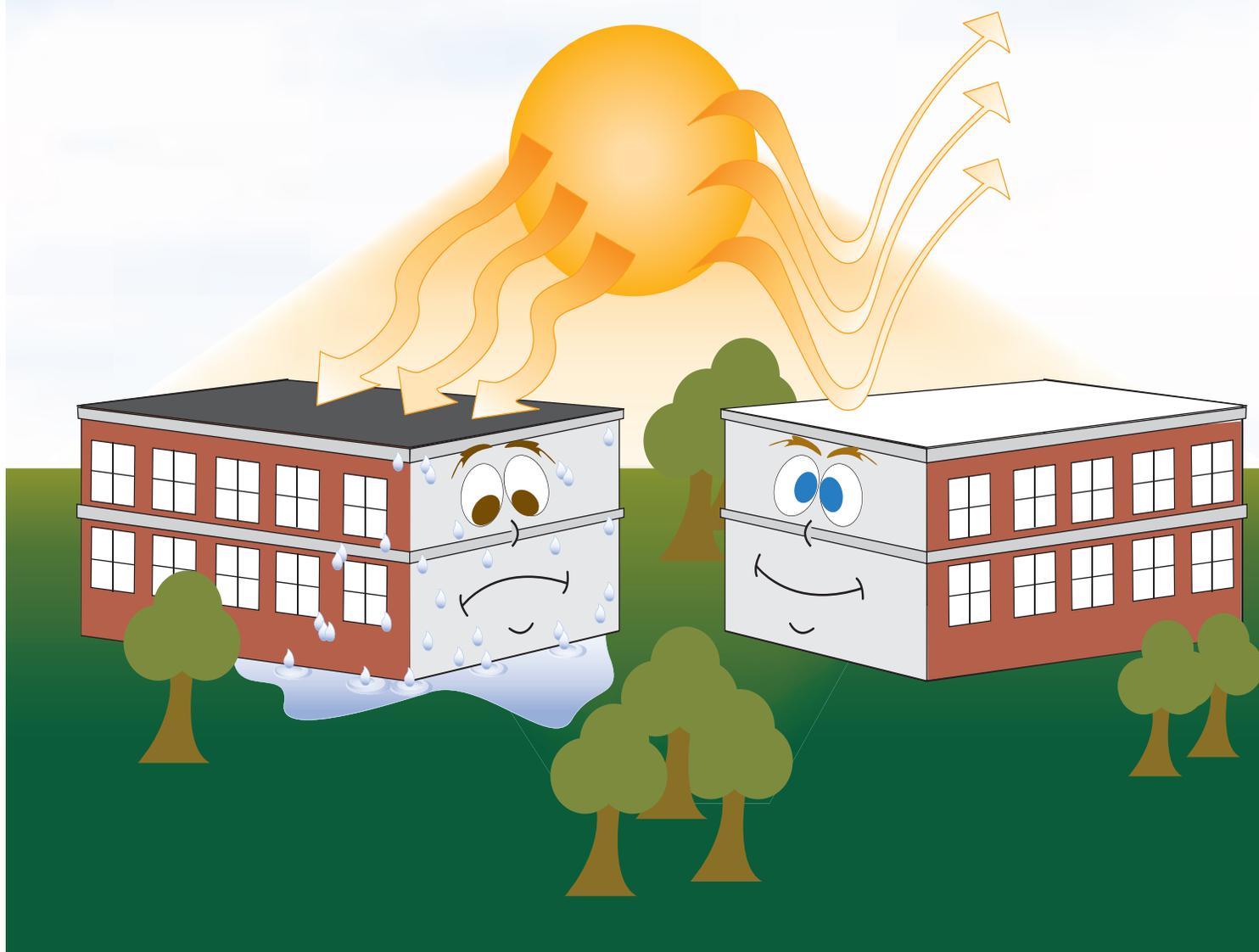




# LEXCAN

## Beat the heat with a Lexcan Cool Roofing System



# What is a Cool Roof?

The difference in surface temperature between a dark coloured roof and a cool roof can easily be 35°C (65°F) on a hot, sunny day. This temperature difference is due to the two surfaces' relative reflectivity to solar radiation. Building insulations and air barrier systems are designed to resist heat transfer by conduction and convection but do not necessarily resist radiation very well. Reducing radiation heat transfer is best achieved by using surface materials that both reflect solar radiation and quickly release any heat energy that has been absorbed. To be considered a Cool Roof, a roof surface must do both very well.

'Albedo' is the term used to describe a surface's reflectivity. A roof system with an albedo greater than 0.65 (65% reflectivity), as tested in accordance with ASTM E 903 is considered good. Emissivity is the measure of absorbed energy a material radiates away from itself, as tested in accordance with ASTM E 408. Roof membranes with emissivity values greater than 0.75 (75%) qualify as cool roofs. The following table illustrates the albedo and emissivity measures for common roofing materials:

## Albedo and Emissivity for Selected Surfaces

Material	Albedo	Emissivity
Clean Pea Gravel	0.72	0.28
Grey Pigment	0.03	0.87
Bright Galv. Steel	0.35	0.13
Aluminum Paint	0.80	0.27 - 0.67
White paint on Aluminum	0.80	0.91
Black EPDM Membrane	0.04	0.88
White Hi-Tuff Membrane	0.78	0.90

Source: "Implementation of solar-reflective surfaces; materials and utility programs". Lawrence Berkeley Laboratory, June, 1992, for all materials except single ply membranes.

In comparing the heat reflectivity of various roof surfaces one must not only consider the roof's albedo and emissivity as freshly installed but also after it has been exposed to the elements for several years. Heat reflectivity will be reduced over time by such things as colour fading, membrane deterioration (i.e. rust, chalking) and the collection of dirt and pollution on the membrane. Studies have found that the total reflectivity of a roof membrane drops considerably after only a few months of service. To meet Energy Star's\* cool roof requirements, the membrane must not fall below the minimum albedo and emissivity values after three years of exposure. Typically, the membrane must have some self-cleaning properties (i.e.: be sufficiently smooth and non-porous) to pass this test.



# The Urban Heat Island Effect

The Urban Heat Island Effect (UHIE) is the name given to the phenomena where large urban areas become 3° to 6° F hotter on summer days than their surrounding countryside. This phenomena was first detected through the analysis of thermographic (infrared) satellite photographs by a group of researchers at Lawrence Berkeley National Laboratories in the 1980s and 1990s. Further study determined that the urban temperature rise was attributable to three major causes: 56% due to a reduction in plant and vegetation coverage, 38% due to dark coloured roofs absorbing more solar energy and the remaining 6% attributed to dark coloured pavement. In the United States alone, the UHIE is believed to cost the economy in excess of \$2 billion per year and represent over 10% of the peak electrical demand across the country. Unfortunately the UHIE is a self-fulfilling phenomena in that as ambient temperatures increase, air conditioners must work harder - which heats and pollutes the outside air even further.



The possibility of roofs being redesigned to play a significant role in reducing the urban heat island effect and global warming has not been lost. Today, many private organizations and governments are actively promoting environmentally friendly roofs, including both garden roofs and cool roofs. The city of Chicago and the State of California, for example, are in the process of rewriting their building codes\* to encourage new commercial roofs that help reduce the UHIE. Other prominent government and voluntary agencies that actively promote the benefits of cool roofs are:

\*Energy Star.™ - has created a standard for cool roofs and lists roofing products which have passed their standard on their website.

Leadership in Energy & Environmental Design. LEED's allows one point for a cool roof in their Green Building Rating System™ for sustainable building design.

The U.S. Environmental Protection Agency & Dept. of Energy - promotes cool roofs through articles and informative websites.

Cool Roof Rating Council. Though somewhat similar to Energy Star™, the CCRC is a politically active voluntary organization that promotes the use of cool roofs.

The Canadian Department of Natural Resources, Office of Energy Efficiency will provide grants to building owners to help cover the cost of designing energy efficient buildings. Design costs to include a cool roof in a building's energy retrofit can qualify for such a grant.

\*: At time of writing.

# Advantages of Cool Roofs

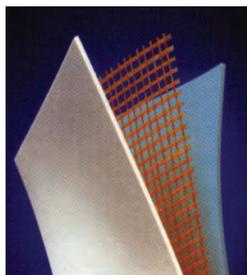
- **Cool roofs reduce air conditioning costs** (and the associated pollution resulting from their use) on hot summer days<sup>1</sup>.
- **Cool roofs help keep unconditioned or poorly insulated interior spaces cool on hot summer days.** Personnel working in these spaces will be more comfortable, productive and less fatigued.
- **Cool roofs contribute towards a reduction in the urban heat island effect by reducing ambient temperatures around a building.** As more and more building owners within a local urban area install garden roofs or cool roofs, there will be a reduced need for air conditioners on hot summer days. Overall energy use and pollution will be correspondingly reduced.
- **Cool roofs are Energy Star™ listed and attract one point in the LEED's<sup>2</sup> Green Building Rating System™ for sustainable building design.**
- **Cool roofs can replace insulation** - For budget conscious building owners in hotter climates, selecting a heat reflective roof system over a darker membrane can be equivalent to adding more insulation.
- **Cool roofs can often be utilized as a recover roof system in retrofit applications.** Where conditions permit<sup>3</sup>, components of the existing roof can be left on the building and simply recovered with a cool roof system. The owner saves on the cost of trucking the old materials to the dump and there is less landfill space used up.
- **Selecting a cool roof may make the building eligible for government grants or tax incentives.**

**Today, Cool Roof systems are available that are quite cost competitive to traditional roof systems in terms of initial installed cost. When one also considers their superior longevity, light weight, low maintenance and other advantages listed below, a Cool Roof quickly becomes the preferred choice for many commercial, institutional and industrial buildings.**

1: For more information on potential cost savings, refer to Lexcan's Technical Bulletin TB 05-02 "Potential Cost Savings with Cool Roofs."  
2: Leadership in Energy & Environmental Design.  
3: The decision to recover over an existing roof should be based on the advice of an experienced roofing professional.

## Lexcan Cool Roof Systems

Lexcan has available both PVC and TPO single ply membrane systems that qualify as cool roofs. Our TPO system is focused on here. For more information on Lexcan's PVC roofing systems, please visit our website at [www.lexcan.com](http://www.lexcan.com) or talk to a Lexcan representative.



## Hi-Tuff TPO

Hi-Tuff roofing systems are based on the Hi-Tuff TPO membrane; a copolymer of polypropylene and ethylene propylene rubber that has been formed into a membrane sheet and internally reinforced with a heavy polyester scrim. The result is a hot air weldable roofing membrane that is faster and easier to install yet offers outstanding resistance to weathering, temperature extremes, ultraviolet exposure and a wide variety of chemicals.

Aside from grey and tan colours, Hi-Tuff is available in highly reflective white that easily surpasses Energy Star's™ cool roof requirements. Other (non-environmental) advantages of Hi-Tuff include:

- **Long-Term Performance** - Hi-Tuff out performs competing roofing systems in just about every physical category. Cold temperature flexibility, seam strength and resistance to UV degradation are just some of the characteristics that make Hi-Tuff stand out as your best roofing choice for long term performance.
- **Roof-top Advertising** - Logos can be incorporated right into your roof through the use of different coloured membranes! Ideal for low rise buildings in downtown cores or on airport flight lines.
- **Safe, Odour Free Installation** - Roofing with Hi-Tuff means roofing without asphalt and its noxious fumes. With Hi-Tuff, specifiers need not fear the fire risk and potential liability inherent in specifying a hot applied roofing system.
- **Light Weight** - Most Hi-Tuff roofs weigh less than 1 lb / ft<sup>2</sup> (4.9 kg / m<sup>2</sup>), including insulation. This can often yield considerable savings in a building's construction through reduced requirements for structural steel and footings.
- **Resistance to Physical Abuse** - The 1.1 mm thick Hi-Tuff membrane is one of the most puncture and tear resistant roofing membranes on the market. Three levels of thicker membranes are available to address the most physically demanding environments.
- **The Backing of Lexcan** - The world's premier supplier of single ply roofing systems, with over 40 years of experience in applications ranging from the most northern industrial building in the world to the deserts of north Africa.

**Hi-Tuff TPO may be installed in two different ways to take full advantage of its cool roof attributes:**

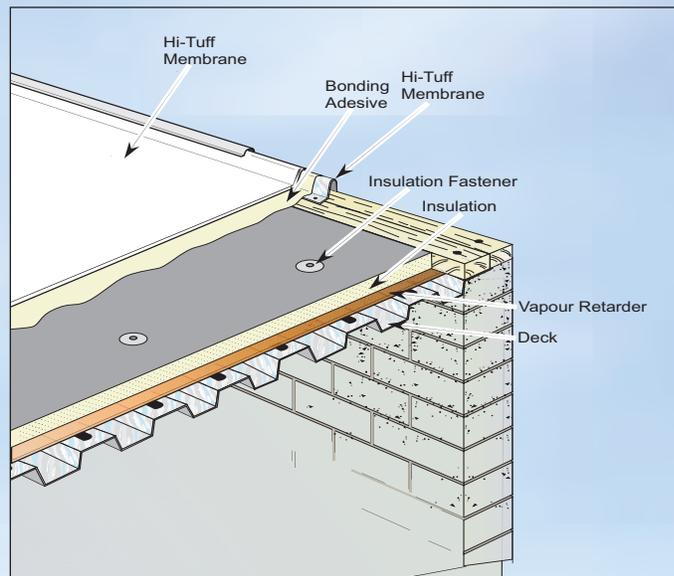
**Fully Adhered** - The adhesive adhered system is the most versatile of Lexcan's roofing assemblies. Able to be used on any flat or sloped surface, it presents a particularly smooth, contour hugging appearance. It is also the system of choice for high-rise buildings or buildings exposed to extreme wind conditions.

In the fully adhered assembly, the Hi-Tuff membrane is bonded to an acceptable insulation or other substrate with Hi-Tuff bonding adhesive; a synthetic rubber based contact cement. Membrane seams are hot air welded to complete the watertight membrane from the parapet to the drain.

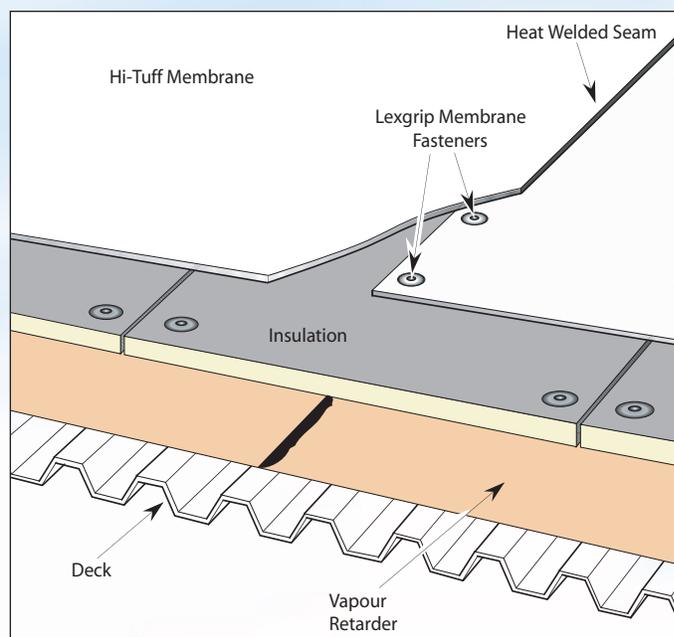
For an even more environmentally friendly alternative, Lexcan has special water based bonding adhesives available that may be used with the Hi-Tuff Fleece membrane. Consult Lexcan for more information on this system.

**Mechanically Fastened** - For an absolute minimal use of VOC's, mechanical fastening is the way to go. In this application, the membrane is secured through the insulation and structural deck with specially designed fasteners evenly spaced down the side of each membrane sheet. Adjacent sheets are positioned to overlap the fasteners and then hot air welded to form a watertight seam that is as strong as the membrane itself. Installation by mechanical fastening is fast and highly cost effective.

Hi-Tuff TPO has been installed on thousands of buildings across Canada, from St. John's, Newfoundland to Victoria B.C. and from Windsor to Yellowknife. For a more complete presentation and technical information on Lexcan Hi-Tuff TPO roofing systems, refer to our Hi-Tuff TPO brochure, technical catalogue or our website at [www.lexcan.com](http://www.lexcan.com).



**Detail of Design A**



**Detail of Design E**

# Lexcan Cool Roof Systems

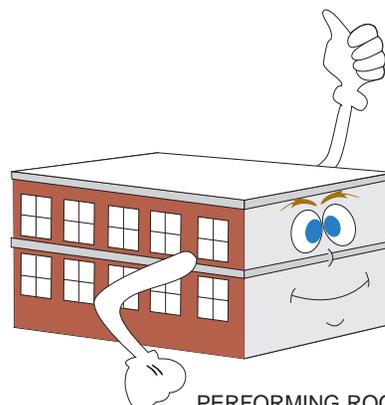
Environmentally Friendly

Energy Saving

Long Lasting

High Performance

# COOL!



PERFORMING ROOFING SOLUTIONS SINCE 1968