

# **Standard Practice 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.*



## 1.0 SCOPE

1.1 This recommended practice 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 limited to enclosed or covered applications.

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

1.4 This Standard Practice 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 affects the installation of insulation materials.

## 2.0 PURPOSE

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

2.2 This Standard Practice is to be used only as a practice guide and is not intended to supplant or override instructions provided by the manufacturer or applicable installation standards. This recommended practice was prepared after consulting with the Technical Committee of Insulation Contractors Association of America (ICAA), numerous manufacturers, and the Department of Housing and Urban Development, Use of Materials Bulletin No. 80.

## 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.*

C-1149 *Specification for Self-Supported Spray Applied Cellulosic Thermal/Acoustical Insulation.*

E-241 *Recommended Practice for Increase Durability of Building Constructions against Water Damage.*

3.2 Federal Regulations

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

16 CFR Part 460 *FTC Trade Regulation Rule, Labeling and Advertising of Home Insulation*

## 4.0 DEFINITIONS

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

4.2 *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.

4.3 *Wall Scrubber* - a tool, with a rotating brush, that grooms the insulation level with 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. See Note 1.

Note 1 - Avoid use of expanding foams around windows. Some windows (vinyl, aluminum framed) can warp, preventing them from operating.

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 until the spraying is completed. Duct tape works well.

5.1.5 If recycling the SCWCI, a totally 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 manufacturer approved spray application machines, spray nozzles, and other necessary equipment, in strict accordance with manufacturer's instructions.

6.2 Semi-spiral hose shall 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 200 to 300 pounds per square inch (PSI) at a flow rate of 2-5 gallons per minute (GPM) is needed. Diaphragm pumps have been found to be adequate. They are very forgiving and supply a constant pressure.

6.4 There are many nozzles to use and various configurations. Nozzles should be 2" to 2 1/2" to facilitate good volume of material. Some have two spray tips, while others have up to six spray tips. Either way 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.

6.5 A wall scrubber should be used for cleaning down walls. This does a superior job and will quickly pay for itself in labor savings. It is not absolutely necessary, but it does provide an excellent appearance.

6.5.1 When using a wall scrubber refer to the manufacturer or supplier for recommendations of safe and correct use of the wall scrubber.

6.6 A moisture meter should be available to monitor the moisture content during application and while the SCWCI is curing.

6.6.1 Wagner Electronics Model L610<sup>1</sup> or equivalent has

been found to give accurate readings when used with SCWCI.

6.7 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. Otherwise, vacuum systems may be added to machines.

6.8 Other items include:

6.8.1 Water Tank

6.8.2 Shovels, Brooms, Trash Cans (for recycle)

6.8.3 Staple Gun and Poly

6.8.4 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. This works very well when spraying in cold weather.

7.2 The pump can be left outside near or on top of the water barrel / tank. Some larger gas machines have the pump mounted to the blower machine and powered by the gas engine. Such self contained systems preclude the need to have several electrical outlets like you need for electric blowers and pumps.

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. Taping the water line to the last ten or twelve feet of insulation hose helps avoid tangles while moving around the work area.

7.4 Connect the blower hose to the nozzle loosely, for easier direction of the nozzle. Do not tape the nozzle to the hose but, 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. Normally the liquid to fiber ratio should be 0.3 to 0.4 pounds of water per pound of fiber. This ratio should give you about 30% to 40% moisture in the initially installed product. Specific recommendations from the thermal insulation manufacturer must be followed. Liquid flow tests should be made periodically to ensure a proper liquid to fiber ratio. In order to install SCWCI at the proper density, these procedures must be followed.

## 8.0 TECHNIQUES OF SPRAYING

8.1 The angle of spray is an absolutely essential part of spraying and must become a habit. A downward angle of ap-

proximately 5 to 10 degrees and about four feet away from the wall gives a layering effect. When spraying layers upon layers, the cavity becomes one solid mass, with no inner voids and giving it structural integrity. 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. Wiping off the stud to get a better idea of the actual thickness in the cavity, will help in learning to judge the thickness of over spray and help to keep it to a minimum. 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 with the right equipment and material.

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.

8.4 Installation of the interior finish should not be permitted until the insulation has dried. This should be monitored using the Moisture Meter described in Section 6.6. The SCWCI may be enclosed when it is sufficiently dry, having a measured moisture content of 25% or less. **Normal drying will occur within 24 to 48 hours depending upon climatic conditions, depth of fill, and initial moisture content. The manufacturer's recommended drying times shall be followed.**

## 9.0 RECYCLING

9.1 When recycling, the material must be mixed properly 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. There are advantages and disadvantages to using the recycling method.

9.2 Advantages of recycling:

9.2.1 When recycling the material, all of the insulation is

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<sup>1</sup> The Wagner Electronics Model L610 moisture meter is available directly from Wagner Electronics. Phone 800-944-7078

used, therefore there is very little waste. This also reduces the need for disposing of the excess material.

9.2.2 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 Disadvantages of recycling

9.3.1 Machine damage and down time are the most crucial items to consider. This can occur when foreign objects such as nails, wood, and other objects go through or get stuck in the machine. There is a simple way to avoid this problem, and many learn the hard way. The simple solution is to completely clean the entire floor of the building before starting to spray.

9.3.2 The recycling method can be more time consuming. Normally there is need for approximately 3 persons to each crew. This is a minimum, larger jobs may require a crew of 4. The type of machine can also factor in how much recycle can be used. This can slow down the process and cause an over supply of recycled material. It is critical that the right equipment be used.

9.3.3 Mixing the recycled with the dry product is very important and can make or break the best sprayers. The material must be blended consistently.

### 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. Some guidelines when spraying in winter conditions follow.

10.2 Heating the building while spraying is necessary if the temperatures are below freezing. In below freezing temperatures, the entire spray system can freeze up. The most vulnerable is the pressure hose and the nozzle. The pump and the inlet pump hose can also freeze. When the building is heated, these items may be inside.

10.2.1 When spraying inside a heated building the comfort level is much better. With higher humidity, the cold can be more severe for workers as well. It is not necessary to heat the building after the spraying is completed. It is much more important to open all the windows and let the air move the moisture out.

10.2.2 The SCWCI will take longer to dry in colder climates. If ambient temperatures are expected to drop below 40°F before drying is completed it may be necessary to use supplemental heat until moisture content measures 25% or less.

10.2.3 If heat is used during the drying process, it is imperative to have ventilation to the outside. Selecting the type of heat to use is also very important. Dry heat, such as electric, works the best. It will speed up the drying process. Propane or gas heat can add high percentages of moisture and should be avoided. Remember, whenever heat is used you must make provisions to ventilate the moisture to the outside of the structure.

### 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.

### 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 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.

13.4 This insulation is not recommended for filling the cavities of masonry 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 180° F.

13.7 It is recommended that the installer wear a dust mask.

#### 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