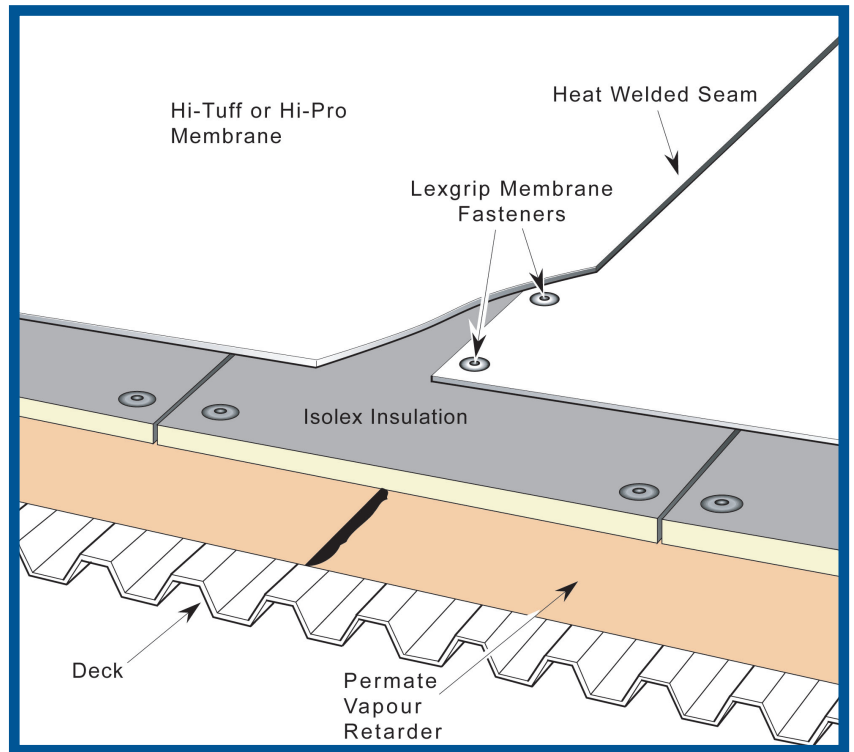




Mechanically Fastened Roof Systems

DESIGN GUIDE

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Mechanically Fastened Roof System Application

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SYSTEM DESCRIPTION

Lexcan's Mechanically Fastened Roof System (MFRS) provides a proven method of economically securing a high performance Lexcan membrane roof. In this system, insulation is first fastened to the roof deck with appropriate mechanical fasteners. The Lexcan reinforced single ply membrane is then loose laid over top and fastened to the deck along the sheet edges with special fasteners. Adjacent membrane sheets are subsequently seamed together to create a uniform, waterproof membrane across the entire roof surface.

The Lexcan Mechanically Fastened roof may be fabricated using either Lexcan Hi-Tuff TPO, Hi-Pro PVC or reinforced Hi-Flex EPDM membranes. The physical performance and features of these membranes are presented in separate product bulletins. This bulletin focuses on the features, advantages and design criteria of Lexcan's mechanically fastened roof system, independent of which membrane is used.

USE

The MFRS is a versatile assembly that may be used in both new and re-roofing applications on commercial and industrial buildings. In most cases it may be installed over an existing roof assembly to avoid the cost and disposal concerns of tearing off the old roof.

FEATURES & ADVANTAGES

- **Lightweight** - There is no need for heavy ballast with the adhesive adhered system. As a lightweight roof assembly, an adhered Lexcan membrane roof can save thousands of dollars by reducing the roof's structural support requirements.
- **Aesthetically Appealing** - Available in several colours, a visible Lexcan single ply roof system can architecturally enhance the overall appeal of a building.
- **Rooftop Advertising** - Emblems or logos can be fabricated into the membrane for inexpensive and highly visible advertising!
- **Energy Efficient** - Use of exposed light coloured membranes can significantly reduce air conditioning costs in the summer. White and tan coloured, Hi-Tuff TPO membrane are Energy Star® compliant and may be used to earn points under the LEED system.
- **Easy to Maintain** - Physical damage to the membrane can be easily located and inexpensively repaired.
- **The Backing of Lexcan** – North America's premier supplier of single ply membrane system roofs. No other company can match Lexcan's breadth and experience in Canadian roofing.

APPROVALS & COMPLIANCES

Lexcan Mechanically Fastened Roof Systems are listed or approved by Underwriter's Laboratories and Factory Mutual Research Corporation. They are also accepted in roofing contractor provincial warranty programs.

Lexcan Hi-Flex EPDM membranes meet CGSB 37-GP-52M and are listed under CCMC. Lexcan Hi-Tuff TPO membranes meet and exceed ASTM D6878-03. Lexcan Hi-Pro PVC membranes meet CGSB 37-GP-56M. Independent laboratory test results are available on request.

* Visit: www.ul.com. Click on "Certifications", then search on Lexcan.
 † Visit: www.roofnav.com. After opening an account, search on Lexcan.

Limitations

The mechanically fastened roof system requires a structurally sound deck capable of accepting appropriate fasteners. The roof decks of some buildings may not be acceptable for this type of roof system.

Single ply membranes are slippery when wet. Appropriate placement of Lexcan Traffic Pads will normally alleviate any slip hazard concerns.

Certain chemicals or industrial pollutants may attack the membrane. Where an unusual chemical environment exists, contact Lexcan to determine chemical compatibility or for information on alternative chemical resistant membranes.

Positively pressurized buildings or buildings with air plenums within the ceiling area may cause mechanically fastened membranes to billow. This problem can be corrected by employing an effective air / vapour barrier within the roof assembly or by reducing the building's internal air pressure.

Extra care should be taken when mechanically fastening to structural decks that have electrical or plumbing conduits running immediately under the deck. The contractor should shut off all utilities and mark the location of these conduits on the shop drawings prior to proceeding with the work.

ROOF DESIGN CONSIDERATIONS

Building Height

The mechanically fastened roof system is not recommended for buildings over 105 metres (350 feet) in height. Lexcan recommends its adhesive adhered roof system for roofs exceeding this height.

Type of Structural Deck

The following chart describes the acceptable deck types and minimum requirements for the mechanically fastened roof system:

Deck Type	Minimum Requirements	Required Membrane Fastener	Minimum Pullout Resistance	Minimum Penetration
Steel	22 ga. (0.75mm)	Lexgrip™ XHD	227 kgs (500 lbs)	19 mm (0.75")
Structural Concrete	Minimum 3000 psi	Lexgrip™ 14-10 w. XHD Plate	363 kgs (800 lbs)	32 mm (1.25")
Wood Planks or Plywood	Minimum 15/32" APA Grade CDX	Lexgrip™ XHD	163 kgs (360 lbs)	25 mm (1")

The mechanically fastened roof system may also be installed over other deck types such as OSB, gypsum, lightweight concrete and cementitious wood fibre. Contact Lexcan for installation requirements and procedures on these deck types.

Lexcan recommends that fastener withdrawal resistance tests be conducted to determine the suitability of a roof deck for a mechanically fastened roof system, particularly on a re-roofing project. Fastener pullout resistance tests are mandatory for deck types not listed in the above table.

Deck materials that might be affected by internal humidity or other environmental factors should be properly treated for moisture resistance. Lexcan will not assume responsibility for damage to the roofing assembly caused by structural deck deterioration or failure.

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LEXCAN MECHANICALLY FASTENED ROOFING SYSTEMS

Wood Nailers

Wood nailers are required along roof edges and at other locations as shown in Lexcan details. Nailers must be new #2 grade wood or better, factory pressure treated for rot resistance. Asphaltic or creosote treated wood is not acceptable. Lexcan requires that wood nailers be attached to the deck to resist a minimum force of 300 kg/m, in any direction.

Slope of Deck and Drainage

There are no slope limitations for the mechanically fastened roof system. Field membranes must be fastened perpendicular to the slope when the slope is greater than 3:1.

Positive drainage to drains is strongly recommended and may be achieved by a designed slope in the structural deck or use of tapered insulation. Temporary ponding is acceptable, however, Lexcan requires rainwater to be completely drained within 48 hours after a rainstorm for warranty purposes.

Vapour Retarder/Air Barrier

A vapour retarder is recommended to protect the roof insulation from the damaging effects of winter time internal humidity drives and will also help minimize roofing membrane flutter during high wind conditions. They are also required in some systems to help reduce the required fastener density.

Substrate & Insulation Alternatives - New Construction

The mechanically fastened Lexcan membrane may be positioned directly over the following substrates in new construction or complete tear-off retrofit applications:

Type	Restrictions
DECK TYPES: Plywood Wood Plank Concrete Steel	Surface must be structurally sound, without protrusions.
INSULATIONS[†]: Polyisocyanurate Expanded Polystyrene* Extruded Polystyrene* Perlite & Basalt	Facer required. Coverboard overlay required on type I. Acceptable. Consult Lexcan for specific approval.
COVERBOARDS: Water resistant Gypsum Board Gypsum Board Polyisocyanurate Fibreboard Perlite Board	Acceptable. Dry, smooth and flat High Density: ¼" or ½" High Density, min, one side asphalt coated Not Acceptable.

For re-cover applications, refer to Lexcan's Technical Bulletin #TB 02-03.

*: CAUTION: Plastic foam insulations with low melting or softening points (example: polystyrene) should not be placed directly under dark coloured membranes. Consider either a lighter coloured membrane or an overlayment of another suitable insulation between the base insulation and the membrane.

Fastening Pattern & Density

Membrane sheet layout, fastening pattern and required density of fasteners for the mechanically fastened roof system are affected by several factors including:

- Type of structural deck
- Local windspeed zone
- Height of the building
- Type of terrain surrounding the building
- Size and location
- Pressurized buildings
- Local building code or insurance underwriter's requirements

All insulation panels must be mechanically attached to the structural deck with Lexgrip insulation.

TABLE 1: Required No. of insulation fasteners for minimum 1.5" (38 mm) thick Iso Insulation.

Membrane Field Sheet Width	6'	8'	10'	12'
4' x 8' Panel Isolex™ Insulation, with Vapour Retarder	5	6	8	8
4' x 8' Panel Isolex™ Insulation, without Vapour Retarder or Re-Cover	5	5	5	5
4' x 4' Panel Isolex™ Insulation, with or without Vapour Retarder	4	4	4	4

NOTE: Fastening rate in perimeter area to be the same as that used in the 'field' area.

Fasteners must be a minimum of 15 cm (6") from insulation panel's edge. Boards must conform to the deck surface. Irregular surfaces will require additional fasteners. If the insulation manufacturer's fastening requirements exceed those of Lexcan, they must be used in lieu of Lexcan's.

TABLE 2: Lexcan Membrane Fastening Requirements:

Building Height		Maximum Field Sheet Width	Maximum Perimeter Sheet Width	No. of Perimeter Sheets
Less than 21m	Less than 70'	12'	6'	2
21m to 35m	70' to 115'	10'	5'	3
35m to 60m	115' to 200'	8'	4'	4
60m to 105m	200' to 345'	6'	4'	5

Lexcan requires the membrane fastening requirements to be increased to the next level for each of the following circumstances:

- Building is located within 15 km of the sea coast, bay or a large lake.
- Building is located on top of a hill (add height of hill to height of building).
- Pressurized buildings
- Mountainous terrain
- Airports
- Any wind zone of 160 km/hour (100 m.p.h.) or greater according to Factory Mutual guidelines. Buildings with large openings (combined area equal to 10% of the total wall area or greater) or overhang roofs will require additional perimeter sheets and fastening. Refer to Lexcan details for additional information.

Time of Installation

New buildings should be at least 80% encapsulated (doors and windows installed, etc.) before construction of the roofing system can commence.

In order to protect the completed roof on new construction projects, the construction manager should ensure that other trades are restricted from working on completed roof sections

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as much as possible. Where other trades must work on the roof, consideration should be given to constructing a temporary 'work' roof (i.e.: plywood on foam to protect the finished roof membrane) to be used until the other trades are finished.

Membrane Alternatives

When one considers all the thicknesses and membrane types available, Lexcan offers numerous choices in mechanically fastened roof systems. Traditional systems feature reinforced membranes in EPDM, TPO and PVC. New alternatives include fleece-backed versions of these membranes. The fleece-backed membranes are ideal for application directly over semi-rough surfaces such as wood, modified bitumen membranes and smooth surface built-up roofs. For more information on the choices and benefits of each membrane type, refer to Lexcan's EPDM, PVC or TPO product brochures.

System	Membrane & Thickness Alternatives	Standard Colours
E1	Lexcan (Reinforced) Hi-Tuff TPO Membranes HT-45 (1.1 mm), HT-60 (1.5 mm), HT-80 (2.0 mm)	White, Tan, Grey
E2	Lexcan Reinforced Hi-Flex EPDM Membranes R-45 (1.1 mm), R-60 (1.5 mm), R-75 (1.9 mm)	Black
E3	Lexcan Reinforced Hi-Pro PVC Membranes HP-50 (1.2 mm), HP-60 (1.5 mm)	White, Grey
E6	Hi-Tuff Fleece-backed CA TPO Membranes FBHT-100-CA (2.54 mm) & FBHT-115-CA (2.92 mm) & FBHT-135-CA (3.43 mm)	White, Grey
E7	Hi-Flex Fleece-backed CA EPDM Membrane FB-100-CA (2.54 mm), FB-115-CA (2.92 mm) & FB-145-CA (3.68 mm)	Black

Re-Roofing

Lexcan's Mechanically Fastened Roof System is particularly suitable for re-roofing where, in many cases, a mechanically fastened membrane may be installed right over top of the existing roof. Where rougher surfaces exist, a suitable cover-board or insulation layer is required underneath the new membrane. On existing smooth surface roofs (modified bitumen, smooth surfaced built-up roofs, etc.) a fleece-backed membrane can usually be used directly over the existing membrane!

There are numerous considerations that should be evaluated prior to deciding on whether a Mechanically Fastened Roof System is suitable for a particular re-cover application. Lexcan strongly recommends that the existing roof be investigated and re-cover proposal reviewed by an experienced and qualified roofing expert prior to making a final decision. For further information on Lexcan's recommendations and requirements for re-cover applications, refer to Lexcan's Technical Bulletin no. 02-03 titled "Recovering over an Existing Roof".

WARRANTIES & WARRANTY REQUIREMENTS

In North America, Lexcan fully backs its roofing and waterproofing systems with comprehensive, long-term Lexguard warranty programs. Lexguard Ultimate warranties are available only on non-mobile commercial, institutional or industrial properties only. Four preconditions must be met to qualify for a Lexcan warranty:

- The roof must be installed by an approved applicator of Lexcan.
- The roof must be installed in strict accordance with current Lexcan specifications and details (or Lexcan approved alterations).
- Lexcan must be advised in writing by the contractor a minimum of two weeks prior to the commencement of the project that a warranty is requested.
- All membrane accessory components must be Lexcan products.
- For further information on the terms and conditions of Lexcan's warranties, please consult your Lexcan representative.

AVAILABILITY & TECHNICAL ASSISTANCE

Lexcan Roofing Systems are available across North America through our local offices and distributors. Lexcan representatives will be pleased to assist you in system selection or roof design. For the address or telephone number of the office nearest you, please contact our head office by phone at 877-792-8308, e-mail at info@lexcan.com or by fax at 905-792-8305.