Engaging the weather:
With fabrics by Sefar

The weather does what it wants. And so can innovative architects, structural engineers, and developers. Sefar fabric in exterior architectural applications limits the effect of the weather, opening up the horizon and bringing the outside indoors. It resists the wind and can withstand winter, sand, and storms. Sefar fabrics introduce a new lightness to sophisticated exterior applications. Permanently.
Google Headquarters, Sunnyvale CA, USA. Visually stunning application by architects Valerio Dewalt Train Associates with engineering by Thornton Tomasetti; fabrication by Duvall Designs.
Creative ideas for textile architecture

Filigree lightness, adaptable shade, controlled light incidence, protection and weather independence, and resistance to snow and wind loads; these are the specifications for membrane construction. Lightweight technical woven 100% PTFE fabrics are light-permeable and permanently durable due to their 100% PTFE composition. They are a visually and functionally convincing solution for both large and small foldable fabric structures, as well as for giant umbrellas, sun sails, awnings, canopies, and facade cladding. Fluoropolymer fabrics are sustainably reliable for architects, planners, and owners in terms of fire protection, weather resistance, and durability. The
fabric achieves its high functionality and aesthetic qualities as a result of optimum manufacturing and light-technical specifications. The chemically stable polymer, environmentally friendly chain makes the membranes exceptionally sturdy and durable. In the end, the high ideals of the drawing board must not be overshadowed by the burdens of poorly constructed fabrics. Sefar fabrics provide certainty.

BC Place Stadium, Vancouver, Canada. In the center of the cable-supported roof construction lies the pneumatically-driven inner roof – one of the largest convertible membrane structures in the world. Schlaich bergermann and partner LP, NY selected SEFAR® Architecture TENARA® Fabric 4T40HF for the retractable cushion.

Sefar produces technical precision yarns for the manufacture of its innovative architecture fabrics. Suitably mounted and coated, these textile materials offer considerable benefits, including unprecedented durability, a low weight to area ratio and excellent light transmission values.
An outdoor event is reliant on weather. Or does it? When huge prizes beckon, performers need to be paid, marketing campaigns assail the masses months in advance, and live audiences wait full of eager anticipation, inclement weather cannot be allowed to spoil the show.

Fabrics which span stadiums and protect event venues need to cover larger surfaces reliably, withstand considerable wind and snow loads, and endure repeated folding cycles by their retractable mountings without failure. Ideally, an open-air atmosphere is preserved thanks to the special lighting effect. SEFAR® Architecture TENARA® Fabric is used above Centre Court at Wimbledon, as well as at BC Place Stadium Vancouver and the Fortress Arena Kufstein, providing high resistance to tearing and exceptional light transmission, as seen in exterior applications for many years.

Large-roof constructions present a particular challenge to Architects and Structural designers, the results have a lasting influence on the object in question. The advantages of 100 % fluoropolymer fabrics are wide-ranging. They are uniquely foldable but at the same time reassuringly sturdy. They are resistant to mold growth and dirt repellant. At the same time, textile materials meet very demanding preservation requirements and do justice to the aesthetic demands of iconic settings.

Top: Centre Court Wimbledon, Great Britain, remains in play even during wet weather thanks to its retractable roof. The historic flair of the show court built in 1922 has been preserved. Ideal lighting conditions, even for TV broadcasts, are assured by high light transmission without bright or dark areas. The result is an open-air atmosphere on court even when the roof itself is closed. And, better still, the grass also continues to grow.
Air above us: Making the most of planning freedom

Main Railway Station, Graz, Austria. It seems so easy: Transparency conveys safety and friendliness to passengers following the redesigning of Graz main station.
The roofs of the public transit areas allow no compromises to be made in either functionality or aesthetics. A challenge for any material. The highly tear-resistant SEFAR® Architecture TENARA® Fabric is made from 100% polytetrafluoroethylene (commonly known as Teflon), which is a chemically inert material, completely UV-resistant, colorfast, and does not yellow over time. And its high strength values are impressive too. When used in transportation constructions, the range of SEFAR® Architecture TENARA® Fabric and other Sefar 100% PTFE exterior fabrics extends far and wide – from principal railway stations in Graz and Salzburg or the Jona Bus Station in Switzerland, to illuminated areas of ferry terminals such as at George Staten Island, transport tunnels at heliports, or ventilation structures in the inner city of Oslo.
Public buildings, office buildings, shopping centers

Public buildings, office buildings, and shopping centers thrive on a welcoming ambiance and the seemingly effortless integration of new and existing objects into the cityscape. Their attractiveness, frequency of visitors, consumer behavior, and purchase interest all depend on being independent of the prevailing weather.

Consequently, there is an increasing trend towards static or dynamic retractable roofs covered with SEFAR® Architecture Fabric protecting inner courtyards, access routes, or entire commercial districts from rain and intensive sunlight – or creating a visual feature and protecting shoppers. Exemplary solutions can be seen at Google Headquarters in Sunnyvale/California, the Hypo Vereinsbank in Munich, or the Bal Harbour Shops in Miami Beach/Florida – the shopping center with the highest retail sales per square meter anywhere in the world.
Metzgergasse, Buchs, Switzerland. Outstanding: A folding membrane roof made from SEFAR® Architecture Fabric spanning the once-again popular and busy Altstadtgasse in the old town of this Swiss health resort – a small town frequently affected by the winds blowing down the upper Rhine valley. When retracted, the roof is compactly stowed beneath a protective cover in the gateway to Metzgergasse. Visitors can stroll along the street regardless of the weather yet within minutes the roof completely covers the shopping area with a skillfully spatial, undulating form which keeps any weather at bay.

All-weather protection: An upgrade in everyone’s interest
Freedom is often regarded as our greatest asset. All the better when life progresses beneath an open sky. Independence from the weather is the expectation. Reliability is the goal. And Sefar has the answer.

People today expect to be independent and flexible and Sefar fabrics limit compromises because of the weather. Restaurants and hotels financially benefit from the dependable possibilities offered by architecturally attractive fabric weather protection, along with the natural lighting atmosphere it creates.

High spanning strengths combined with low weight to area ratios give planners an impressive degree of design freedom. In the long term too, the decision to use Sefar fabrics is a cost-effective one. Highly UV-resistant, colorfast – without yellowing, resistant to moisture absorption and dirt repellant, the robust material remains visually pleasing despite the effects of katabatic winds, spray, or salty sea air.

In this way, exterior commercial spaces stay attractive and can be monetized at any time, regardless of weather. Top international hotels such as Radisson Blu and trendy venues like the Juvia Restaurant and Soho Beach House, both in Miami, as well as in exclusive holiday hotels on Lake Constance, such as the Riva in Southern Germany all benefit from Sefar fabric protection.

Radisson Blu Edwardian Hotel, Surrey, England. Upper class: The in-house team of architects responsible for the Radisson Blu Edwardian Hotel in the southern English county of Surrey chose SEFAR® Architecture Fabric for the outdoor area.
A green light for outdoors: The exterior range

Permanent constructions are possible thanks to the textile materiality of 100 % PTFE – an extremely translucent fluoropolymer fabric.

Sefar 100 % PTFE fabrics as part of architectural, exterior applications are known for maximum durability and flexibility combined with high strength values, and industry leading UV resistance. Open mesh fabrics can be used in aesthetic facade cladding. High tensile strength values with low surface weights are additional benefits to create reliable fabric solutions. All Sefar materials are characterized by their very high chemical stability and excellent resistance to staining. For every demanding application, there is a suitable Sefar fabric.

### The benefits at a glance

- Permanently UV-resistant and colorfast
- High light transmission, yet soft light appearance
- Suitable for foldable kinetic structures
- Free from plasticizers, PVC and other harmful chemicals
- Water and Weather proof
- Dirt, mold and Mildew repellent
- No moisture absorption
- Highly functional and attractive thanks to optimized fabric manufacture and light technical specifications
- Industry leading material replacement warranties

Detailed information about the fabrics shown here and for the entire range can be found on Sefar’s website. [www.sefararchitecture.com](http://www.sefararchitecture.com)
Rüti, Seelisberg, Switzerland. Rüti is where Switzerland was founded and is now a cultural monument. Developed in close collaboration with the Swiss Heritage Protection Department, the roof of the Rütihaus restaurant terrace adds a slender elegance to the landscape, despite its metal and wood frame. The translucent SEFAR® Architecture TENARA® Fabric 4T40HF fabric covering provides protection from the weather and from UV radiation.
The choice of construction material characterizes a building both functionally and visually. At Sefar, we appreciate that also. That is why our fabric range includes standard products as well as customized ones.

If innovative fabrics symbolize freedom in planning, standard versions may be only part of the solution. Customized products for individual design and functional concepts are an everyday occurrence for creative architects and progressive structural engineers around the world. Huge architectural umbrellas with technical fabrics may, for example, overshadow imposing memorials, braving desert storms and extreme UV radiation. In this way, Sefar fabrics can characterize cities and silhouettes in an impressive yet in a light-textile, often almost organic way, as at Ammonhof Dresden, Schloss Weitra in Austria, or the leisure area at the legendary Rütli meadow in Seelisberg, Switzerland. Even private villas set sail with Sefar fabrics.

Medina Haram Piazza, Medina, Saudi Arabia. Protection from above: 250 highly flexible sun shades, each with a surface area of 25.5 x 25.5 m, create plenty of shade for pilgrims at Medina Haram Piazza. Applications made from blue PTFE ribbon provide a distinctive design to the underside of the sand-colored and extra heavy 100 % PTFE fabric developed by Sefar especially for this project.
High-tech: For the highest expectations

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*Tenara*       *E-Line*
Sefar exterior fabric for construction solutions

High-tech fabrics are increasingly being used in modern architecture. Folding, stretching, and deploying without material failure is our premise, which is why SEFAR® Architecture fabrics for exterior applications are a genuine alternative to glass fiber fabrics with their fragile fibers or PVC-coated polyester fabrics which become brittle over time and liable to break when folded. Our clients benefit from Sefar’s extensive experience with 100 % PTFE. Sefar never uses plasticizers. These additives which are contained in PVC-coated fabrics escape into the environment over time. With mechanical stress, damage to the coating, or assembly and maintenance strain, the PVC leaching occurs even more quickly resulting in embrittling of the material and localized loss of strength. By contrast, the flexibility of Sefar 100 % PTFE fabrics with their stable polymer chains is a natural property of the material and the risk of premature breakdown and permanent damage is mostly avoided.

Biax Tests

For many membrane construction projects, it is important to know the elastic properties of the fabric under biaxial conditions. In this case, Sefar uses the special competence of accredited laboratories to determine the biaxial strain behavior of the intended fabric under project-specific load conditions.

Folding Tests

Numerous innovative projects worldwide demonstrate how suitable our 100 % PTFE fabrics are for landmark folding roof and canopy structures. For specific projects, Sefar commits to independent laboratories to perform extensive fabric folding tests to ascertain and confirm the robustness of our materials through a high number of folding cycles and at different temperatures.

Weldability of TENARA Fabrics

SEFAR® Architecture TENARA® Fabric 4T20HF and 4T40HF can be welded using conventional, high-frequency welding machines, without the need to strip coatings or the use of additional costly taping agents. Even with relatively narrow overlaps, seam strengths of more than 80 % of the maximum tensile load of the base material can be achieved. Detailed welding instructions can be provided on request.

Fire Performance Testing

Assessing the flammability of the fabric is one of the most important tests since safety depends on this in the event of a fire. In Europe, it is the classification standard EN 13501-1 which determines a construction product’s rating according to the single burning item (SBI) corner combustion test, which measures heat and smoke release rates. At the same time, some countries have their own national standards in place to ensure respective requirements are met. For SEFAR® Architecture Fabric, DIN 4102-1 is the most demanding standard. The fire conditions are reconstructed in a special chamber.

Criteria for the classification standard are:
– Limited spread of fire and heat emission
– Disclosure of burning droplets and smoke emission in the test certificate

The American Standard ASTM E-84/NFPA 255 is used to verify the surface burning characteristics of materials used in buildings. This is a ceiling burning simulation which is carried out in a so-called Steiner Tunnel, enabling the flame spread index and smoke developed index to be determined. In individual cases, positive fire test results are sufficient for objects where fire classification A is required. Sefar fabrics are permanently monitored by building authority-recognized test institutes and have all the necessary certification.