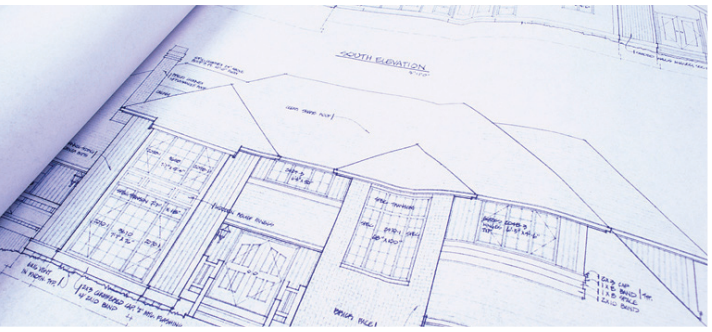
An Architectural Guide to

PREMIUM BUILDING INSULATION

NU-WOOL®
PREMIUM CELLULOSE INSULATION
GREEN Since 1949



PREMIUM SOUND CONTROL :: LONGER FIRE PROTECTION :: NATURALLY GREEN PRODUCT

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NU-WOOL®
PREMIUM CELLULOSE INSULATION
GREEN Since 1949

Nu-Wool® Premium Cellulose Insulation

This binder contains the information you need to easily specify our insulation product in your projects. This book attempts to cover all the issues that architects and other specifiers have about the product based on our surveys. However, there may be new issues and applications that have not been addressed and you are encouraged to call the Technical Services Department at Nu-Wool Co., Inc. to have those questions answered.

Nu-Wool Premium Cellulose Insulation makes your building more efficient, healthy and quieter. The recycled content of Nu-Wool Premium Cellulose Insulation is 86%, with 65% of that being post-consumer recycled newspaper. This helps our environment and also helps make your project “Greener.”

Visit us on the web at nuwool.com to learn more about this product. To contact the Technical Services Department, call 800-748-0128. If you would like one of our knowledgeable staff to present an AIA Accredited Learning Event at your facility, please call our toll free number.

THE AMERICAN INSTITUTE OF ARCHITECTS

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November 2017

Product Guide Specification

Specifier Notes: This product guide specification is written according to the Construction Specifications Institute (CSI) 3-Part Format, including *MasterFormat, SectionFormat,* and *PageFormat,* as described in *The Project Resource Manual.*

This section must be carefully reviewed and edited by the Architect to meet the requirements of the project and local building code. Coordinate this section with other specification sections and the Drawings. Delete all "Specifier Notes" after editing this section.

SECTION 07210 (07 21 00)

THERMAL INSULATION

Specifier Notes: This section covers Nu-Wool® Company, Inc. Nu-Wool® Premium Cellulose Insulation pneumatically blown dry into attics and floor assemblies and pneumatically sprayed damp into open wall cavities. Consult Nu-Wool Company, Inc. for assistance in editing this section for the specific application.

Nu-Wool Premium Cellulose Insulation may contribute points toward LEED™ certification. Consult Nu-Wool Company, Inc. for more information.

PART 1 GENERAL

1.1 SECTION INCLUDES

Specifier Notes: Edit the following paragraph for the specific application.

A. Cellulose Insulation:
   1. Pneumatically blown dry into open and enclosed building assemblies.
   2. Pneumatically sprayed damp into open wall cavities: Nu-Wool Premium Cellulose Insulation installed using the WALLSEAL system.

1.2 REFERENCE STANDARDS

Specifier Notes: List reference standards mentioned in this section, complete with designations and titles. Delete reference standards not included in this edited section. This article does not require compliance with reference standards, but is merely a listing of those used.

A. ASTM C 739 – Standard Specification for Cellulosic Fiber Loose-Fill Thermal Insulation.

B. ASTM E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials.

C. ASTM E 119 – Standard Test Methods for Fire Tests of Building Construction and Materials.

D. CPSC Standard 16 CFR Parts 1209 and 1404.

E. UL 723 – Standard for Test for Surface Burning Characteristics of Building Materials.

1.3 SUBMITTALS

Specifier Notes: Edit submittal requirements as required. Delete submittals not required.

A. Product Data: Submit manufacturer's product data.

B. Manufacturer's Certification: Submit manufacturer's certification that materials comply with specified requirements and are suitable for intended application.

C. Warranty Documentation: Submit manufacturer's standard warranty.

1.4 QUALITY ASSURANCE

A. Installer's Qualifications:
   1. Installer regularly engaged, for past 1 year, in installation of cellulose insulation of similar type to that specified.
   2. Employ persons trained for installation of cellulose insulation.
   3. Installer: Certified by cellulose insulation manufacturer.
   4. Installer's Equipment: Approved by cellulose insulation manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage and Handling Requirements:
   1. Store and handle materials in accordance with manufacturer's instructions.
   2. Keep materials in manufacturer's original, unopened containers and packaging until installation.
   3. Store materials in clean, dry area indoors.
   4. Protect materials during storage, handling, and installation to prevent damage.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Nu-Wool Company, Inc., 2472 Port Sheldon Street, Jenison, Michigan 49428. Toll Free (800) 748-0128. Phone (616) 669-0100. Fax (616) 669-2370. Website www.nuwool.com. E-mail info@nuwool.com.

2.2 THERMAL INSULATION

Specifier Notes: Nu-Wool Premium Cellulose Insulation is used for both methods of installation – pneumatically blown dry into building assemblies and pneumatically sprayed damp into open wall cavities.

A. Cellulose Insulation:
   1. Pneumatically Blown Dry into Attics and Floor Assemblies: Nu-Wool Premium Cellulose Insulation.
   2. Pneumatically Sprayed Damp into Open Wall Cavities: Nu-Wool WALLSEAL Insulation.

B. Material Description:
   1. Manufactured from recycled newspapers.
   2. Post-Consumer Recycled Content: 85 percent minimum.
   3. Fibers: Treated with boric acid and sodium polyborate additives to create permanent flame resistance.
   4. Fungicide Additive:
      a. EPA registered.
      b. Makes insulation resistant to mold growth.

C. Compliance:
   1. UL classified R-8078.
   2. CPSC Standard 16 CFR Parts 1209 and 1404.
   3. ASTM C 739.
   4. ASTM E 119: Firewalls U382, U369a, U369b, U360.
   5. ES Report ESR-2217.

D. Test Results:
   1. Settled Density:
      a. Maximum density after long-term settling of dry installation: 1.6 lbs per cu ft.
   2. Thermal Resistance:
      a. Average thermal resistance (R-value) per inch: 3.8.
   3. Flammability Characteristics:
      a. Critical Radiant Flux: 0.12 W/cm^2 minimum.
      b. Smoldering Combustion: No evidence of flaming and weight loss of 15.0 percent maximum.
   4. Moisture Vapor Sorption:
      a. Moisture Gain in Insulation: 15 percent maximum by weight.

5. Environmental Characteristics:
   a. When in contact with steel, copper, aluminum, or galvanized materials: Non-corrosive.
   b. Does not support fungal growth.
6. Surface Burning Characteristics, ASTM E 84 and UL 723: Nu-Wool Premium Cellulose Insulation.
   a. Flame Spread Index: 15.
   b. Smoke Developed Index: 5.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas to receive cellulose insulation.

B. Notify Architect of conditions that would adversely affect installation or subsequent use.

C. Do not begin installation until unacceptable conditions are corrected.

3.2 PREPARATION

A. Protection of In-Place Conditions:
   1. Protect adjacent surfaces, electrical boxes, open pipes, and register openings in accordance with manufacturer's instructions.
   2. Protect adjacent surfaces from contact with pneumatically blown dry or pneumatically sprayed damp cellulose insulation.
   3. Prevent cellulose insulation from plugging soffit vents in attics.

B. Preparation: Ensure mechanical, plumbing, electrical, and other utility installations have been completed before installation of cellulose insulation.

3.3 INSTALLATION

A. Install cellulose insulation in accordance with manufacturer's instructions at locations indicated on the Drawings.

B. Install cellulose insulation to uniform density without voids, gaps, or air pockets.

C. Install cellulose insulation to density and depth to achieve required R-values.

D. Pneumatically Blown Dry Cellulose Insulation:
   1. Pneumatically blow cellulose insulation after mechanical, plumbing, electrical, and other utility installations have been completed.
   2. Ensure heat-producing devices in attics have barriers constructed around them to prevent contact with cellulose insulation.
   3. Install cellulose insulation to a density of 1.6 to 3.5 lbs. per cu. ft.

E. Pneumatically Sprayed Damp Cellulose Insulation:
   1. Pneumatically spray cellulose insulation with controlled water fog for adhesion into open wall cavities after mechanical, plumbing, electrical, and other utility installations have been completed.
   2. Install cellulose insulation to a density of 3.0 to 3.5 lbs. per cu. ft to prevent settling in wall cavities.
   3. Use quantity of water in installation to ensure proper adhesion into wall cavities and proper density.

Specifier Notes: Insert the section number in the following sentence.

   4. Install gypsum board to 2-by-4 walls as specified in Section _____ a minimum of 24 hours after installation of pneumatically sprayed damp cellulose insulation.

3.4 PROTECTION

A. Protect installed cellulose insulation from damage during construction.

END OF SECTION

Product Specification

1. PRODUCT NAME

Nu-Wool Premium Cellulose Insulation and WALLSEAL are registered trademarks for Nu-Wool Co., Inc.

2. MANUFACTURER

Established in 1949, Nu-Wool Co., Inc. manufactures environmentally friendly cellulose insulation materials. Its production facility is located at 2472 Port Sheldon St, Jenison, MI 49428. Contact by phone at 800-748-0128 or email at rdevries@nuwool.com.

3. PRODUCT DESCRIPTION

Nu-Wool Premium Cellulose Insulation is an energy saving insulation made from recycled paper (primarily newspaper) and is packaged in 50 square feet @ R-19 bags. Nu-Wool Premium Cellulose Insulation, with its superior thermal (3.8 R-Value per inch) and air infiltration properties, is installed in walls, attics and floors of residential and commercial buildings by factory trained installers. This environmentally friendly, “green” insulation provides savings* on energy bills when compared to fiberglass insulation materials. Nu-Wool Premium Cellulose Insulation is the longest running UL Classified product in the cellulose insulation industry. Nu-Wool Premium Cellulose Insulation uses borate chemicals as fire retardants, and also contains an EPA registered fungicide making it resistant to the growth of mold.

Using the Nu-Wool WALLSEAL System, Nu-Wool Premium Cellulose Insulation is installed in wall cavities forming a seamless bond that insures the correct density to prevent settling while making the wall resistant to air movement and achieving maximum thermal performance.

Nu-Wool Premium Cellulose Insulation is applied with air to open attic spaces at a density of 1.4 pounds per cubic foot. The manufacturers’ coverage chart reflects the settling after application in open blow situations.

4. TECHNICAL DATA

4.1 All cellulose insulation must conform to the CPSC standard 16 CFR Part 1209 and 1404. Nu-Wool also meets ASTM C-739. Also refer to UL R-8078 and R-13173.

4.2 Density is measured using ASTM C-739 standards and is 1.6 lb/ft^3.

4.3 Thermal resistance was measured by test method ASTM C-518 (4 in. thick) and is 3.8 (R-value/in.)

4.4 Surface Burning Characteristics: Surface burning characteristics are determined using two methods. Critical radiant flux using test method ASTM E 970 and ASTM E 84. ASTM E 970 Greater than 0.12 watts/ cm2 ASTM E 84 Less than 25, Class 1

4.5 Moisture Vapor Sorption: Nu-Wool meets the requirements of ASTM C 739 of less than 15% maximum weight gain under test conditions. Variations in relative humidity will not affect the thermal properties of the insulation.

4.6 Corrosiveness: Nu-Wool is tested for contact against copper, steel and aluminum under the test conditions of ASTM C 739 and is not corrosive to these metals.

4.7 Building Codes: Nu-Wool meets all the current building codes.

4.8 Sound Transmission Loss (STC) Ratings: Nu-Wool has been tested for numerous wall assemblies at Riverbank Laboratories using ASTM E 90. Specific wall assemblies are listed in this book.

4.9 Other Test Properties: Under ASTM C 739, there are tests for fungi resistance, odor and smolder resistance.

*Savings vary. Find out why in the seller's fact sheet on R-values. Higher R-values mean greater insulating power.

UL Evaluation Report

UL ER8078-01

Issued: May 14, 2015

Visit UL's On-Line Certifications Directory: www.ul.com/erdirectory for current status of report.

UL Category Code: ULEX

CSI MasterFormat®

DIVISION: 07 00 00 – THERMAL AND MOISTURE PROTECTION
Sub-level 2: 07 20 00 – Thermal Protection
Sub-level 3: 07 21 00 – Thermal Insulation
Sub-level 4: 07 21 23 – Loose Fill Insulation
Sub-level 4: 07 21 26 – Blown Insulation

COMPANY:

Nu- Wool Company Inc.
2472 Port Sheldon St
Jenison, MI 49428
(800) 748-0128
www.nuwool.com

1. SUBJECT:

NU-WOOL PREMIUM CELLULOSE INSULATION, NU-WOOL ENERGY CARE CELLULOSE INSULATION AND NU-WOOL WALLSEAL FIRE & SOUND INSULATION

Throughout this report, the reference to Nu-Wool Insulation will apply to all products described above, except where indicated otherwise, and except for Nu-Wool Wallseal Fire & Sound Insulation.

2. SCOPE OF EVALUATION

- 2015, 2012 and 2009 *International Building Code* ® (IBC)
- 2015, 2012 and 2009 *International Residential Code* ® (IRC)
- 2015, 2012 and 2009 *International Energy Conservation Code* ® (IECC)
- 2015, 2012, and 2009 *International Mechanical Code* ® (IMC)
- NFPA 70 National Electric Code ®, 2014 Edition
- ICC-ES Acceptance Criteria for Quality Documentation (AC10), dated June 2014

The products were evaluated for the following properties:

- Surface Burning Characteristics (ANSI/UL723, ASTM E84)
- Physical Properties (ASTM C739)
- Thermal Resistance (ASTM C739, ASTM C518)
- Sound Transmission (ASTM E90, ASTM E413)
- Fireblocking
- Fire-Resistance Rated Construction (ANSI/UL263)
- Ignition Barrier – Attics
- Attic and crawlspace applications

3. REFERENCED DOCUMENTS

- ANSI/UL723, 10th Ed. (ASTM E84), Test for Surface Burning Characteristics of Building Materials
- ANSI/UL263, 14th Ed. (ASTM E119), Fire Test of Building Construction and Materials
- ASTM C739-11, Standard Specification for Cellulosic Fiber Loose Fill Thermal Insulation
- ASTM C518-10, Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
- ASTM C1015-06, Standard Practice for Installation of Cellulosic and Mineral Fiber Loose Fill Thermal Insulation
- ASTM E90-09, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
- ASTM E413-10, Classification for Rating Sound Insulation
- ASTM C840-13, Standard Specification for Application and Finishing of Gypsum Board
- CPSC 16 CFR Part 1209 (2002), Interim Safety Standard for Cellulose Insulation
- CPSC 16 CFR Part 1404 (2002), Cellulose Insulation
- ICC-ES Acceptance Criteria for Quality Documentation (AC10), dated June 2014

4. USES

Nu-Wool Insulation is used as nonstructural thermal insulating material in buildings of all types of construction. The insulation is for use as an interior finish on or within floors, floor-ceiling or roof-ceiling assemblies, attics, crawl spaces, walls and partitions. See Sections 5 and 6 for specific applications for each product. The insulation is recognized for use in sound transmission assemblies, as fire blocking material, in both non-fire-resistance rated construction and fire-resistance rated construction in accordance with Section 703 of the 2015, 2012, or 2009 IBC, and as an ignition barrier over foam plastic in accordance with Section R316.5.3 of the 2015, 2012, or 2009 IRC.

Nu-Wool Wallseal Fire & Sound Insulation is for use in specific fire-resistance rated construction in accordance with Section 703 of the 2015, 2012, or 2009 IBC, as described in Section 6.10.

5. PRODUCT DESCRIPTION

5.1 General:

Nu-Wool Insulation consists of a uniform low density mixture of recycled cellulosic fibers and borate-based fire retardant chemicals. Product application methods include wall spray (spray-applied), loose fill, and dry dense-pack, as described in Section 6. Spray-applied applications are applied with water. Loose fill and dry dense-pack applications are applied without water. Fire-blocking, and fire-resistance rated applications are non-thermal insulation applications for use in various structures.

Nu-Wool Wallseal Fire & Sound Insulation is a spray-applied, uniform, low density mixture of recycled cellulosic fibers and borate-based fire retardant chemicals.

5.2 Surface Burning Characteristics

The products meet the requirements of CPSC 16 CFR Part 1209 and have a flame spread index of not more than 25, and a smoke developed index of not more than 50 when tested in accordance with ANSI/UL 723 (ASTM E84) in accordance with the requirements set forth in Section 720 of the 2015 or 2012 IBC (Section 719 of the 2009 code) and Section 302.10 of the 2015, 2012, or 2009 IRC.

5.3 ASTM C739 Properties

Nu-Wool insulation has a thermal resistance R-value of 3.8 F-ft^2-h/Btu at a nominal density of 1.6 lb/ft^3 when tested in accordance with ASTM C739 and C518, at a mean sample temperature of 75°F. In addition, the insulation has been evaluated in accordance with ASTM C739 for the following properties:

Property	Tested in Accordance with
Settled Density	ASTM C739 / CPSC 16 CFR 1209
Smoldering Combustion	ASTM C739 / CPSC 16 CFR 1209
Odor Emission	ASTM C739 / ASTM C1304
Critical Radiant Flux	ASTM C739 / ASTM E970 / CPSC 16 CFR 1209
Corrosiveness	ASTM C739 / CPSC 16 CFR 1209
Fungi Resistance	ASTM C739 / ASTM C1338
Moisture Vapor Sorption	ASTM C739

5.4 Sound Transmission:

The products described in this section have been evaluated in accordance with ASTM E90 and ASTM E413 for use as part of the Sound Transmission Rated Assemblies as summarized below:

Product	In accordance with	UL Design Assembly	STC rating
Nu-Wool Insulation	ASTM E90 ASTM E413	U360	50 or greater
Nu-Wool Wallseal Fire & Sound Insulation	ASTM E90 ASTM E413	U382	50 or greater

Refer to the UL Fire Resistance Directory, File R8078 (CCAZ), for details of the sound assemblies above.

6. INSTALLATION

6.1 General:

Installation of Nu-Wool Insulation and Nu-Wool Wallseal Fire & Sound Insulation must comply with ASTM C1015, as applicable, this report, and the manufacturer's published installation instructions.

Installation must be in accordance with CPSC 16 CFR 1404, Section E4004 of the 2015, 2012, or 2009 IRC, and NFPA 70 (NEC) 410.116 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) in accordance with Section E4003.2 of the 2015, 2012, or 2009 IRC.

When Nu-Wool Insulation or Nu-Wool Wallseal Fire & Sound Insulation is installed within a plenum, the installation must be in accordance with Section 602.2.1 of the 2015, 2012, or 2009 IMC. Installation is not permitted in the area from the exit of the cooling coil to the downstream end of the drain pan, in accordance with Section 604.13 of the 2015, 2012, or 2009 IMC.

The code official may require an approved vapor retarder to be installed in accordance with Section 1405.3 of the 2015, 2012, or 2009 IBD, Section R702.7 of the 2015 or 2012 IRC, Section R601.3 of the 2009 IRC, or Section 402.1.1 of the 2015 IECC. Protection against condensation in exterior wall assemblies must be provided in accordance with these sections of the code.

Attic ventilation, when required by the code, must not be blocked by the application of the insulation when installed in accordance with Section R806.3 of the 2015, 2012, or 2009 IRC.

6.2 Wall Spray (Spray-Applied):

Nu-Wool Insulation may be used in spray-applied, exposed applications as an interior finish and in concealed applications within walls and partitions at a density of between 3 and 4.6 lbs/ft^3 (43.2 and 73.7 kg/m^3).

Before enclosing spray applied Nu-Wool insulation in walls, the insulation must be left uncovered for a minimum of 24 hours.

Spray-applied Nu-Wool insulation must be installed in accordance with the manufacturer's detailed instructions, published by Nu-Wool, Co. Inc.

Nu-Wool Wallseal Fire & Sound Insulation is a spray-applied, uniform, low density mixture of recycled cellulosic fibers and borate based fire retardant chemicals used for UL fire wall design designation U382. The product is spray-applied with water at a minimum density of 4.58 lbs/ft^3 (73.4 kg/m^3), and is assembly specific.

Before enclosing Nu-Wool Wallseal Fire & Sound Insulation in walls, the insulation must be left uncovered for a minimum of 24 hours.

6.3 Loose Fill:

Nu-Wool Insulation is used for exposed loose fill applications on horizontal or sloped attic floors at a density of between 1.5 and 3.0 lbs/ft^3 (19.2 and 48.0 kg/m^3) when installed in accordance with Section R806.3 of the 2015, 2009, or 2009 IRC.

Nu-Wool 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).

Loose fill Nu-Wool Insulation applications must be installed in accordance with the manufacturer's detailed instructions, published by Nu-Wool Co., Inc.

6.4 Dry Dense-Pack:

Nu-Wool Insulation is used in dry dense-pack applications for concealed spaces of walls, partitions, and roof-ceiling or floor-ceiling assemblies. Dry dense-pack products are installed at a density of between 3.5 and 5.0 lbs/ft^3 (56.1 and 80.0 kg/m^3) when installed in accordance with Section R806.5 of the 2015 or 2012 IRC or Section R806.4 of the 2009 IRC, as applicable.

Dry dense-pack installation requires pneumatic application of the product in closed or netted cavities.
Nu-Wool Insulation installed in dry dense-pack applications must be installed in accordance with the manufacturer's detailed instructions, published by Nu-Wool Co., Inc.

6.5 Installation Directly Beneath the Roof:

Nu-Wool Insulation may be installed beneath the roof deck when installed in accordance with Section R806.5 of the 2015 or 2012 IRC, or Section R806.4 of the 2009 IRC, for the following applications using the dry dense-pack methodology:

- **Exposed Roof Decks and Roof Framing Members:**

  May be installed beneath exposed roof decks when dry dense-packed behind netting at a minimum density of 3.5 lbs/ft^3. Climate Zones 2B and 3B do not require an air impermeable insulation layer to the roof deck per Section R806.5 of the IRC. The use of Nu-Wool products in cathedralized attics outside of Zones 2B and 3B needs to be reviewed by a hygric / thermal analysis evaluation tool, such as WUFI (Wärme und Feuchtetransport Instationär, or Transient Heat and Moisture Transport), to determine the need for air barriers on the exposed side of the insulation.

- **Enclosed Rafter Spaces (Insulated Cathedral Ceilings):**

  Insulated cathedral ceilings are rafter spaces, formed where ceilings are applied directly to the underside of the roof framing members, which fully encapsulate the thermal insulation on all sides. In applications with vented rafter spaces, Nu-Wool insulation is dry dense-packed to a density of 3.5 to 5.0 lbs/ft^3 (56.1 to 80.0 kg/m^3) and installed in accordance with Section 1203.2 of the 2015, 2012, or 2009 IBC and Section R806.5 of the 2015 or 2012 IRC or Section R806.4 of the 2009 IRC, as applicable.

  In applications with unvented rafter spaces, Nu-Wool Insulation may be dry dense-packed over an air impermeable insulation in accordance with Section R806.5 of the 2015 or 2012 IRC or Section R806.4 of the 2009 IRC, as applicable**.** The air impermeable insulation must be of a thickness necessary to comply with the R-Value specified in Table R806.5 of the 2015 or 2012 IRC or Table R806.4 of the 2009 IRC, as applicable.

6.6 Metal Construction:

Nu-Wool Insulation may be used in construction using metal studs, metal buildings, or any construction in which Nu-Wool Insulation will be in contact with metal structural or sheathing members.

6.7 Crawl Spaces:

Nu-Wool Insulation can be applied to foundation walls in unvented crawl spaces. Nu-Wool Insulation may be used as floor / ceiling insulation over a crawl space.

6.8 Fireblocking:

Nu-Wool Insulation may be used as fireblocking materials in accordance with Section 718.2.1 of the 2015 or 2012 IBC, Section 717.2.1 of the 2009 IBC, Sections R302.11.1 and R602.8 of the 2015, 2012 or 2009 IRC, and may be used as alternatives to the fireblocking materials required in Section R302.11.1 of the 2015, 2012 or 2009 IRC.

The insulation may be placed in concealed spaces of 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 existing insulation in the spaces between the studs, access holes measuring from 1 inch (25.4 mm) in diameter 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 space with a minimum height of 16-inches (406 mm) above the floor level. Nu-Wool Insulation is then installed into the open space, filling from the floor a full 16-inch (406 mm) (or greater) height, and contacting all surfaces. After installation has been completed, the plugs are replaced and the wall covering is repaired with tape and joint compound in accordance with ASTM C840 or GA 216.

When there is no insulation in the wall or partition, insulation must completely fill the stud cavity to a minimum depth of 16 inches (406 mm).

6.9 Installation in Attics when used as a Prescribed Ignition Barrier:

Nu-Wool Insulation may be used as an ignition barrier over foam plastics on attic floors in accordance with Section R316.5.3 of the 2015, 2012, or 2009 IRC, when applied at a minimum thickness of 1-1/2 inches (38.1 mm) and a minimum installed density of 1.6 lbs/ft^3 (25.6 kg/m^3).

6.10 Fire-Resistance:

6.10.1 Calculated Fire-Resistance

The fire-resistance rating of wood-stud walls is increased by 15 minutes when calculating fire-resistance in accordance with Table 722.6.2(5) of the 2015 or 2012 IBC, or Table 721.6.2(5) of the 2009 IBC, when the spaces between wood studs are completely filled with Nu-Wool Insulation having a nominal density not less than 2.6 pcf (41.6 kg/m^3).

6.10.2 Fire-Resistance Ratings

Refer to the UL Fire Resistance Certification information for File R8078 (CCAZ) for applicable design coverage and details of the fire-resistance wall assemblies covered by this report. Fire-resistance ratings are only applicable when the assemblies are constructed in accordance with the published designs.

Nu-Wool Wallseal Fire & Sound Insulation is for use only in UL Fire Resistive Design No. U382. All other designs specified in the File R8078 (CCAZ) Classification Card are applicable for Nu-Wool Insulation.

7. CONDITIONS OF USE

7.1 General:

The products described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 2.0 of this report, subject to the following conditions:

7.2 Installation must comply with this report, the manufacturer's published installation instructions, and the applicable code. If there is a conflict between this report and the manufacturer's published installation instructions, this report governs.

7.3 Nu-Wool Insulation and Nu-Wool Wallseal Fire & Sound Insulation may be installed in noncombustible construction without affecting the noncombustible classification as described in Section 603.1 of the 2015, 2012, or 2009 IBC.

7.4 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.

7.5 When the fire-resistance rated wall or floor-ceiling assemblies described in Section 6 are used in multi-family applications, design and details to verify compliance with all of the applicable requirements of any code must be prepared by a registered design professional where required by state or local jurisdictions in which the project is constructed and submitted to the local code official for approval.

7.6 Nu-Wool Insulation and Nu-Wool Wallseal Fire & Sound Insulation are manufactured under the UL LLC Classification and Follow-Up Service Program at the following Nu-Wool Co. Inc. plant, which includes audits in accordance with ICC-ES Acceptance Criteria for Quality Documentation, AC10:

Jenison, Michigan

8. SUPPORTING EVIDENCE

8.1 Manufacturer's published installation instructions.

8.2 UL test reports and Classification in accordance with the following:

- Surface Burning Characteristics in accordance with ANSI/UL 723 (ASTM E84). See UL Product Certification Category for Loose Fill Materials (BNST) Thermal transmission testing in accordance with ASTM C518
- Physical properties testing in accordance with ASTM C739. See UL Product Certification Category for Loose Fill Materials (BPHX)
- Fire Resistance in accordance with ANSI/UL 263 (ASTM E119). See UL Product Certification Category for Sprayed Fiber (CCAZ)

8.3 Reports of physical property testing in accordance with CPSC 16CFR Parts 1209 and 1404

8.4 Reports of sound transmission testing in accordance with ASTM E90 and ASTM E413

8.5 Reports of fireblocking testing

8.6 Documentation of quality system elements described in AC10, ICC-ES Acceptance Criteria for Quality Documentation (AC10), dated June 2014

9. IDENTIFICATION

Each package of Nu-Wool Insulation and Nu-Wool Wallseal Fire & Sound Insulation described in this evaluation report is identified by a marking bearing the report holder's name (Nu-Wool Co. Inc.), the product name, the address of the manufacturing plant, the date of manufacture, the UL Classification Mark, and the evaluation report number UL ER8078-01. Additionally, each package must bear a label with information required by FTC 16 CFR Part 460 and CPSC 16 CFR, Parts 1209 and 1404.

The validity of the evaluation report is contingent upon this identification appearing on the product or UL Classification Mark certificate.

Jobsite labeling for the insulation must comply with Section N1101.10.1.1 of the 2015 IRC or Section N1101.12.1.1 of the 2012 IRC.

10. USE OF UL EVALUATION REPORT

10.1 The approval of building products, materials or systems is under the responsibility of the applicable authorities having jurisdiction.

10.2 UL Evaluation Reports shall not be used in any manner that implies an endorsement of the product, material or system by UL.

10.3 The current status of this report, as well as a complete directory of UL Evaluation Reports may be found at UL.com via our On-Line Certifications Directory:

www.ul.com/erdirectory

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PREMIUM CELLULOSE INSULATION
GREEN Since 1949

Underwriters Laboratories Classification

Wall Cavity Insulation

NEW CONSTRUCTION:
Blown in with controlled water fog for adhesion.

DRYING TIME:
Can be covered with drywall in 24 hours. Total drying time, approximately 30 days.

SOUND CONTROL:
Airborne sounds are controlled by the product's density and its ability to completely fill stud cavities. These properties also control air infiltra tion from the exterior environment.

INSPECTION:
Integrity of insulation in walls can be verified through the use of an infrared survey.

Blown-In Cellulose Insulation Standards

ASTM-C-739
ASTM-E-84
ASTM-E-119
UL-723
NFPA-225
ASA-A2-5

UL CLASSIFIED SPRAY FIBER
FLAME SPREAD 15
SMOKE DEVELOPED 5

INGREDIENTS:
RECYCLED CELLULOSE FIBERS
BORIC ACID (H_3BO_3)
SODIUM POLYBORATE ($Na_2SO_4H_3BO_3$)

R-VALUE: 3.8 per inch

DENSITY: 1.6 PCF settled density

Underwriters Laboratories Inc.
Classified Loose Fill Material R-8078
Classified in accordance with the following ASTM C-739 Characteristics.

CLASSIFIED UL

Flammability Characteristics:
- Critical Radiant Flux: Greater than or equal to 0.12w/cm^3
- Smoldering Combustion: Less than or equal to 15.0%

Environmental Characteristics:
- Corrosiveness: Acceptable
- Fungal Growth: Acceptable

Physical Characteristics:
- Density (settled): 1.6 pcf
- Thermal Resistance: 3.8 R (in.) (HH-I-515-E)
- Moisture Absorption: Acceptable
- Odor Emission: Acceptable
- Starch Content: Negative

Underwriters Laboratories Inc.
Classified Spray Fiber R-13173

CLASSIFIED UL

Surface burning characteristics applied to inorganic reinforced cement board with a maximum thickness of 5 inches*

Flame Spread 15
Smoke Developed 5
* Must be applied with water in accordance with the application instructions.

ASTM E 84-17

Standard Test Method for Surface Burning Characteristics of Building Materials

UL-723

NFPA-225

Scope

1.1 This fire-test-response standard for the comparative surface burning behavior of building materials is applicable to exposed surfaces such as walls and ceilings. The test is conducted with the specimen in the ceiling position with the surface to be evaluated exposed face down to the ignition source. The material, product, or assembly shall be capable of being mounted in the test position during the test. Thus, the specimen shall either be self-supporting by its own structural quality, held in place by added supports along the test surface, or secured from the backside.

1.2 The purpose of this test method is to determine the relative burning behavior of the material by observing the flame spread along the specimen. Flame spread and smoke developed index are reported. However, there is not necessarily a relationship between these two measurements.

Nu-Wool Premium Cellulose Insulation has a Flame spread of 15 and a Smoke developed of 5. This allows the material to be left exposed per the IRC. By comparison a red oak board has a Flame spread of 100.

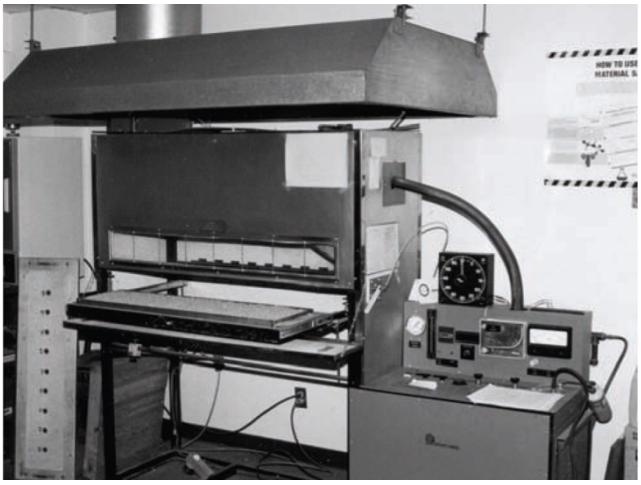
ASTM 970-17

Test Method for Critical Radiant Flux of Exposed Attic Insulation

This test method is used for flooring, carpeting, aircraft insulation and attic insulation. The critical radiant flux for attic insulation shall be equal to or greater than 0.12 W/cm2.

Quality control radiant panel tests are done throughout the production day. These tests are also witnessed during the inspections done by personnel from Underwriters Laboratories.

A full-scale Electric Radiant Panel is part of the Nu-Wool testing facility.



Thermal Resistance

Nu-Wool Premium Cellulose Insulation is tested for thermal resistance regularly at Underwriters Laboratories under the follow up program for ASTM C 739.

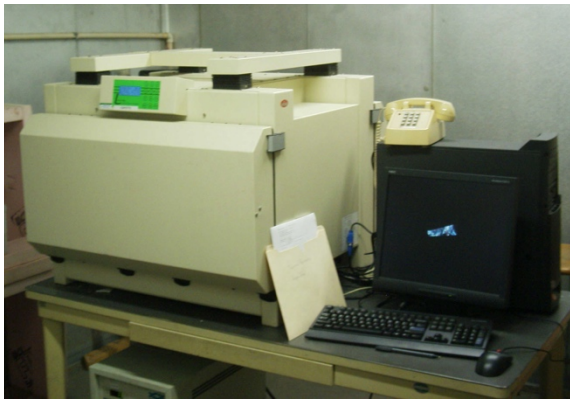
Test Method ASTM C 518

Testing Laboratory: **Underwriters Laboratories**

Test Results: **3.8 R (in.)**

Description of the test method

The C-518 test is performed inside a instrument that does not allow for any air movement. The top half of the device has a plate that is 100 degrees F and on the bottom at 50 Degrees F making for an average temperature of 75 degrees F. The material to be tested is put between these plates. With such a small area convection and radiation, two other forms of thermal transfer aren't measured to their full extent. Also, the absence of air movement prevents the test from predicting any real world performance.



Fire Blocking

Nu-Wool Premium Cellulose Insulation, spray-applied or dense pack loose-fill, can be used as a fire blocking material in accordance with 2009 IBC Section 717.2.1, 2012 IBC section 718.2.1 and 2009 / 2012 IRC Section R302.11.1.

Please refer to the UL ER 8078-01 for further information.

Ignition Barrier for Foam Plastic Insulation

Nu-Wool Premium Cellulose Insulation, spray-applied or loose-filled, 1.5 inches thick, can be used as an ignition barrier over foam plastic insulation in accordance with 2012 IRC Section R316.5.3.

NU-WOOL®
PREMIUM CELLULOSE INSULATION
GREEN Since 1949

Federal Trade Commission Fact Sheet

This Is Cellulose Loose-Fill Insulation

NU-WOOL APPLICATION CHART

Pneumatic Application Coverage Chart — Carta Neumática De la Cobertura Del Uso							
R-value at 75°F mean temp R-vaores en la temp. apropiada de 75°F	Minimum thickness (in inches) Grueso mínimo (en pulgadas)		Maximum Net Coverage (no adjustment for framing) Cobertura neta máxima (ningún ajuste para enmarcar)			Gross Coverage (based on 2" x 6" framing on 16" centers) Cobertura gruesa baseda en 2" x 6" que emarcan el centros del 16")	
To obtain a thermal resistance (R) of Para obtener una resistencia termal (R) de	Installed insulation should not be less than El aislamiento instalado no debe ser menos que	Thickness after settling Grueso después de colocar	Maximum sq. ft. per bag Pies cuadrados máximos por boisa	Minimum bags per 1000 sq. ft Bolsas mínimas por 1000 pies cuadrados	Minimum weight per sq. ft. (lbs) Peso mínimo por 1000 pies cuadrados (lbs)	Maximum sq. ft. per bag Pies cuadrados máximos por bolsa	Minimum bags per 1000 sq. ft Bolsas mínimas por 1000 pies cuadrados
13	4.42	3.98	79.4	12.6	0.32	87.6	11.4
19	6.16	5.55	50.5	19.8	0.50	55.7	18.0
22	7.04	6.34	42.7	23.4	0.59	46.4	21.5
30	9.40	8.46	30.1	33.2	0.83	32.1	31.2
32	9.99	8.99	28.1	35.6	0.89	29.8	33.6
38	11.76	10.58	23.3	43.0	1.08	24.5	40.9
40	12.35	11.12	22.0	45.4	1.14	23.1	43.3
49	15.01	13.51	17.7	56.5	1.41	18.4	54.3
60	18.27	16.44	14.3	70.0	1.75	14.8	67.8

Wall Coverage Chart (3.3 pcf Density) — Gráfico de Cobertura pared (3.3 Densidad PCF)							
R-value at 75°F mean temp R-vaores en la temp. apropiada de 75°F	Nominal Dimensions Las dimensiones nominales	Thickness (in inches) Grueso (en pulgadas)	Minimum weight per sq. ft. (lbs) Peso mínimo por 1000 pies cuadrados (lbs)	Maximum sq. ft. per bag Pies cuadrados máximos de la cobertura por bolsa		Maximum coverage per 1000 sq. ft. Cobertura máxima por 1000 pies cuadrados	
				16" oc	24" oc	16" oc	24" oc
13	2 x 4 x 96	3.5	0.96	28.66	27.71	34.89	36.09
20	2 x 6 x 96	5.5	1.51	18.24	17.63	54.83	56.72

Coverage is based on settled density, except for sidewall application. Initial installed thickness information was derived using a Krendl K500 blowing machine at 5 for the gate (material) setting and 6.5 for the air setting. Use this chart for estimating purposes only. Application techniques, equipment, equipment settings, atmospheric conditions and hose length all affect the coverage of this product. Coverage chart based on nominal bag weight of 25 lbs / 11.34 kg. Minimum net weight 23 lbs / 10.43 kg.

Read this before you buy - What you should know about R-values:

The chart shows the R-value of this insulation. R means resistance to heat flow. The higher the R-value, the greater the insulating power. Compare insulation R-values before you buy.

There are other factors to consider. The amount of insulation you need depends mainly on the climate you live in. Also, your fuel savings from insulation will depend upon the climate, the type and size of your house, the amount of insulation already in your house, and your fuel use patterns and family size. If you buy too much insulation, it will cost you more than what you'll save on fuel.

To get the marked R-value, it is essential that this insulation is installed properly.

Manufactured by: Nu-Wool Co., Inc.
2472 Port Sheldon St. • Jenison, MI 49428
616.669.0100 • 800.748.0128 • Fax: 616.669.2370
nuwool.com

05/2016

WARRANTY

NU-WOOL CO., INC. WARRANTS that NU-WOOL® PREMIUM CELLULOSE INSULATION, when properly installed, will retain all the physical characteristics of the current Federal Specifications and the ASTM Test Standards relating to this product as listed below.

Smoldering Combustion	Density (Settled)
Critical Radiant Flux	Thermal Resistance
Permanency of Chemical Formulations	Moisture Absorption
Corrosiveness	Odor Emission
Fungal Growth	Starch Content

These characteristics are warranted according to the specifications published on the package of the product installed in the structure. If NU-WOOL® PREMIUM CELLULOSE INSULATION, when properly installed in compliance with our Recommended Installation Methods, including minimum FHA recommended ventilation and HUD Manufactured Home Construction and Safety Standards, should fail to retain any of the characteristics listed above and on the package, NU-WOOL CO., INC. will replace the insulation and repair any structural damage attributable to a defect in the insulation product manufactured by NU-WOOL CO., INC.

In order to assert any warranty rights please contact NU-WOOL CO., INC. , 2472 PORT SHELDON STREET, JENISON, MICHIGAN 49428. NU-WOOL CO., INC. shall not be liable for any incidental or consequential damages resulting from a breach of this warranty or any express or implied warranty arising under state law. Some states do not allow the exclusion of limitation of consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Please complete and return the attached WARRANTY REGISTRATION FORM to NU-WOOL CO., INC., 2472 PORT SHELDON STREET, JENISON, MICHIGAN 49428, in order to establish proper installation of the product. Failure to return this card will not adversely affect your warranty rights if you can otherwise establish that NU-WOOL® PREMIUM CELLULOSE INSULATION has been installed in compliance with NU-WOOL RECOMMENDED INSTALLATION PRACTICES.

FULL LIFETIME WARRANTY

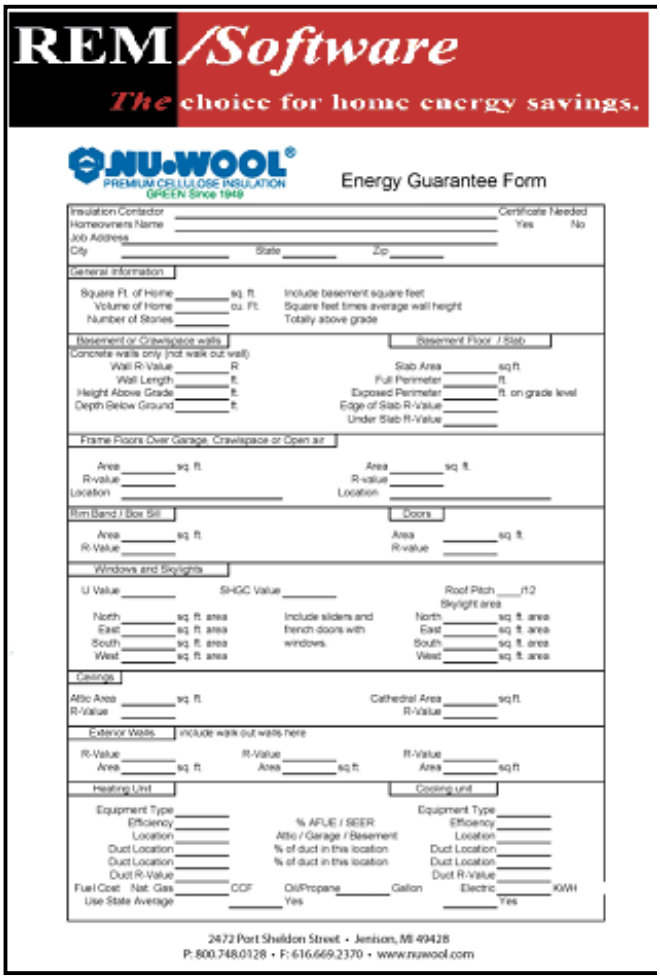
NU-WOOL®
PREMIUM CELLULOSE INSULATION
GREEN Since 1949

NU-WOOL CO., INC.
2472 PORT SHELDON STREET
JENISON, MICHIGAN 49428
11/13

Guaranteed Energy Program

Nu-Wool Co., Inc., through Nu-Wool Certified WALLSEAL Dealers, offers a Guaranteed Energy Program for new homes insulated with Nu-Wool Premium Cellulose Insulation and/or Nu-Seal Spray applied polyurethane foam, at no cost to the home owner or builder. Under this program, a home's heating and cooling bills are guaranteed for a period of three years. If the heating and cooling bill exceed the guaranteed amount, Nu-Wool Co., Inc. will reimburse the home owner 50% of the overage. Builders can use this guarantee as an attractive selling feature to home buyers.

Ask your Nu-Wool Certified WALLSEAL dealer to include your home in this program. You can have the amount of the guarantee made available to you during the design stage of the project. Changes in the building envelope and HVAC system can be modeled to show the potential impact before any costs are incurred.


REM/Software
The choice for home energy savings.

NU-WOOL® PREMIUM CELLULOSE INSULATION GREEN Since 1949

Energy Guarantee Form

Insulation Contractor
Homeowners Name
Job Address
City State Zip
Certificate Needed Yes No

General Information
Square Ft. of Home sq. ft.
Volume of Home cu. Ft.
Number of Stories
Include basement square feet
Square feet times average wall height
Totally above grade

Basement or Crawlspace walls
Concrete walls only (not walk out wall)
Wall R-Value R
Wall Length ft.
Height Above Grade ft.
Depth Below Ground ft.

Basement Floor / Slab
Slab Area sq.ft.
Full Perimeter ft.
Exposed Perimeter ft. on grade level
Edge of Slab R-Value
Under Slab R-Value

Frame Floors Over Garage, Crawlspace or Open air
Area sq. ft.
R-value
Location
Area sq. ft.
R-value
Location

Rim Band / Box Sill
Area sq. ft.
R-Value

Doors
Area sq. ft.
R-value

Windows and Skylights
U Value
SHGC Value
Include sliders and french doors with windows.
Roof Pitch ___/12
Skylight area
North sq. ft. area
East sq. ft. area
South sq. ft. area
West sq. ft. area
North sq. ft. area
East sq. ft. area
South sq. ft. area
West sq. ft. area

Ceilings
Attic Area sq. ft.
R-Value
Cathedral Area sq.ft.
R-Value

Exterior Walls include walk out walls here
R-Value
Area sq. ft.
R-Value
Area sq.ft.
R-Value
Area sq.ft

Heating Unit
Equipment Type
Efficiency
Location
Duct Location
Duct Location
Duct R-Value
Fuel Cost Nat. Gas CCF
Use State Average
% AFUE / SEER
Attic / Garage / Basement
% of duct in this location
% of duct in this location
Oil/Propane Gallon
Yes

Cooling unit
Equipment Type
Efficiency
Location
Duct Location
Duct Location
Duct R-Value
Electric KWH
Yes

2472 Port Sheldon Street • Jenison, MI 49428
P: 800.748.0128 • F: 616.669.2370 • www.nuwool.com

Corrosion Guarantee

Nu-Wool Premium Cellulose Insulation is warranted for all the test items currently in effect for insulation materials under ASTM Standard C 739. Included in this standard is a test for corrosion resistance.

Nu-Wool Co., Inc. warrants its insulation product, when properly installed, to be corrosion resistant to all types of metal for the life of the structure. Nu-Wool Co. Inc. has offered, since 1978, a full lifetime warranty for their products. That warranty clearly lists each test characteristic, including corrosion.

Nu-Wool Co., Inc. specifically warrants those test characteristics to metal buildings properly insulated with Nu-Wool Premium Cellulose Insulation.

Cellulose Drying

Nu-Wool Co., Inc. advises our contractors that walls insulated with the Nu-Wool WALLSEAL system can be covered with drywall within 24 hours of application. This is due to the product's ability to release moisture in a controlled manner.

Air is the primary mechanism for moisture transfer. In fact, air accounts for 98% of all vapor movement in insulated cavities. Clearly, the best method to control vapor movement is to control the air. Moisture will always move from areas of high concentrations to low concentration. During winter months, this usually means that the moisture moves from inside towards the outside air. If the outside air is below freezing, the drying process can be slowed. High humidity climates and unusual site conditions can also have an effect on the drying process. If you have questions about a particular situation, please call Nu-Wool for technical support.

Nu-Wool Premium Cellulose Insulation contains an EPA registered fungicide, making the insulation resistant to the growth of mold. Registration is achieved only after rigorous testing to ensure that the borate-based fungicide in Nu-Wool Premium Cellulose Insulation will resist the growth of mold even when exposed to conditions favorable to mold growth.

Nu-Wool Co., Inc. Guarantee

If Nu-Wool Premium Cellulose Insulation, when installed in compliance with our recommended installation methods, should fail, Nu-Wool Co., Inc. will replace the insulation and repair any structural damage attributable to a defect in the insulation product. This guarantee covers the recommended practice of covering the wall with drywall within 24 hours of application.

Guaranteed to Perform Without a Vapor Retarder

Nu-Wool Co., Inc. advises contractors that a vapor retarder is not necessary with the Nu-Wool WALLSEAL system in walls using gypsum wallboard in typical situations. This is due to the product's unique ability to resist air movement, and therefore, the transmission of moisture. Air movement is the primary mechanism for moisture transfer. In fact, air accounts for 98% of all vapor movement in insulated cavities. Clearly, stopping air movement is the fundamental issue that builders and insulators should address. Vapor retarders on walls are not necessary or even desirable in all buildings or in all climates, because they can trap moisture. There are special cases such as indoor pool rooms where a vapor retarder may be required. Please see the Section on Vapor Retarders and High Humidity Areas. ASHRAE standards warn against the use of vapor retarders in any structure in warm climates. There is also danger with moisture problems in cold climates caused by moisture being driven into the wall in the summer. Building codes have changed significantly regarding the use of vapor retarders. Contact Nu Wool Technical Services for further information

The Nu-Wool Guarantee

Nu-Wool Co., Inc. guarantees the proper application of Nu-Wool Premium Cellulose Insulation, installed using the Nu-Wool WALLSEAL system without a vapor retarder in buildings with walls using gypsum wallboard with normal relative humidity levels. Vapor retarders are still necessary in buildings with high relative humidity levels, such as those with indoor pools.

Safety Data Sheet

Effective: June 1, 2015

SECTION 1 – PRODUCT AND COMPANY INFORMATION

Product Identifier: Cellulose Insulation

Product Name: Nu-Wool® Premium Cellulose Insulation
Energy Care® Cellulose Insulation

Manufacturer: Nu-Wool Co., Inc.
2472 Port Sheldon St.
Jenison, MI 49428

Emergency Phone: (800) 748-0128

Nu-Wool® and Energy Care® are Registered Trademarks of Nu-Wool Co., Inc.

SECTION 2 – HAZARDS IDENTIFICATION

Hazard Classification: Eye Irritation Hazard Category 2B

Signal Word: Warning

Hazard Statements: Causes eye irritation

Precautionary Statements: Wash hands thoroughly after handling. If in eyes, rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, seek medical attention.

Other hazards which do not result in classification: None

SECTION 3 – COMPOSITION / INFORMATION ON INGREDIENTS

Ingredient	CAS #	Percentage
Cellulose fiber	65996-61-4	85-92%
Sodium polyborate	183290-63-3	5-10%
Boric acid	10043-35-3	3-5%

Other ingredients are present in the final product at less than 1% and do not pose a health hazard.

SECTION 4 – FIRST AID MEASURES

Eyes: For dust exposure, immediately flush eyes with plenty of water for at least 10 minutes. Seek medical attention if irritation persists.

Skin: If skin is exposed, wash with soap and large amounts of water. If irritation persists, seek medical attention.

Ingestion: Symptoms include diarrhea, nausea, and vomiting. Seek medical attention if material was ingested and symptoms persist.

Inhalation: If irritation or difficulty breathing occurs, remove to fresh air. Seek medical attention if conditions persist.

Notes to physicians or first aid providers: Exposure to dust may aggravate symptoms of persons with preexisting respiratory tract conditions and may cause skin and gastrointestinal symptoms.

SECTION 5 – FIRE-FIGHTING MEASURES

Extinguishing media: Any fire extinguishing media, including Water Spray, Foam, Dry Chemical, CO_2.

Special fire-fighting procedures: Wear self-contained breathing apparatus (pressure demand MSHA/NIOSH approved, or equivalent) and full protective gear.

Unusual fire and explosion hazards: None, CMS material is not flammable, combustible, or explosive. The product itself is a flame retardant.

SECTION 6 – ACCIDENTAL RELEASE MEASURES

General: Boric acid may damage trees or vegetation when exposed to large quantities.

Land spill: Shovel, sweep, or vacuum product. Place in disposal container. Avoid bodies of water.

Water spill: Large quantities may cause localized contamination of surrounding waters depending on the quantity spilled. At high concentrations, may damage localized vegetation, fish, and other aquatic life.

SECTION 7 – HANDLING AND STORAGE

Precautions for Safe Handling: No special handling is required.

Conditions for safe storage, including incompatibilities: Storage of sealed bags in a dry, indoor location is recommended. To maintain product integrity, handle on a first in-first out basis. Use good housekeeping and controls so that dust levels are below the exposure limits listed in Section 8.

Storage temperature: Ambient

Storage pressure: Atmospheric

Special sensitivity: None

SECTION 8 – EXPOSURE CONTROLS / PERSONAL PROTECTION

OSHA PEL-TWA:	15 mg/m^3 total dust and 5 mg/m^3 respirable dust
ACGIH TLV-TWA-OEL:	2 mg/m^3 inhalable particles
ACGIH STEL:	6 mg/m^3
Cal OSHA PEL-TWA:	10 mg/m^3 total dust and 5 mg/m^3 respirable fraction

ENGINEERING CONTROLS AND VENTILATION: Use local exhaust ventilation to keep airborne concentrations of dust below permissible exposure limits.

RESPIRATORY PROTECTION: Where airborne concentrations are expected to exceed exposure limits, NIOSH/MSHA certified respirators (e.g., N95) must be used.

EYE PROTECTION: Eye protection according to ANSI Z.87.1 or other national standards may be warranted if environment is excessively dusty.

SKIN PROTECTION: Standard work gloves (cotton, canvas or leather) may be warranted if environment is excessively dusty.

SECTION 8 NOTES: PEL: Permissible Exposure Limit, TLV: Threshold Limit Value, TWA: Time Weighted Average, STEL: Short Term Exposure Limit

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Gray, fiber

Odor: Not applicable

Odor threshold: Not applicable

pH as supplied: 7.3

Melting point / freezing point: Not applicable

Boiling point / boiling range: Not established

Flash point: Not applicable

Evaporation rate: Not applicable

Flammability / flammability range: Not applicable

Explosive limits: Not applicable

Vapor pressure: Not applicable

Vapor density: Negligible at 20°C

Relative density: Not applicable

Solubility in water: Insoluble

Specific gravity: Not applicable

Partition coefficient: Not applicable

Auto-ignition temperature: Not applicable, not self-heating

Decomposition temperature: Not applicable

Viscosity: Not applicable

Explosive properties: Not explosive, does not contain chemical groups associated with explosivity

Oxidizing properties: Not oxidizing, does not contain chemical groups associated with oxidation

SECTION 10 – STABILITY AND REACTIVITY

Reactivity: Non-reactive

Stability: Stable

Possibility of hazardous reactions: Non-reactive

Conditions to avoid: None

Incompatible materials: None

Hazardous decomposition or by-products: None known.

SECTION 11 – TOXICOLOGICAL INFORMATION

Routes of exposure: Inhalation is the most significant route of exposure in occupational and other settings. Dermal exposure is not usually a concern as cellulose fibers are not absorbed through intact skin. Nu-Wool® Premium Cellulose Insulation and Energy Care® Cellulose Insulation are not intended for ingestion.

Symptoms related to the physical, chemical, and toxicological characteristics: Symptoms of cellulose fiber exposure include runny nose, sneezing, and coughing.

Delayed and immediate effects as well as chronic effects from short and long-term exposure: No chronic or reproductive effects from cellulose have been reported in the literature.

Acute toxicity:

Cellulose fiber:

Oral LD_{50} (rat): >5,000 mg/kg of body weight
Dermal LD_{50} (rabbit): >2,000 mg/kg of body weight
Inhalation LC_{50} (rat): >5.8 mg/L
Dermal irritation/corrosivity: Nonirritating, nonsensitizing
Eye irritation: No information found.

Sodium polyborate:

Oral LD_{50} (rat): 3,479 mg/kg of body weight
Dermal LD_{50} (rabbit): >2000 mg/kg of body weight
Inhalation LC_{50} (rat): >5.8 mg/L
Dermal irritation/corrosivity: 0 (Zero), sodium polyborate is non-corrosive
Eye irritation: Draize test in rabbits produced mild eye irritation effects. Many years of occupational exposure history reflects no indication of human eye injury from exposure to sodium polyborate.

Boric acid:

Oral LD_{50} (rat): 2,550 mg/kg of body weight
Dermal LD_{50} (rabbit): >2,000 mg/kg of body weight
Inhalation LC_{50} (rat): >2.01 mg/L
Dermal irritation/corrosivity: Nonirritating, nonsensitizing
Eye irritation: Nonirritating

CHRONIC HEALTH HAZARDS: No chronic effects from cellulose fiber, sodium polyborate, or boric acid have been reported in the literature. Human epidemiological studies show no increase in pulmonary disease in occupational populations with chronic exposures to inorganic borates and sodium borate dust.

REPRODUCTIVE EFFECTS: Borate-treated cellulose insulation contains boric acid and cellulose fiber. Borate-treated cellulose insulation was tested for purposes of hazard classification under the Occupational Safety and Health Administration's 2012 Hazard Communication Standard.

In a study conducted under OECD Guideline 414, there were no developmental effects in rats exposed to up to 270 mg/m^3 (the highest exposure tested). In workers chronically exposed to high levels of borates for several years by way of inhalation, food, and drinking water, there was a clear absence of any reproductive effects.

Classification: No classification

CARCINOGENICITY: Cellulose fiber, sodium polyborate, and boric acid are not listed as a known or suspected carcinogen by OSHA, ACGIH, NTP, or IARC.

SECTION 12 – ECOLOGICAL INFORMATION

Cellulose: No information found in the literature.

Boron: No information specific to sodium polyborate or boric acid was found in the literature. The following information is based on other boron compounds and normalized for boron.
LC_{50} (Water flea, *D. magna*): 101.2 mg/L (48-hr)
NOEC (Water flea, *D. magna*): 5.7 mg/L (21-d)
LC_{50} (Rainbow trout, *O. mykiss*): 351.7 mg boron/L (96-hr)
LC_{50} (Bluegill, *L. macrochirus*): 4.6 mg boron/L (24-hr)

PHYTOTOXICITY: Boron is an essential micronutrient for healthy growth of plants. It can be harmful to boron sensitive plants in higher quantities. Care should be taken to minimize the amount of borate product released to the environment.

PERSISTENCE AND DEGRADABILITY: Biodegradation is not an applicable endpoint since the product is an inorganic substance.

BIOACCUMMULATIVE POTENTIAL: This product will undergo hydrolysis in water to form undissociated boric acid. Boric acid will not biomagnify through the food chain. Octanol/Water partition coefficient: Log Pow = -0.7570 @ 25°C (based on boric acid).

MOBILITY IN SOIL: The product is soluble in water and is leachable through normal soil. Adsorption to soils or sediments is insignificant.

OTHER EFFECTS: None.

SECTION 13 – DISPOSAL CONSIDERATIONS

Waste disposal method: Dispose as a non-hazardous waste.

RCRA Hazard Class: This product is a non-hazardous waste when spilled or disposed of as defined in the Resource Conservation and Recovery Act (RCRA) regulations (40CFR 261).

SECTION 14 – TRANSPORT INFORMATION

May be shipped as a non-hazardous material.

SECTION 15 – REGULATORY INFORMATION

TSCA NO.: Nu-Wool® Premium Cellulose Insulation and Energy Care® Cellulose Insulation do not appear on the EPA TSCA inventory list. Boric acid does appear on the EPA TSCA inventory list (10043-35-3)

RCRA: Nu-Wool® Premium Cellulose Insulation and Energy Care® Cellulose Insulation are not listed as a hazardous waste under any sections of the Resource Conservation and Recovery Act or regulations (40) CFR 261 et seq.).

SUPERFUND: CERCLA/SARA. Nu-Wool® Premium Cellulose Insulation and Energy Care® Cellulose Insulation are not listed under CERCLA (the Comprehensive Environmental Response Compensation and Liability Act) or its 1986 amendments, SARA, (the Superfund Amendments and Reauthorization Act), including substances listed under Section 313 of SARA, Toxic Chemicals, 42 USC 11023, 40 CFR 372.65; Section 302 of SARA, Extremely Hazardous Substances, 42 USC 11002, 40 CFR 355; or the CERCLA Hazardous Substances list, 42 USC 9604, 40 CFR 302.

SAFE DRINKING WATER ACT: Nu-Wool® Premium Cellulose Insulation and Energy Care® Cellulose Insulation are not regulated under the SDWA, 42 USC 300g-1, 40 CFR 141 et seq. Consult state and local regulations for possible water quality advisories regarding boron.

Clean Water Act (Federal Water Pollution Control Act): 33 USC 1251 et seq.

a.) Nu-Wool® Premium Cellulose Insulation and Energy Care® Cellulose Insulation are not itself a discharge covered by any water quality criteria of Section 304 of the CWA, 33USC 1314

b.) It is not on the Section 307 List of Priority Pollutants, 33 USC 1317, 40 CFR 129

c.) It is not on the Section 311 List of Hazardous Substances, 33 USC 1321, 40 CFR 116.

OSHA/CAL OSHA: This SDS document meets the requirements of both OSHA (29 CFR 1910.1200) and Cal OSHA (Title 8 CCR 5194(g)) hazard communication standards. Refer to Exposure Control/Personal Protection for regulatory exposure limits.

SECTION 16 – OTHER INFORMATION

Other information: This SDS was finalized on June 1, 2015 and is compliant with OSHA HCS/HazCom 2012 Final Rule. This replaces the previous version dated May 2010.

Information presented herein has been compiled from sources considered dependable and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Nothing herein is to be construed as recommending any practice or any product in violation of any patent or in violation of any law or regulation. The user is responsible to determine the suitability of any material for a specific purpose and adopt necessary safety precautions. We make no warranty as to results to be obtained in using any material and, since conditions or use are not under our control, we must necessarily disclaim all liability with respect to use of any material supplied by us.

Safety Data Sheet

Effective: June 1, 2015

SECTION 1 – PRODUCT AND COMPANY INFORMATION

Product Identifier: Cellulose Insulation

Product Name: Nu-Wool® Fire and Sound Cellulose Insulation

Manufacturer: Nu-Wool Co., Inc.
2472 Port Sheldon St.
Jenison, MI 49428

Emergency Phone: (800) 748-0128

Nu-Wool® is a Registered Trademark of Nu-Wool Co., Inc.

SECTION 2 – HAZARDS IDENTIFICATION

Hazard Classification: Eye Irritation Hazard Category 2B

Signal Word: Warning

Hazard Statements: Causes eye irritation

Precautionary Statements: Wash hands thoroughly after handling. If in eyes, rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, seek medical attention.

Other hazards which do not result in classification: None

SECTION 3 – COMPOSITION / INFORMATION ON INGREDIENTS

Ingredient	CAS #	Percentage
Cellulose fiber	65996-61-4	85-92%
Sodium polyborate	183290-63-3	5-10%
Boric acid	10043-35-3	3-5%

Other ingredients are present in the final product at less than 1% and do not pose a health hazard.

SECTION 4 – FIRST AID MEASURES

Eyes: For dust exposure, immediately flush eyes with plenty of water for at least 10 minutes. Seek medical attention if irritation persists.

Skin: If skin is exposed, wash with soap and large amounts of water. If irritation persists, seek medical attention.

Ingestion: Symptoms include diarrhea, nausea, and vomiting. Seek medical attention if material was ingested and symptoms persist.

Inhalation: If irritation or difficulty breathing occurs, remove to fresh air. Seek medical attention if conditions persist.

Notes to physicians or first aid providers: Exposure to dust may aggravate symptoms of persons with preexisting respiratory tract conditions and may cause skin and gastrointestinal symptoms.

SECTION 5 – FIRE-FIGHTING MEASURES

Extinguishing media: Any fire extinguishing media, including Water Spray, Foam, Dry Chemical, CO_2.

Special fire-fighting procedures: Wear self-contained breathing apparatus (pressure demand MSHA/NIOSH approved, or equivalent) and full protective gear.

Unusual fire and explosion hazards: None, CMS material is not flammable, combustible, or explosive. The product itself is a flame retardant.

SECTION 6 – ACCIDENTAL RELEASE MEASURES

General: Boric acid may damage trees or vegetation when exposed to large quantities.

Land spill: Shovel, sweep, or vacuum product. Place in disposal container. Avoid bodies of water.

Water spill: Large quantities may cause localized contamination of surrounding waters depending on the quantity spilled. At high concentrations, may damage localized vegetation, fish, and other aquatic life.

SECTION 7 – HANDLING AND STORAGE

Precautions for Safe Handling: No special handling is required.

Conditions for safe storage, including incompatibilities: Storage of sealed bags in a dry, indoor location is recommended. To maintain product integrity, handle on a first in-first out basis. Use good housekeeping and controls so that dust levels are below the exposure limits listed in Section 8.

Storage temperature: Ambient

Storage pressure: Atmospheric

Special sensitivity: None

SECTION 8 – EXPOSURE CONTROLS / PERSONAL PROTECTION

OSHA PEL-TWA:	15 mg/m^3 total dust and 5 mg/m^3 respirable dust
ACGIH TLV-TWA-OEL:	2 mg/m^3 inhalable particles
ACGIH STEL:	6 mg/m^3
Cal OSHA PEL-TWA:	10 mg/m^3 total dust and 5 mg/m^3 respirable fraction

ENGINEERING CONTROLS AND VENTILATION: Use local exhaust ventilation to keep airborne concentrations of dust below permissible exposure limits.

RESPIRATORY PROTECTION: Where airborne concentrations are expected to exceed exposure limits, NIOSH/MSHA certified respirators (e.g., N95) must be used.

EYE PROTECTION: Eye protection according to ANSI Z.87.1 or other national standards may be warranted if environment is excessively dusty.

SKIN PROTECTION: Standard work gloves (cotton, canvas or leather) may be warranted if environment is excessively dusty.

SECTION 8 NOTES: PEL: Permissible Exposure Limit, TLV: Threshold Limit Value, TWA: Time Weighted Average, STEL: Short Term Exposure Limit

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Green, fiber

Odor: Not applicable

Odor threshold: Not applicable

pH as supplied: 7.3

Melting point / freezing point: Not applicable

Boiling point / boiling range: Not established

Flash point: Not applicable

Evaporation rate: Not applicable

Flammability / flammability range: Not applicable

Explosive limits: Not applicable

Vapor pressure: Not applicable

Vapor density: Negligible at 20°C

Relative density: Not applicable

Solubility in water: Insoluble

Specific gravity: Not applicable

Partition coefficient: Not applicable

Auto-ignition temperature: Not applicable, not self-heating

Decomposition temperature: Not applicable

Viscosity: Not applicable

Explosive properties: Not explosive, does not contain chemical groups associated with explosivity

Oxidizing properties: Not oxidizing, does not contain chemical groups associated with oxidation

SECTION 10 – STABILITY AND REACTIVITY

Reactivity: Non-reactive

Stability: Stable

Possibility of hazardous reactions: Non-reactive

Conditions to avoid: None

Incompatible materials: None

Hazardous decomposition or by-products: None known.

SECTION 11 – TOXICOLOGICAL INFORMATION

Routes of exposure: Inhalation is the most significant route of exposure in occupational and other settings. Dermal exposure is not usually a concern as cellulose compounds are not absorbed through intact skin. Nu-Wool® Fire and Sound Cellulose Insulation is not intended for ingestion.

Symptoms related to the physical, chemical, and toxicological characteristics: Symptoms of cellulose exposure include runny nose, sneezing, and coughing.

Delayed and immediate effects as well as chronic effects from short and long-term exposure: No chronic or reproductive effects from cellulose have been reported in the literature.

Acute toxicity:

Cellulose:

Oral LD_{50} (rat): >5,000 mg/kg of body weight
Dermal LD_{50} (rabbit): >2,000 mg/kg of body weight
Inhalation LC_{50} (rat): >5.8 mg/L
Dermal irritation/corrosivity: Nonirritating, nonsensitizing
Eye irritation: No information found.

Sodium polyborate:

Oral LD_{50} (rat): 3,479 mg/kg of body weight
Dermal LD_{50} (rabbit): >2000 mg/kg of body weight
Inhalation LC_{50} (rat): >5.8 mg/L
Dermal irritation/corrosivity: 0 (Zero), sodium polyborate is non-corrosive
Eye irritation: Draize test in rabbits produced mild eye irritation effects. Many years of occupational exposure history reflects no indication of human eye injury from exposure to sodium polyborate.

Boric acid:

Oral LD_{50} (rat): 2,550 mg/kg of body weight
Dermal LD_{50} (rabbit): >2,000 mg/kg of body weight
Inhalation LC_{50} (rat): >2.01 mg/L
Dermal irritation/corrosivity: Nonirritating, nonsensitizing
Eye irritation: Nonirritating

CHRONIC HEALTH HAZARDS: No chronic effects from cellulose, sodium polyborate, or boric acid have been reported in the literature. Human epidemiological studies show no increase in pulmonary disease in occupational populations with chronic exposures to inorganic borates and sodium borate dust.

REPRODUCTIVE EFFECTS: Borate-treated cellulose insulation contains boric acid and cellulose fiber. Borate-treated cellulose insulation was tested for purposes of hazard classification under the Occupational Safety and Health Administration's 2012 Hazard Communication Standard.

In a study conducted under OECD Guideline 414, there were no developmental effects in rats exposed to up to 270 mg/m^3 (the highest exposure tested). In workers chronically exposed to high levels of borates for several years by way of inhalation, food, and drinking water, there was a clear absence of any reproductive effects.

Classification: No classification
Nu-Wool® Fire and Sound Cellulose Insulation contains C.I. Basic Green 4 which is a suspected reproductive toxicant (Category 2) but is present at less than 0.1% by weight in the final product.

CARCINOGENICITY: Cellulose, sodium polyborate, boric acid, and other ingredients are not listed as a known or suspected carcinogen by OSHA, ACGIH, NTP, or IARC.

SECTION 12 – ECOLOGICAL INFORMATION

Cellulose: No information found in the literature.

Boron: No information specific to sodium polyborate or boric acid was found in the literature. The following information is based on other boron compounds and normalized for boron.

LC_{50} (Water flea, *D. magna*): 101.2 mg/L (48-hr)
NOEC (Water flea, *D. magna*): 5.7 mg/L (21-d)
LC_{50} (Rainbow trout, *O. mykiss*): 351.7 mg boron/L (96-hr)
LC_{50} (Bluegill, *L. macrochirus*): 4.6 mg boron/L (24-hr)

PHYTOTOXICITY: Boron is an essential micronutrient for healthy growth of plants. It can be harmful to boron sensitive plants in higher quantities. Care should be taken to minimize the amount of borate product released to the environment.

PERSISTENCE AND DEGRADABILITY: Biodegradation is not an applicable endpoint since the product is an inorganic substance.

BIOACCUMMULATIVE POTENTIAL: This product will undergo hydrolysis in water to form undissociated boric acid. Boric acid will not biomagnify through the food chain. Octanol/Water partition coefficient: Log Pow = -0.7570 @ 25°C (based on boric acid).

MOBILITY IN SOIL: The product is soluble in water and is leachable through normal soil. Adsorption to soils or sediments is insignificant.

OTHER EFFECTS: None.

SECTION 13 – DISPOSAL CONSIDERATIONS

Waste disposal method: Dispose as a non-hazardous waste.

RCRA Hazard Class: This product is a non-hazardous waste when spilled or disposed of as defined in the Resource Conservation and Recovery Act (RCRA) regulations (40CFR 261).

SECTION 14 – TRANSPORT INFORMATION

May be shipped as a non-hazardous material.

SECTION 15 – REGULATORY INFORMATION

TSCA NO.: Nu-Wool® Fire and Sound Cellulose Insulation does not appear on the EPA TSCA inventory list. Boric acid does appear on the EPA TSCA inventory list (10043-35-3)

RCRA: Nu-Wool® Fire and Sound Cellulose Insulation is not listed as a hazardous waste under any sections of the Resource Conservation and Recovery Act or regulations (40) CFR 261 et seq.).

SUPERFUND: CERCLA/SARA. Nu-Wool® Fire and Sound Cellulose Insulation is not listed under CERCLA (the Comprehensive Environmental Response Compensation and Liability Act) or its 1986 amendments, SARA, (the Superfund Amendments and Reauthorization Act), including substances listed under Section 313 of SARA, Toxic Chemicals, 42 USC 11023, 40 CFR 372.65; Section 302 of SARA, Extremely Hazardous Substances, 42 USC 11002, 40 CFR 355; or the CERCLA Hazardous Substances list, 42 USC 9604, 40 CFR 302.

SAFE DRINKING WATER ACT: Nu-Wool® Fire and Sound Cellulose Insulation is not regulated under the SDWA, 42 USC 300g-1, 40 CFR 141 et seq. Consult state and local regulations for possible water quality advisories regarding boron. Clean Water Act (Federal Water Pollution Control Act): 33 USC 1251 et seq.

a.) Nu-Wool® Fire and Sound Cellulose Insulation is not itself a discharge covered by any water quality criteria of Section 304 of the CWA, 33USC 1314

b.) It is not on the Section 307 List of Priority Pollutants, 33 USC 1317, 40 CFR 129

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OSHA/CAL OSHA: This SDS document meets the requirements of both OSHA (29 CFR 1910.1200) and Cal OSHA (Title 8 CCR 5194(g)) hazard communication standards. Refer to Exposure Control/Personal Protection for regulatory exposure limits.

SECTION 16 – OTHER INFORMATION

Other information: This SDS was finalized on June 1, 2015 and is compliant with OSHA HCS/HazCom 2012 Final Rule. This replaces the previous version dated May 2010.

Information presented herein has been compiled from sources considered dependable and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Nothing herein is to be construed as recommending any practice or any product in violation of any patent or in violation of any law or regulation. The user is responsible to determine the suitability of any material for a specific purpose and adopt necessary safety precautions. We make no warranty as to results to be obtained in using any material and, since conditions or use are not under our control, we must necessarily disclaim all liability with respect to use of any material supplied by us.

Insulation Installation around Vents and Fireplaces

Vent Types	Clearances*	Typical appliance vented
B	1” from combustibles	Natural Gas
L	3” from combustibles	Oil Fired
Chimney Factory Masonry	See manfuactures listing 2” Air gap. Only draft stopping allowed in the 2” space.	Solid fuel burning fireplace.

* Manufactures listed clearances take precedence over all code required clearances.

Vent Insulation

- Check thimble to make sure it maintains required clearance.
- Do not over-blow into the thimble.
- Use fire block sealant to fill gaps between vent and spacer.
- Check behind chimneys and vents to make sure you are not blowing into an open cavity
  below.
- Install sheet metal draft stop around masonry chimney. Seal gaps with fire block sealant
  and install an insulation shield made from rolled flashing or hardware cloth.

Fireplace Insulation

1. Preferred method:
   Have the builder install drywall prior to fireplace installation. Punch holes in drywall and
   dense pack; patch holes with plugs and gypsum cement.
2. Alternate method:
   Install unfaced fiberglass batts. Secure batts in place with rolled flashing and roofing nails.

   Check for gaps between insulation and framing.

   In all cases:

   Seal around all openings, gas line, electric wires, vents.

   Insulate under the fire place if the space is cantilevered over the exterior.

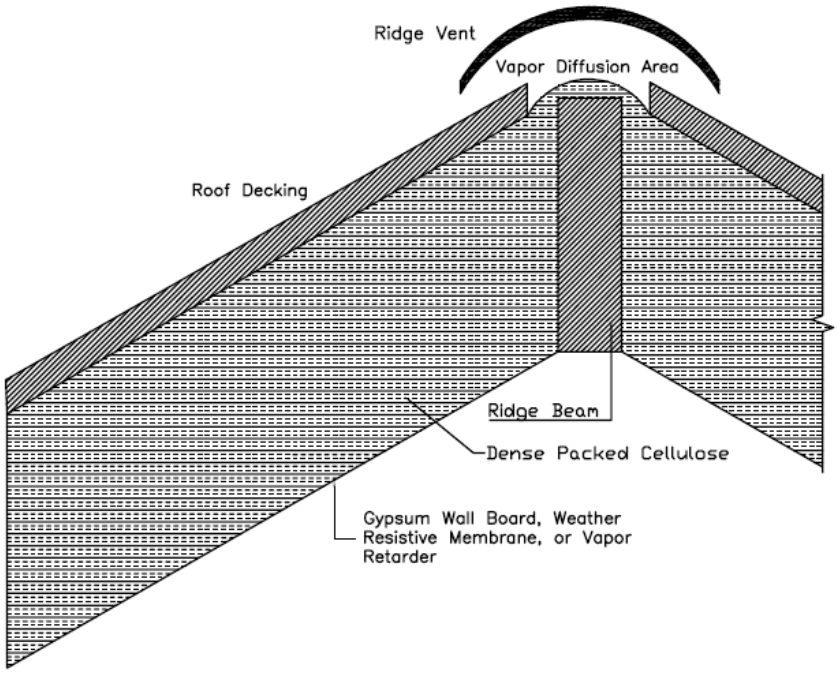
   Clean all debris off and around fireplace.

Cathedral and Unvented Attic Assemblies

For years, Nu-Wool has proposed the use of dense packed cellulose as a viable option to insulating attic assemblies. These attics do not have the typical air space used for ventilation and are sometimes referred to as hot roof assemblies. The current building codes allow for this if a layer of air impermeable insulation is installed between the roof deck and the rest of the insulation. The thickness of this air impermeable layer is determined by the climate zone the building is in. The higher the zone the thicker the layer.

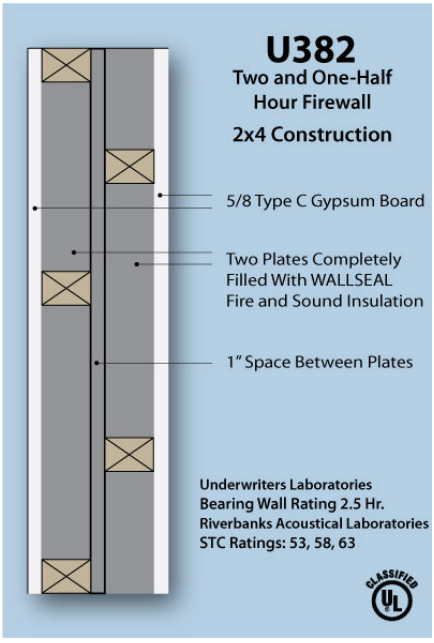
In anticipation of new methods or materials, there is a mechanism that allows for applications not yet written into the code. One method to obtain code compliance is to use modeling software such as WUFI. This software can be used to show that a Nu Wool Premium Insulation dense packed attic can be a suitable alternative to using air impermeable insulation.

In order to eliminate the air impermeable insulation, the only changes one needs to make from the roof assembly described by code are the inclusion of a vapor diffusion port to the exterior at the peak of the assembly and an air or vapor retarder in direct contact with the insulation on the inside. This can be accomplished with a ridge vent on top and either a typical interior finish such as gypsum wall board or using a weather resistive membrane or vapor retarder on the inside.



U382

Two and One-Half Hour Fire Assembly



U382 is a fully load-bearing two and one-half hour assembly meeting all the requirements of ASTM-E-119 and UL 263. This wall meets the requirements of shaft wall assemblies. The independently loaded double wall assembly maintains its integrity beyond the nominal one-hour for each side, giving the wall a two-hour thirty minute rating. U382 was able to retain its integrity for a total of 2 hours 40 minutes.

Each row of studs was placed under a load of 10,932 pounds applied vertically to achieve the maximum working stress of wood studs in accordance with 2005 National Design Specification for wood studs.

STC tests were done on three configurations for this assembly: One using the wall as tested; one layer of gypsum board each side achieving an STC of 53. The second test added one-layer of gypsum board to one side and this wall achieved an STC of 58. The third test for STC added a layer of gypsum board to each side and achieved an STC of 63. Actual test data showed one point less on each wall as these walls were simply taped at the seams rather than using gypsum "mudding." Riverbank Acoustical data shows that this method results in a one point less STC. Using this method facilitates testing.

U382 can also be viewed on the Underwriters Laboratories web site www.ul.com. Any questions concerning the assembly and use of this wall should be directed to the Technical Department of Nu-Wool Co., Inc.

ONLINE CERTIFICATIONS DIRECTORY

Design No. U382
BXUV.U382
Fire-resistance Ratings - ANSI/UL 263

Page Bottom

Design/System/Construction/Assembly Usage Disclaimer

- Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Certified products, equipment, system, devices, and materials.
- Authorities Having Jurisdiction should be consulted before construction.
- Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
- Only products which bear UL's Mark are considered Certified.

BXUV - Fire Resistance Ratings - ANSI/UL 263

BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

See General Information for Fire-resistance Ratings - ANSI/UL 263

See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

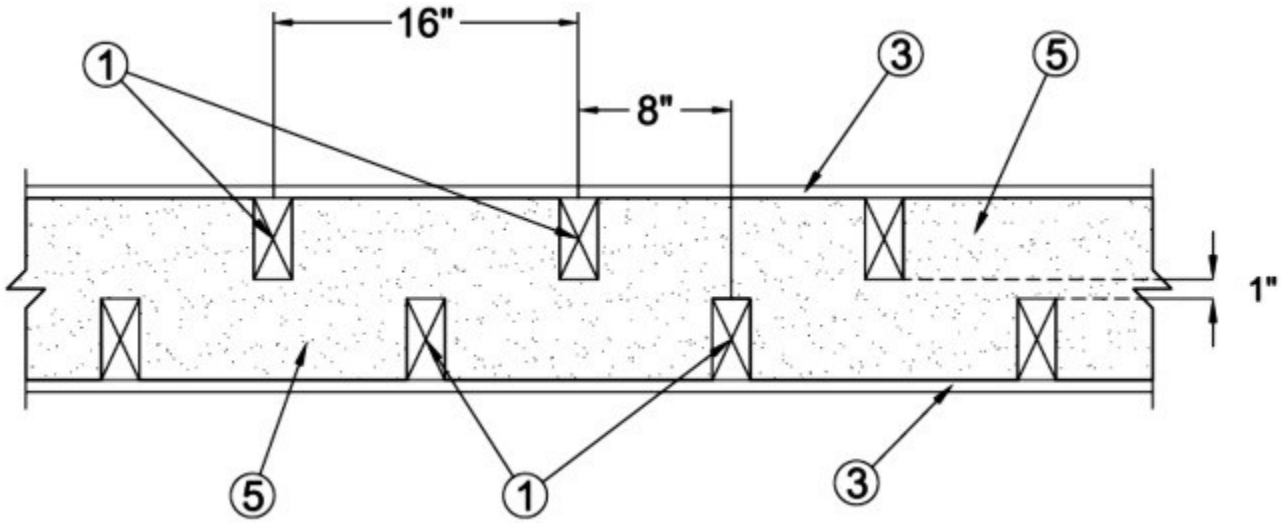
Design No. U382

March 17, 2017

Bearing wall rating — 2 Hr, 2-1/2 Hr or 3 Hr (See items 3, 3A and 3B)

This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide BXUV or BXUV7

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**



1. **Wood Studs —** Double row of nominal 2 x 4 in. studs, spaced 16 in. OC and cross-braced at mid-height. Opposite rows spaced 1 in. apart, staggered 8 in. OC and joined at the top and bottom with bearing plates.

2. **Bearing Plates —** (Not Shown) — Nominal 2 x 4 in. Two layers on top and one layer on bottom for each row of studs.

3. **Wallboard, Gypsum* —** One layer of 4 ft wide. 5/8 in. thick gypsum wallboard applied vertically and nailed to studs and bearing plates 7 in. OC with 6d cement coated nails, 1-7/8 in. long, 0.0915 in. shank diameter and 1/4 in. diameter head. Gypsum wallboard joints centered over studs.

AMERICAN GYPSUM CO — Type AG-C

GEORGIA-PACIFIC GYPSUM L L C — Type TG-C

UNITED STATES GYPSUM CO — Type C

USG BORAL ZAWAWI DRYWALL L L C SFZ — Type C

3A. **Wallboard, Gypsum* —** Two layers of 5/8 inch thick, 4 ft wide gypsum wallboard applied vertically or horizontally, with the first layer of gypsum board attached with 6d cement coated nails spaced 10 in. OC., and the second layer of gypsum board attached with 8d nails spaced 7 in. OC. Vertical or horizontal joints between 1st and 2nd layer of wallboard are to be staggered. For 3 Hour Rating.

AMERICAN GYPSUM CO — Type AG-C

GEORGIA-PACIFIC GYPSUM L L C — Type TG-C

UNITED STATES GYPSUM CO — Type C

USG BORAL ZAWAWI DRYWALL L L C SFZ — Type C

3B. **Wallboard, Gypsum* —** One layer of 4 ft wide. 5/8 in. thick gypsum wallboard applied horizontally and nailed to studs and bearing plates 7 in. OC with 6d cement coated nails, 1-7/8 in. long, 0.0915 in. shank diameter and 1/4 in. diameter head. For 2 Hour Rating Only.

AMERICAN GYPSUM CO — Type AG-C

GEORGIA-PACIFIC GYPSUM L L C — Type TG-C

UNITED STATES GYPSUM CO — Type C

USG BORAL ZAWAWI DRYWALL L L C SFZ — Type C

4. **Joints and Screwheads —** (Not shown) — Wallboard joints taped and both joints and nailheads covered with joint compound.

5. **Fiber, Sprayed* —** Green Colored Spray applied cellulose material. The fiber is applied with water to completely fill the enclosed 8 in. cavity in accordance with the application instructions supplied with the product. The minimum dry density is 4.58 lbs/ft^3.

NU-WOOL CO INC — Wallseal Fire and Sound Insulation

6. **Mesh Netting —** (Not shown) — Any thin, woven or non-woven fibrous netting material attached with staples to the outer face of one row of studs to facilitate the installation of the sprayed fiber from the opposite row.

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

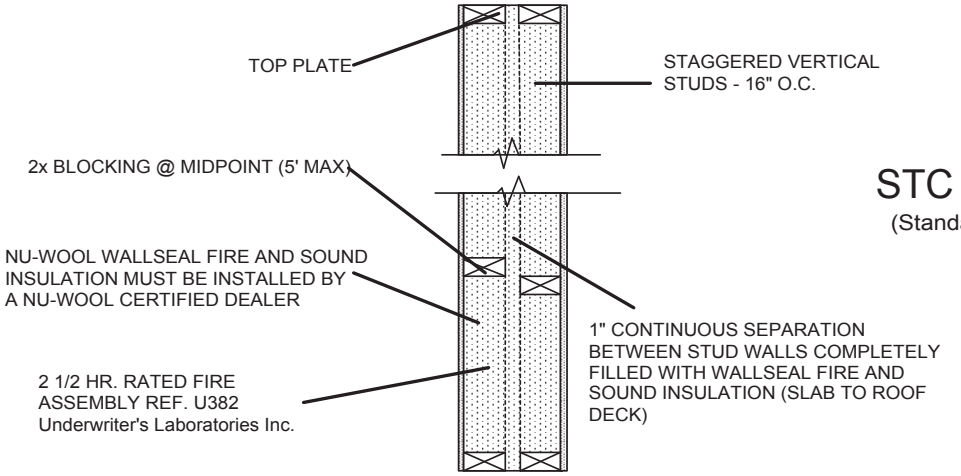
Last Updated on 2017-03-17

Questions? Print this page Terms of Use Page Top

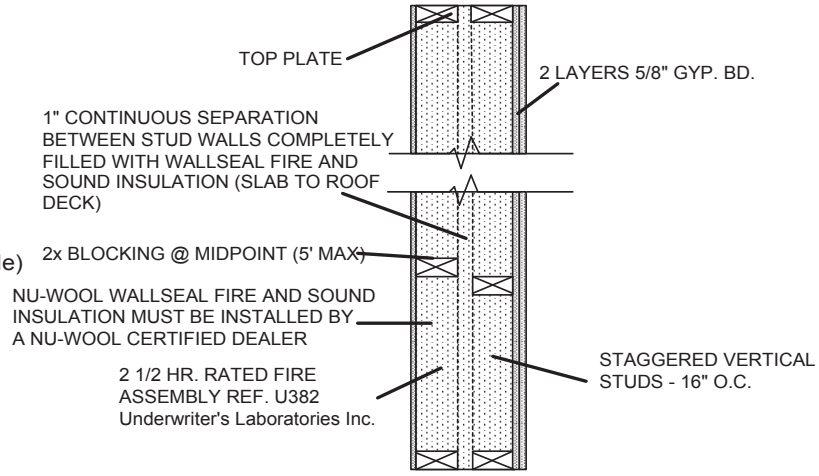
NU-WOOL®
PREMIUM CELLULOSE INSULATION
GREEN Since 1949

Nu-Wool Design Detail - U382 - 2 Hr. Full-Load Bearing Firewall
Acoustical Properties

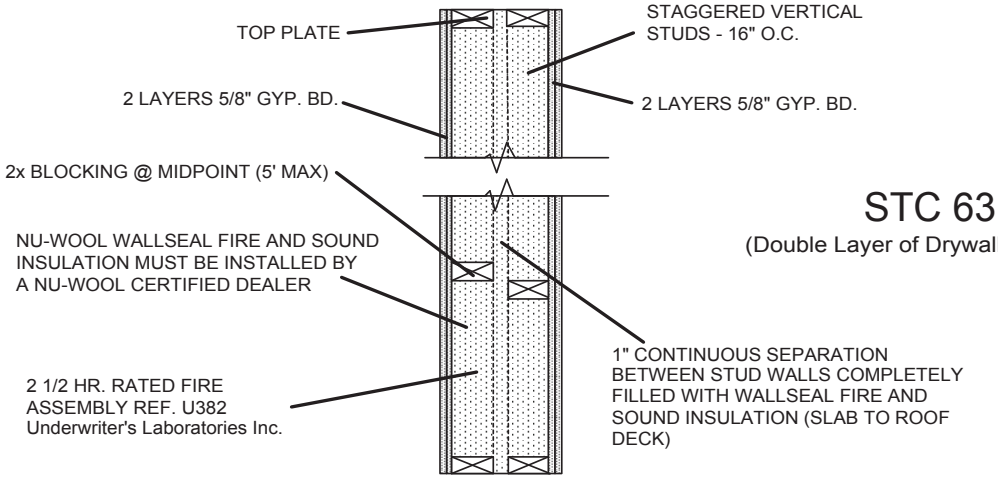
FIND A NU-WOOL DEALER 1-800-748-0128 or www.nuwool.com



STC 53
(Standard)



STC 58
(Double Layer of Drywall on One-Side)



STC 63
(Double Layer of Drywall on Both Sides)

NU-WOOL®
PREMIUM CELLULOSE INSULATION
GREEN Since 1949

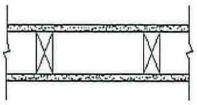
Wood Fire Wall Assemblies
Underwriters Laboratories

Nu-Wool Premium Cellulose Insulation, installed using the WALLSEAL System ("WALLSEAL") has been approved for use by UL in the following fire wall assembles.

Wood Studs

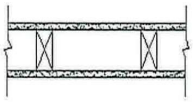
45 Min.

U317 Single wood studs 16' o.c.; single layer ½" or ¾" type "x" gypsum board each side; WALLSEAL 3 ½" thick.

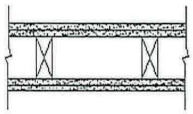


1 Hour

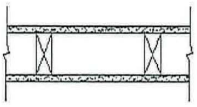
U305 Single wood studs 16" o.c.; single layer 5/8" type "x" gypsum board each side; WALLSEAL 3 ½" thick.



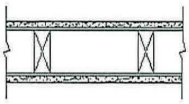
U307 Single wood studs 16" o.c.; single layer 5/8" type "x" gypsum board each side; 7/16" wood particle board each side;



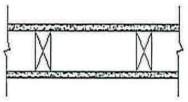
U309 Single wood studs 24" o.c.; single layer 5/8" type "x" gypsum board each side; WALLSEAL 3 ½" thick.



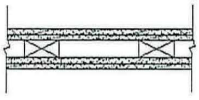
U321 Single wood studs 16" o.c.; ¼" hard board each side; 5/8" or ¾" type "x" gypsum board each side; WALLSEAL 3 ½" thick.



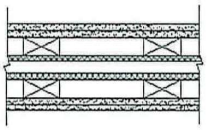
U333 Single wood studs 16" o.c.; single layer 5/8" type "x" gypsum board each side; WALLSEAL 3 ½" thick .



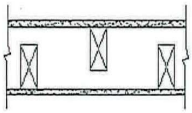
U338 Single wood studs flat wise 24" o.c.; double layer 5/8" type "x" gypsum board each side; WALLSEAL 1 ½" thick.



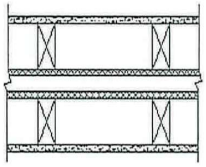
U339 Double layer wood studs flat wise 24" o.c.; double layer 5/8" type "x" gypsum board each side; plywood sheathing within wall with air space between; WALLSEAL in stud cavities.



U340 Single wood studs staggered 12" o.c. on opposite sides; single layer 5/8" type "x" gypsum board each side; WALLSEAL 5 ½" thick.

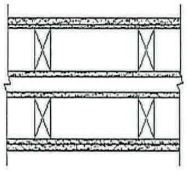


U341 Double layer wood studs 24" o.c.; single layer 5/8" type "x" gypsum board each side; 7/16" wood structural panels in wall with air space between; WALLSEAL in stud cavity.



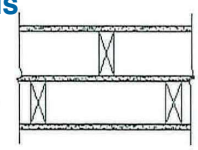
2 Hour

U342 Double layer wood studs 16" o.c.; double layer 5/8" type "x" gypsum board each side; single layer 5/8" gypsum board within wall with air space between; WALLSEAL in stud cavity.

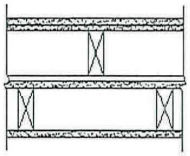


Nu-Wool Properietary Fire Walls

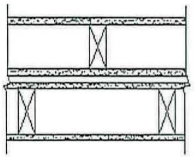
U360 Double layer wood studs 16" o.c. opposite sides; 5/8" type "x" gypsum board on outside and between stud layers; WALLSEAL in stud cavity .



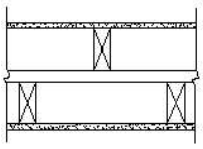
U369 (Configuration A) Double layer wood studs staggered 16" o.c. on opposite sides; double layer 5/8" type "x" gypsum board on one side; single layer 5/8" type "x" gypsum board on other side; air space within wall with single layer gypsum board on one side; WALLSEAL in stud cavity.



U369 (Configuration B) Double layer wood studs staggered 16" o.c. on opposite sides; single layer 5/8" type "x" gypsum board on each side; single layer 5/8" type "x" gypsum board with 0" to 3 ½" air space between gypsum board; WALLSEAL in stud cavity.



U382 Double layer wood studs 16" o.c.; opposite sides and cross braced at mid-height; 5/8" type "C" gypsum on outside; WALLSEAL in stud cavity and between stud layers.



NU-WOOL®
PREMIUM CELLULOSE INSULATION
GREEN Since 1949

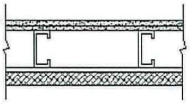
Steel Fire Wall Assemblies
Underwriters Laboratories

Nu-Wool Premium Cellulose Insulation, installed using the WALLSEAL System ("WALLSEAL") has been approved for use by UL in the following fire wall assembles.

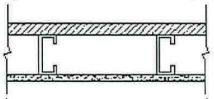
Steel Studs

1 Hour

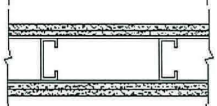
U040 Single steel studs 24" o.c.; double layer 5/8" type "x" gypsum board one side; ½" galv. steel subgirts and insulated steel panel on other side; WALLSEAL 3 5/8" thick.



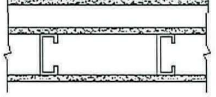
U434 Single steel studs 24" o.c.; single layer 5/8" type "x" gypsum board one side; 7/8" cement plaster other side; WALLSEAL in stud cavity.



U440 Single steel studs 24" o.c.; steel resilient channel one or both sides; double layer ½" type "x" gypsum board each side: WALLSEAL in stud cavity.

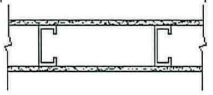


U465 Single steel studs 24" o.c.; single layer 5/8" gypsum board each side; WALL-SEAL in stud cavity.



U469 Single steel "C-T" shaped studs 24" o.c.; 1" gypsum board between studs, single layer 5/8" type "x" gypsum board one side; WALLSEAL in stud cavity.

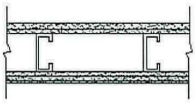
U 495 (1 Hour) Single steel studs 24" o.c.; sin-gle layer 5/8" or ¾" type "x" gypsum board each side; WALLSEAL in stud



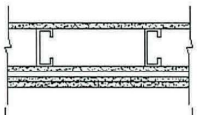
V416 Single steel studs 24" o.c.; one layer ¾" type "x" gypsum board one side; WALL-SEAL in stud cavity.

2 Hour

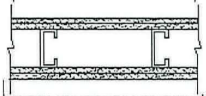
U403 Single layer steel studs 24" o.c.; double layer 5/8" type "x" gypsum board one side; single layer of 5/8, ½", and ¼" gypsum board on other side; WALLSEAL in stud cavity.



U408 Single layer steel studs 24" o.c.; single layer 5/8" type "x" gypsum one side; triple layer 5/8" gypsum board with resilient channel between base layer and outer two; WALLSEAL in stud cavity.



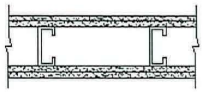
U411 Single layer steel studs 24" o.c.; double layer 5/8" type "x" gypsum board each side; WALLSEAL in stud cavity.



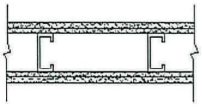
U412 Single layer steel studs 24" o.c.; double layer ½" type "x" gypsum board each side; WALLSEAL in stud cavity.

U438 Single "C-T" shaped steel studs 24" o.c.; 1" gypsum board between studs double layer ½" type "x" gypsum board one side; WALLSEAL in stud cavity.

U495 (2 Hour) Single steel studs 24" o.c.; single layer 5/8" or ¾" type "x" gypsum board and single layer 5/8" gypsum board each side; WALLSEAL in stud cavity.

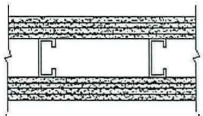


V410 Single steel studs 24" o.c.; one layer ½" and 5/8" type "x" gypsum board each side; WALLSEAL in stud cavity.



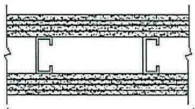
3 Hour

U426 Single steel studs 24" o.c.; quadruple layer ½" type "x" gypsum board each side; WALLSEAL in stud cavity.

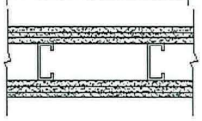


U435 (3 Hour) Single steel studs 16" or 24" o.c.; triple layer ½" type "x" gypsum board each side; WALLSEAL in stud

U462 Single steel studs 24" o.c.; quadruple layer ½" type "x" gypsum board each side; WALLSEAL in stud cavity.



U463 (3 Hour) Single steel studs 24" o.c.; triple layer ½" type "x" gypsum board each side; WALLSEAL in stud cavity.

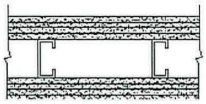


U478 Single layer steel studs 24" o.c.; triple layer ½" type "x" gypsum board one side; double layer ½" type "x" gypsum board and ½" or 5/8" plaster on other side; WALLSEAL in stud cavity.

4 Hour

U435 (4 Hour) Single steel studs 16" or 24" o.c.; quadruple layer ½" type "x" gypsum board one side; WALLSEAL in stud cavity.

U463 (4 Hour) Single steel studs 24" o.c.; quad-ruple layer ½" type "x" gypsum board each side; WALLSEAL in stud cavity.



NU-WOOL®
PREMIUM CELLULOSE INSULATION
GREEN Since 1949

STC Ratings

STC Ratings of wall assemblies insulated with Nu-Wool Premium Cellulose Insulation.

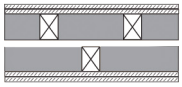
Testing done with full scale assemblies at Riverbank Acoustical Laboratories. Some walls extrapolated from other data.

The diagrams and stated STC ratings listed below are intended to serve as a guide. Construction practices have an influence on final STC ratings. Nu-Wool® Co., Inc. cannot guarantee actual STC ratings. Flanking sound patterns, the integrity of the wall, and floor and ceiling construction are important factors in effective sound control.

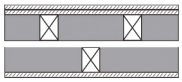
For more information, please contact the technical department of Nu-Wool Co., Inc. at 800.748.0128.

WOOD STUD ASSEMBLIES
Nu-Wool proprietary firewall designs

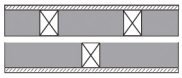
63 **U382:** Staggered wood studs 16" o.c.; double layer ⅝" type "C" gypsum board each side; WALLSEAL® 3 ½" thick



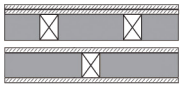
58 **U382:** Staggered wood studs 16" o.c.; double layer ⅝" type "C" gypsum board one side, single layer other side; WALLSEAL® 3 ½" thick



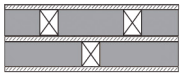
53 **U382:** Staggered wood studs 16" o.c.; single layer ⅝" type "C" gypsum board each side; WALLSEAL® 3 ½" thick



58 **U369:** Staggered wood studs 16" o.c.; double layer ⅝" type "x" gypsum board one side, single layer other side; WALLSEAL® 3 ½" thick.



51 **U360:** Staggered wood studs 16" o.c.; single layer ⅝" type "x" gypsum board each side and between studs; WALLSEAL® 3 ½" thick

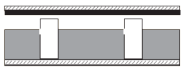


STEEL STUD ASSEMBLIES
STC Ratings for common wall assemblies

60 Single steel studs 16" o.c.; resilient channel one side; double layer ⅝" type "x" gypsum board each side; WALLSEAL® 3 ½" thick.

58 Single steel studs 16" o.c.; resilient channel one side; double layer ½" type "x" gypsum board each side; WALLSEAL® 3 ½" thick.

54 Single 6" studs 16" o.c.; resilient channel one side; one layer, ⅝" gypsum board each side; WALLSEAL® 3 ⅝" thick.

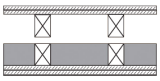


52 Single steel studs 16" o.c.; resilient channel one side; single layer ⅝" type "x" gypsum board each side; WALLSEAL® 3 ½" thick.

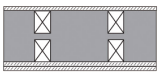
46 Single steel studs 16" o.c.; single layer ½" gypsum board each side; WALLSEAL® 3 ½" thick.

WOOD STUD ASSEMBLIES
STC ratings for common wall assemblies

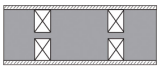
66 Double wood studs 16" o.c.; double layer ½" type "x" gypsum board each side; WALLSEAL® one side 3 ½" thick



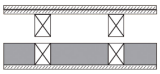
62 Double wood studs 16" o.c.; double layer ½" gypsum board one side, single layer other side; both cavities WALLSEAL® to thickness



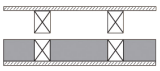
61 Double wood studs 16" o.c.; single layer ½" gypsum board each side; both cavities WALLSEAL® to thickness



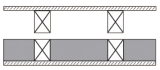
59 Double wood studs 16" o.c.; double layer ½" type "x" gypsum board one side, single layer other side; WALLSEAL® one side 3 ½" thick.



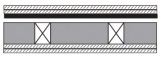
58 Double wood studs 16" o.c.; single layer ½" type "x" gypsum board each side; WALLSEAL® one side 3 ½" thick



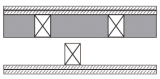
58 Double wood studs 16" o.c.; single layer ⅝" type "x" gypsum board each side; WALLSEAL® one side 3 ½" thick



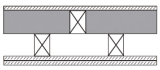
58 Single wood studs 16" o.c.; resilient channel one side; double layer ½" type "x" gypsum board each side; WALLSEAL® 3 ½" thick



56 Staggered wood studs 24" o.c.; double layer ⅝" type "x" gypsum board each side; WALLSEAL® one side 3 ½" thick

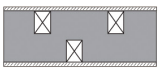


54 Staggered wood studs 24" o.c.; double layer ⅝" type "x" gypsum board one side, single layer other side; WALLSEAL® one side 3 ½" thick

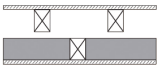


54 Single wood studs 16" o.c.; resilient channel; single layer ⅝" type "x" gypsum board one side, double layer other side, WALLSEAL® 3 ½" thick

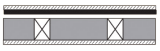
53 Staggered wood studs 16" o.c.; single layer ½" gypsum board each side; both cavities WALLSEAL® to thickness



52 Staggered wood studs 16" o.c.; single layer ⅝" type "x" gypsum board each side; WALLSEAL® one side 3 ½" thick

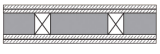


51 Single wood studs 16" o.c.; resilient channel one side; single layer ⅝" type "x" gypsum board each side, WALLSEAL® 3 ½" thick



48 Single wood studs 16" o.c.; resilient channel one side; single layer ½" type "x" gypsum board each side; WALLSEAL® 3 ½" thick

47 Single wood studs 16" o.c.; double layer ½" type "x" gypsum board each side; WALLSEAL® 3 ½" thick



45 Single wood studs 16" o.c.; single layer ⅝" type "x" gypsum board each side; WALLSEAL® 3 ½" thick

42 Single wood studs 16" o.c.; double layer ½" gypsum board one side, single layer ½" gypsum board other side; WALLSEAL® 3 ½" thick

41 Single wood studs 16" o.c.; single layer ½" type "x" gypsum board each side; WALLSEAL® 3 ½" thick

Use of Vapor Retarders

Building Codes have finally caught up to building science with the adoption of vapor retarder classes.

Class I	**0.1 perm or less**
Class II	**1.0 perm or less and greater than 0.1 perm**
Class III	**10 perm or less and greater than 1.0 perm**

The following are encouraged:

- The construction of assemblies that are able to dry by diffusion to at least one side and in many cases to both sides.
- The ability to use insulating sheathings in cold climates without the creation of “double vapor retarders.”
- The ability to use damp spray insulations in cold climates with insulating sheathings without the creation of “double vapor retarders.”

Consult your local codes as the use of a vapor retarder is a function of location and construction type. In many cases simple latex paint used for finishing is all that is required.

Vapor Barriers and High Humidity Areas

While Nu-Wool Premium Cellulose Insulaton, installed using the WALLSEAL System, is designed to work without a vapor retarder under normal conditions, it is not recommended for use without a vapor retarder in pool areas and other situations where high humidity is present.

Guaranteed to Perform Without a Vapor Retarder

Nu-Wool Co., Inc. advises contractors that a vapor retarder is not necessary with the Nu-Wool WALLSEAL system in walls using gypsum wallboard in typical situations. This is due to the product's unique ability to resist air movement, and therefore, the transmission of moisture. Air movement is the primary mechanism for moisture transfer. In fact, air accounts for 98% of all vapor movement in insulated cavities. Clearly, stopping air movement is the fundamental issue that builders and insulators should address. Vapor retarders on walls are not necessary or even desirable in all buildings or in all climates, because they can trap moisture. There are special cases such as indoor pool rooms where a vapor retarder may be required. Please see the Section on Vapor Retarders and High Humidity Areas. ASHRAE standards warn against the use of vapor retarders in any structure in warm climates. There is also danger with moisture problems in cold climates caused by moisture being driven into the wall in the summer. Building codes have changed significantly regarding the use of vapor retarders. Contact Nu Wool Technical Services for further information

The Nu-Wool Guarantee

Nu-Wool Co., Inc. guarantees the proper application of Nu-Wool Premium Cellulose Insulation, installed using the Nu-Wool WALLSEAL system without a vapor retarder in buildings with walls using gypsum wallboard with normal relative humidity levels. Vapor retarders are still necessary in buildings with high relative humidity levels, such as those with indoor pools.

Technical Support

Nu-Wool Co., Inc. makes a product that it proudly stands behind. Because of the guaranteed energy efficient qualities of Nu-Wool Premium Cellulose Insulation, Nu-Wool provides technical support throughout the construction of the building. This support is offered to the architect, the building official, the general contractor/builder and the insulation contractor. If there is a problem or you need help with an issue, contact the Technical Services Department and get the answers you need - 800.748.0128.

THE TECHNICAL SERVICES DEPARTMENT OFFERS THE FOLLOWING SERVICES:

- ✓ Blower Door Testing
- ✓ Infrared Analysis
- ✓ Moisture Testing
- ✓ Acoustic Troubleshooting
- ✓ Calculating BTU Loads
- ✓ Energy Usage Analysis
- ✓ Duct Blaster Technology
- ✓ HVAC Sizing
- ✓ Resolving Building Code Issues
- ✓ Recommendations for Proper Installation