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ADDING INSULATION TO HOUSE ATTICS

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Thousands of Canadians are contemplating adding insulation to the attics of their homes, but require further information on how to select the most suitable type, how much it will cost, and how to apply it. This note provides a brief answer to each of these questions. Further information on insulation and its application can be found in reference (1) and the publications of the Mineral Wool Association, Ontario Hydro, Hydro Quebec, other utilities and manufacturers, and in an article on insulation in Canadian Homes, 7 September 1974.

Attics may be insulated with either loose-fill insulations or batt-type insulations. Loose-fill insulations may be applied by pouring and then leveling, or with a blower. Contractors normally use batt- or blowing-type insulation in new construction and blowing- or pouring-type insulation when adding insulation to an existing attic. These types are used because they minimize the total installed cost. Homeowners generally do not have the equipment necessary for blowing so must use batt or pouring types. They also prefer these types of insulation because less dust is produced during application.

Thermal insulations can be compared in terms of the installed cost of the insulation necessary to provide one unit of thermal resistance over a one square foot area. This is calculated from the cost of a square foot of insulation divided by its thermal resistance, i.e., R-factor.

The R-factor is printed on batts and is listed for various thicknesses on bags of pouring and blowing insulation. Some manufacturers simply list the R-factor for one inch of insulation. Where no information is provided, the thermal resistance per inch can be determined as the reciprocal of thermal conductivity (k values) listed in handbooks.

In any city, the price of a particular insulation can vary by at least 20% from one supplier to another. It can also vary with quantity. It is desirable to compare the prices of all

insulations on the same general basis. The prices can then be used to compute the uninstalled cost per unit R-factor for a square foot area. These values have been calculated for Ottawa based on the prices for small quantities (see Table I). The cost of installation can be as much as or more than the cost of material.

TABLE I

UNINSTALLED COST (IN OTTAWA) OF VARIOUS INSULATIONS

(per unit R-factor for square foot area)

Type	R-factor/in.	¢/R-ft^2
Batts - rock wool*	3.3	1.0
- glass fibre*	3.0	1.2
Pouring - rock wool	2.8	1.4
- glass fibre	3.5	1.0
Blowing - rock wool	2.8	0.9
- glass fibre	2.4	0.4
Expanded mica	2.3	3.3
† Shredded polystyrene (S.E.)**	3.3	1.4
Cellulose fibre** or mascerated paper**	3.6	1.0
Wood shavings**	2.4	0.4

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* Where insulation is being added to an attic, batts without membranes, called "friction fit" batts, should be used. Membranes should be slit lengthwise in three places if batts with membranes are used

** This method can increase the potential for fire to spread especially when placed over fibrous insulation.

† Prices for this material can vary by a factor of 3.

The figures given in Table I can be used to estimate the cost of material to increase the R-factor of insulation in an attic. For example, using glass fibre batts to increase the R-factor by 14 units, from the normal value of R-10 to a value of R-24, which is still slightly below the most economical thickness for most parts of Canada, would cost approximately $200, i.e., 1200 ft^2 x 1.2 ¢/R-ft^2 x 14 R = $201.60. Some points to consider when installing insulation are:

(1) Walk only on joists or preferably on boards temporarily placed across the joists.

(2) Protect loose, granular insulation from high air velocities near vent openings or at the perimeter to prevent drifting or use adequately secured batt insulation at such locations.

(3) Ensure that soffit vents do not become blocked and that air passages are provided through to the attic space. One method to provide maximum edge insulation thickness is to fill the space between the top of the outside wall and roof with batt insulation and insert cardboard tubes or other spacers between the insulation and roof sheathing.

(4) Insulate and weatherstrip the attic access door and tightly fill gaps around chimneys and at concrete party walls with noncombustible materials. Locate and seal openings where plumbing or electrical wires extend through the ceiling to reduce heat and air leakage.

(5) Ensure that exhaust fan ducts have tightly sealed joints, extend completely to the outside, and are insulated.

Reference

(1) Stephenson, D.G. Determining the Optimum Thermal Resistance for Walls and Roofs. National Research Council of Canada, Division of Building Research, Bldg. Res. Note No. 105, Jan. 1976.