

# **Guide for the Installation of Sprayed Cellulosic Wall Cavity Insulation**

*Cellulose wall cavity spray insulation is rapidly growing in popularity among new home builders and buyers. This guide is a general outline of the methods and practices that have been found to result in satisfactory cellulose wall spray installations.*



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## 1.0 SCOPE

1.1 This guide covers the application of Sprayed Cellulosic Wall Cavity Insulation (SCWCI) into wood/steel framed cavities of single and multi-family dwellings.

1.2 SCWCI is applied to enclosed or covered spaces.

1.3 When installing SCWCI materials it is essential that the guidelines of the manufacturer are followed. This guide is not intended to supersede local, state or federal codes.

1.4 This guide assumes that the installer possesses a good working knowledge of the applicable codes and regulations, safety practices, tools, equipment, and methods necessary for the proper installation of SCWCI materials. It also assumes that the installer understands the fundamentals of residential construction that affect the installation of insulation materials.

## 2.0 PURPOSE

2.1 The purpose of this Standard Practice is to inform installers of the acceptable procedures to ensure proper installation. It also identifies precautions which need to be taken.

2.2 This document is to be used only as a guide and is not intended to supplant or override instructions provided by the manufacturer or applicable installation standards.

## 3.0 APPLICABLE DOCUMENTS

3.1 ASTM Standards

C-168 *Terminology of Terms Relating to Thermal Insulating Materials.*

C-739 *Specification for Cellulosic Fiber (Wood Based) Loose Fill Thermal Insulation.*

C-755 *Recommended Practice for Selection of Vapor Barriers for Thermal Insulation.*

C-1015 *Practice for Installation of Cellulosic and Mineral Fiber Loose Fill Thermal Insulation.*

3.2 Federal Regulations

16 CFR Part 1209 *Consumer Products Safety Commission Interim Safety Standard for Cellulose Insulation*

## 4.0 DEFINITIONS

4.1 *Overspray* - that portion of material from a spray pattern not filling or adhering to intended substrates.

4.2 *Overfill* - insulation sprayed beyond the stud face to insure a totally filled cavity after scrubbing.

4.3 *Spray Nozzle* - a tube with a liquid atomizing unit attached to intermix fibers and liquid. These nozzles can have various numbers and configurations of spray tips.

4.4 *Wall Scrubber* - a tool, with a rotating brush, that grooms the insulation flush to the face of the studs.

## PRELIMINARY INSPECTION

5.1 An inspection of the building is essential prior to installation. Special considerations to the following areas is very important.

5.1.1 All voids around windows and doors should be sealed to stop air infiltration. Various materials such as

foam backer rod or urethane spray foam are available for this purpose.

5.1.2 Seal all vertical plumbing and electrical penetrations through both top and bottom plates of all walls.

5.1.3 Cover finished areas including windows, doors, fireplaces, etc. It is faster to protect finish surfaces than to clean them later. 2 or 4 mil. polyethylene sheeting works well.

5.1.4 Cover electrical boxes and other necessary openings until the spraying is completed.

5.1.5 If recycling the SCWCI, a clean floor is absolutely essential before starting to spray. Objects such as nails, wood, wire, etc., could damage the machine. Sweep these from the floor before starting to spray the SCWCI.

## 6.0 EQUIPMENT

6.1 The insulation shall be applied with spray application machines, spray nozzles, and other necessary equipment suitable for the material being installed.

6.2 Semi-spiral hose should be used. This hose allows the material to tumble and stay in the air stream. 2 1/2" or 3" hose can be used, if you use 3" hose you need to reduce to 2 1/2" to attach the spray nozzle.

6.3 A pump capable of up to 1,200 psi at a flow rate sufficient to dampen the fibers as required by the insulation manufacturer.

Nozzles should be 2" to 3" to facilitate good volume of material. The control of fiber to water ratio must be consistent. The liquid pressure line must be rated to handle the pressures that the pump is delivering.

6.4 A wall scrubber should be used for cleaning down walls. The cavity must be sprayed beyond the stud surface. Wall scrubbing is recommended to be done from the floor upward, in which case the scrubber head should be spinning upward against the wall cavity. Downward scrubbing may cause sags. After wall scrubbing, there should be no voids. Refer to the manufacturer or supplier for recommendations on safe and correct use of the wall scrubber.

6.5 Large commercial vacuums may be used to aid in the recycling process (see Section 9). Some machines have vacuum systems attached that blend the recycled cellulose with new bags of cellulose.

Otherwise, vacuum systems may be added to machines.

6.6 Other items include:

6.6.1 Water Tank

6.6.2 Shovels, Brooms, Trash Cans (for recycle)

6.6.3 Staple Gun and Poly

6.6.4 Stiff Kitchen Broom

## 7.0 EQUIPMENT SETUP

7.1 The blower machine may be mounted in a truck or trailer to be positioned at the job site as close to a door as practicable to make recycling easier and increase production. An alternative is to take the machine into the building in a central location.

7.2 The pump, hoses, and water tank need to be protected from freezing. Electrical outlets may require ground fault protection per local regulations.

7.3 At the job site pull the hose to the farthest point you must insulate. Make the hose no longer than necessary (100' min.) having as few bends as possible. Next, pull the water line out along the insulation hose.

7.4 Connect the blower hose to the nozzle loosely, for easier direction of the nozzle. When going from room to room, the hose will turn. When it does, the nozzle must be adjusted on the hose. Tape the water pressure hose to the blower hose just behind the nozzle to keep the nozzle attached, while allowing removal of the nozzle by disconnecting the pressure hose from the nozzle and simply sliding the nozzle out of the blower hose.

7.5 Adjust the blower machine and pump according to manufacturer's recommendations. Refer to manufacturer's recommendations for the correct pressure settings for the nozzle in use. Specific recommendations from the thermal insulation manufacturer must be followed. Liquid flow tests may be made periodically to verify a proper liquid to fiber ratio. This can be done by measuring the amount of water sprayed into a bucket during a period of 1 minute and comparing to the fiber feed rate.

## **8.0 TECHNIQUES OF SPRAYING**

8.1 Start at the bottom of the cavity. Use a 45 degree downward angle for about 2 or 3 passes. Then within 4 or 5 passes gradually shift to a slightly downward angle (about 5 to 10 degrees). Retain that angle until about 12" from the top of the cavity. Gradually start shifting the angle upward so that the underside of the top plate can get a film of moisture before completing the top. On the last 4" of the top of the cavity, with a slightly faster pass, angle at about 45 degrees to complete to top. Do not overfill at the top. That same angle procedure should be used to properly seal the underside of windows, blocking and the underside of electrical boxes. Spray behind electrical boxes before spraying the cavity. This will assure that there is a good seal behind to boxes. The angle of spray is an absolutely essential part of spraying and must become a habit. A downward angle of approximately 5 to 10 degrees and about 3 to 4 feet away from the wall gives a layering effect. Nozzle tips should be slightly angled up to condition the wall sheathing to assist in cellulose adherence. Care should be taken to protect the nozzles from damage. Periodically the tips should be replaced as they wear and change the spray pattern. As the nozzle moves from one side to the other, angle the nozzle sideways and maintain 5 to 10 degrees down, spraying into the existing insulation. Nearing the top of the wall, keep the nozzle angled down. To fill the very top, under the plate, turn the nozzle angle up and step in a little closer to pack the insulation against and into the top of the cavity. After the top portion is almost full step back and level out the nozzle to finish the cavity. Be careful not to over fill the top portion of the wall cavity. The

cavities under windows, soffits, etc. must be treated the same as the top plate.

8.2 Filling the cavity to the proper thickness comes with experience. The nozzle should be centered to the cavity (not the person). A very even pass will assure a smooth surface on the face of the stud. The smoother the surface, the less overspray will be needed, and that will make less recycle on the floor. Angles are critical to give a firm buildup in the cavity and alleviate voids. A smooth and steady movement of the nozzle will also help to decrease the amount of over spray. Many new applicators have problems with fall off. There are three principles to know about fall off.

8.2.1 The thicker the wall, the more weight is pulling on the sprayed insulation. Therefore it is very important to know the fiber to water ratio and keep it consistent. The thicker the walls the more important this becomes.

8.2.2 The wider the distance between studs, the less surface area the sprayed material has to attach itself. 16" OC (on center) are much more forgiving than 24" OC stud spacing. Framing with 2x8, 24" OC can be successfully sprayed

8.2.3 The angle of the nozzle and the velocity of the material are the two most important factors to reduce fall off. The sprayed insulation must hit the substrate and stay. This can only be achieved with the proper angle. If the angle is not correct the material will tend to deflect or slide off the studs and substrate. This can be mastered with practice and training.

8.3 In all cases it is important to maintain a consistent ratio of dry to recycle material.

8.4 There are many variables such as climate, depth of insulation and initial moisture content that affect the rate of drying. The manufacturer's recommended drying times shall be followed.

## **9.0 RECYCLING**

9.1 When recycling overspray and overfill material, all of the insulation is used, therefore there is very little waste. This also reduces the need for disposing of the excess material. When recycling, the material must be mixed uniformly or problems are likely to occur. If mixed improperly the wall cavity insulation may be too wet, causing inconsistent flow leading to instability causing insulation to fall out of the wall cavity.

9.2 Carefully adjust moisture or fiber volume when the recycling method begins. The recycled material adds moisture mixed with the dry product. Adjusting the water pressure or changing the spray tips, will help maintain the same moisture percentage throughout the job.

9.3 When a recycle machine is used with a dry machine, the slide-gate, on each machine will determine how much material will be feeding into the hose. Adjusting the slide-gate of each machine as necessary, along with tip size on the nozzles, and water pressure and air pressure, will determine the result of the application.

## **10.0 COLD WEATHER SPRAYING**

10.1 SCWCI can be applied successfully in freezing conditions. Always consult the manufacturer for

recommendations on spraying in severe climates and conditions.

13.7 It is recommended that the installer wear a N95 or equivalent dust mask and eye protection.

## 11.0 SPECIAL AREAS

11.1 SCWCI is excellent for sound control. It can be used in walls between rooms and other areas that require sound control. Consult the manufacturer for the recommendations of the type of sound control that is needed for each configuration.

11.2 When spraying sound walls, normally there is no backing. Drywall on one side would be a good backing. Most builders do not want to bring dry-wall installers in to only do one side of sound walls. Netting can be used on one side. It must be installed very tightly and stapled every 2". After spraying the sound walls, netting should be installed on the other side of the wall to protect against damage from drywall stockers and others that may accidentally hit it. The netting of the 2<sup>nd</sup> side should also be very tight, however, stapling can be every 12".

11.3 Cellulose insulation has been tested and found to meet code requirements for fire stopping around steel through penetrations in fire rated walls. Cellulose insulation is approved as a fire block in the International Building Code and the International Residential Code. ICC codes allow an additional 15 minutes in a nominal 2 x 4 wall for calculated fire resistance ratings. Cellulose insulation is a key component of several proprietary two hour fire wall designs. Consult manufacturers' technical bulletins for details.

## 12.0 VAPOR RETARDERS

12.1 Consult local or state building codes about the use of vapor retarders if applicable.

## 13.0 PRECAUTIONS AND LIMITATIONS

13.1 Heaters and non IC-rated recessed light fixtures must not be covered by the insulation. Local or Federal codes should be followed if applicable. It is recommended that a minimum of 3 inches of air space be maintained between any fixture and the blocking.

13.2 Cold air returns and combustion air intakes for hot air furnaces must not be blocked or the insulation should not be installed in a manner which would allow it to be drawn into the system.

13.3 Insulation should not be allowed to contact chimneys or flues. A minimum of 3 inches of air space should be maintained with blocking used to retain the insulation. (Use CPSC language)

13.4 This insulation is not recommended for filling the cavities of concrete block walls.

13.5 Consult the manufacturer about using SCWCI below grade or ground level because of moisture considerations.

13.6 This insulation is to be used in the temperatures range of -50°F. to 194° F.

### Other CIMA Publications

If you have found this technical bulletin useful you may also want to obtain copies of these CIMA publications.

*Cellulose Insulation: Codes, Regulations, and Specifications*, CIMA Technical Bulletin No. 1

*Standard Practice for Installing Cellulose Building Insulation*, CIMA Technical Bulletin No. 2

*Guide for Installation of Cellulosic Fiber Stabilized Thermal Insulation*, CIMA Technical Bulletin No. 5