

EASY\$ TIP SHEETS

Energy Advice Saving Yukoners Money

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Insulating for energy efficiency

On cold days heat escapes from your home and on warm days heat flows into your home. Insulation can slow these processes, reducing your energy costs and improving your comfort. Many people believe that because hot air rises, most heat loss will be through the ceiling. This is not necessarily true. Heat moves equally in all directions, from a warm spot to a colder one. To get the full benefit of energy savings from insulation, you must insulate your entire home.

Adding insulation

Unless your home was constructed with special attention to energy efficiency, adding insulation will reduce your energy bills. Additional insulation will make it easier to maintain a uniform temperature throughout your home and can also reduce noise levels. Insulation can be added as a do-it-yourself project but, given the complexity of the task, a homeowner may prefer to hire a professional contractor to perform the service. Either way, it's important to choose and install the insulation correctly.

The decision about how much insulation to add to your home will depend on how much insulation is already in the house, how the house was built and the difficulty involved in adding insulation. If you decide to add insulation, you will need to know which insulation to use.

Goal and Summary

This Easy\$ tip sheet makes recommendations that will help you save money on your energy costs over the long term and make your home more comfortable. It examines types of insulation, installation techniques and strategies for effectively utilizing it in your home.

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What are insulation values?

Over time, insulation has changed, reflecting innovation and the characteristics of new products. Insulation is rated by its thermal resistance value (RSI) or the Imperial measurement (R) value; both are a measure of the insulation's resistance to heat flow. In each case, the higher the RSI or R-value, the slower the heat transfer rate through the insulating material.

How much insulation?

Typically, an R2000 home in the Yukon will have R28 in the walls, R50 in the ceiling and R20 in the basement walls. However, given that oil prices have more than tripled in recent years, home owners are encouraged to use higher insulation levels. The Yukon Housing Corporation builds its new houses with significantly higher levels of insulation.

Where to install insulation

The following briefly describes how to better insulate your home. For detailed information, check out the Natural Resources Canada Office of Energy Efficiency's publication called, "Keeping the Heat In". This publication can be found online at <http://oee.nrcan.gc.ca/residential/personal/heat/keeping-heat-in-toc.cfm?attr=4> or ordered by calling 1 800 387-2000. You can also pick up a copy from the Energy Solutions Centre.

Frame wall — new construction

Full wall insulation is recommended for the outside walls of your home. Fill all voids between the wall studs and cover with a vapour barrier on the warm side of the insulation (i.e. the side of the wall on the inside of the house). Voids include spaces between studs, at corners, cracks around windows and doors, and the header joists between floors. To prevent freezing, insulation should be fitted behind pipes and electrical boxes. Insulation should be split to go over wires when no other method is possible.

Frame wall — existing construction

Before insulating, all cracks on the interior wall should be sealed and a vapour barrier should be installed to prevent moisture from getting into the wall and the insulation.

When no insulation exists in an outside wall, each stud space can be blown full with high density cellulose fibre insulation. Extreme care should be taken during this application to eliminate the creation of any voids. Where some insulation already exists in the walls, do not attempt to fill voids with blown cellulose fibre, as it may not distribute properly within the space and could result in costly retrofit projects. Where an outside renovation is considered, such as new siding, adding exterior grade rigid insulation sheathing can increase the R-value of the wall. New siding or stucco may then be applied.

Alternatively, framing can be added to the exterior of the house to permit installation of fiberglass batt insulation, mineral wool insulation, or cellulose. Rigid foam insulation and foamed-in-place insulation are two other alternatives.

Basement wall insulation

Framed construction basement walls can be insulated in the same way as the walls on the main floor. A sealer should be used between the masonry wall or the floor and the sill plate, or bottom wall plate. The seal helps prevent air leakage and heat loss where the two meet. A vapour barrier should also be installed on the warm side of the insulation. A masonry wall should be insulated to the floor or footing. If applied to the exterior, insulation specifically approved for use above or below-grade applications, as appropriate, should be used.

Crawlspace wall insulation

Enclosed crawlspace walls should be insulated and heated to at least 16°C (60°F) to help prevent condensation and mould growth. This will also help maintain comfortable temperatures on the floor surface above and prevent water pipes from freezing. As an alternative where the crawlspace doesn't need constant heating, you may insulate the underside of the floor above and all ductwork and water pipes. Screened vents with a tight-fitting removable door should be installed to provide a free vent area of 1/500th of the crawlspace floor area. At least two vents should be installed and located across from each other to ensure a flow of air across the crawlspace. If the crawlspace is heated, the vents should be closed during the heating season and opened whenever the crawlspace is not being heated.

Ceiling insulation

Attics over ceilings are usually the easiest and cheapest areas to insulate in your home. Before adding insulation to an attic the existing vapour barrier should be checked for gaps and rips. Sheets of polyethylene film can be spread over the entire area and tucked into place, flat against the ceiling, if the existing vapour barrier needs to be replaced or did not exist. A vapour barrier can be placed on top of existing insulation as long as twice as much insulation is placed on the cold side of the vapour barrier as on the warm (ceiling) side. When adding the new insulation, make sure no gaps or spaces are left unfilled as this reduces the overall insulation level. Attic hatch covers should be weather-stripped and insulated the same as the rest of the ceiling. Be careful not to block ventilation airflow from vents in the eaves, as this can lead to damaging moisture buildup.

Floor insulation

Floors over areas exposed to outdoor temperatures should be insulated in order for the room temperature to be comfortable. The vapour barrier must always be placed on the warm side of the insulation, whether it is adhered to the bare floor or stapled to the sub-floor prior to insulating. If the sub-floor is made of plywood, simply seal all joints with caulking or construction adhesive. There is no need to add a vapour barrier to plywood sub-flooring.

Slab-on-grade

Slab-on-grade floors should be insulated with at least RSI 1.76 (R10) rigid insulation around the perimeter for 60 cm (24 inches) in from the perimeter. If the floor has embedded heating ducts, cables or pipes, it should be insulated to RSI 1.76 (R10) under the entire area.

Slab edge insulation

One metre of exposed, uninsulated slab edge loses as much heat as several square metres of insulated wall area. If the slab is heated, the slab edge heat loss almost doubles. Insulating the exposed perimeter of the slab can reduce heat loss and maintain warmer floor surface temperatures inside your home.

Which insulation should I use?

Choosing the best insulation for your particular job is dependent on the job itself. Some insulation types are easier to work with in a range of applications, while others are best suited to specific jobs. It is important to know that the different forms of insulation can be used together to achieve the best results in your particular application. For example, you can add batt or roll insulation over loose fill or vice versa; however, heavier weighted material should not be placed over easily compressed materials, as this will reduce the total R-value.

Forms of insulation

Brief descriptions of the different forms of insulation available are provided here as a handy guide.

Blanket insulation refers to products available in either rolls or batts. These products are flexible and are usually made from fibre glass or mineral fibres. They are available in widths suited to standard spacing of wall studs or attic and floor joists. Blanket insulation comes with or without vapour barrier and flame-resistant facings. This insulation is lightweight, relatively easy to install, will not slump or settle and is fire and mould resistant. Small amounts of moisture will have little effect on the R-value, and blankets can be cut to fit. Caution should be taken with blanket insulation as the fibres can cause eye, skin and respiratory irritation during installation.

Blown-in loose-fill insulation includes loose fibres or fibre pellets that are blown into building cavities or attics using special equipment. Another form includes fibres that are co-sprayed with an adhesive to make them resistant to settling.

Cellulose fibre insulation is made from finely shredded newsprint, chemically treated to resist fire, vermin and fungal growth. Due to the small size of the particles, cellulose can flow around obstructions to give a uniform fill. This insulation can settle over time, resulting in lower than expected R-values, if not blown to manufacturer's recommended density. Cellulose fibre can be installed with rented equipment or hand poured.

Blown glass fibre is similar to glass fibre blankets except that the material is chopped up. The particles in glass fibre tend to be larger than cellulose particles; so, it doesn't always flow as freely around obstructions. This form of insulation is fire resistant, but not fire proof. It is mould resistant and small amounts of moisture have little effect on the R-value. Caution should be taken when handling this material as it can cause eye, skin and respiratory irritation during installation.

Is vermiculite insulation a problem?

Prior to its close in 1990, much of the world's supply of vermiculite came from a mine near Libby, Montana. This mine had a natural deposit of asbestos which resulted in the vermiculite being contaminated with asbestos. Attic insulation produced using vermiculite ore, particularly ore that originated from the Libby mine, may contain asbestos fibers. Today, vermiculite is mined at three U.S. facilities and in other countries which have low levels of contamination in the finished material. For more information go to the following web site: <http://www.epa.gov/asbestos/pubs/insulation.html>

Vermiculite comes in treated and untreated varieties. The treated material is coated with asphalt to make it water repellent for use in high-moisture areas. Untreated vermiculite absorbs water and dries very slowly. Vermiculite is non-combustible, odourless and non-irritating.

Foamed-in-place polyurethane foam insulation is a closed-cell foam that can be used in a variety of spray applications. For large applications, the material is mixed on-site using special equipment. For small applications, the foam is available in spray cans for sealing around window frames, plumbing, etc. The foam will act as an air barrier but not a vapour barrier and should be protected from prolonged exposure to sunlight. When the foam is used in the interior of a home, it must be covered with a fire-resistant material such as drywall.

Rigid insulation is made from fibrous materials or plastic foam and is pressed into board-like forms and moulded pipe-coverings. Some forms of rigid insulation also come with a reflective foil covering that reduces heat loss when next to an air space. Some types of rigid insulation can be used for interior and exterior sheathing but if used in the interior of your home, must be covered with a fire-resistant material such as drywall.

Sealants and Gaskets

Sealants are used to make airtight and vapour-tight seals around windows or doors or to seal joints between building components. Make sure the sealant you use is compatible with the surface you apply it to.

Specialty *gaskets* have been developed for sealing joints where caulking may not be appropriate.

Sill plate gaskets can be installed between the foundation and sill plate during construction or where a new addition meets the existing house walls.

Electrical outlet and lighting fixture gaskets are designed to fit behind cover plates of electrical receptacles, switches and lighting mounts, reducing air and moisture leakage into walls and attics. These gaskets are most effective when used in conjunction with caulking and child safety plugs. Neoprene gaskets are flexible and very durable. They can be used for sealing joints where movement is expected, such as on plumbing stacks.

Other Factors

When choosing insulation for your home, you need to consider other factors besides the amount of insulation or the RSI/R values of the insulating material. Good ventilation, moisture control and vapour barriers are also important.

Ventilation

Good ventilation will prevent elevated moisture levels, which can lead to condensation on window surfaces and give rise to surface mould, rot and mildew in your home during the heating season. This can damage the structure of your home and cause health problems for you and your family. Condensation can also happen within walls and roof spaces.

If heavy condensation is present, you should consider installing a mechanical ventilation system. An air-to-air heat exchanger or Heat Recovery Ventilator (HRV) can be used to pre-heat cold incoming air with warm exhaust air to reduce the ventilation heating load and annual heating costs. When installing new insulation, make sure you do not insulate over ventilation, air exchange and air exhaust openings.

For more information about ventilating your home see the Easy\$ tip sheet, *Good Ventilation is Important*.

Vapour barriers

Installing a vapour barrier on the warm side of insulation can prevent moisture from entering walls and attics. An effective vapour barrier must be vapour diffusion resistant, durable and continuous around the entire home.

A number of building materials resist vapour diffusion well enough to be used as vapour barriers. These materials include polyethylene, oil-based and special vapour barrier paints, some insulation materials and exterior-grade plywood. Different materials may act as the vapour barrier in different parts of the house. When retrofitting a wall, check that the interior surface of the wall is vapour resistant to prevent moisture from getting into the wall, or install a vapour barrier.

In some cases the same material may work as both an air barrier and a vapour barrier. Polyethylene sheets and foil-backed gypsum drywall can combine these functions.

Recessed lighting fixtures

The electrical code prohibits the use of recessed lighting fixtures blanketed in thermal insulation because heat build-up can lead to a fire hazard. If these fixtures are to be covered, they must have a thermal protection device to switch them off should overheating occur.

In addition, the lighting fixtures must be Canadian Standards Association (CSA) approved for this type of installation. The lights or bulbs in the fixture must not exceed the maximum wattage allowable for the particular light fixture.

Wiring

Where insulation will cover electrical wiring, the wiring should be examined before insulating. All wiring connections should be placed in junction boxes and any wiring with deteriorated electrical insulation should be replaced. If you are in doubt, have the wiring examined by a qualified electrical contractor.

Chimney clearances

The National Building Code requires that adequate clearance be maintained between chimneys and combustible insulation, such as cellulose fibre. These clearances are 50 mm (two inches) for masonry and all-fuel metal chimneys; 25 mm (one inch) for type B gas vents and 45.5 cm (18 inches) for single-walled metal C vents.

Warning for combustion safety

Furnaces, fireplaces, wood stoves and any other fuel-burning appliances require air for combustion and diluting and exhausting the products of combustion out of the home. If there is not enough air, it is possible that the chimney or flue could backdraft or spill dangerous gases into the home.

Do not seal or cover any exhaust or air intake vents, as this may lead to a hazardous situation.

To ensure that your home has adequate air intake and venting to prevent air quality and moisture problems, some work may need to be done to your home. Hiring a qualified contractor with specialized equipment and experience is recommended. It is important that the work follows all safety and health regulations and recommendations for long-term safety, savings and comfort. You can help ensure that the work is done right, by obtaining a building permit before starting the retrofit and then having a Yukon government or City of Whitehorse building inspector approve the work once it is completed.

Installation

You should ensure that all installations not only meet your requirements, but also the manufacturer's instructions and all applicable codes, standards and regulations.

This Easy\$ tip sheet is provided by the Energy Solutions Centre.

If you have additional questions or comments, please contact the Energy Solutions Centre:

Phone: (867) 393-7063 or toll-free from the communities at 1-800-661-0408 ext. 7063

Mail: Box 2703 (EMR-206),
Whitehorse, Yukon Y1A 2C6

Web: www.esc.gov.yk.ca

