTM E84 for the Hardibacker 500® backerboard.
- 6.74** Ramtech Laboratories, Inc., Laboratory Number 11569/1647, dated June 2, 2000, containing results of water tightness testing performed in accordance with ASTM C1185 on Hardibacker 500®.
- 6.75** Ramtech Laboratories, Inc., Laboratory Number 11569B/1655, dated June 27, 2000, containing results of falling ball impact testing performed in accordance with ASTM D1037 on Hardibacker 500®.
- 6.76** Ramtech Laboratories, Inc. Laboratory Number 11569A/1654, dated July 10, 2000, containing results of flexural strength testing performed in accordance with ASTM C947, freeze thaw testing performed in accordance with ASTM C666, and bacteria resistance testing performed in accordance with ASTM G22 on the Hardibacker 500®.

## 7.0 CONDITIONS OF USE

The National Evaluation Service finds that the James Hardie Building Products described in this report comply with, or are an alternative to materials noted in the *BOCA National Building Code/1999*, the *1999 Standard Building Code*, the *1997 Uniform Building Code*, and subject to the following conditions:

- 7.1** Products shall be installed in accordance with this report.
- 7.2** Hardiplank® lap, Hardie® Shingleside® cladding, and Shingleside® Heritage™ panel sidings shall be installed on exterior walls braced in accordance with the applicable building code:
- Section 2305.7 of the *BOCA National Building Code/1999*.
  - Section 2308.2 of the *1999 Standard Building Code*.
  - Section 2320.11.3 and 2320.11.4 of the *1997 Uniform Building Code*.
- 7.3** Maximum wind pressures and allowable loads for panel shear walls shall comply with Table 2a and 3 of this report, respectively.
- 7.4** In jurisdictions adopting the Uniform Building Code and the Standard Building Code, Harditex® baseboard is acceptable for use as water repellent panel sheathing. The weather-resistance performance of joints and terminations has not been evaluated.
- 7.5** Compressed sheet of equivalent thickness to Species Group 1 plywood is an acceptable alternative to plywood subflooring specified in:
- Section 2307.3.3 of the *BOCA National Building Code/1999*, Table 2307.3.3.
  - Section 2307.6 of the *1999 Standard Building Code*, Table 2307.6C.
  - Section 2320.9.2 and Table 23-II-F-1 of the *1997 Uniform Building Code*.
- 7.6** Use of compressed sheet subfloor as a component of a floor diaphragm is outside the scope of this report.

**7.7** 5/8 inch (15.9 mm) thick Titan™-FR panel is recognized as an alternative to 5/8 inch (15.9 mm) thick ASTM C36, Type "X", gypsum board, or 5/8 inch thick ASTM C1278, Type "X" gypsum fiber panel for use in fire-resistive construction recognized in the above referenced codes.

**7.8** The exterior siding panels installed on exterior walls shall be installed over a water-resistive barrier in accordance with the applicable code.

**7.9** Flashing shall be installed at all penetrations and terminations in accordance with the applicable code.

**7.10** The products shall be manufactured at the following locations with quality control inspections by Intertek Testing Services, Inc. (NER-QA219):

- Fontana, California
- Cleburne, Texas

- Plant City, Florida
- Tacoma, Washington
- Rose Hill, NSW, Australia
- Carole Park, Queensland, Australia
- Brooklyn, VIC, Australia
- Welshpool, WA, Australia
- Penrose, Auckland, New Zealand

**7.11** This report is subject to re-examination on a periodic basis. For information on the current status of this report consult the NES product evaluation listing or contact the NES.

**Table 1  
STANDARD NOMINAL PLANK & PANEL DIMENSIONS**

<b>Product Type</b>	<b>Width</b>	<b>Length</b>	<b>Thicknesses (Inches)</b>
Hardiplank	4, 5-1/4, 6, 6-1/4, 7-1/4, 7-1/2, 8, 8-1/4, 9-1/4, 9-1/2 11-1/4 & 12 inches	12, 14 feet	5/16
Hardisoffit (unvented)	4, 6, 12, 16, 24 & 48 inches	8 & 12 feet	3/16 & 1/4
Hardisoffit (vented)	4, 6, 12, 16 & 24 inches	12 feet	1/4
Hardiflex	48 inches	8, 9 & 10 feet	3/16, 1/4, 5/16 & 3/8
Hardipanel	48 inches	8, 9 & 10 feet	1/4 & 5/16
Harditex	48 inches	8, 9 & 10 feet	1/4, 5/16, 3/8 & 7/16
Hardipanel Shiplap	48-3/4 inches	8, 9 & 10 feet	5/16
Hardibacker (square edge)	36 & 48 inches	4, 5, 8 feet	1/4 & 7/16
Hardibacker 500 (square edge)	48 inches	8, 9, 10 feet	13/32
Titan (tapered edge)	48 inches	8, 9 & 10 feet	1/4 & 7/16
Hardibacker (Multilay)	48 inches	4 & 8 feet	1/4 & 5/16
Titan-FR	48 inches	8, 9 & 10 feet	5/8
Hardie® Shingleside® cladding	6, 8, & 12 inches	18 inches	1/4
Shingleside® Heritage panel (square & staggered edge)	48 inches	16 inches	1/4
Shingleside® Heritage panel (half round)	48 inches	19 inches	1/4
Compressed Sheet	48 inches	8, 9, 10 feet	1/2, 5/8 & 3/4

**Notes to Table 1:**

1. Plank and panel products are also available in other lengths, widths, and thicknesses by special arrangement.
2. 1 inch = 25.4 mm, 1 ft = 304.8 mm

Table 2a — MAXIMUM WIND SPEED

Product Type	Product Thick. (in.)	Fastener Type	Fastener Spacing (in.)	Frame Type <sup>1</sup>	Stud Spacing (in.)	Height of Bldg (ft)	Maximum Basic Wind Speed (Mph) for Exposure Category									
							Uniform Building Code			Standard Building Code			BOCA National Building Code			
							B	C	D	< 60 ft	C	D	B	C	D	
Hardiflex Hardisoffit (unvented)	3/16	4d common 1-1/2 in. long	6	2 x 4 wood	16	20	90	70	-	90	70	-	90	70	-	
						40	80		80			80				
						60	70		70			70				
						100	70				70					
Hardipanel Hardiflex Harditex Hardisoffit (unvented)	1/4	4d common 1-1/2 in. long	8	2 x 4 wood	16	20	90		-	90		-	90		-	
					24	40	80		80			80				
						60	70		70			70				
						20	70				70					
Hardisoffit (vented)	1/4	0.083" shank x 0.187" HD ringshank nail at 8" o.c. at all bearing	-	2 x 4 SG = 0.40	22.5 max	0-15	150	140	120	150			150	140	110	
						20	150	130	120	140			150	130	110	
						40	150	130	110	130			150	120	100	
						60	150	120	110	120			150	110	100	
						100	140	105	100		105	90	130	105	90	
Hardipanel Hardiflex Harditex	1/4	6d common 2 in. long	6	2 x 4 wood	16	20	120	100	-	120	120	-	120	100	-	
						40	120	95		120	110		120	90		
						60	110	90		120	110		120	90		
						100	100	85		70	70		95	70		
						200	90	80		70	70		80	70		
Hardipanel Hardiflex Harditex	1/4	No. 11 ga. 1-1/4 in. long galvanized roofing nail	6	2 x 4 wood	16	20	110	80	-	110	80	-	110	80	-	
					24	40	105	80		105	80		105	80		
						100	90	70		70	70		90	70		
						150	80	70		70	70		80	70		
						200	80			70	70		80			
Hardipanel Hardiflex Harditex	1/4	No. 11 ga. 1-1/4 in. long galvanized roofing nail	4 edge 12 field	2 x 4 wood	16	20	120	90	-	120	90	-	120	90	-	
						40	120	90		120	90		120	90		
						60			110			80		100	80	
						100	100	80		80		100	80			
						200	90	70		70		90	70			
Hardipanel Hardiflex Harditex	5/16	0.091 in. shank, 0.225 in. HD, 1.5 in. long ring shank nail	4 edge 8 field	2 x 4 wood <sup>2</sup>	16	0-15	110	100	-	100	80	-	115	85	-	
						20	110	95		95	75		110	80		
						40	95	85		85	70		95	75		
						60	90	80		80			85	70		
						100	80			70			70	70		
Hardipanel Hardiflex Harditex	5/16	4d common 1-1/2 in. long	8	2 x 4 wood	16	40	110	80	-	110	80	-	110	80	-	
					24	100	90	70		70		90	70			
						150	80			80		80				
						200	70			70		70				
						20	90			90		80		70		
Hardipanel Hardiflex Harditex	5/16	6d common 2 in. long	6	2 x 4 wood	16	20	120	110	-	120	120	-	120	100	-	
						40	120	100		120	120		120	90		
						60	110	95		120	100		120	80		
						100	100	90		90		95	70			
						200	90	80		80		80	70			
Hardipanel Hardiflex Harditex	5/16	6d common 2 in. long	6	2 x 4 wood	24	20	110	80	-	120	110	-	120	80	-	
						40	100	80		105	90		105	80		
						60	90	70		95	90		95	70		
						100	80	70		70		80	70			
						200	70			70		70	70			
Hardipanel Hardiflex Harditex	5/16	6d common 2 in. long	4	2 x 4 wood	16	20	120	120	-	120	120	-	120	100	-	
						40	120	120		120	120		120	100		
						60	120	120		120	110		120	90		
						100	120	110		80		120	80			
						200	120	100		70		105	70			

Table 2a — MAXIMUM WIND SPEED

Product Type	Product Thick. (in.)	Fastener Type	Fastener Spacing (in.)	Frame Type <sup>1</sup>	Stud Spacing (in.)	Height of Bldg (ft)	Maximum Basic Wind Speed (Mph) for Exposure Category								
							Uniform Building Code			Standard Building Code			BOCA National Building Code		
							B	C	D	< 60 ft	C	D	B	C	D
Hardipanel Hardiflex Harditex	5/16	6d common 2 in. long	4	2 x 4 wood	24	20	120	105	-	120	120	-	120	105	-
						40	120	100	120	110	-	120	95	-	
						60	110	90	120	110	-	120	90	-	
						100	100	85	-	80	-	100	80	-	
						200	90	80	-	70	-	80	70	-	
Hardipanel Hardiflex Harditex	5/16	6d common 2 in. long	6 edge 12 field	2 x 4 wood	16	40	120	90	-	120	90	-	120	90	-
						60	-	110	-	-	-	-	-	-	
						100	100	80	-	80	-	100	80	-	
						200	90	70	-	70	-	90	70	-	
						-	-	-	-	-	-	-	-	-	
Hardipanel Shi lap Panel	5/16	0.092" shank x 2" x 0.225" HD ringshank nail	3 edge 8 field	2 x 4 SG = 0.40	16	0-15	140	110	95	125	-	-	150	110	90
						20	130	105	95	120	-	-	150	105	85
						40	120	95	90	110	-	-	130	95	80
						60	115	90	85	100	-	-	120	90	75
						100	105	85	80	-	80	-	95	80	-
Hardipanel Shi lap Panel	5/16	0.092" shank x 2" x 0.225" HD ringshank nail	4 edge 8 field	2 x 4 SG = 0.40	16	0-15	130	100	90	120	-	-	150	105	85
						20	130	100	90	115	-	-	140	100	80
						40	115	95	85	100	-	-	125	90	75
						60	110	90	80	95	-	-	115	85	75
						100	100	80	75	-	75	-	90	75	-
Hardipanel Shi lap Panel	5/16	0.092" shank x 2" x 0.225" HD ringshank nail	5 edge 8 field	2 x 4 SG = 0.40	16	0-15	130	95	85	115	-	-	140	90	80
						20	120	95	80	110	-	-	140	90	80
						40	110	85	80	95	-	-	120	85	75
						60	100	80	75	90	-	-	110	80	-
						100	90	80	70	-	-	90	75	-	
Hardipanel Shi lap Panel	5/16	0.092" shank x 2" x 0.225" HD ringshank nail	6 edge 8 field	2 x 4 SG = 0.40	16	0-15	120	90	80	105	-	-	140	95	75
						20	115	90	80	100	-	-	130	90	70
						40	110	85	75	90	-	-	110	80	70
						60	100	80	75	85	-	-	100	75	-
						100	95	75	-	-	-	-	80	-	-
Hardipanel Shi lap Panel	5/16	0.092" shank x 2" x 0.225" HD ringshank nail	7 edge 8 field	2 x 4 SG = 0.40	16	0-15	110	85	75	100	-	-	130	90	70
						20	110	80	70	95	-	-	120	85	70
						40	100	80	70	85	-	-	100	80	-
						60	90	75	-	80	-	-	90	70	-
						100	85	70	-	-	-	-	75	-	-
Hardipanel Shi lap Panel	5/16	0.092" shank x 2" x 0.225" HD ringshank nail	8 edge 8 field	2 x 4 SG = 0.40	16	0-15	105	80	70	90	-	-	120	80	70
						20	100	80	70	90	-	-	110	80	-
						40	90	70	-	80	-	-	95	70	-
						60	85	70	-	75	-	-	90	-	-
						100	80	-	-	-	-	-	75	-	-
Hardiflex Harditex	7/16	No. 11 ga 1-3/4 in. long galvanized roofing nail	6	2 x 4 wood	16	20	120	120	-	120	120	-	120	120	-
						40	120	110	-	120	110	-	120	110	-
						60	120	110	-	120	100	-	120	100	-
						100	110	110	-	90	90	-	110	90	-
						200	110	100	-	80	80	-	100	80	-
Heritage Panel Straight Installation	1/4	0.083" shank x0.187" HD ringshank nail into OSB only	13.75			0-15	100	70	-	80	-	-	110	70	-
						20	90	70	-	80	-	-	105	70	-
						40	85	70	-	70	-	-	90	70	-
						60	80	-	-	70	-	-	80	-	-
						100	70	-	-	70	-	-	70	-	-
Heritage Panel Staggered Installation	1/4	0.083" shank x0.187" HD ringshank nail into OSB only	13.75			0-15	90	70	-	80	-	-	90	70	-
						20	90	70	-	80	-	-	90	-	-
						40	80	-	-	70	-	-	80	-	-
						60	70	-	-	-	-	-	70	-	-
						100	-	-	-	-	-	-	-	-	-
Heritage Panel	1/4	0.083" shank x 0.187" HD ringshank nail at each stud		2 x 4 SG = 0.40	16	0-15	150	120	110	150	-	-	150	120	100
						20	150	120	100	150	-	-	150	120	100
						40	140	110	100	130	-	-	150	110	90
						60	130	105	95	120	-	-	140	100	90
						100	120	100	90	-	90	80	110	90	80

**Table 2a — MAXIMUM WIND SPEED**

Product Type	Product Thick. (in.)	Fastener Type	Fastener Spacing (in.)	Frame Type <sup>1</sup>	Stud Spacing (in.)	Height of Bldg (ft)	Maximum Basic Wind Speed (Mph) for Exposure Category								
							Uniform Building Code			Standard Building Code			BOCA National Building Code		
							B	C	D	< 60 ft	C	D	B	C	D
Heritage Panel	1/4	0.083" shank x 0.187" HD ringshank nail at each stud	-	2 x 4 SG = 0.40	24	0-15	115	90	80	100			130	90	70
						20	110	85	70	100			120	85	70
						40	105	80	70	90			110	80	-
						60	90	75	-	85			100	75	-
						100	85	70	-	-			80	-	-
Hardiflex Hardisoffitt (unvented)	3/16	Min. No. 8-18, 1 in. long x 0.323 in. HD Hi-Lo® S® or S-12™ ribbed buglehead screws	6	Min. No. 20 ga. x 3-5/8 in. x 1-3/8 in. metal C-stud	16	20	80	70	-	80	70	-	80	70	-
						40	80			80			80		
						60	70			70			70		
						100	70						70		
Hardipanel Hardiflex Harditex	1/4	Min. No. 8-18, 1 in. long x 0.323 in. HD Hi-Lo® S® or S-12™ ribbed buglehead screws	6	Min. No. 20 ga. x 3-5/8 in. x 1-3/8 in. metal C-stud	16	20	120	90	N/A	120	90	N/A	120	90	N/A
						40	110	90		110	90		110	90	
						60	100	80		100	80		100	80	
					24	100	90	80			80		90	80	
						150	90	70			70		90	70	
						200	80	70		90	70		80	70	
						20	90	70		80	70		90	70	
Hardipanel	5/16	ET & F 0.100 x 1.5" x 25" HD ES 4144	4 edge 8 field	Min. No. 20 ga. x 3.62" x 1.375" Metal C-stud	16	0-15	150	115	100	130			150	120	100
						20	140	110	100	130			150	110	90
						40	130	105	90	120			140	100	90
						60	120	100	90	110			130	100	80
						100	110	95	85		75	-	105	85	70
Hardipanel	5/16	ET & F 0.100 x 1.5" x 25" HD ES 4144	4 edge 8 field	Min. No. 20 ga. x 3.62" x 1.375" Metal C-stud	24	0-15	120	90	80	105			135	90	75
						20	110	85	75	100			130	90	70
						40	100	80	70	90			110	80	70
						60	95	75	70	85			100	75	70
						100	85	70	-		-	-	80	-	-
Hardiflex Harditex	7/16	Min. No. 8-18, 1 in. long x 0.311 in. HD Hi-Lo® S® or S-12™ ribbed buglehead screws	6	Min. No. 20 ga. x 3-5/8 in. x 1-3/8 in. metal C-stud	16	20	120	120	-	120	120	-	120	120	-
						40	120	120		120	120		120	120	
						60	120	110		120	120		120	110	
						100	120	110		90	90		120	90	
						200	110	110		80	80		100	80	

**Notes to Table 2a:**

1. Values are for species of wood having a specific gravity of 0.42 or greater, unless otherwise noted.
2. Values are for species of wood having a specific gravity of 0.36 or greater.

Table 2b — MAXIMUM WIND SPEED

Product Type	Product (in.)		Fastener Type	Fastener Spacing (in.)	Frame Type <sup>1</sup>	Stud Spacing (in.)	Height of Bldg (ft)	Maximum Basic Wind Speed (Mph) for Exposure Category								
	Thick.	Width						Uniform Building Code			Standard Building Code			BOCA National Building Code		
								B	C	D	< 60 ft	C	D	B	C	D
Hardiplank	5/16	4.00	ET & F pin 0.100 x 1.5" x 0.25" HD	Through Overlap	Min. No. 20 ga. x 3.62" x 1.375" Metal C-stud	16	0-15 20 40 60 100	150	150	150	150			150	150	150
								150	150	150	150			150	150	150
								150	150	150	150			150	150	150
								150	150	150	150	140	120	150	140	120
								150	150	150	150			150	140	120
Hardiplank	5/16	6.00	ET & F pin 0.100 x 1.5" x 0.25" HD	Through Overlap	Min. No. 20 ga. x 3.62" x 1.375" Metal C-stud	16	0-15 20 40 60 100	150	150	140	150			150	150	130
								150	150	140	150			150	150	130
								150	140	130	150			150	140	120
								150	130	120	150	110	100	150	130	110
								150	130	120			140	110	100	
Hardiplank	5/16	6.25	ET & F pin 0.100 x 1.5" x 0.25" HD	Through Overlap	Min. No. 20 ga. x 3.62" x 1.375" Metal C-stud	16	0-15 20 40 60 100	150	150	140	150			150	150	130
								150	150	130	150			150	150	120
								150	140	130	150			150	140	120
								150	140	120	150	110	100	150	130	110
								150	130	120			130	110	100	
Hardiplank	5/16	7.50	ET & F pin 0.100 x 1.5" x 0.25" HD	Through Overlap	Min. No. 20 ga. x 3.62" x 1.375" Metal C-stud	16	0-15 20 40 60 100	150	140	120	150			150	140	110
								150	130	120	150			150	130	110
								150	120	110	130			150	120	105
								140	120	110	130	100	80	150	110	110
								130	110	100			120	100	80	
Hardiplank	5/16	8.00	ET & F pin 0.100 x 1.5" x 0.25" HD	Through Overlap	Min. No. 20 ga. x 3.62" x 1.375" Metal C-stud	16	0-15 20 40 60 100	150	130	110	150			150	130	110
								150	130	110	150			150	130	110
								150	120	110	130			150	120	100
								130	110	105	12	95	90	150	110	90
								130	110	100			120	95	85	
Hardiplank	5/16	8.25	ET & F pin 0.100 x 1.5" x 0.25" HD	Through Overlap	Min. No. 20 ga. x 3.62" x 1.375" Metal C-stud	16	0-15 20 40 60 100	150	130	110	150			150	130	110
								150	130	110	140			150	130	100
								140	110	100	130			150	115	100
								130	110	100	120	90	80	140	110	90
								120	105	100			120	90	80	
Hardiplank	5/16	9.50	ET & F pin 0.100 x 1.5" x 0.25" HD	Through Overlap	Min. No. 20 ga. x 3.62" x 1.375" Metal C-stud	16	0-15 20 40 60 100	150	120	105	140			150	120	100
								150	120	100	130			150	120	100
								140	110	100	120			140	110	90
								120	105	90	110	80	75	130	100	90
								120	100	90			110	80	75	
Hardiplank	5/16	12.00	ET & F pin 0.100 x 1.5" x 0.25" HD	Through Overlap	Min. No. 20 ga. x 3.62" x 1.375" Metal C-stud	16	0-15 20 40 60 100	140	110	90	120			150	110	90
								140	105	90	120			150	110	90
								120	100	90	110			130	100	80
								110	95	85	100	75	70	120	90	80
								105	90	80			100	75	70	
Hardiplank	5/16	4.00	ET & F pin 0.100 x 1.5" x 0.25" HD	Through Overlap	Min. No. 20 ga. x 3.62" x 1.375" Metal C-stud	24	0-15 20 40 60 100	150	140	130	150			150	150	120
								150	140	125	150			150	140	120
								150	130	120	150			150	135	110
								150	125	115	140	100	90	150	125	105
								140	120	100			120	100	90	
Hardiplank	5/16	6.00	ET & F pin 0.100 x 1.5" x 0.25" HD	Through Overlap	Min. No. 20 ga. x 3.62" x 1.375" Metal C-stud	24	0-15 20 40 60 100	150	120	100	140			150	120	100
								150	115	100	135			150	120	100
								130	110	95	120			140	105	90
								125	100	90	110	80	70	130	100	85
								115	100	90			110	80	75	
Hardiplank	5/16	6.25	ET & F pin 0.100 x 1.5" x 0.25" HD	Through Overlap	Min. No. 20 ga. x 3.62" x 1.375" Metal C-stud	24	0-15 20 40 60 100	150	120	100	135			150	120	100
								150	110	100	130			150	110	95
								130	105	95	120			130	105	90
								120	100	90	110	80	70	120	100	80
								110	95	90			90	90	70	
Hardiplank	5/16	7.50	ET & F pin 0.100 x 1.5" x 0.25" HD	Through Overlap	Min. No. 20 ga. x 3.62" x 1.375" Metal C-stud	24	0-15 20 40 60 100	130	100	90	120			150	100	85
								125	100	85	110			140	100	80
								115	90	80	100			120	90	75
								110	85	80	95	75	-	110	80	75
								100	80	75			90	70	-	



Table 2b — MAXIMUM WIND SPEED

Product Type	Product (in.)		Fastener Type	Fastener Spacing (in.)	Frame Type <sup>1</sup>	Stud Spacing (in.)	Height of Bldg (ft)	Maximum Basic Wind Speed (Mph) for Exposure Category								
	Thick.	Width						Uniform Building Code			Standard Building Code			BOCA National Building Code		
								B	C	D	< 60 ft	C	D	B	C	D
Hardiplank	5/16	8.00	ET & F pin 0.100 x 1.5" x 0.25" HD	Through Overlap	Min. No. 20 ga. x 3.62" x 1.375" Metal C-stud	24	0-15	130	100	85	115			150	100	80
							20	120	95	80	110			140	100	80
							40	110	90	80	100			120	90	75
							60	105	85	75	95	70	-	110	80	70
							100	95	80	70			90	70	-	
Hardiplank	5/16	8.25	ET & F pin 0.100 x 1.5" x 0.25" HD	Through Overlap	Min. No. 20 ga. x 3.62" x 1.375" Metal C-stud	24	0-15	125	95	85	110			140	100	80
							20	120	90	80	105			140	90	80
							40	110	85	80	95			120	85	70
							60	100	80	75	90	70	-	110	80	70
							100	90	80	70			90	70	-	
Hardiplank	5/16	9.50	ET & F pin 0.100 x 1.5" x 0.25" HD	Through Overlap	Min. No. 20 ga. x 3.62" x 1.375" Metal C-stud	24	0-15	120	90	80	100			130	90	70
							20	110	90	75	100			130	90	70
							40	100	80	70	90			110	80	70
							60	90	80	70	85			110	80	-
							100	85	70	-		-	80	-	-	
Hardiplank	5/16	12.00	ET & F pin 0.100 x 1.5" x 0.25" HD	Through Overlap	Min. No. 20 ga. x 3.62" x 1.375" Metal C-stud	24	0-15	100	80	-	90			120	80	-
							20	100	80	-	90			110	80	-
							40	90	70	-	80			90	70	-
							60	85	70	-	75			90	-	-
							100	80	-	-		-	70	-	-	
Hardiplank	5/16	4.00	ET & F Panelfast 0.100 x 1.5" x 0.25" HD	Through top edge of plank	Min. No. 20 ga. x 3.62" x 1.375" Metal C-stud	16	0-15	150	150	150	150			150	150	150
							20	150	150	150	150			150	150	150
							40	150	150	150	150			150	150	150
							60	150	150	150	150	150	150	150	150	150
							100	150	150	150		150	150	150	140	
Hardiplank	5/16	6.00	ET & F Panelfast 0.100 x 1.5" x 0.25" HD	Through top edge of plank	Min. No. 20 ga. x 3.62" x 1.375" Metal C-stud	16	0-15	150	110	100	130			140	110	90
							20	150	110	100	140			140	105	85
							40	130	100	90	120			130	95	80
							60	120	100	90	110	75	-	120	90	80
							100	110	90	80			95	75	-	
Hardiplank	5/16	6.25	ET & F Panelfast 0.100 x 1.5" x 0.25" HD	Through top edge of plank	Min. No. 20 ga. x 3.62" x 1.375" Metal C-stud	16	0-15	140	110	100	130			150	100	85
							20	140	110	90	120			140	100	80
							40	120	100	90	115			120	90	75
							60	120	95	85	105	70	-	110	85	70
							100	110	90	80			90	70	-	
Hardiplank	5/16	7.50	ET & F Panelfast 0.100 x 1.5" x 0.25" HD	Through top edge of plank	Min. No. 20 ga. x 3.62" x 1.375" Metal C-stud	16	0-15	120	90	80	110			130	90	70
							20	120	90	80	100			120	85	70
							40	110	80	75	95			105	75	-
							60	100	80	70	90			95	70	-
							100	90	75	70		-	75	-	-	
Hardiplank	5/16	8.00	ET & F Panelfast 0.100 x 1.5" x 0.25" HD	Through top edge of plank	Min. No. 20 ga. x 3.62" x 1.375" Metal C-stud	16	0-15	110	90	80	100			120	80	70
							20	110	85	70	100			110	80	-
							40	100	80	70	90			100	70	-
							60	90	70	70	80			90	70	-
							100	80	70	-		-	70	-	-	
Hardiplank	5/16	8.25	ET & F Panelfast 0.100 x 1.5" x 0.25" HD	Through top edge of plank	Min. No. 20 ga. x 3.62" x 1.375" Metal C-stud	16	0-15	110	90	70	100			120	80	-
							20	110	80	70	95			110	80	-
							40	100	80	70	85			100	70	-
							60	90	70	-	70			90	-	-
							100	80	70	-		-	70	-	-	
Hardiplank	5/16	4.00	ET & F Panelfast 0.100 x 1.5" x 0.25" HD	Through top edge of plank	Min. No. 20 ga. x 3.62" x 1.375" Metal C-stud	24	0-15	150	150	150	150			150	150	150
							20	150	150	150	150			150	150	140
							40	150	150	150	150			150	150	130
							60	150	150	150	150	130	110	150	130	110
							100	150	150	150			150	130	110	
Hardiplank	5/16	6.00	ET & F Panelfast 0.100 x 1.5" x 0.25" HD	Through top edge of plank	Min. No. 20 ga. x 3.62" x 1.375" Metal C-stud	24	0-15	130	100	90	110			140	95	80
							20	120	100	85	110			130	90	70
							40	110	90	85	100			110	80	70
							60	110	85	80	90			105	80	-
							100	100	80	70		-	80	-	-	

Table 2b — MAXIMUM WIND SPEED

Product Type	Product (in.)		Fastener Type	Fastener Spacing (in.)	Frame Type <sup>1</sup>	Stud Spacing (in.)	Height of Bldg (ft)	Maximum Basic Wind Speed (Mph) for Exposure Category								
	Thick.	Width						Uniform Building Code			Standard Building Code			BOCA National Building Code		
								B	C	D	< 60 ft	C	D	B	C	D
Hardiplank	5/16	6.25	ET & F Panelfast 0.100 x 1.5" x 0.25" HD	Through top edge of plank	Min. No. 20 ga. x 3.62" x 1.375" Metal C-stud	24	0-15	120	95	80	110			130	90	70
							20	120	90	80	100			120	85	70
							40	110	85	70	90			110	80	-
							60	100	80	70	80			90	75	-
							100	90	70	70		-	-	70	-	-
Hardiplank	5/16	7.50	ET & F Panelfast 0.100 x 1.5" x 0.25" HD	Through top edge of plank	Min. No. 20 ga. x 3.62" x 1.375" Metal C-stud	24	0-15	110	90	70	100			120	80	70
							20	110	85	70	100			110	80	-
							40	100	80	70	90			100	70	-
							60	90	75	70	80			90	70	-
							100	85	70	-		-	-	70	-	-
Hardiplank	5/16	8.00	ET & F Panelfast 0.100 x 1.5" x 0.25" HD	Through top edge of plank	Min. No. 20 ga. x 3.62" x 1.375" Metal C-stud	24	0-15	100	80	70	90			110	70	-
							20	100	75	70	90			100	70	-
							40	90	70	-	80			85	-	-
							60	80	-	-	75			80	-	-
							100	75	-	-		-	-	-	-	-
Hardiplank	5/16	8.25	ET & F Panelfast 0.100 x 1.5" x 0.25" HD	Through top edge of plank	Min. No. 20 ga. x 3.62" x 1.375" Metal C-stud	24	0-15	90	70	-	80			100	-	-
							20	90	70	-	80			90	-	-
							40	80	-	-	70			80	-	-
							60	75	-	-	70			70	-	-
							100	70	-	-		-	-	-	-	-
Hardiplank	5/16	4.00	6d common 2" long	Through Overlap	2 x 4	16	0-15	150	150	150	150			150	150	150
							20	150	150	150	150			150	150	150
							40	150	150	150	150			150	150	150
							60	150	150	150	150			150	150	130
							100	150	150	140		130	120	150	130	120
Hardiplank	5/16	6.00	6d common 2" long	Through Overlap	2 x 4	16	0-15	150	150	135	150			150	150	130
							20	150	150	130	150			150	150	130
							40	150	150	120	150			150	140	120
							60	150	150	120	150			150	130	115
							100	150	150	120		110	100	140	110	100
Hardiplank	5/16	6.25	6d common 2" long	Through Overlap	2 x 4	16	0-15	150	150	120	150			150	150	130
							20	150	150	120	150			150	150	120
							40	150	150	120	150			150	140	120
							60	150	130	120	150			150	130	115
							100	150	130	110		110	100	150	110	100
Hardiplank	5/16	7.50	6d common 2" long	Through Overlap	2 x 4	16	0-15	150	150	120	150			150	140	120
							20	150	150	120	150			150	140	120
							40	150	130	110	140			150	120	120
							60	150	120	110	130			150	120	115
							100	130	110	110		110	90	140	100	90
Hardiplank	5/16	8.00	6d common 2" long	Through Overlap	2 x 4	16	0-15	150	130	120	150			150	140	110
							20	150	130	115	150			150	140	110
							40	150	120	110	130			150	120	100
							60	140	120	105	130			150	115	100
							100	130	110	100		95	85	120	95	85
Hardiplank	5/16	8.25	6d common 2" long	Through Overlap	2 x 4	16	0-15	150	130	115	150			150	140	110
							20	150	130	110	150			150	130	100
							40	150	120	110	130			150	120	100
							60	140	115	105	120			150	110	100
							100	130	110	100		95	80	130	95	80
Hardiplank	5/16	9.50	6d common 2" long	Through Overlap	2 x 4	16	0-15	150	120	110	140			150	130	105
							20	150	120	110	140			150	120	100
							40	140	110	100	120			140	120	95
							60	130	105	100	120			120	120	90
							100	120	100	95		90	80	115	90	80
Hardiplank	5/16	12.00	6d common 2" long	Through Overlap	2 x 4	16	0-15	140	110	95	130			150	110	95
							20	140	105	95	120			150	110	90
							40	120	100	90	110			140	100	85
							60	115	95	85	105			120	95	80
							100	110	90	80		80	70	100	80	70

Table 2b — MAXIMUM WIND SPEED

Product Type	Product (in.)		Fastener Type	Fastener Spacing (in.)	Frame Type <sup>1</sup>	Stud Spacing (in.)	Height of Bldg (ft)	Maximum Basic Wind Speed (Mph) for Exposure Category								
	Thick.	Width						Uniform Building Code			Standard Building Code			BOCA National Building Code		
								B	C	D	< 60 ft	C	D	B	C	D
Hardiplank	5/16	4.00	6d common 2" long	Through Overlap	2 x 4	24	0-15	150	130	115	150			150	130	110
							20	150	130	110	140			150	130	110
							40	150	120	110	130			150	120	100
							60	140	120	100	120	95	80	150	115	95
							100	130	110	100			120	95	80	
Hardiplank	5/16	6.00	6d common 2" long	Through Overlap	2 x 4	24	0-15	140	110	95	130			120	110	90
							20	140	100	95	120			120	110	90
							40	130	100	95	110			120	100	80
							60	115	95	85	105	80	70	120	90	80
							100	105	90	80			100	80	70	
Hardiplank	5/16	6.25	6d common 2" long	Through Overlap	2 x 4	24	0-15	120	105	95	120			120	110	90
							20	120	100	90	120			120	100	85
							40	120	95	85	110			120	95	80
							60	110	90	80	100	80	70	120	90	80
							100	105	85	80			100	80	70	
Hardiplank	5/16	7.50	6d common 2" long	Through Overlap	2 x 4	24	0-15	120	95	85	110			120	100	80
							20	120	95	85	110			120	95	80
							40	110	85	80	100			120	90	75
							60	100	85	75	95	70	70	120	85	70
							100	95	80	70			90	70	-	
Hardiplank	5/16	8.00	6d common 2" long	Through Overlap	2 x 4	24	0-15	120	95	80	110			120	100	80
							20	120	95	80	105			120	90	70
							40	105	85	70	100			110	80	70
							60	100	85	70	90	70	-	105	80	70
							100	90	75	70			85	70	-	
Hardiplank	5/16	8.25	6d common 2" long	Through Overlap	2 x 4	24	0-15	115	95	80	110			120	95	80
							20	115	95	80	100			120	90	75
							40	105	85	70	95			110	80	70
							60	100	85	70	90			105	75	70
							100	90	75	70			85	-	-	
Hardiplank	5/16	9.50	6d common 2" long	Through Overlap	2 x 4	24	0-15	110	85	75	100			120	90	70
							20	110	85	70	95			120	85	70
							40	95	75	70	85			100	80	-
							60	90	75	-	85	-	-	100	70	-
							100	85	70	-			80	-	-	
Hardiplank	5/16	12.00	6d common 2" long	Through Overlap	2 x 4	24	0-15	70	75	-	90			110	80	-
							20	95	70	-	85			110	75	-
							40	90	70	-	80			95	70	-
							60	80	-	-	75			85	-	-
							100	70	-	-			70	-	-	
Hardiplank	5/16	4.00	No. 8-18 x 1-5/8" long x 0.323" HD HiLo or ribbed bungle head screw	Through Overlap	Min. No. 16 ga. x 3.62" x 1.375" Metal C-stud	16	0-15	150	150	150	150			150	150	150
							20	150	150	150	150			150	150	140
							40	150	150	140	150			150	150	140
							60	150	150	140	150			150	150	130
							100	150	150	130			130	115	115	
Hardiplank	5/16	6.00	No. 8-18 x 1-5/8" long x 0.323" HD HiLo or ribbed bungle head screw	Through Overlap	Min. No. 16 ga. x 3.62" x 1.375" Metal C-stud	16	0-15	150	150	140	150			150	150	120
							20	150	140	140	150			150	140	120
							40	150	130	130	150			150	130	115
							60	150	130	130	140			150	120	110
							100	140	120	120			135	105	95	
Hardiplank	5/16	6.25	No. 8-18 x 1-5/8" long x 0.323" HD HiLo or ribbed bungle head screw	Through Overlap	Min. No. 16 ga. x 3.62" x 1.375" Metal C-stud	16	0-15	150	140	120	150			150	150	120
							20	150	140	120	150			150	140	120
							40	150	130	110	140			150	130	110
							60	150	120	110	140			150	120	105
							100	140	120	110			130	105	90	

Table 2b — MAXIMUM WIND SPEED

Product Type	Product (in.)		Fastener Type	Fastener Spacing (in.)	Frame Type <sup>1</sup>	Stud Spacing (in.)	Height of Bldg (ft)	Maximum Basic Wind Speed (Mph) for Exposure Category								
	Thick.	Width						Uniform Building Code			Standard Building Code			BOCA National Building Code		
								B	C	D	< 60 ft	C	D	B	C	D
Hardiplank	5/16	7.50	No. 8-18 x 1-5/8" long x 0.323" HD HiLo or ribbed bungle head screw	Through Overlap	Min. No. 16 ga. x 3.62" x 1.375" Metal C-stud	16	0-15	150	130	110	150			150	130	110
							20	150	120	110	140			150	130	105
							40	140	110	105	130			150	115	100
							60	130	110	100	120			150	110	90
							100	120	100	95		90	80	115	90	80
Hardiplank	5/16	8.00	No. 8-18 x 1-5/8" long x 0.323" HD HiLo or ribbed bungle head screw	Through Overlap	Min. No. 16 ga. x 3.62" x 1.375" Metal C-stud	16	0-15	150	130	110	150			150	130	110
							20	150	120	110	140			150	130	105
							40	150	110	105	130			150	115	100
							60	150	110	100	120			140	110	90
							100	130	100	95		90	80	115	90	80
Hardiplank	5/16	8.25	No. 8-18 x 1-5/8" long x 0.323" HD HiLo or ribbed bungle head screw	Through Overlap	Min. No. 16 ga. x 3.62" x 1.375" Metal C-stud	16	0-15	150	120	110	140			150	130	110
							20	150	120	110	140			150	120	105
							40	140	110	105	120			150	115	100
							60	120	110	100	120			140	105	90
							100	120	100	95		90	80	115	90	80
Hardiplank	5/16	9.50	No. 8-18 x 1-5/8" long x 0.323" HD HiLo or ribbed bungle head screw	Through Overlap	Min. No. 16 ga. x 3.62" x 1.375" Metal C-stud	16	0-15	150	115	100	130			150	120	100
							20	150	110	100	130			150	115	95
							40	130	110	95	120			140	105	90
							60	120	110	90	110			130	100	85
							100	115	95	85		85	75	110	85	75
Hardiplank	5/16	12.00	No. 8-18 x 1-5/8" long x 0.323" HD HiLo or ribbed bungle head screw	Through Overlap	Min. No. 16 ga. x 3.62" x 1.375" Metal C-stud	16	0-15	130	100	90	120			150	110	90
							20	130	100	90	120			150	105	80
							40	120	90	80	100			120	95	80
							60	110	90	80	100			120	90	75
							100	100	85	80		75	-	95	75	-
Hardiplank	5/16	4.00	No. 8-18 x 1-5/8" long x 0.323" HD HiLo or ribbed bungle head screw	Through Overlap	Min. No. 16 ga. x 3.62" x 1.375" Metal C-stud	24	0-15	150	150	130	150			150	150	120
							20	150	140	130	150			150	140	120
							40	150	130	120	150			150	130	110
							60	150	130	110	140			150	120	110
							100	140	110	110		105	90	135	105	90
Hardiplank	5/16	6.00	No. 8-18 x 1-5/8" long x 0.323" HD HiLo or ribbed bungle head screw	Through Overlap	Min. No. 16 ga. x 3.62" x 1.375" Metal C-stud	24	0-15	150	130	105	140			150	120	100
							20	150	130	100	130			150	120	100
							40	150	110	100	120			140	110	95
							60	140	105	90	115			130	100	90
							100	130	100	90		85	75	110	85	75
Hardiplank	5/16	6.25	No. 8-18 x 1-5/8" long x 0.323" HD HiLo or ribbed bungle head screw	Through Overlap	Min. No. 16 ga. x 3.62" x 1.375" Metal C-stud	24	0-15	150	120	100	135			150	150	100
							20	150	110	100	130			150	140	95
							40	130	105	90	120			140	130	90
							60	120	100	90	110			130	120	85
							100	110	95	90		85	70	110	85	75
Hardiplank	5/16	7.50	No. 8-18 x 1-5/8" long x 0.323" HD HiLo or ribbed bungle head screw	Through Overlap	Min. No. 16 ga. x 3.62" x 1.375" Metal C-stud	24	0-15	140	110	90	120			150	110	90
							20	130	100	90	120			150	105	90
							40	120	95	85	110			130	95	80
							60	110	90	80	100			120	90	80
							100	100	90	80		80	70	115	80	70
Hardiplank	5/16	8.00	No. 8-18 x 1-5/8" long x 0.323" HD HiLo or ribbed bungle head screw	Through Overlap	Min. No. 16 ga. x 3.62" x 1.375" Metal C-stud	24	0-15	130	105	90	120			150	110	90
							20	130	100	90	115			150	105	85
							40	120	95	80	105			130	95	80
							60	110	90	80	100			120	90	75
							100	100	85	80		75	-	95	75	-

Table 2b — MAXIMUM WIND SPEED

Product Type	Product (in.)		Fastener Type	Fastener Spacing (in.)	Frame Type <sup>1</sup>	Stud Spacing (in.)	Height of Bldg (ft)	Maximum Basic Wind Speed (Mph) for Exposure Category								
	Thick.	Width						Uniform Building Code			Standard Building Code			BOCA National Building Code		
								B	C	D	< 60 ft	C	D	B	C	D
Hardiplank	5/16	8.25	No. 8-18 x 1-5/8" long x 0.323" HD HiLo or ribbed bungle head screw	Through Overlap	Min. No. 16 ga. x 3.62" x 1.375" Metal C-stud	24	0-15	130	100	90	120			150	105	90
							20	130	100	90	115			150	105	85
							40	120	90	80	105			120	90	80
							60	110	90	80	100			115	85	75
							100	100	85	75		75	-	95	75	-
Hardiplank	5/16	9.50	No. 8-18 x 1-5/8" long x 0.323" HD HiLo or ribbed bungle head screw	Through Overlap	Min. No. 16 ga. x 3.62" x 1.375" Metal C-stud	24	0-15	120	95	80	110			140	100	80
							20	120	90	80	105			140	95	80
							40	110	85	75	95			120	85	75
							60	100	80	70	90			110	80	70
							100	90	80	70		70	-	90	70	-
Hardiplank	5/16	12.00	No. 8-18 x 1-5/8" long x 0.323" HD HiLo or ribbed bungle head screw	Through Overlap	Min. No. 16 ga. x 3.62" x 1.375" Metal C-stud	24	0-15	115	80	70	100			130	90	70
							20	110	80	70	95			120	85	70
							40	95	75	70	85			100	75	-
							60	90	70	-	80			95	70	-
							100	80	70	-		-	-	80	-	-
Hardiplank	5/16	4.00	No. 11 ga. 1-1/4" long Galv. roofing nail	Through top edge of plank	2 x 4 wood	16	0-15	150	150	150	150			150	150	150
							20	150	150	150	150			150	150	150
							40	150	150	150	150			150	150	150
							60	150	150	150	150			150	150	150
							100	150	150	150		140	120	150	140	120
Hardiplank	5/16	6.00	No. 11 ga. 1-1/4" long galv. roofing nail	Through top edge of plank	2 x 4 wood	16	0-15	150	150	130	150			150	150	130
							20	150	150	130	150			150	150	120
							40	150	140	120	150			150	130	115
							60	150	130	120	140			150	130	110
							100	150	120	110		110	95	140	110	95
Hardiplank	5/16	6.25	No. 11 ga. 1-1/4" long galv. roofing nail	Through top edge of plank	2 x 4 wood	16	0-15	150	150	130	150			150	150	120
							20	150	140	120	150			150	140	120
							40	150	130	120	150			150	130	110
							60	150	130	110	140			150	120	110
							100	140	120	110		100	95	135	100	95
Hardiplank	5/16	7.50	No. 11 ga. 1-1/4" long galv. roofing nail	Through top edge of plank	2 x 4 wood	16	0-15	150	130	115	150			150	130	110
							20	150	130	110	140			150	130	110
							40	150	120	110	135			150	120	100
							60	140	115	105	125			150	110	95
							100	130	110	100		95	85	120	95	85
Hardiplank	5/16	8.00	No. 11 ga. 1-1/4" long galv. roofing nail	Through top edge of plank	2 x 4 wood	16	0-15	150	130	110	150			150	130	105
							20	150	120	110	140			150	120	100
							40	140	115	100	130			150	115	95
							60	130	110	100	120			140	110	95
							100	120	110	95		90	80	115	90	80
Hardiplank	5/16	8.25	No. 11 ga. 1-1/4" long galv. roofing nail	Through top edge of plank	2 x 4 wood	16	0-15	150	120	110	140			150	130	105
							20	150	120	105	140			150	120	105
							40	140	110	100	125			150	110	95
							60	130	110	100	120			140	105	90
							100	120	100	95		90	80	115	90	80
Hardiplank	5/16	9.50	No. 11 ga. 1-1/4" long galv. roofing nail	Through top edge of plank	2 x 4 wood	16	0-15	150	110	100	130			150	120	100
							20	140	110	100	130			150	115	95
							40	130	100	90	115			140	100	90
							60	120	100	90	110			130	100	85
							100	110	95	80		80	70	105	80	70
Hardiplank	5/16	12.00	No. 11 ga. 1-1/4" long galv. roofing nail	Through top edge of plank	2 x 4 wood	16	0-15	130	100	90	115			150	105	85
							20	120	100	80	110			140	100	80
							40	110	90	80	100			120	95	75
							60	110	80	80	95			110	85	75
							100	100	80	75		75	-	90	75	-

Table 2b — MAXIMUM WIND SPEED

Product Type	Product (in.)		Fastener Type	Fastener Spacing (in.)	Frame Type <sup>1</sup>	Stud Spacing (in.)	Height of Bldg (ft)	Maximum Basic Wind Speed (Mph) for Exposure Category								
	Thick.	Width						Uniform Building Code			Standard Building Code			BOCA National Building Code		
								B	C	D	< 60 ft	C	D	B	C	D
Hardiplank	5/16	4.00	No. 11 ga. 1-1/4" long galv. roofing nail	Through top edge of plank	2 x 4 wood	24	0-15	150	150	140	150			150	150	130
							20	150	150	140	150			150	150	130
							40	150	150	130	150			150	140	120
							60	150	140	130	150			150	140	120
							100	150	130	120	150	115	105	150	115	105
Hardiplank	5/16	6.00	No. 11 ga. 1-1/4" long galv. roofing nail	Through top edge of plank	2 x 4 wood	24	0-15	150	120	110	140			150	130	105
							20	150	120	105	140			150	120	105
							40	140	110	100	125			150	110	95
							60	130	110	100	115			140	105	90
							100	120	100	100		90	80	110	90	80
Hardiplank	5/16	6.25	No. 11 ga. 1-1/4" long galv. roofing nail	Through top edge of plank	2 x 4 wood	24	0-15	150	120	110	140			150	125	100
							20	150	120	100	130			150	120	100
							40	130	110	100	120			150	110	95
							60	120	110	95	110			130	105	90
							100	120	100	90		85	80	110	85	80
Hardiplank	5/16	7.50	No. 11 ga. 1-1/4" long galv. roofing nail	Through top edge of plank	2 x 4 wood	24	0-15	140	110	95	120			150	115	90
							20	140	105	90	120			150	110	90
							40	120	100	90	110			130	100	80
							60	120	95	85	100			120	95	80
							100	110	90	70		80	70	100	80	70
Hardiplank	5/16	8.00	No. 11 ga. 1-1/4" long galv. roofing nail	Through top edge of plank	2 x 4 wood	24	0-15	130	100	90	120			150	110	90
							20	130	100	90	115			150	105	80
							40	120	95	80	105			120	95	80
							60	120	95	80	100			110	90	75
							100	110	90	70		90	-	95	90	-
Hardiplank	5/16	8.25	No. 11 ga. 1-1/4" long galv. roofing nail	Through top edge of plank	2 x 4 wood	24	0-15	130	100	90	120			150	110	85
							20	130	100	90	110			140	105	85
							40	120	95	80	100			120	90	80
							60	110	95	80	95			110	90	75
							100	100	90	75		75	-	90	70	-
Hardiplank	5/16	9.50	No. 11 ga. 1-1/4" long galv. roofing nail	Through top edge of plank	2 x 4 wood	24	0-15	120	95	80	110			140	100	80
							20	120	90	80	105			130	90	75
							40	110	90	70	95			115	85	70
							60	100	85	70	90			105	80	70
							100	95	75	70		70	-	85	70	-
Hardiplank	5/16	12.00	No. 11 ga. 1-1/4" long galv. roofing nail	Through top edge of plank	2 x 4 wood	24	0-15	110	80	70	90			120	85	70
							20	110	80	70	90			120	80	70
							40	100	80	70	80			105	75	-
							60	80	80	-	80			90	70	-
							100	80	80	-		-	-	80	-	-
Hardiplank	5/16	4.00	0.089" shank x 0.221" HD x 2" long galv. siding nail	Through overlap	2 x 4	16	0-15	150	115	100	130			150	120	95
							20	140	110	95	125			150	110	95
							40	130	105	90	115			140	100	90
							60	120	100	90	110			130	95	85
							100	110	90	85		80	70	105	80	70
Hardiplank	5/16	6.00	0.089" shank x 0.221" HD x 2" long galv. siding nail	Through overlap	2 x 4	16	0-15	120	90	85	110			140	95	80
							20	120	90	80	100			130	90	70
							40	105	80	75	90			110	85	70
							60	100	80	70	90			105	80	70
							100	90	75	70		-	-	90	-	-
Hardiplank	5/16	6.25	0.089" shank x 0.221" HD x 2" long galv. siding nail	Through overlap	2 x 4	16	0-15	120	90	80	100			140	95	70
							20	105	90	80	100			130	90	70
							40	105	85	70	90			110	80	70
							60	95	80	70	85			105	75	-
							100	90	75			-	-	90	-	-
Hardiplank	5/16	7.50	0.089" shank x 0.221" HD x 2" long galv. siding nail	Through overlap	2 x 4	16	0-15	110	80	70	90			120	85	70
							20	100	80	70	90			120	80	70
							40	90	75	-	80			100	75	-
							60	85	70	-	80			95	70	-
							100	80	70	-		-	-	75	-	-



Table 2b — MAXIMUM WIND SPEED

Product Type	Product (in.)		Fastener Type	Fastener Spacing (in.)	Frame Type <sup>1</sup>	Stud Spacing (in.)	Height of Bldg (ft)	Maximum Basic Wind Speed (Mph) for Exposure Category								
	Thick.	Width						Uniform Building Code			Standard Building Code			BOCA National Building Code		
								B	C	D	< 60 ft	C	D	B	C	D
Hardiplank	5/16	4.00	0.093" shank x 0.222" HD x 2" long galv. siding nail	Through top edge of plank	2 x 4	16	0-15	150	130	110	150			150	130	110
							20	150	120	110	140			150	130	105
							40	140	115	100	130			150	115	100
							60	140	110	100	120	90	80	140	110	95
							100	125	100	95			110	90	80	
Hardiplank	5/16	6.00	0.093" shank x 0.222" HD x 2" long galv. siding nail	Through top edge of plank	2 x 4	16	0-15	130	100	80	110			150	100	80
							20	120	95	80	110			140	95	80
							40	110	90	80	100			120	90	75
							60	100	85	75	90	75	-	110	85	70
							100	95	80	70			90	75	-	
Hardiplank	5/16	6.25	0.093" shank x 0.222" HD x 2" long galv. siding nail	Through top edge of plank	2 x 4	16	0-15	120	90	80	110			140	100	80
							20	120	90	80	100			130	95	75
							40	105	80	75	95			115	85	70
							60	100	80	70	90	70	-	110	70	70
							100	90	75	70			95	70	-	
Hardiplank	5/16	7.50	0.093" shank x 0.222" HD x 2" long galv. siding nail	Through top edge of plank	2 x 4	16	0-15	110	85	75	100			130	90	70
							20	110	80	70	95			120	85	70
							40	95	80	70	85			105	80	-
							60	90	75	-	80	-	-	95	70	-
							100	80	70	-			85	-	-	
Hardiplank	5/16	8.00	0.093" shank x 0.222" HD x 2" long galv. siding nail	Through top edge of plank	2 x 4	16	0-15	100	80	70	90			120	85	70
							20	100	80	70	90			115	80	70
							40	90	75	-	80			100	75	-
							60	80	70	-	80	-	-	90	70	-
							100	80	-	-			80	-	-	
Hardiplank	5/16	8.25	0.093" shank x 0.222" HD x 2" long galv. siding nail	Through top edge of plank	2 x 4	16	0-15	100	80	70	90			120	80	70
							20	100	80	-	90			115	80	-
							40	90	75	-	80			100	70	-
							60	80	75	-	75	-	-	90	70	-
							100	75	-	-			80	-	-	
Hardiplank	5/16	9.50	0.093" shank x 0.222" HD x 2" long galv. siding nail	Through top edge of plank	2 x 4	16	0-15	100	75	-	80			110	80	-
							20	90	70	-	80			110	75	-
							40	80	-	-	70			90	70	-
							60	80	-	-	70	-	-	80	-	-
							100	70	-	-			-	-	-	
Hardiplank	5/16	12.00	0.093" shank x 0.222" HD x 2" long galv. siding nail	Through top edge of plank	2 x 4	16	0-15	90	-	-	70			100	70	-
							20	80	-	-	70			90	-	-
							40	75	-	-	-			80	-	-
							60	70	-	-	-			70	-	-
							100	-	-	-			-	-	-	
Hardiplank	5/16	4.00	0.093" shank x 0.222" HD x 2" long galv. siding nail	Through top edge of plank	2 x 4	24	0-15	140	105	95	120			150	110	90
							20	130	100	90	115			150	105	85
							40	120	95	85	105			130	95	80
							60	115	90	80	100	75	-	120	90	75
							100	105	85	80			95	75	-	
Hardiplank	5/16	6.00	0.093" shank x 0.222" HD x 2" long galv. siding nail	Through top edge of plank	2 x 4	24	0-15	100	80	70	90			120	80	-
							20	100	80	-	90			110	80	-
							40	90	70	-	80			100	70	-
							60	85	70	-	75	-	-	90	70	-
							100	75	-	-			75	-	-	
Hardiplank	5/16	6.25	0.093" shank x 0.222" HD x 2" long galv. siding nail	Through top edge of plank	2 x 4	24	0-15	100	80	70	90			120	70	-
							20	100	75	-	85			110	70	-
							40	90	70	-	80			95	-	-
							60	85	-	-	75			85	-	-
							100	75	-	-			70	-	-	
Hardiplank	5/16	7.50	0.093" shank x 0.222" HD x 2" long galv. siding nail	Through top edge of plank	2 x 4	24	0-15	90	70	-	80			100	70	-
							20	90	-	-	75			100	70	-
							40	80	-	-	70			85	-	-
							60	70	-	-	-			75	-	-
							100	-	-	-			-	-	-	



**Table 2b — MAXIMUM WIND SPEED**

Product Type	Product (in.)		Fastener Type	Fastener Spacing (in.)	Frame Type <sup>1</sup>	Stud Spacing (in.)	Height of Bldg (ft)	Maximum Basic Wind Speed (Mph) for Exposure Category								
	Thick.	Width						Uniform Building Code			Standard Building Code			BOCA National Building Code		
								B	C	D	< 60 ft	C	D	B	C	D
Hardiplank	5/16	8.00	0.093" shank x 0.222" HD x 2" long galv. siding nail	Through top edge of plank	2 x 4	24	0-15 20 40 60 100	90	-	-	80			100	70	-
								85	-	-	75			100	70	-
								75	-	-	70			80	-	-
								70	-	-	-			75	-	-
								-	-	-	-			-	-	-
Hardiplank	5/16	8.25	0.093" shank x 0.222" HD x 2" long galv. siding nail	Through top edge of plank	2 x 4	24	0-15 20 40 60 100	85	-	-	70			100	70	-
								85	-	-	70			95	-	-
								70	-	-	-			85	-	-
								70	-	-	-			75	-	-
								-	-	-	-			-	-	-
Hardiplank	5/16	9.50	0.093" shank x 0.222" HD x 2" long galv. siding nail	Through top edge of plank	2 x 4	24	0-15 20 40 60 100	80	-	-	70			90	-	-
								80	-	-	70			90	-	-
								70	-	-	-			75	-	-
								-	-	-	-			70	-	-
								-	-	-	-			-	-	-
Hardiplank	5/16	12.00	0.093" shank x 0.222" HD x 2" long galv. siding nail	Through top edge of plank	2 x 4	24	0-15 20 40 60 100	70	-	-	-			70	-	-
								-	-	-	-			80	-	-
								-	-	-	-			-	-	-
								-	-	-	-			-	-	-
								-	-	-	-			-	-	-
Hardiplank	5/16	9.50	0.091" shank, 0.221" HD, 1.5" long corrosion resistant nail	Face nailed through the overlap @ 12" o.c.	7/16" thick APA rated OSB sheathing or equivalent solid sheathing	-	0-15 20 40 60 100	100	80	-	90			115	80	-
								95	75	-	85			110	75	-
								85	70	-	80	-	-	90	70	-
								80	-	-	75	-	-	85	-	-
								70	-	-	-	-	-	70	-	-

**Notes to Table 2b:**

1. Values are for species of wood having a specific gravity of 0.42 or greater, unless otherwise noted.

**Table 3**  
**SHEAR VALUES ALLOWABLE LOADS IN POUNDS PER LINEAL FOOT FOR PANEL SHEAR WALLS<sup>1,2</sup>**

Product Type	Product Thickness (inch)	Fastener Type	Fastener Spacing (inch)	Frame Types	Stud Spacing (inch)	Shear Value (plf)
Hardiflex Hardisoffit	3/16	4d common 1-1/2 in. long	6	2 x 4 wood <sup>5</sup>	16	145
Hardipanel Hardiflex Hardisoffit	1/4	4d common 1-1/2 in. long	8	2 x 4 wood <sup>5</sup>	16 & 24	120
Hardibacker Titan	1/4	0.086 in. x 1-3/8 in. long gypsum wall board nail	6	2 x 4 wood <sup>5</sup>	16 & 24	140
Hardipanel Hardiflex	1/4	6d common 2 in. long	6	2 x 4 wood <sup>5</sup>	16	190
Hardipanel Hardiflex Harditex Hardibacker Titan	1/4	No. 11 ga. 1-1/4 in. long galvanized roofing nail	6	2 x 4 wood <sup>5</sup>	16 & 24	180
Hardipanel Hardiflex Harditex Hardibacker Titan	1/4	No. 11 ga. 1-1/4 in. long galvanized roofing nail	4 edge 12 field	2 x 4 wood <sup>5</sup>	16 & 24	265
Hardipanel Hardiflex Harditex Hardibacker Titan	1/4	No. 11 ga. 1-1/4 in. long galvanized roofing nail	3 edge 6 field	2 x 4 wood <sup>5</sup> w/48 in. mid-height block	16 & 24	295
Shiplap	5/16	0.092 in. shank, 0.225 in. HD, 2 in. long ring shank nail	3 edge 8 field	2 x 4 wood <sup>4</sup>	16	268
Shiplap	5/16	0.092 in. shank, 0.225 in. HD, 2 in. long ring shank nail	4 edge 8 field	2 x 4 wood <sup>4</sup>	16	238
Shiplap	5/16	0.092 in. shank, 0.225 in. HD, 2 in. long ring shank nail	5 edge 8 field	2 x 4 wood <sup>4</sup>	16	208
Shiplap	5/16	0.092 in. shank, 0.225 in. HD, 2 in. long ring shank nail	6 edge 8 field	2 x 4 wood <sup>4</sup>	16	179
Shiplap	5/16	0.092 in. shank, 0.225 in. HD, 2 in. long ring shank nail	7 edge 8 field	2 x 4 wood <sup>4</sup>	16	149
Shiplap	5/16	0.092 in. shank, 0.225 in. HD, 2 in. long ring shank nail	8 edge 8 field	2 x 4 wood <sup>4</sup>	16	119
Hardipanel Hardiflex	5/16	0.091 in. shank, 0.225 in. HD, 1.5 in. long ring shank nail	4 edge 8 field	2 x 4 wood <sup>3</sup>	16	198
Hardipanel Hardiflex	5/16	4d common 1-1/2 in. long	8	2 x 4 wood <sup>5</sup>	16 & 24	120
Hardipanel Hardiflex	5/16	6d common 2 in. long	6	2 x 4 wood <sup>5</sup>	16	200
Hardipanel Hardiflex	5/16	6d common 2 in. long	6	2 x 4 wood <sup>5</sup>	24	153
Hardipanel Hardiflex	5/16	6d common 2 in. long	4	2 x 4 wood <sup>5</sup>	16	233
Hardipanel Hardiflex	5/16	6d common 2 in. long	4	2 x 4 wood <sup>5</sup>	24	212
Hardipanel Hardiflex	5/16	6d common 2 in. long	6 edge 12 field	2 x 4 wood <sup>5</sup>	16	157
Hardipanel Hardiflex	5/16	6d common 2 in. long	6 edge 12 field	2 x 4 wood <sup>5</sup>	24	145

**Table 3**  
**SHEAR VALUES ALLOWABLE LOADS IN POUNDS PER LINEAL FOOT FOR PANEL SHEAR WALLS<sup>1,2</sup>**

Product Type	Product Thickness (inch)	Fastener Type	Fastener Spacing (inch)	Frame Types	Stud Spacing (inch)	Shear Value (plf)
Hardipanel Hardiflex Harditex Hardibacker	5/16	No. 11 ga. 1-1/2 in. long galvanized roofing nail	6	2 x 4 wood <sup>5</sup>	16	200
Hardipanel Hardiflex Harditex Hardibacker	5/16	No. 11 ga. 1-1/2 in. long galvanized roofing nail	4 edge 12 field	2 x 4 wood <sup>5</sup>	16	280
Hardipanel Hardiflex Harditex Hardibacker	5/16	No. 11 ga. 1-1/2 in. long galvanized roofing nail	3 edge 6 field	2 x 4 wood <sup>5</sup> w/48 in. mid-height block	16	340
Hardiflex Hardipanel Harditex Hardibacker Titan	7/16	No. 11 ga. 1-3/4 in. long galvanized roofing nail	6	2 x 4 wood <sup>5</sup>	16	280
Hardiflex Hardisoffit	3/16	Min. No. 8-18, 1 in. long x 0.323 in. HD Hi-Lo® S® or S-12™ ribbed buglehead screws	6	Min. No. 20 ga. x 3-5/8 in. x 1-3/8 in. metal C-stud	16	140 <sup>6</sup>
Hardipanel Hardiflex Harditex Hardibacker Titan	1/4	Min. No. 8-18, 1 in. long x 0.323 in. HD Hi-Lo® S® or S-12™ ribbed buglehead screws	6	Min. No. 20 ga. x 3-5/8 in. x 1-3/8 in. metal C-stud	16 & 24	125 <sup>6</sup>
Hardipanel Hardiflex Harditex Hardibacker	5/16	Min. No. 8-18, 1 in. long x 0.323 in. HD Hi-Lo® S® or S-12™ ribbed buglehead screws	6	Min. No. 20 ga. x 3-5/8 in. x 1-3/8 in. metal C-stud	16	160 <sup>6</sup>
Hardipanel Hardiflex Harditex Hardibacker Titan	7/16	Min. No. 8-18, 1 in. long x 0.311 in. HD Hi-Lo® S® or S-12™ ribbed buglehead screws	6	Min. No. 20 ga. x 3-5/8 in. x 1-3/8 in. metal C-stud	16	162 <sup>6</sup>
Hardipanel Hardiflex Harditex	5/16	ET & F 1-1/2 in. long x 0.10" knurled shank x 0.25" HD pin fastener (AKN100-0150NA)	4 edge 8 field	Min. No. 20 ga. x 3-5/8 in. x 1-3/8 in. metal C-stud	16	154
Hardipanel Hardiflex Harditex	5/16	ET & F 1-1/2 in. long x 0.10" knurled shank x 0.25" HD pin fastener (AKN100-0150NA)	4 edge 8 field	Min. No. 20 ga. x 3-5/8 in. x 1-3/8 in. metal C-stud	24	133

- All board edges shall be supported by framing. Panels shall be applied with the long dimension either parallel or perpendicular to studs.
- The maximum height-to-length ratio for construction in this Table is 2:1.
- Values are for species of wood having a specific gravity of 0.36 or greater.
- Values are for species of wood having a specific gravity of 0.40 or greater.
- Values are for species of wood having a specific gravity of 0.42 or greater, unless otherwise noted.
- Under the Uniform Building Code, these steel-framed assemblies are limited to wind load resistance only.
- 1 inch = 25.4 mm, 1plf = 14.59 N/m

**Table 4**  
**“K” and “R” VALUES FOR FIBER-CEMENT PRODUCTS**

<b>Product Thickness (inch)</b>	<b>Thermal Conductivity<sup>1</sup> <math>K_{\text{eff}} = \text{Btu/hr-ft}^2\text{-}^\circ\text{F}</math></b>	<b>Thermal Resistance<sup>1</sup> <math>R = 1/K_{\text{eff}}</math></b>	<b>Actual Thermal Conductivity<sup>2</sup> (<math>K_{\text{eff}}</math>)</b>	<b>Actual Thermal Resistance<sup>2</sup> (R)</b>
1/4	1.95	0.51	7.80	0.13
5/16	2.07	0.48	6.62	0.15
3/8	2.18	0.46	5.81	0.17
7/16	2.30	0.44	5.26	0.19

**Notes to Table 4:**

1. Based on 1 inch of panel thickness.
2. Actual value for panel thickness shown.
3. 1 inch = 25.4 mm, 1 Btu/h-ft<sup>2</sup>-°F = 5.678 W/m<sup>2</sup>-K

**Table 5**  
**PERMEANCE VALUES FOR FIBER-CEMENT PRODUCTS**

<b>Product Thickness (inch)</b>	<b>Permeance (perms)</b>
1/4	1.75
5/16	1.54
3/8	1.32
7/16	1.10

1 inch = 25.4 mm, 1 perm = 57 mg/(s•m<sup>2</sup>•Pa)

**Table 6A**  
**BOCA National Building Code/1999**  
**ALLOWABLE BASIC WIND SPEEDS (MILES PER HOUR) FOR**  
**HARDIE® SHINGLESIDE® CLADDING EXTERIOR WALL FINISH**

Sheathing Type	Fastener Type	Weather Exposure and Fastener Location	Height of Building (feet)	Exposure Category	
				B	C
Minimum 15/32 inch thick plywood complying with DOC PS 1-95	Min. 0.121 in. shank x 0.371 in. HD x 1-1/4 in. long corrosion resistant roofing nail	8 inch exposure 2 roofing nails 9 inches from butt edge	0-15	110	95
			20	110	90
			40	110	80
			60	110	75
			100	80	
			200	70	
		7 inch exposure 2 roofing nails 8 inches from butt edge	0-15	110	110
			20	110	105
			40	110	95
			60	110	90
			100	95	75
			200	80	70
		6 inch exposure 2 roofing nails 7 inches from butt edge	0-15	110	110
			20	110	110
			40	110	105
60	110		100		
100	105		85		
200	90		75		

**Table 6B**  
**SBCCI - 1999 Standard Building Code**  
**ALLOWABLE BASIC WIND SPEEDS (MILES PER HOUR) FOR**  
**HARDIE® SHINGLESIDE® CLADDING EXTERIOR WALL FINISH**

Sheathing Type	Fastener Type	Weather Exposure and Fastener Location	Height of Building (feet)	Exposure Category		
				Standard	Coastal	
Minimum 15/32 inch thick plywood complying with DOC PS 1-95	Min. 0.121 in. shank x 0.371 in. HD x 1-1/4 in. long corrosion resistant roofing nail	8 inch exposure 2 roofing nails 9 inches from butt edge	0-15	105	105	
			20	100	100	
			40	90	90	
			60	85	85	
			7 inch exposure 2 roofing nails 8 inches from butt edge	0-20	110	110
				40	100	100
		60		95	95	
		6 inch exposure 2 roofing nails 7 inches from butt edge	0-60	110	110	
			100	75	75	
			200	70	70	

**Table 6C**  
**ICBO - 1997 Uniform Building Code**  
**ALLOWABLE BASIC WIND SPEEDS (MILES PER HOUR) FOR**  
**HARDIE® SHINGLESIDE® CLADDING EXTERIOR WALL FINISH**

Sheathing Type	Fastener Type	Weather Exposure and Fastener Location	Height of Building (feet)	Exposure Category	
				B	C
Minimum 15/32 inch thick plywood complying with DOC PS 1-95	Min. 0.121 in. shank x 0.371 in. HD x 1-1/4 in. long corrosion resistant roofing nail	8 inch exposure 2 roofing nails 9 inches from butt edge	0-20	110	90
			40	100	80
			60	95	75
			100	90	70
			200	80	70
			7 inch exposure 2 roofing nails 8 inches from butt edge	0-20	110
		40		110	95
		60		110	90
		100		105	85
		200		95	80
		6 inch exposure 2 roofing nails 7 inches from butt edge		0-20	110
			40	110	105
			60	110	100
			100	110	95
			200	100	90

**Notes to Tables 6A, 6B and 6C:**

1. Table values are based on an importance factor of 1.0
2. 1 foot = 305 mm, 1 inch = 25.4 mm, 1 mph = 1.6 km/h

**Table 7A**  
**BOCA National Building Code/1999**  
**ALLOWABLE BASIC WIND SPEEDS (MILES PER HOUR) FOR**  
**HARDIE® SHINGLESIDE® CLADDING EXTERIOR WALL FINISH**

Sheathing Type	Fastener Type	Weather Exposure and Fastener Location	Height of Building (feet)	Exposure Category	
				B	C
Minimum 7/16 inch thick OSB sheathing complying with DOC-PS 2-95	Min. 0.091 in. shank x 0.221 in. HD x 1-1/2 in. long corrosion resistant siding nail	8 inch exposure 2 siding nails 9 inches from butt edge	0-15	110	75
			20	110	75
			40	90	70
		7 inch exposure 2 siding nails 8 inches from butt edge	0-15	110	90
			20	110	85
			40	105	80
		6 inch exposure 2 siding nails 7 inches from butt edge	60	100	75
			100	110	95
			200	110	90
			60	110	80
			100	85	70
			200	75	

**Table 7B**  
**SBCCI - 1999 Standard Building Code**  
**ALLOWABLE BASIC WIND SPEEDS (MILES PER HOUR) FOR**  
**HARDIE® SHINGLESIDE® CLADDING EXTERIOR WALL FINISH**

Sheathing Type	Fastener Type	Weather Exposure and Fastener Location	Height of Building (feet)	Exposure Category	
				Standard	Coastal
Minimum 7/16 inch thick OSB sheathing complying with DOC-PS 2-95	Min. 0.091 in. shank x 0.221 in. HD x 1-1/2 in. long corrosion resistant siding nail	8 inch exposure 2 siding nails 9 inches from butt edge	0-20	85	85
			40	75	75
			60	70	70
		7 inch exposure 2 siding nails 8 inches from butt edge	0-15	100	100
			20	95	95
			40	85	85
		6 inch exposure 2 siding nails 7 inches from butt edge	60	80	80
			100	110	110
			200	105	105
			60	100	100
			100	70	70

**Table 7C**  
**ICBO - 1997 Uniform Building Code**  
**ALLOWABLE BASIC WIND SPEEDS (MILES PER HOUR) FOR**  
**HARDIE® SHINGLESIDE® CLADDING EXTERIOR WALL FINISH**

Sheathing Type	Fastener Type	Weather Exposure and Fastener Location	Height of Building (feet)	Exposure Category	
				B	C
Minimum 7/16 inch thick OSB sheathing complying with DOC-PS 2-95	Min. 0.091 in. shank x 0.221 in. HD x 1-1/2 in. long corrosion resistant siding nail	8 inch exposure 2 siding nails 9 inches from butt edge	0-15	100	75
			20	90	70
			40	85	
		7 inch exposure 2 siding nails 8 inches from butt edge	60	80	
			100	70	
			200	110	90
		6 inch exposure 2 siding nails 7 inches from butt edge	0-15	110	85
			20	110	80
			40	100	80
			60	90	75
			100	85	70
			200	70	
			0-20	110	95
			40	110	85
			60	105	80
			100	80	
			200	70	

**Notes to Tables 7A, 7B, and 7C:**

1. Table values are based on an importance factor of 1.0
2. 1 foot = 305 mm, 1 inch = 25.4 mm, 1 mph = 1.6 km/h

**Table 8A**  
**BOCA National Building Code/1999**  
**ALLOWABLE BASIC WIND SPEEDS (MILES PER HOUR) FOR**  
**HARDIE® SHINGLESIDE® CLADDING EXTERIOR WALL FINISH**

Sheathing Type	Fastener Type	Weather Exposure and Fastener Location	Height of Building (feet)	Exposure Category	
				B	C
Minimum 7/16 inch thick OSB sheathing complying with DOC-PS 2-95	Min. 0.091 in. shank x 0.221 in. HD x 1-1/2 in. long corrosion resistant siding nail	8 in. exposure 3 siding nails per 12 in. wide, 9 in. from butt edge, 2 siding nails per 6 & 8 in. wide	0-15	110	90
			20	110	85
			40	100	75
			60	95	70
			100	75	
		7 in. exposure 3 siding nails per 12 in. wide, 8 inches from butt edge, 2 siding nails per 6 & 8 in. wide	0-15	110	105
			20	110	100
			40	110	90
			60	110	85
6 in. exposure 3 siding nails per 12 in. wide, 7 inches from butt edge, 2 siding nails per 6 & 8 in. wide	100	90	70		
	200	80			
	0-20	110	110		
	40	110	100		
		60	110	90	
		100	100	80	
		200	85	70	

**Table 8B**  
**SBCCI - 1999 Standard Building Code**  
**ALLOWABLE BASIC WIND SPEEDS (MILES PER HOUR) FOR**  
**HARDIE® SHINGLESIDE® CLADDING EXTERIOR WALL FINISH**

Sheathing Type	Fastener Type	Weather Exposure and Fastener Location	Height of Building (feet)	Exposure Category	
				Standard	Coastal
Minimum 7/16 inch thick OSB sheathing complying with DOC-PS 2-95	Min. 0.091 in. shank x 0.221 in. HD x 1-1/2 in. long corrosion resistant siding nail	8 in. exposure 3 siding nails per 12 in. wide, 9 in. from butt edge, 2 siding nails per 6 & 8 in. wide	0-15	100	100
			20	95	95
			40	85	85
			60	80	80
			0-15	110	110
		7 in. exposure 3 siding nails per 12 in. wide, 8 inches from butt edge, 2 siding nails per 6 & 8 in. wide	20	105	105
			40	95	95
			60	90	90
			0-15	110	110
6 in. exposure 3 siding nails per 12 in. wide, 7 inches from butt edge, 2 siding nails per 6 & 8 in. wide	20	110	110		
	40	110	110		
	60	105	105		
	100	70	70		

**Table 8C**  
**ICBO - 1997 Uniform Building Code**  
**ALLOWABLE BASIC WIND SPEEDS (MILES PER HOUR) FOR**  
**HARDIE® SHINGLESIDE® CLADDING EXTERIOR WALL FINISH**

Sheathing Type	Fastener Type	Weather Exposure and Fastener Location	Height of Building (feet)	Exposure Category	
				B	C
Minimum 7/16 inch thick OSB sheathing complying with DOC-PS 2-95	Min. 0.091 in. shank x 0.221 in. HD x 1-1/2 in. long corrosion resistant siding nail	8 in. exposure 3 siding nails per 12 in. wide, 9 in. from butt edge, 2 siding nails per 6 & 8 in. wide	0-15	110	85
			20	110	80
			40	100	75
			60	90	70
			100	80	70
		7 in. exposure 3 siding nails per 12 in. wide, 8 inches from butt edge, 2 siding nails per 6 & 8 in. wide	200	70	
			0-15	110	110
			20	110	105
			40	110	100
6 in. exposure 3 siding nails per 12 in. wide, 7 inches from butt edge, 2 siding nails per 6 & 8 in. wide	60	110	95		
	100	100	80		
	200	90	75		
	0-15	110	110		
		20	110	105	
		40	110	100	
		60	110	95	
		100	105	90	
		200	95	85	

**Notes to Tables 8A, 8B, and 8C:**

1. Table values are based on an importance factor of 1.0
2. 1 foot = 305 mm, 1 inch = 25.4 mm, 1 mph = 1.6 km/h

**Table 9A**  
**SBCCI - 1999 Standard Building Code**  
**Allowable Fastener Spacing (in.)**  
**Hardiplank Lap Siding fastened to ASTM C-90 Concrete Wall**

Height of Building (feet)	6-1/4 and 6 inch wide Hardiplank	7-1/2 inch wide Hardiplank	8-1/4 and 8 inch wide Hardiplank	9-1/2 inch wide Hardiplank
0-15	18.25	14.5	13.75	11.5
20	16.5	13.25	12.25	10.5
30	14.75	11.75	11	9.25
40	13.5	10.75	10.25	8.5
50	12.75	10.25	9.5	8
60	12.25	9.75	9	7.5

**Table 9B**  
**BOCA National Building Code/1999**  
**Allowable Fastener Spacing (in.)**  
**Hardiplank Lap Siding fastened to ASTM C-90 Concrete Wall**

Height of Building (feet)	6-1/4 and 6 inch wide Hardiplank		7-1/2 inch wide Hardiplank		8-1/4 and 8 inch wide Hardiplank		9-1/2 inch wide Hardiplank	
	Exposure B	Exposure C	Exposure B	Exposure C	Exposure B	Exposure C	Exposure B	Exposure C
0-15	24.0	15.0	24.0	12.0	24.0	11.25	20.25	9.5
20	24.0	13.75	23.0	11.0	21.5	10.25	18.25	8.75
40	21.0	11.25	16.75	9.0	15.75	8.5	13.25	7.25
60	17.75	10.0	14.25	8.0	13.25	7.5	11.25	6.25
100	14.0	8.75	11.25	7.0	10.5	6.5	8.75	5.5

**Table 9C**  
**ICBO - 1997 Uniform Building Code**  
**Allowable Fastener Spacing (in.)**  
**Hardiplank Lap Siding fastened to ASTM C-90 Concrete Wall**

Height of Building (feet)	6-1/4 and 6 inch wide Hardiplank		7-1/2 inch wide Hardiplank		8-1/4 and 8 inch wide Hardiplank		9-1/2 inch wide Hardiplank	
	Exposure B	Exposure C	Exposure B	Exposure C	Exposure B	Exposure C	Exposure B	Exposure C
0-15	24.0	14.25	19.25	11.25	18.0	10.5	15.25	9.0
20	22.5	13.25	18.0	10.5	16.75	9.75	14.25	8.25
40	17.75	11.5	14.25	9.25	13.5	8.5	11.25	7.25
60	15.75	10.5	12.75	8.5	11.75	8.0	10.0	6.75
100	13.25	9.25	10.5	7.5	9.75	7.0	8.25	5.75

**Notes to Table 9A, 9B, and 9C:**

1. Fasteners shall be ET&F Fastening Systems, Inc. Erico Stud nail, ET & F No. ASM-144-125, head dia. = 0.30 in., shank dia. = 0.14 in.
2. Maximum basic wind speed shall be 110 mph.
3. Exposure Category C (for Table 9A).
4. 1 inch = 25.4 mm, 1 foot = 305 mm.