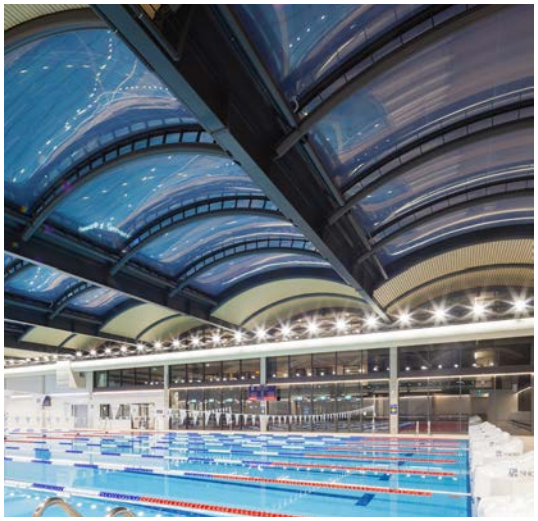
MakMax Australia

Rhodes Central, Sydney NSW

MakMax ETFE Capability

THE NEW GENERATION MATERIAL THAT GOES BEYOND GLASS

MakMax boasts an international portfolio of TensoSky™ ETFE projects, including stadiums, shopping centres, roof canopies, educational facilities, porte-cochere, walkways and distinctive project feature designs.



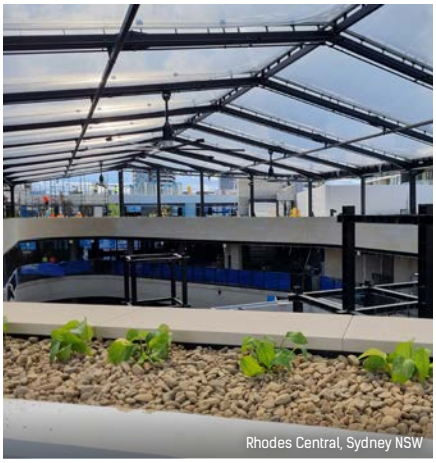
WHAT IS ETFE FOIL?

ETFE (Ethylene Tetrafluoroethylene) is durable, highly-transparent, environmentally friendly and a lightweight alternative to glass structures.

This modern membrane is considered the material of choice for skylight applications and architectural building facades, and increasingly used in conjunction with, or as an alternative to other tensile membrane materials for roofing structures. The flexible nature of the membrane offers an elegant and modern design alternative.

Design. Engineer. Fabricate. Install.

Reference Projects


Rhodes Central, Sydney NSW

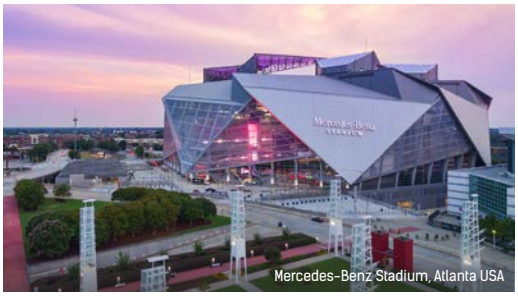

Clarence Integrated Care, Rosny TAS


US Embassy, London UK


Commercial Centre, Chambourcy France


Shenzen Water Park, China


Empire City Casino, Yonkers USA


Mercedes-Benz Stadium, Atlanta USA


Institute of Technical Education, Singapore

Design. Engineer. Fabricate. Install.

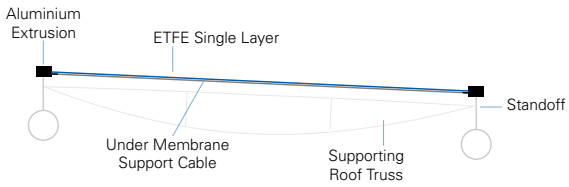
MakMax TensoSky™ ETFE System

SINGLE LAYER APPLICATION

ETFE foil can be applied in a single layer to form a durable, lightweight glazed roof.

Reinforced with cables, lightweight steel or aluminium to maintain shape and stability, a single-layer ETFE structure is perfect for allowing natural light into a buildings via applications such as skylights and atrium roofing.

Flexible and able to form architecturally unique shapes, ETFE foil is also popular as an architectural building façade.

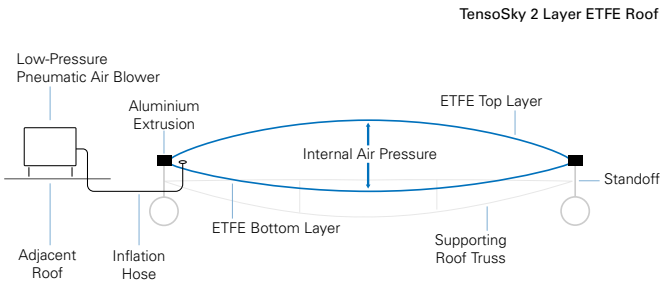


DOUBLE & TRIPLE LAYER APPLICATION

MakMax's TensoSky™ ETFE system makes use of air-filled ETFE pillows to create lightweight, thermally insulated and highly translucent roofing.

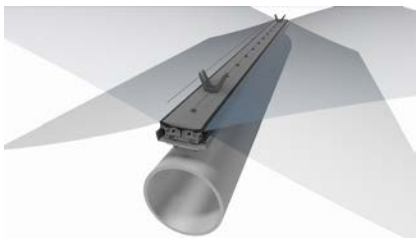
The ETFE pillows, or cushions, are created with a pneumatic system which maintains low-pressure air between 2 or 3 layers of ETFE film. The cushions are restrained in aluminium extrusions and supported by a lightweight truss frame and cable system.

Under typical loading conditions, ETFE cushions can range from 1 to 5 metres wide and reach up to 60m in length.



EXTRUSIONS / CLAMPING SYSTEMS

The ETFE foil layers are bonded to the steelwork via a lightweight anodized aluminum extrusion system. Extrusion systems incorporate internal rubberised components to make the connections waterproof.



TENSOSKY TECHNICAL SPECIFICATIONS

TensoSky™ System	The TensoSky™ ETFE system consists of AGC Fluon® ETFE film, set inside a uniquely designed and engineered aluminium frame. The TensoSky™ ETFE system includes single, dual and triple layer ETFE applications.
Engineering & Design	Design work and coordination will be undertaken by our in-house team of specialist structural engineers.
Footings & HD Bolts	Where footings are installed by the customer's builder or construction company, Reaction Loads Summary & supply of HD bolts included
Steelwork	Structural steelwork is designed and fabricated in accordance with the requirements AS4100.
Air Inflation System / Energy Consumption	A pneumatic ETFE cushion system is generally supplied with one or more inflation units. Each unit consists of two redundant blowers forming a backup system for guaranteed structural stability. A series of pressure sensors monitor the internal pressure of the ETFE cushions, maintaining them between 5 psi and 6 psi. Depending on air temperature and humidity, one unit can supply a roof of up to 1400sqm. These units are UL certified and run on an 110V power with consumption less than 1KW/h.
Air Supply Lines	Coated PVC supply line running from the blower unit to each cushion. Blower unit assumed to be located within 40m of the ETFE structure and in an external or well-ventilated plant area on.
Edge Cables	Galvansied steel cables with stainless steel terminations.
Hardware	Galvanised Steel.
Extrusions	Anodised aluminium.

Benefits of ETFE

LIGHT TRANSMISSION

ETFE films can be highly transparent (from 90% to 95%), allowing natural sunlight and UV into a building. This offers a range of proven benefits for building inhabitants, from reducing stress and boosting the immune system, to allowing for the natural growth of indoor gardens.

ENVIRONMENTALLY FRIENDLY

From extruding of the film to transportation to site, compared to similar cladding material, less overall energy is consumed, thus reducing the overall carbon footprint. In addition, the nature of ETFE systems enhances the building physics through insulation and natural light transmission, contributing to the global low energy aspect of the building.

RECYCLABLE

Easily recyclable, waste from the manufacturing process or even old elements can be remolded into new products such as tubing components and wires.

DURABLE

ETFE is robust and unlikely to degrade after exposure to environmental pollution, UV light, harsh chemicals, or extreme temperature variations.

COST EFFECTIVE

Due to the lightweight nature of the membrane material, substructure support systems and concrete foundations can be designed more efficiently. ETFE systems also provide ample natural daylighting, thus minimising energy costs by lowering the demand for indoor lighting.

SOLAR CONTROL/SHADING

ETFE film systems can incorporate a number of different Frit patterns on one or more multiple layers to alter solar performance. The film is printed with various standard or custom patterns.

COLOURS

Colours can be introduced in a variety of ways. It can be applied during the film extrusion process providing a consistent tint in various tones from red to violet or by adding coloured lighting with changeable colour options.

ENVIRONMENTAL PRODUCT DECLARATION

The sustainability of the TensoSky™ ETFE system with Fluon® ETFE-film has been assessed by Germany's Institut Bauen und Umwelt e.V.

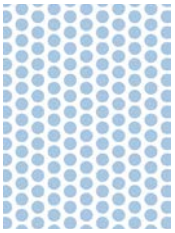
The system has been awarded an Environmental Product Declaration:

Declaration number:
EPD-TAI-20190092-ICB1-EN

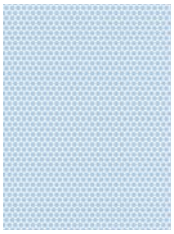
Issue Date: 05.08.2019

Valid to: 04.08.2024

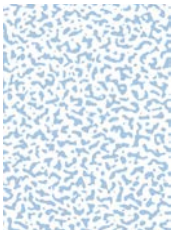
FRIT PATTERNS



16mm Dots LT=78%



Honeycomb LT=65%



Big Sprinkle LT=78%

COLOUR

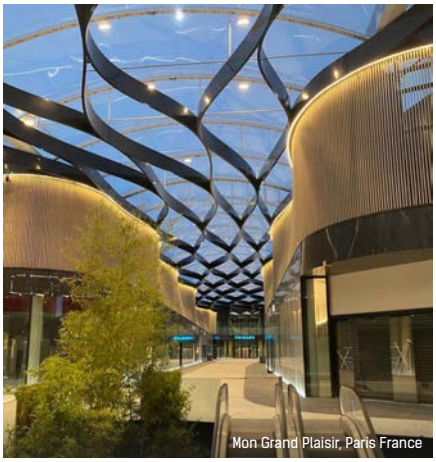
Lodz Tram Station, Poland

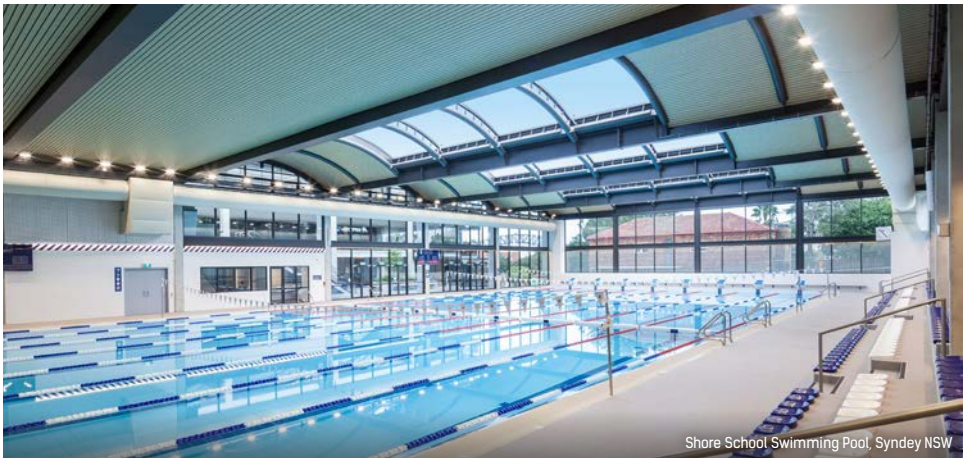
COMPARISION TO GLASS

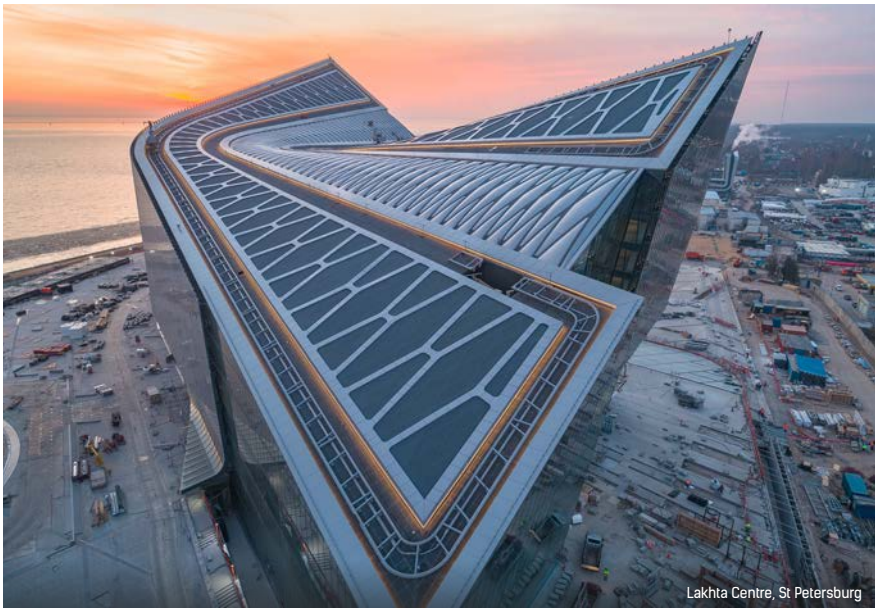
	TensoSky™ ETFE System			Glass Cladding	
	Single Layer	Double Layer	Triple Layer	Single Layer	Double-Glazed
Material Thickness	200µm	200µm+ 200µm	200µm+ 200µm+ 200µm	6mm	6mm+6mm
Weight (kg/m³)	0.35	0.70	1.05	15.0	30.3
Visable Light Transmission (%)	90.5	82.4	75.4	88.9	79.6
UV Transmission (%)	83.5	71.5	62.3	61.4	45.5
U-Value (w/m²l)	5.8	2.6	1.7	5.9	2.9

Approximate values used a comparison only. ETFE values are based on Natural (clear) composition. Glass values are based on clear (untinted).
For specific project requirements, different material weights, surface treatments and print-types are available.

MakMax
Australia


Mon Grand Plaisir, Paris France

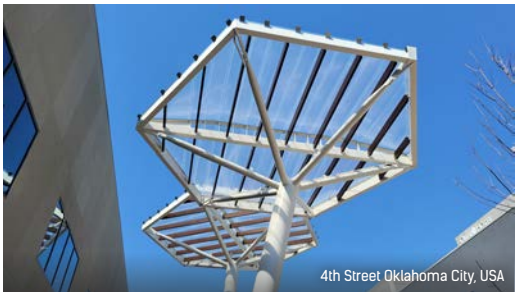

Shore School Swimming Pool, Syndey NSW


Lakhta Centre, St Petersburg


Wuyue Plaza, Jiangsu China


XI Model House, Busan Korea


Stade de la Licorne, France


4th Street Oklahoma City, USA


Swatch+Omega Headquarters, Biel Switzerland

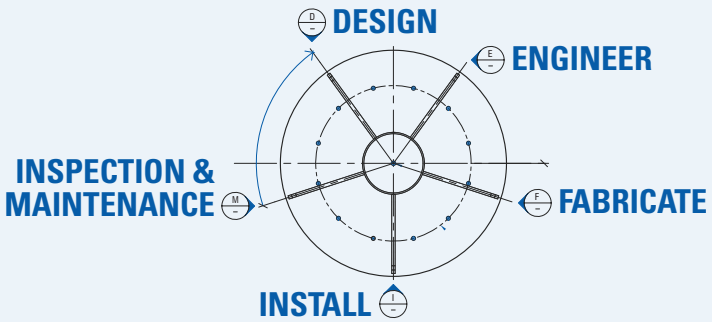
Design. Engineer. Fabricate. Install.

Macquarie University Arts Precinct, NSW

[For more information visit www.makmax.com.au/fabrics/etfe/](www.makmax.com.au/fabrics/etfe/)

MaKMax Australia is the market leader in ETFE roofing, facades, shade structures and skylights and we offer our clients a full circle of comprehensive professional service and support;

- In-house designers, engineers & fabrication.
- In-house project mangers & construction managers.
- Agents, partners & installation crews in every state for continuity of service, even during COVID border disruptions.
- In-house RPEQ/NER qualified engineering inspectors for regular routine maintenance programs.
- In-house maintenance, cleaning and technical support.



Design. Engineer. Fabricate. Install.

MakMax Australia
1300 625 629 | info@makmax.com.au | www.makmax.com.au

SCI QUAL INTERNATIONAL

JAS-ANZ
WWW.JAS-ANZ.ORG/REGISTER