

New Vikings Football Stadium First in the U.S. to Use Lightweight ETFE Film Roof

3M Science creates an enjoyable environment year round inside the stadium by permitting outdoor atmosphere without frigid temperatures

The new home of the Minnesota Vikings, U.S. Bank Stadium, will become the first sports facility in the United States with a transparent roof, permitting outdoor light without weather restrictions. Utilizing material from the franchise's [Official Science Partner](#), 3M, the venue will be covered by high-performance film, extruded from 3M Dyneon Fluoroplastic ETFE (ethylene-tetrafluoroethylene). The product, which lets light in, is lighter than glass, and more cost-effective than retractable alternatives.

Open-air football stadiums are not often a viable option in northern climates. The Dallas-based firm HKS Architects designed the stadium roof using ETFE film cushion technology, which is already widespread in Europe and Asia, to enable year-round use for a variety of events. The design lowered construction costs by around \$100 million compared to a retractable roof.

Energy Efficient Insulating Air Cushions Lower Operating Costs

The stadium's 248,000-square-foot roof and facade is covered by 75 three-layer ETFE film cushions, making U.S. Bank Stadium the largest ETFE film project in the United States. Some of the individually air-filled cushions are more than 1,200 square feet long and about 32 feet wide. The top film is printed with a geometric pattern, which scatters the sunlight and prevents a greenhouse effect in summer. In winter, the film roof protects the interior from the cold outside temperatures.

The film cushions allow 95 percent of daylight to pass through, but their weight is only about five percent of the weight of glass. As a result, the supporting steel structure is light and slender, offering spectators a premium view of the playing field.

Designed for High Snow Loads

Since the Metrodome's roof collapsed in 2010 under the weight of a 17-inch snowstorm, architects and roof planners paid particular attention to the load-bearing capability under heavy snow falls. Compared to other roofing membranes, ETFE films feature superior values for tear strength, resistance to tear propagation and puncture resistance – which let the air-filled cushions easily cope with highly concentrated impact loads like hail. Their use in northern Europe and the Alps prove their winter compatibility in areas with heavy snow fall.

U.S. Bank's asymmetric roof inclines more toward the north to fend off the snow. The films are so smooth snow can hardly get a grip, sliding off in an almost controlled manner. A heavy rain shower is enough to

clean it.

To learn more about Fluoroplastic ETFE, you can read about it [here](#).

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M Science helps to create an enjoyable environment year round for Minnesota Viking fans by permitting outdoor atmosphere without frigid temperatures (Photo: Business Wire)

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