INSULATION CONTRACTORS ASSOCIATION OF AMERICA

Technical Bulletin

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No. 32: LOOSE-FILL INSULATION - INSTALLATION

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SECTION 1 - FEDERAL TRADE COMMISSION (FTC RULE 460) REQUIREMENTS

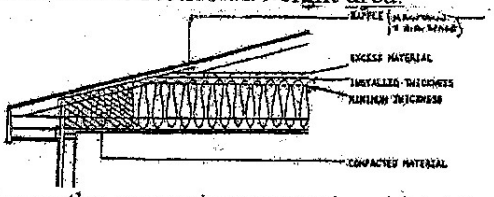
For loose-fill insulations, the initial installed thickness must be determined pursuant to ASTM C 1373-03, "Standard Test Method for Determination of Installed Thickness of Pneumatically Applied Loose-Fill Building Insulation. The insulation installer must follow the installation instructions on the label or with the package and the installer must use the initial installed thickness information on the product bag label (coverage chart) to ensure the appropriate amount of insulation has been installed.

SECTION 2 - IN ATTICS WITH LOW PITCHED ROOFS

Low pitched roofs may restrict the thickness of the insulation which can be installed, particularly at eaves where the distance from the attic floor to the roof or to the ventilation baffle may be less than the bag label chart's "minimum thickness." In these situations it is important to optimize the total overall R-value of the attic installation by varying density to compensate for differences in thickness. The recommended approach is to install the manufacturer's stated "number of bags per 1000 square feet" based on the total insulated area of the attic in the following manner:

First, material blown into the eaves must be compacted to a greater density than the rest of the open blow. The compacted material will have a higher R-value per inch than the rest of the open blow installation. This is true for light density fiberglass but may not be the case for denser materials like cellulose or rock wool which may have lower R per inch values at increased densities. An alternative method would be to install high-density batts around the perimeter of the attic.

Second, the excess material from the restricted area must be installed in the area of the attic floor where height is not restricted. It will produce a greater weight per square foot, a greater installed thickness and higher R-value than the restricted height area.



This sketch (not to scale) shows the approximate way in which blown-in insulation might vary in density and thickness when the correct number of bags of insulation are installed.
The overall R-value originally desired may or may not be achieved depending on eave height, roof pitch, insulation material used, and installation techniques employed. The best approach to achieving the desired overall R-value is when the:

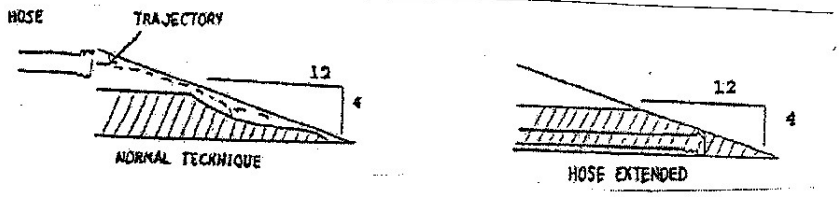
- eave area insulation is fully and properly installed (see below)
- excess insulation is blown into the open area
- the correct number of bags for the total square footage are used

BACKGROUND EXPERIMENTS

Using normal techniques, i.e., lofting insulation toward the eaves, the R-value of blown insulation in the area of the eaves is reduced by two factors:

1. Contrary to most opinion, the blown insulation is less dense than in the open blow area.
2. The restricted height from floor to roof prevents insulation material from reaching the eave to fill up the space available.

Field trials have shown that if the hose end is placed directly into the juncture of attic floor and roof (or insulation baffle) and insulation is "blown to rejection", a density 10 - 20% greater than the design density can be achieved. This is 1.1 to 1.2 times the density shown at the minimum thickness on the bag label for open blow R-values.



NOTE: The illustration above assumes no eave vent or baffle.

RECOMMENDED INSTALLATION TECHNIQUES

1. As in all attic installations, install baffles and dams to maintain at least a 1" air space between insulation and roof sheathing and to prevent insulation from being blown over eaves.

2. Starting at one end of the attic, extend the blowing hose directly into the eave area (perpendicular to wall plate) and withdraw the hose toward the center of the attic as the area fills, until the thickness equals the required minimum thickness listed on the coverage chart of the R-value desired.

   Blow opposite eave areas before blowing the open area between. Blow the open area using the standard open blow method. (If desired, all eaves can be blown first before blowing the open area.)

3. As a final step, any excess material shall be blown into the open area. NOTE: This excess material should be used. The increase in thickness it provides to the open area, no matter how slight, will increase the average R-value.

The blowing hose can be extended by temporarily tying or taping a length of rigid wood or plastic extension rod to the end of the hose. If the extension rod is of sufficient length, the hose operator can remain in the center of the attic and reach all wall plate areas with the end of the hose.

This technique yields the highest R-value at the eaves, requires no added equipment or hose changes, is quick and easy to implement.

CONCLUSION

The final overall R-value can be determined by a calculation which takes into account the following variables: eave height, roof pitch, insulation material, desired insulation R-value, compacted density in eave, area of compacted density, installed thickness in open blow area, and added thickness in open area due to excess material. Using the techniques described will assure that a higher overall R-value will be achieved than would have been obtained using conventional application techniques. **The ideal solution is for the builder to create adequate room for insulation.**

SECTION 3 - IN CEILINGS WITH RECESSED FIXTURES

Improper installation of any type of blown-in insulation can cause fire risks and other unsafe conditions. Specific hazards that can result from improper installation include fires caused by heat buildup in recessed lighting fixtures, deterioration or failure of electrical wiring components, and heat build-up resulting from overcurrent protection devices incorrectly matched to wiring.

The professional insulation contractor is well aware of the requirement to keep insulation 3" away from recessed fixtures that are not IC-rated (Insulation-Contact). The following is excerpted from the 1996 National Electrical Code issued by the National Fire Protection Association.

Article 410.65 - Temperature

(a) Combustible Material. Fixtures shall be so installed that adjacent combustible material will not be subjected to temperatures in excess of 90^0 C (194^0 F).

(b) Fire-Resistant Construction. Where a fixture is recessed in fire-resistant material in a building of fire-resistant construction, a temperature higher than 90^0 C (194^0 F), but not higher than 150^0 C (302^0 F), shall be considered acceptable if the fixture is plainly marked that it is listed for that service.

(c) Recessed Incandescent Fixtures. Incandescent fixtures shall have thermal protection and shall be so identified as thermally protected.

Exception No. 1: Recessed incandescent fixtures identified for use and installed in poured concrete.

Exception No. 2: Recessed incandescent fixtures that provide by construction design, the equivalent temperature performance characteristics of thermally protected fixtures and are so identified.

Article 410.66 - Clearance and Installation

(a) Clearance. Recessed portions of lighting fixture enclosures, other than at the points of support, shall be spaced at least 1/2 inch (12.7 mm) from combustible materials.

Exception: Recessed fixtures identified as suitable for insulation to be in direct contact with the fixture.

(b) Installation. Thermal insulation shall not be installed within 3 inches (76 mm) of the recessed fixture enclosure, wiring compartment, or ballast, and shall not be so installed above the fixture so as to entrap heat and prevent the free circulation of air.

Exception: Recessed fixtures identified as suitable for insulation (IC-rated) to be in direct contact with the fixture.

Fixture Identification

- "IC" Fixtures. IC is the abbreviation for Insulation Contact. IC-rated fixtures are designed to operate safely when in direct contact with insulation.

- "Thermally Protected" Fixtures. Sometimes called "TC" for Thermal Cutout. These fixtures do require insulation to be spaced 3" away from the fixture or the thermal protector will disconnect the fixture.

Conclusion

1. The 3" spacing rule should be observed on all recessed lighting fixtures. Exception: If the recessed lighting fixture is clearly identified as an "IC" fixture.

2. Installing insulation over any non-IC labeled fixture can lead to the risk of combustion or, at the least, interruption in the lighting due to thermal cutoff.

For further information, see ASTM Technical Committee C-16 on Thermal Insulation, ASTM C-1015, *Standard Practice for Installation of Cellulosic and Mineral Fiber Loose-Fill Thermal Insulation*, § 4.2. Also, see National Electrical Code 410-66(b).