ESR-1996
Issued August 1, 2006
This report is subject to re-examination in one year.

ICC Evaluation Service, Inc.
www.icc-es.org

Business/Regional Office ■ 5360 Workman Mill Road, Whittier, California 90601 ■ (562) 699-0543
Regional Office ■ 900 Montclair Road, Suite A, Birmingham, Alabama 35213 ■ (205) 599-9800
Regional Office ■ 4051 West Flossmoor Road, Country Club Hills, Illinois 60478 ■ (708) 799-2305

DIVISION: 07—THERMAL AND MOISTURE PROTECTION
Section: 07210—Building Insulation

REPORT HOLDER:

U.S. GREENFIBER, L.L.C.
2500 DISTRIBUTION STREET
CHARLOTTE, NORTH CAROLINA 28203
(800) 228-0024
greenfiber.info@us-gf.com
www.us-gf.com

EVALUATION SUBJECT:

COCOON AND COCOON 2 THERMAL AND SOUND INSULATION PRODUCTS

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2003 *International Building Code*® (IBC)
- 2003 *International Residential Code*® (IRC)
- BOCA® *National Building Code*/1999 (BNBC)
- 1997 *Uniform Building Code*™ (UBC)

Properties evaluated:

- Physical properties
- Thermal resistance
- Sound transmission
- Surface-burning characteristics
- Fireblocking
- Fire-resistance-rated construction
- Attic and crawl space installation

2.0 USES

Cocoon and Cocoon 2 Thermal and Sound Insulation Products are used as nonstructural thermal insulating materials in buildings of all types of construction. The insulation is for installation on or within floors, floor-ceiling or roof-ceiling assemblies, attics, crawl spaces, walls and partitions. The insulation is recognized for use as sound transmission control and fireblocking and in fire-resistance-rated construction.

3.0 DESCRIPTION

3.1 General:

Cocoon and Cocoon 2 Thermal and Sound Insulation Products consist of a uniform low-density mixture of cellulosic fibers and fire-retardant chemicals. The products have a flame-spread index of not more than 25 and a smoke-developed index of not more than 450 when tested in accordance with ASTM E 84 (UBC Standard 8-1). Density and thermal characteristics of the Cocoon and Cocoon 2 loose-fill and spray-applied insulations are given in Table 1 of this report.

3.2 Cocoon 2 Spray-applied Insulation:

Cocoon 2 is a spray-applied insulation used for exposed application as an interior finish on new or existing steel, wood, gypsum board, aluminum, masonry or concrete substrates; for concealed application within walls and partitions; or for exposed applications on horizontal or sloped attic floors. Cocoon 2 spray-applied insulation is used within walls and partitions at a density of between 2.5 and 3.0 lbs/ft^3 (40.1 and 48.1 kg/m^3) and is used on attic floors at a density of between 1.2 and 2 lbs/ft^3 (19.2 and 32.0 kg/m^3). The product is spray-applied with water to activate the dry adhesive in the fire-retardant-treated cellulose fibers.

3.3 Cocoon Loose-fill Insulation:

Cocoon is a loose-fill insulation used in concealed spaces of walls, partitions, and roof-ceiling or floor-ceiling assemblies; or is exposed on horizontal or sloped attic floors. Cocoon loose-fill insulation is used in enclosed spaces at a density of 3.0 to 4.0 lbs/ft^3 (48.1 to 64.1 kg/m^3), and is installed on exposed surfaces at a density of between 1.2 and 2.0 lbs/ft^3 (19.2 and 32.0 kg/m^3).

4.0 INSTALLATION

4.1 General:

Installation of the Cocoon and Cocoon 2 Thermal and Sound Insulation products is to comply with ASTM C 1015, this report and the manufacturer's published installation instructions.

When installation is above or adjacent to recessed luminaires (lighting fixtures) or other heat-producing elements, a permanent barrier is necessary to maintain a 3-inch (76 mm) clearance between the item and the insulation, unless the recessed luminaire is identified as Type IC and is listed in accordance with the applicable code for direct contact with insulation, or the heat-producing element is listed for zero clearance to combustibles. The insulation is limited to areas where the temperature will not exceed 194°F (90°C).

The code official may require an approved vapor retarder to be installed in accordance with IBC Section 1403.3, IRC Section R318.1, UBC Section 1403.3 or BNBC Section 1404.3, as applicable. Attic vents are not to be blocked by the application of the Cocoon or Cocoon 2 insulation.

4.2 Spray-applied Insulation:

All surfaces that are to receive the Cocoon 2 spray-applied insulation material are to be clean, dry and free from dust, grease, oil, rust and other agents tending to reduce bonding qualities. Before enclosing in walls, the insulation is to be dry

for a minimum of 24 hours and the moisture content is to be 25 percent or lower. Cocoon 2 spray-applied insulation may be applied to sloped attic floors, regardless of slope. The insulation is sprayed into its final position using a pneumatic device. A fine water mist is mixed with the insulation as it passes through a specially designed nozzle that activates a dry adhesive component in the insulation.

4.3 Loose-fill Insulation:

Cocoon loose-fill insulation is installed into its final position using a pneumatic device. The insulation may be applied to sloped attic floors having a maximum slope of 5:12 (41.7 percent slope).

4.4 Fireblocking:

Cocoon and Cocoon 2 insulations are permitted to be used as fireblocking in accordance with IBC Section 717.2.1, BNBC Section 721.2 or UBC Section 708.2.1, Item 1, and are permitted to be used as alternates to the fireblocking required in IRC Section R602.8.1.

Cocoon and Cocoon 2 insulations may be placed in new or existing wood or steel stud walls and partitions of combustible construction with stud spacing up to 24 inches (610 mm) on center. When the walls and partitions have insulation in the spaces between the studs, access holes measuring from 1 inch in diameter (25.4 mm) to 6 inches (152 mm) square are cut in the wall covering at each space between studs, and the plugs are removed. The existing insulation is cut and pushed away to form a minimum 16-inch-deep (406 mm) space. Cocoon 2 spray-applied or Cocoon loose-fill insulation, as applicable, is then installed into the open space, filling the full 16-inch (406 mm) (or greater) depth and contacting all surfaces. After installation has been completed, the plugs are replaced and the wall covering is repaired.

When there is no insulation in the wall or partition, Cocoon 2 spray-applied insulation is to fill the stud space to a minimum depth of 16 inches (406 mm).

4.5 Sound Transmission:

The following wall assemblies have a Sound Transmission Class (STC) of 50 or greater:

4.5.1 Wood Stud Wall: The assembly consists of nominally 2-by-4 wood studs, spaced at 16 inches (406 mm) on center. One layer of $^5/_8$-inch-thick (15.9 mm), Type X gypsum board is attached vertically to the studs on one face of the wall with minimum $1^5/_8$-inch-long (41 mm), Type S screws spaced at 8 inches (203 mm) on center along board edges and intermediate studs. On the opposite face of the wall, minimum No. 25 gage resilient channels, spaced at 24 inches (610 mm) on center, are attached horizontally to the studs and the top and bottom plates with minimum $1^5/_8$-inch-long (41 mm), Type S screws. One layer of $^5/_8$-inch-thick (15.9 mm), Type X gypsum board is installed vertically and attached to the resilient channels with minimum 1-inch-long (25.4 mm), Type S screws at each resilient channel and at 8 inches (203 mm) along the top and bottom edges. The cavities are filled with Cocoon 2 spray-applied insulation, as described in Section 4.1 of this report. Gypsum board joints and screw heads are taped and sealed with joint compound, in accordance with C 840 or GA 216.

4.5.2 Double Wood Stud Wall, Assembly No. 1: The double wood stud wall assembly consists of two rows of nominally 2-by-4 wood studs on a nominally 2-by-6 wood plate. The studs on each side of the wall are spaced at 16 inches (406 mm) on center and are staggered from the studs on the opposite side. One layer of $^5/_8$-inch-thick (15.9 mm), Type X gypsum board is attached vertically to the exterior faces of the studs on both sides of the wall with minimum $1^5/_8$-inch-long (41 mm), Type S screws, spaced at 8 inches (203 mm) on center along board edges and intermediate studs. The stud cavities are filled with Cocoon 2 spray-applied insulation, as described in Section 4.1 of this report. Gypsum board joints and screw heads are taped and sealed with joint compound, in accordance with C 840 or GA 216.

4.5.3 Double Wood Stud Wall, Assembly No. 2: The wall assembly consists of two nominally 2-by-4 wood studs on two nominally 2-by-4 wood sill plates separated by a 1-inch-thick (25.4 mm) air gap between them. Studs are spaced at 16 inches (406 mm) on center. One layer of $^5/_8$-inch-thick (15.9 mm), Type X gypsum board is attached vertically to both exterior faces of the wall with $1^5/_8$-inch-long (41 mm), Type S screws spaced at 8 inches (203 mm) on center along board edges and intermediate studs. The cavity of the wall assembly is filled with Cocoon 2 spray-applied insulation, as described in Section 4.1 of this report. Gypsum board joints and screw heads are taped and sealed with joint compound, in accordance with C 840 or GA 216.

4.5.4 Steel Stud Wall, Assembly No. 1: Minimum No. 25 gage [0.018 inch thick (0.46 mm)] steel studs, $3^5/_8$ inches (92 mm) deep, complying with the applicable code, are spaced at 24 inches (610 mm) on center. One layer of $^5/_8$-inch-thick (15.9 mm), Type X gypsum board is attached vertically to both faces of the studs with minimum 1-inch-long (25.4 mm), Type S screws spaced at 12 inches (305 mm) on center along board edges and intermediate studs. The stud cavities are filled with Cocoon 2 spray-applied insulation, as described in Section 4.1 of this report. Gypsum board joints and screw heads are taped and sealed with joint compound, in accordance with C 840 or GA 216.

4.5.5 Steel Stud Wall, Assembly No. 2: Minimum No. 25 gage [0.018 inch thick (0.46 mm)] steel studs, $3^5/_8$ inches (92 mm) deep, complying with the applicable code, are spaced at 24 inches (610 mm) on center along board edges and intermediate studs. One layer of $^5/_8$-inch-thick (15.9 mm), Type X gypsum board is attached vertically to one face of the studs with minimum 1-inch-long (25.4 mm), Type S screws spaced at 12 inches (305 mm) on center. On the opposite face, minimum No. 25 gage resilient channels, spaced at 24 inches (610 mm) on center, are attached horizontally to the studs and the top and bottom plates with Type S screws of sufficient length to penetrate the studs a minimum of $^1/_4$ inch (6.4 mm). A double layer of $^5/_8$-inch-thick (15.9 mm), Type X gypsum board is attached to the resilient channels. The base layer is attached horizontally to the resilient channels with Type S screws spaced at 24 inches (610 mm) on center. The face layer is attached vertically to the resilient channels with Type S screws spaced at 12 inches (305 mm) on center. Screws are to have sufficient length to penetrate the studs a minimum of $^1/_4$ inch (6.4 mm). The stud cavities are filled with Cocoon 2 spray-applied insulation, as described in Section 4.1 of this report. Gypsum board joints and screw heads are taped and sealed with joint compound, in accordance with C 840 or GA 216.

4.5.6 Steel Stud Wall, Assembly No. 3: Minimum No. 25 gage [0.018 inch thick (0.46 mm)], $2^1/_2$-inch-deep (64 mm) steel studs are spaced at 16 inches (406 mm) on center. One layer of $^5/_8$-inch-thick (15.9 mm), Type X gypsum board is attached to both faces of the wall with minimum 1-inch-long (25.4 mm), Type S screws spaced at 12 inches (305 mm) on center. The stud cavities are filled with Cocoon insulation, as described in Section 4.1 of this report. Gypsum board joints and screw heads are taped and sealed with joint compound, in accordance with C 840 or GA 216.

4.6 Fire-resistance-rated Wall Construction:

4.6.1 General: Cocoon 2 spray-applied insulation is permitted to be installed in stud cavities of fire-resistance-rated wood or steel stud wall assemblies incorporating

gypsum board or gypsum sheathing described in IBC Table 720.1(2) or UBC Table 7-B without affecting the hourly rating. Time assigned for additional protection of wood-stud walls is 15 minutes when calculating fire resistance in accordance with IBC Section 721.2.1.4(2) or UBC Standard 7-7, Section 7.724.

Steel electrical boxes on opposite sides of the wall are to be separated by a horizontal distance not less than the depth of the studs, in accordance with exception 1 of IBC Section 712.3.2, when the wall cavity is filled with Cocoon 2 insulation, as described in Section 4.1 of this report.

4.6.2 One-hour Fire-resistance-rated Nonload-bearing Steel Stud Wall Partition: The wall assembly consists of minimum No. 25 gage [0.018 inch thick (0.46 mm)], $2^1/_2$- or $3^5/_8$-inch-deep (64 mm or 92 mm) steel studs spaced at 24 inches (610 mm) on center. One layer of $^5/_8$-inch-thick (15.9 mm), Type X gypsum board is attached to both sides of the studs with $1^5/_8$-inch-long (92 mm), Type S screws spaced at 12 inches (305 mm) on center. The stud cavity is filled with Cocoon 2 spray-applied insulation, as described in Section 4.1 of this report. Gypsum board joints and screws are taped and sealed with joint compound, in accordance with C 840 or GA 216.

5.0 CONDITIONS OF USE

The Cocoon and Cocoon 2 Thermal and Sound Insulation Products described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

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

5.2 The insulation, when installed in accordance with Section 4.6 of this report, is permitted to be installed in the fire-resistance-rated assemblies described in this report.

5.3 The insulation is permitted to be installed in noncombustible construction without affecting the noncombustible recognition.

5.4 The installer must provide the code official a signed and dated statement describing the type of insulation installed, including thickness, coverage area *R*-value and number of bags or pounds of insulation installed.

5.5 Cocoon and Cocoon 2 Thermal and Sound Insulation products are manufactured by U.S. GreenFiber, L.L.C., at their manufacturing plants located in Phoenix, Arizona; Sacramento, California; Denver, Colorado; Tampa, Florida; Lithia Springs, Georgia; East St. Louis, Illinois; Norfolk, Nebraska; Hagaman, New York; Charlotte, North Carolina; Delphos, Ohio; Waco, Texas; Salt Lake City, Utah; and Elkwood, Virginia.

6.0 EVIDENCE SUBMITTED

6.1 Manufacturer's published installation instructions.

6.2 Reports of tests in accordance with ASTM C 518; ASTM E 84 (UBC Standard 8-1); ASTM E 90; ASTM E 119 (UBC Standard 7-1); ASTM E 413; CPSC 16 CFR, Parts 1209 and 1404; and fire-resistance comparison tests of fireblocking.

6.3 A quality control manual.

7.0 IDENTIFICATION

Each package containing the Cocoon or Cocoon 2 Thermal and Sound Insulation products described in this report is identified by a stamp bearing the manufacturer's name (U.S. GreenFiber, L.L.C.), the product name, the address of the manufacturing plant, the date of manufacture and the evaluation report number (ESR-1996). Additionally, each package must bear a label with information required by CPSC 16 CFR, Parts 1209 and 1404.

TABLE 1—THERMAL PROPERTIES OF COCOON INSULATION

INSULATION TYPE AND LOCATION	NOMINAL DENSITY (pcf)	THERMAL CONDUCTIVITY *k*-VALUE (Btu-in./hr.·sq. ft.·°F)	*R*-VALUE (per inch of thickness)
Cocoon 2 spray-applied[1]			
Walls	2.7	0.27	3.7
Ceilings	1.6	0.27	3.7
Cocoon loose-fill[2]			
Walls	3.5	0.28	3.6
Ceilings	1.6	0.27	3.7

For **SI:** 1 pcf = 16.018 kg/m^3; 1 Btu-in./hr.-sq. ft.-°F = 0.1442 W/m · k; 1 inch = 25.4 mm.

[1]Water is field-mixed with the dry insulation fibers at the nozzle of the spray equipment.
[2]Densities noted in the table are the settled densities.