

Sefar Architecture

Experiences, ideas and new ways with architecture fabrics



Credits

Sefar Architecture –
Experiences, ideas and new ways
with architecture fabrics

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Woven for architects

“You have the best fabrics for architecture and don’t even know it!” At the time, we could not have appreciated the significance of this remark made by one of our customers back in 2005. As a developer and producer of precision fabrics for exclusively technical applications such as screen printing, filtration and sieving processes, we were used to discussing specifications such as mesh count, air passage, and filter performance with our clients down to the very last detail. That architects would find our fabrics aesthetic and at the same time highly functional went beyond – we admit it – our powers of imagination back then.

Inspired by this growing interest, Sefar founded an independent business sector and from that time on developed new types of fabric for textile architecture. Our 180+ years of know-how in manufacturing technical fabrics was the comprehensive basis on which we were quickly able to offer a small range of architecture fabrics, unique in terms of their aesthetic and functional qualities.

We believe in fabrics. Then and now. It gives us great pleasure to sense their increasing significance as the “fifth construction element.” We want to share this feeling with you and present “Sefar Architecture” – a magazine giving fabrics an appropriate platform in the world of architecture. Overwhelmed by the interest which our fabrics have generated within a short time frame, it is now our desire to amaze you with their application possibilities. Discover fabrics from a completely new angle. Read, see, and experience for yourself that fabrics are not simply meshes but also light sources, resonance regulators, and ambience creators.

If having read the contents you feel like visiting a world-leading weaving mill, you are welcome at our Heiden premises in Switzerland any time. Set in the middle of the idyllic peace and quiet of an Alpine health resort, hundreds of machines constantly weave the materials of today which become the unique projects of tomorrow. Who knows – maybe “you have the best project for architecture fabrics and don’t even know it”? Not yet anyway.

With this in mind: enjoy reading, looking, and being amazed.

Ingo Thalhammer

Head of Sefar Architecture

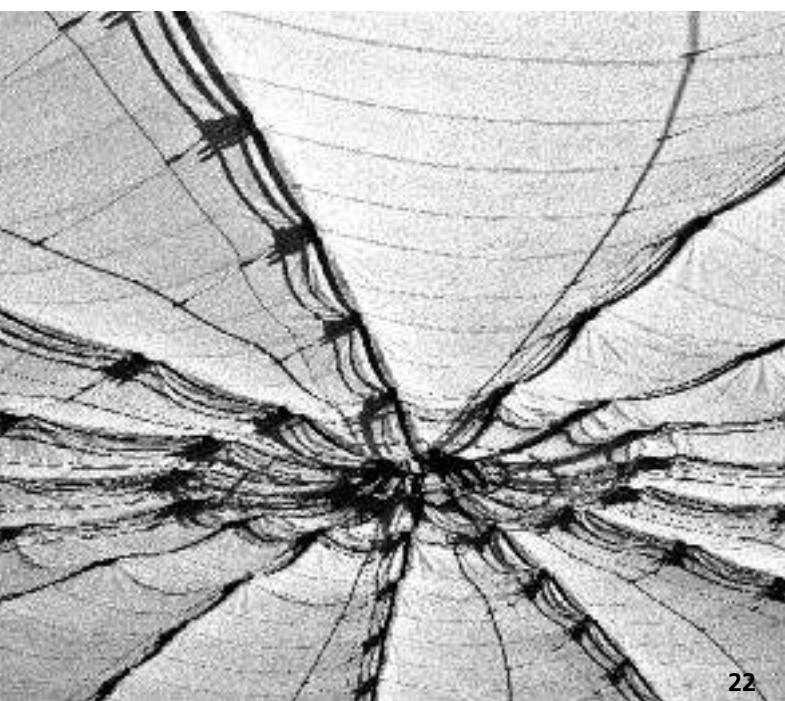




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Detail of the retractable membrane roof at the Kufstein Fortress Arena with SEFAR® Architecture TENARA® fabric.



internal

Technical fabrics by Sefar

A new dimension in architectonic design form.

When it comes to producing technical fabrics with exceptional physical characteristics, Sefar is second to none in its comprehensive know-how and far-reaching experience. For over 180 years, ongoing product development and the inclusion of new areas of application have been significant elements of the corporate philosophy.

One of the fundamental principles of the corporation is to be continuously striving to find new solutions. Over 180 years ago, the cornerstones of today's multinational operation – with a total of 2,100 employees in 24 countries – were laid on the production of silk bolting cloth for use as flour sieves in cereal milling. Sefar is the leading manufacturer of technical precision fabrics based on synthetic monofilaments. These fabrics enter into a multitude of

uses, reaching from screen printing to diverse filtration application in industries such as medical, food, chemicals and pharmaceuticals, clean and waste water, automotive, aerospace, mobile phone, mining and refining, and many more. High tech fabrics for architecture complement the range.

Newly developed "smart fabrics"

In the fields of solar technology, electronics, and the glass industry, Sefar has produced a convincing range of "smart fabrics" – functional materials for the most diverse of applications. For example, they can combine the flexibility of fabric with the properties of a printed circuit board, be temperature regulated, have their own integrated sensors and technical measurement components, or function as electromagnetic shields in electronic equipment. Most of these smart fabrics

are currently still in the development stage and on the basis of specific customer requirements are undergoing comprehensive testing and optimization.

Consistent ongoing development for the field of architecture

The development of special technical fabrics has arisen from ongoing Sefar practice. Our corporate philosophy states: "We focus all our activities on market needs," and "We provide our industrial customers with the best solutions for their applications." The combination of these two guidelines can be duly applied to the field of architecture: in response to customer feedback through architecture partners (see the editorial of this publication by Ingo Thalhammer), the corporation has conducted research and manufactured products related to areas of architectural application. The resulting business



High-precision, technical fabrics are made specifically for the individual field of application.


sector “Sefar Architecture” is responsible for the development, production, and sales of special technical architecture fabrics.

For designers with an individual signature

In the field of architecture, many years of know-how are also the foundations on which to develop materials with special properties for internal or external architectonic solutions. Uses for these special fabrics include glass constructions and facades, modular light ceilings, sun protection systems, illumination and acoustic awnings, and many other design applications. Materiality and the functional properties of architecture fabrics provide architects, planners, and designers with opportunities to achieve projects bearing their own individual signature. In implementing all this, Sefar works closely

with a network of experts including specialists in glass, facade, and metal construction. Current examples of such projects can be found here in this magazine.





Monofilament yarns have a minimum diameter of 20 μm ; the single filament of a multifilament yarn can be as fine as 1 μm . Depending on the type of fabric, its width can be up to 6,000 warp yarns per meter.

fluoropo

Fluoropolymers in

The reemergence of long-term values has increased the demand for high-quality materials which can permanently fulfill high expectations of aesthetics and functionality.

For this reason, high-tech fabrics are increasingly being used in modern architecture. In collaboration with lighting and polymer experts, Sefar has been successful in developing a new generation of fabrics made from polytetrafluoroethylene (PTFE) and polyvinylidene fluoride (PVDF). The starting material is pure fluoropolymer fabric, and these then receive special finishing and coating treatments to acquire their particular properties.

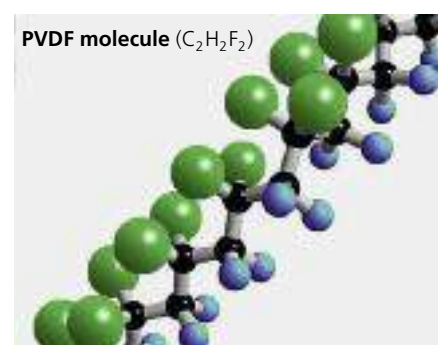
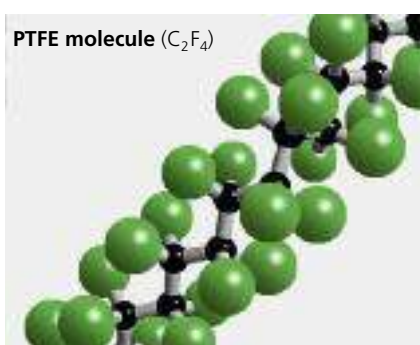
Robust polymers

Fluoropolymers are exceptional materials for fabrics, the most common being PTFE – an unbranched, linear, part-crystalline polymer made up of fluorine and carbon atoms. This plastic is popularly known by its brand name Teflon®. Fluorine as a raw material is only found naturally in the form of compounds, especially fluorite, also known as fluorspar (CaF_2), a mineral which is mined principally in China but also in Germany. Fluorine gets its name from the Latin 'fluor' meaning "stream" because the most-commonly occurring fluoride mineral – fluorite – was already used in early times as a flux to reduce the melting point of ore and make it flow more easily. Fluorite is treated with sulfuric acid to obtain hydrofluoric acid which in turn is the raw material used in the production of tetrafluoroethylene, a gaseous monomer. In the presence of peroxide as an initiator, and under extreme pressure, the monomer polymerizes to form PTFE.

Under high temperature and pressure in extruders, the powder-like polymer is spun either into monofilament threads or a film which can afterwards be cut and twisted into yarns. Spinning and weaving require specialist equipment and great expertise on the part of the producer to achieve homogenous and reproducible quality.

The chemical inertness and tough durability of fluoropolymers is due to the fact that fluorine atoms, especially in comparison to very small hydrogen atoms, have a relatively

large spatial circumference which protects the atomic bonds between the carbon atoms in the molecule. In effect, the fluorine atoms shield the carbon bonds. With PTFE, this shielding is at its most pronounced because here the maximum possible number of fluorine atoms is present. By contrast, the effect is somewhat reduced in PVDF owing to a smaller number of fluorine atoms in the molecule, but compared to common polymers which contain no fluorine at all, such as polyvinylchloride (PVC) or polyester fabrics, it is clearly superior.



black = carbon atoms **green** = fluorine atoms **blue** = hydrogen atoms

The carbon bonds $\begin{array}{c} | & | \\ -\text{C}- & \text{C}- \\ | & | \end{array}$ are completely protected by the fluorine atoms. This gives PTFE its unique properties.

The carbon bonds $\begin{array}{c} | & | \\ -\text{C}- & \text{C}- \\ | & | \end{array}$ are relatively well shielded by fluorine atoms. This means PVDF has properties similar to PTFE.

Polymers

architecture

Properties

Fluoropolymers are long-lasting, highly translucent, very strong, easy to clean (think of a Teflon® frying pan!), totally UV and environmentally resistant, as well as being extremely aesthetic. In external locations, coated PTFE fabrics are increasingly popular owing to their flexibility in foldable constructions.

No fiber breakage

PTFE-coated fiberglass products are extremely common in membrane structures. With these fabrics, it is the PTFE coating alone that enables load-bearing fabrics to be formed from breakable glass fibers. Along with pure fluoropolymer fibers, the supporting fabric is also made from pure fluoropolymer (e.g. PTFE or PVDF) and the coating from a 100% fluoropolymer mix (made for example from THV, PTFE, and PVDF). This has the following advantages over conventional fiberglass products:

- High flexibility
- High translucence
- No fiber breakage

The elimination of fiber breakage alone prevents point-source lessening of tensile strength and ensures long-lasting operational reliability. And all this combined with virtually limitless folding/unfolding, such as when opening or closing a convertible construction.

The qualities and tensile strength of pure fluoropolymer fabrics today have values remarkably close to those of fiberglass fabrics.

Free from plasticizers

Architecture fabrics made from pure fluoropolymers are free from plasticizers, unlike other materials such as PVC. Fluoropolymers do not need any additives as they are naturally flexible materials; folding constructions made with these remain operational over long periods. In the event of damage to the surface, there is no hardening or increasing brittleness.

Plasticizers, which are used in synthetic materials are based on phthalic acid esters and can be harmful to health. The research has not been completed yet, but some plasticizers are even thought to be carcinogenic. Because of their high volatility these can become concentrated in enclosed spaces and then inhaled. Short-term exposure to skin can also be dangerous because they are able to penetrate the skin barrier. Many types of plasticizer are now banned by law, but it does not follow that those still permitted are therefore harmless.

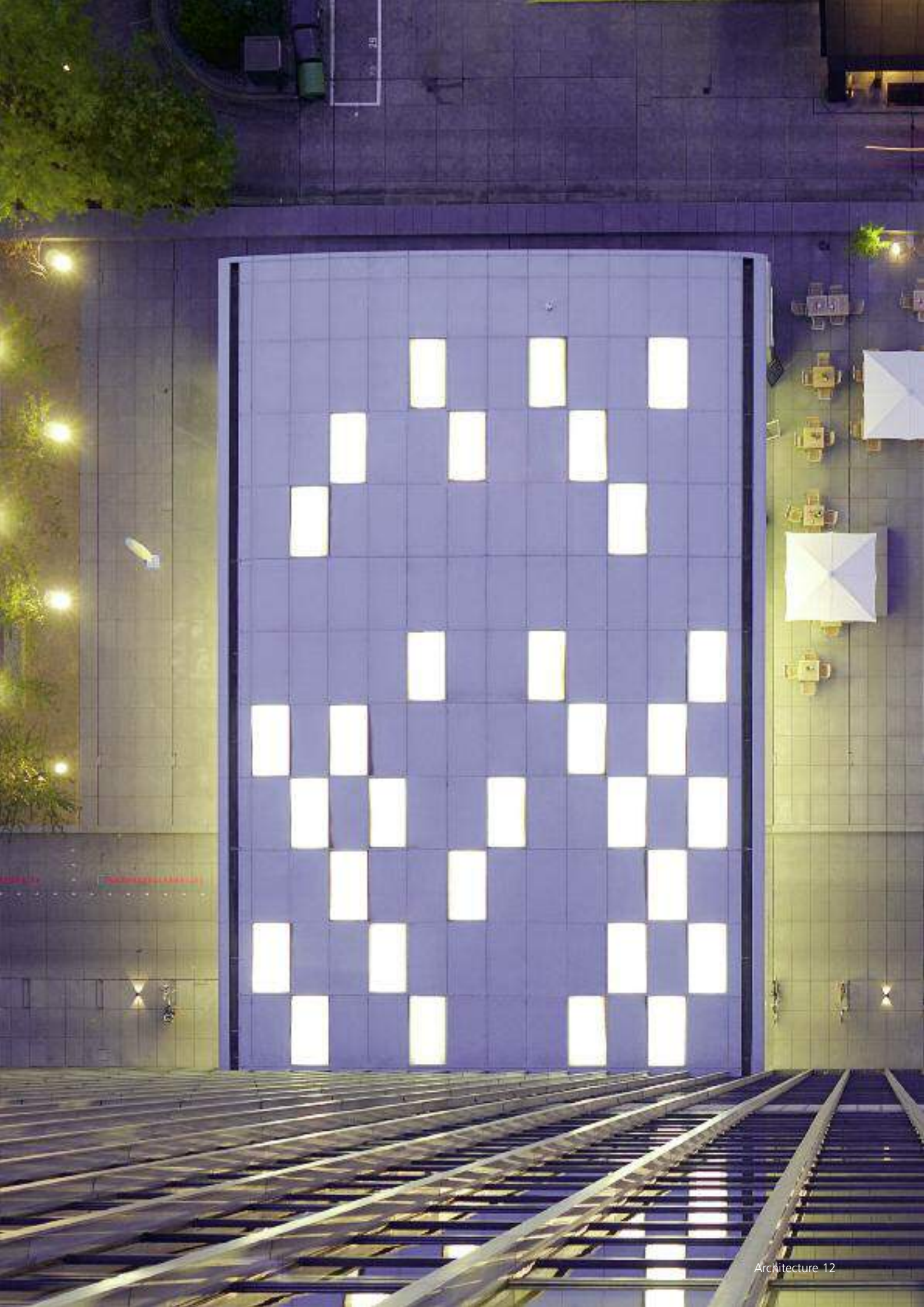
In addition to issues of health, the volatility of plasticizers means that over time materials become brittle and their functional tensile strength is reduced. One can speak of an accelerated aging process; manufacturing and assembly, the folding procedure, and other external mechanical or chemical impacts can also damage the coating. If the underlying supporting material contains plasticizers, these quickly escape into the environment through the damaged area. The result is localized hardening,

which in turn leads to a reduction in material strength and thus to reduced operational reliability and safety.

Summary

The fluorine reclaimed from the mineral fluorite lends its unique properties to a number of polymers such as PTFE or PVDF. Fluoropolymers can be spun into yarn which is then woven into high-performance fabric. Spinning and weaving require specialist know-how on the part of the supplier to make a homogenous and reproducible product. These fluoropolymer fabrics satisfy a growing trend for high-grade construction materials. They are characterized by a large number of benefits:

- High UV resistance
- Maximum flexibility
- Excellent light-technical properties
- High tensile strength values
- Odorless
- Non-yellowing
- Low dirt adhesion
- Resistant to chemicals
- Stable polymer chains / long-lasting
- No toxic plasticizers
- No hardening or brittle areas
- Good fire safety values



From the start a game with light

Sefar Architecture Fabrics light up
the forecourt at FBC in Frankfurt.



Standing 142 meters above the ground, it is impossible to miss FBC – the Frankfurt Büro Center. With its new forecourt canopy which leads directly into the foyer, FBC is now a truly architectonic eye-catcher. The modular Lightframe light ceiling, both outside and inside, was constructed using SEFAR® Architecture IL-80-OP Fabric.



How can you give an emotional kick to a well-known and immovable building which has long been part of the city skyline? To achieve this task, local architects Just/Burgeff drew on innovative materials and thus new design possibilities. In SEFAR® Architecture IL-80-OP, they found a suitable architecture fabric which more than satisfied the requirements of both the external and internal redesign.

Architecture fabric connects

Today the horizontally oriented light canopy is synonymous with the prominent FBC building. The modular Light-frame construction, specially developed

for Sefar, with its individual (but arranged as a single unit) membrane elements spans wide sections of the entrance area and continues into the foyer as a light ceiling. This has the effect of connecting two different spaces, namely the busy Mainzer Landstrasse outside and the more peaceful Café Pavilion within.

Games with light

The construction itself forms a link between natural daylight and precisely controlled artificial lighting. In the outside area of the forecourt, the ever-changing light intensity (dependent on cloud cover and the movement of the

FBC

Mainzer Landstrasse
Frankfurt, Germany

Architect

Just/Burgeff, Architects,
Frankfurt, Germany
www.just.burgeff.de

Engineering

ArtEngineering GmbH,
Dr. Ing. S. Greiner,
Stuttgart, Germany
www.greiner-engineering.com

Manufacturing/ Implementation

Schmid GmbH,
Simmerberg, Germany
www.schmidgmbh.de

Fabric

SEFAR® Architecture IL-80-OP







SEFAR® Architecture IL-80-OP**Fabric material**

PVDF (polyvinylidene fluoride)

Material coating

100% fluoropolymer

Weave

Plain 1/1

Area density (g/m²)

240

Highest tensile strength**warp/weft (N/5 cm)**

1,050/1,050 as per EN ISO

13934-1

Highest tensile elongation**strength warp/weft (%)**

40/25 as per EN ISO 13934-1

Tear force warp/weft (N)

35/50 as per DIN 53859-5

Water column (mm)

> 500

sun across the sky) interplays with the diffusing properties of the fabric. At the same time, shadows are cast on the underside of the forecourt canopy. As darkness falls, the architecture fabric is illuminated from within, becoming an integral part of the nighttime scene.

in the planning stages thanks to its intelligent functional and application possibilities.

One material, many possibilities

SEFAR® Architecture IL-80-OP satisfies all the requirements of both external and internal sections. These include resistance to weather-related influences, easy cleaning of the outer surfaces as well as its noise absorption properties in the foyer area. One material for many different situations – scoring highly



Exciting interplay of light and shade

Textile awning for restaurant and bar at the exclusive Soho Beach House, Miami.

The redesign and expansion of the exclusive Soho Beach House, a private club with a worldwide following, was an architectonic balance between contemporary and traditional styles. In view of its proximity to the historic Sovereign Hotel, no compromises were going to be made in the quality of the materials chosen since safety regulations in this hurricane-risk area are very strict. SEFAR® Architecture TENARA® Fabric proved to be the ideal choice for the implementation of two retractable sun awnings covering the inner courtyard of the building.

At the famous Soho Beach House in Miami, it was important to combine the highest standards of aesthetics with any functional requirements. The proposed sun awnings needed to provide shade for guests yet allow sufficient light to penetrate the inner courtyard. The reason for this: Silver Buttonwood trees require a lot of light in order to grow. The demand for a flexible, retractable sun roof arose from the need for the plants to be watered with natural rainfall and the value placed by guests on spatial "openness" after dark or when the sun is low in the sky.

Optimum 40% light transmission

The decision to employ SEFAR® Architecture TENARA® Fabric was reached relatively quickly. The reason: the material is fire resistant, extremely durable, can be retracted many times without visible signs of wear and tear, and at 40% light transmission offers the optimum degree of light/shade intensity for



Even when closed, the retractable roof blends harmoniously into the overall architectonic picture.

both trees and guests. Owing to the high risk of hurricanes in Miami, the fabric has to possess the highest possible tensioning force. SEFAR® Architecture TENARA® Fabric scores highly here with a figure of 900 kg per linear meter. No further maintenance is needed, but it is easy to clean if necessary.

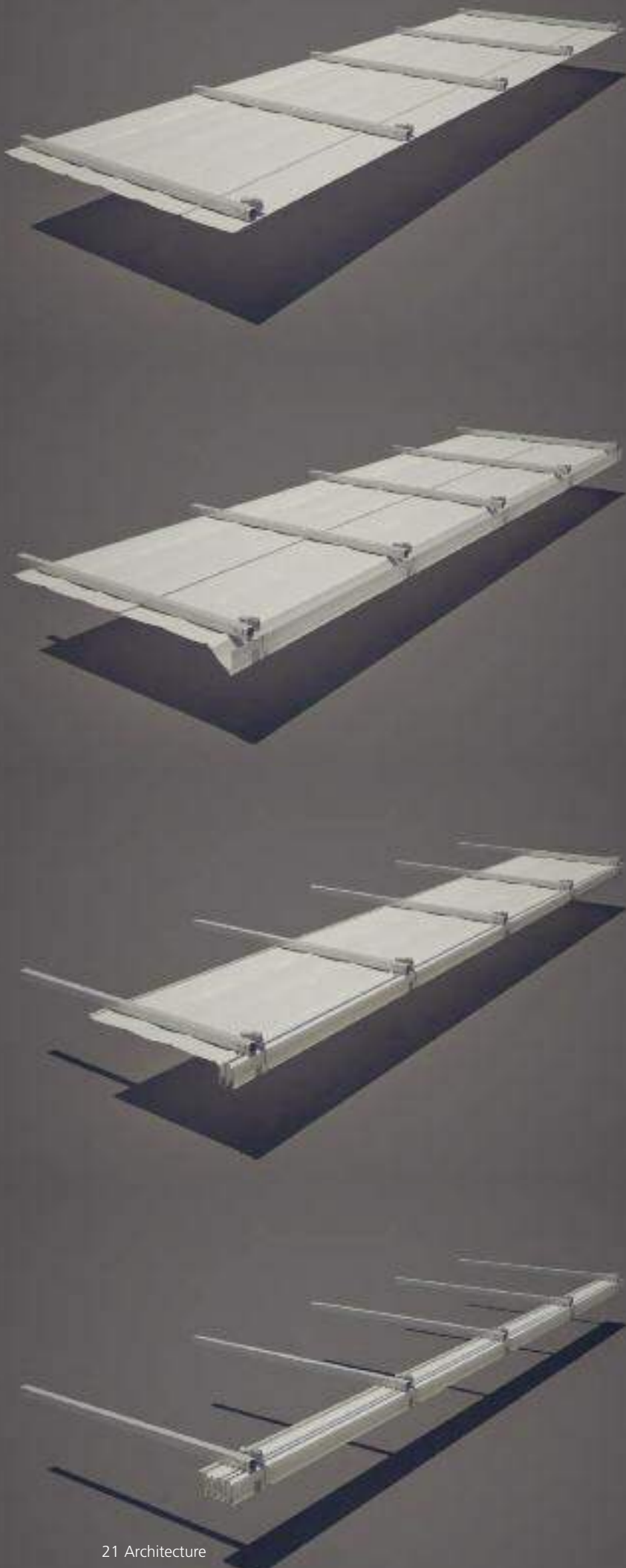
Opening and closing with added value

The two awnings – the first on level one above Cecconi's Garden Restaurant, the other on level two over the Club Bar – are controlled by a highly modern weather program from Uni-Systems. In addition to manual opening and closing, the awnings automatically retract in the event of unfavorable weather conditions. When closed, the folding roof measures only 122 cm in

width and blends in harmoniously with the general architectonic setting. What's more, in avoiding having to install an unattractive and expensive sprinkler system in the garden, the trees are watered naturally. When rain falls, the sun awning is automatically retracted – when no guests are sitting in the garden – and water can seep into the ground unhindered.

Further potential in the future

Peter Katcha, Sefar Director of North American Sales comments: "I am very happy that with SEFAR® Architecture TENARA® Fabric we were able to realize this demanding and prestigious project. At the same time, I am very proud of the fact that there was no viable alternative to this material. With a light transmission of 40%, we can offer around double the normal industry standard of just 20%. The exclusive Soho Beach House is exactly the right type of location to prove the unique qualities of our architectural fabrics. Together with our partner Uni-Systems, we have shown what is technologically possible – and what we will be able to supply in the future."



Soho Beach House

Miami FL, USA,
www.sohobeachhouse.com

Architect

Shulman + Associates
Miami FL, USA
www.shulman-design.com

Engineering, Manufacturing/ Implementation, Sales

Uni-Systems LLC, Minneapolis,
USA, www.uni-systems.com

General Contractor

Moss Construction Management
Fort Lauderdale FL, USA
www.mosscm.com

Fabric

SEFAR® Architecture TENARA®
4T40HF

SEFAR® Architecture TENARA® Fabric 4T40HF

Fabric material

Fluoropolymer-coated fabric
made from PTFE fibers

Area density

1,080 g/m²

Thickness

0.55 mm

Width

1.575 m

Highest tensile strength warp

4,000N/5 cm (ASTM D4851)

Highest tensile strength weft

4,000N/5 cm

Trapezoidal tear strength warp

798 N (ASTM D4851)

Trapezoidal tear strength weft

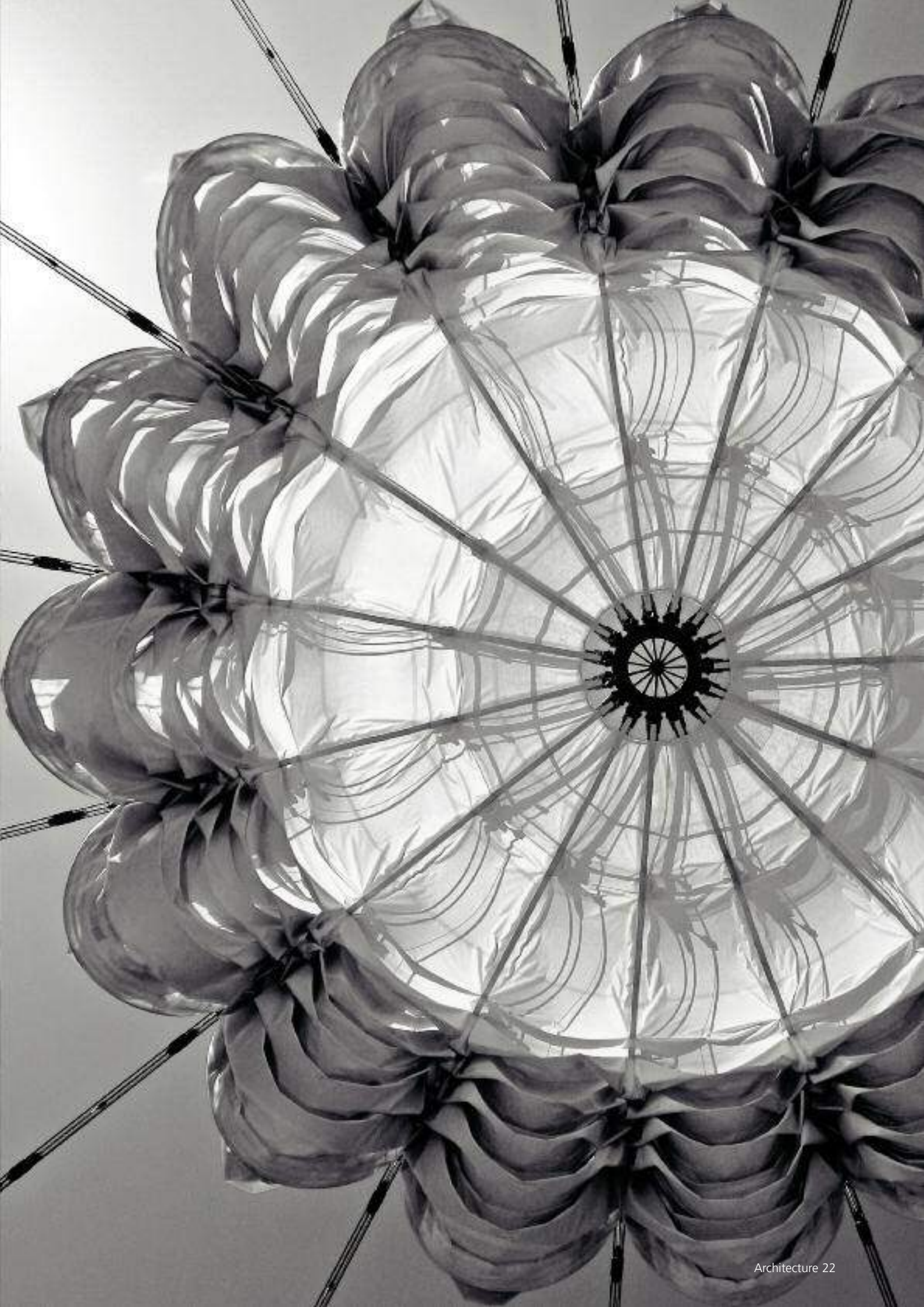
752 N

Light transmission

38% (ASTM E903,
average 450–650 nm)

Fire resistance

EN 13501 B-s1, d0,
ASTM E84 – Class A,
NFPA 701 – Small Scale-Pass



Open-air
feeling
under a
retractable
roof.

Top City / pro.media



The Kufstein Fortress Arena offers both.

In recent years, the Kufstein Fortress Arena has established itself as a popular hotspot for events in the Tirol region of Austria. Here in the immediate vicinity of the impressive fortifications, concerts, exhibitions and events of all kinds take place. Owing to the changeable nature of the weather in the Austrian Alps, a roof system was needed which did not reduce the open-air feel of the arena. The solution: SEFAR® Architecture TENARA® Fabric.



Top City/pro.media

Events scheduled to take place in the open air always carry a certain element of risk – not least in the Austrian Alps. Cancellations are not only costly but they upset the very guests which organizers are trying to attract as regular visitors to the event venue. A roof covering for this historic fortress arena was the only solution. The seemingly contradictory project requirement was obvious: the roof should not impact negatively on the open-air feel of the arena.

Kugel + Rein Architects and Engineers, Stuttgart, found the solution in Sefar AG, Heiden, Switzerland.

Design, acoustics, and light

The Arena roof was conceptualized as a circular “flower” in shape, opening from the center and lying above the event area. A total of over 2,000 m² of translucent white membranes were used in its construction, which in addition to the necessary weather protection offer a

host of additional technical benefits. SEFAR® Architecture TENARA® Fabric also scores well as a highly functional acoustic ceiling, which is an extremely important factor especially when staging concerts. The fabric ensures a harmonious balance between the orchestra and the open air. On top of all this, the roof can also be used as an additional projection surface for light effects whose exclusivity contributes to a spectacular Arena experience.





**Kufstein Fortress Arena,
Austria**

Architect / Engineering

Kugel + Rein Architects and
Engineers, Stuttgart, Germany
www.kugel-rein.eu

Manufacturing/

Implementation

Hightex GmbH,
Rimsting, Germany
www.hightexworld.com

Fabric

SEFAR® Architecture TENARA®

SEFAR® Architecture TENARA®

Fabric 4T40HF

Fabric material

Fluoropolymer-coated fabric
made from PTFE fibers

Area density

1,080 g/m²

Thickness

0.55 mm

Width

1.575 m

Highest tensile strength warp

4,000N/5 cm (ASTM D4851)

Highest tensile strength weft

4,000N/5 cm

Trapezoidal tear strength

warp

798 N (ASTM D4851)

Trapezoidal tear strength weft

752 N

Light transmission

38% (ASTM E903,
average 450–650 nm)

Fire resistance

EN 13501 B-s1, d0,
ASTM E84 – Class A,
NFPA 701 – Small Scale-Pass



Fifty-two meters in diameter

The construction of the membrane roof at the Kufstein Fortress Arena has made a lot of impact architectonically. The supporting framework resembles a horizontal wire wheel about 52 meters in diameter, constructed from fifteen triangular segments. The wire wheel is an efficient, self-contained, highly pre-stressed supporting system which in practice is remarkably quick to put into operation. In just four minutes, the SEFAR® Architecture TENARA® Fabric

roof can be electrically opened or closed, and in so doing, apart from the impact of the wind, only vertical force is directed onto its foundations.

Open air, under cover

Weather protection, acoustic ceiling and projection surface – in addition to all this, thanks to its 40% light transmission properties and all-round open structure, SEFAR® Architecture TENARA® Fabric manages to preserve that authentic open-air feeling. Exceptionally strong

sunlight, rainfall, or unexpected changes in the weather are no longer a reason to delay or cancel long-planned events. At the same time, the textile material completely satisfies the high demands of monumental preservation and blends easily into the historic ensemble, with aesthetic modernity and due sensitivity.



Flying high in Zurich

A light ceiling with additional functions opens up the skies.



Anyone flying out of Switzerland's largest airport in Zurich will be taking to the skies before they even leave the ground – optically at least. For the light ceiling incorporating SEFAR® Architecture IA-80-CL Fabric ensures a truly unique sense of space through the transmission of a sophisticated, controlled light effect coupled with the targeted application of acoustic absorption.

Nowhere does one feel closer to the skies than at an airport. This is especially true at Zurich Airport, where passengers in the newly refurbished passage to Terminal 1 already get a sense of taking off. This effect is made possible through the selective use of SEFAR® Architecture IA-80-CL Fabric. During the course of his research, architect Florin Baeriswyl from dai AG in Zurich became aware of the many different types of architecture fabrics produced by Sefar. After initial discussions and more detailed planning, it became clear that this material would be ideal for spatial design, illumination, and acoustic insulation. Perfect, in fact, for

large and small projects in Zurich and the whole world.

Open to something new

Florin Baeriswyl and his team at dai have symbolically opened the airport to the skies. Adhering to the stringent safety regulations for public places, the light ceiling was created in a patented, detailed frame design. Architect Florin Baeriswyl explains: "For us it was important that in spite of its enormous surface area, the entire construction should be airy and slightly transparent. Only in this way was it possible to create the sensation of 'open sky' in the interior of an airport building."

Zurich Airport

Terminal 1 / Car Park Lift 1

Architect

Florin Baeriswyl, dai AG, Zurich, Switzerland, www.dai.ch

Engineering

ArtEngineering GmbH
Dr. Ing. S. Greiner
Stuttgart, Germany
www.greiner-engineering.com

Fabric

SEFAR® Architecture IA-80-CL



SEFAR LIGHTFRAME®:
Easy to assemble
and maintain thanks
to its lightweight
and intelligent
supporting structure.

**SEFAR® Architecture
A-80-CL**

Fabric material

PVDF (polyvinylidene fluoride),
calendared, open-pored

Fabric width (cm)

146, 270, 340

Weave Twill 1/3

Area density (g/m²) 440

Highest tensile strength

warp/weft (N/ 5cm)

1,800/1,000 as per EN ISO
13934-1

Highest tensile elongation

strength warp/weft (%)

35/27 as per EN ISO 13934-1

Tear force warp/weft (N)

40/80 as per DIN 53859-5

Fire resistance

B1 as per DIN 4102; B-s1, d0 as
per DIN EN 13501-1

Light transmission (%)
> 80 as per ASTM D 1003
Reflectance (%) 19
Absorption (%) 1



Behind the scenes of the light ceiling: Lights, cabling, and building services technology – unseen by the public at Zurich Airport.

Light and sound

The finished result: by means of a clever interplay with the lighting technology behind it, the fabric ceiling imparts a pleasant feeling of familiarity and calmness – ideal for nervous flyers. Irregular changes between cool and warm light generate that “light feeling.” At the same time, this indoor sky suppresses the constant sound of multiple footsteps, rolling suitcases, and all that makes up a busy international airport. With its special acoustic properties, SEFAR® Architecture IA-80-CL Fabric ensures a highly efficient reduction in background noise.

Intelligent applications

“A fabric that transmits light like the clouds and swallows sound like the sky; in Sefar we have found a partner who constantly surprises us with functional materials, never previously thought possible,” enthuses Florin Baeriswyl. Today, the light ceiling at Zurich Airport is a prototype and successful working example of the intelligent application of architecture fabrics in public places – not least because of close collaboration between the Sefar development section, the planning architects, and the manufacturers.

"Architectural fabrics are very much the trend. And Sefar is the trendsetter."

Architect Florin Baeriswyl from dai AG in Zurich, on new discoveries, trends, and previously undreamt-of possibilities.

You are one of the first architects to have used Sefar Architecture Fabrics. How did you come across these special materials in the first place?

Florin Baeriswyl: Actually we found one another. Sefar commissioned me and my dai office to advise the newly established architecture sector of the organization on their market branding. The aim was to position this sector in the market place as a stand-alone division. In addition to our consultative role (in the interdisciplinary activities of dai), the fabric naturally excited me as an architect.

How did the further collaboration which followed develop from that? Where have you provided input? In which areas have you been inspired by existing architecture fabric ranges?

Florin Baeriswyl: This project gave us a deep insight into the diversity of Sefar products. In this way, we have got to know and value the creative potential and versatility of this partner. On this basis, it was possible to develop new areas of application in architecture and design situations together, for example in the form of a light ceiling at Zurich airport. But also in the course of the development of the special illumination "natural sky," which controls the natural interplay with light and at the same time provides an echoabsorption function.

What application possibilities do architecture fabrics open up?

Florin Baeriswyl: The possibilities are as good as limitless. I find architecture fabrics interesting because – depending on the concrete product – they combine so many different properties. For example, they are reverberation absorbent, nonflammable, UV resistant and thus suitable for outdoor applications, and easy to keep clean. Even oil, ketchup, or coffee leaves no trace behind.

Apart from that, the fabric can be formed, tensioned, and hung in almost any way – and it has an exceptionally

low intrinsic weight. No other rigid architectural material can offer that.

How do your clients react when you suggest the application of fabrics in spatial planning and design? Is their first reaction more one of interest or of skepticism?

Florin Baeriswyl: Initially it is definitely one of skepticism, and that is understandable since this versatile material is not yet widely known. But as soon as I show them product samples, tell them about its many additional benefits and functions, and provide testimonies of working examples, this turns into enthusiasm. Suddenly most clients want to belong to the architectonic trendsetters. That's what we want!

Are we really witnessing the beginning of a new trend? In which areas can architecture fabrics still make advances?

Florin Baeriswyl: The best thing about this development is that we are still really only at the beginning. Theoretically – and of course also practically – there are hardly any limits to the application of SEFAR® Architecture Fabrics. Thanks to exceptional physical properties such as the UV resistance already mentioned, the fabrics can be used anywhere in the world. With unbelievable additional functions such as electrical conductivity, these fabrics pave the way for previously undreamt-of possibilities. I am already excited about what can still be achieved with it. And to return to the original question – yes, architecture fabrics are very much the trend. And Sefar is the trendsetter.

The story of the development of Sefar Architecture Fabrics is inseparably linked to the Swiss architect Florin Baeriswyl. Following an architecturally atypical contract, an exciting collaboration of creative minds has evolved. In a recent interview, Florin Baeriswyl explained how, thanks to Sefar, he is constantly able to surprise his clients with something new.



Light,

AIRY,

Maximum flexibility, minimum effort – the architecture fabric SEFAR® Architecture IL-90-CL makes these seemingly conflicting requirements possible in a perfect way. Manufacturer Luft & Laune GmbH has developed a unique event tent for Swisscom, which is sure to create a sensation.

While revising the corporate design of Swisscom, it was also decided to reorganize how the organization would present itself to customers at public events. Instead of inflexible, bulky, and heavy equipment, a concept was created based on an inflatable event tent which can be assembled and dismantled in a short time and with minimal effort, irrespective of its location. Since the tent had to conform to demanding aesthetic and functional restraints, only special materials could be considered for the task.

and a great atmosphere



The Swisscom Event Tent brings it all together!

Demands met optimally

The final choice was the architecture fabric SEFAR® Architecture IL-90-CL, which with its high light transmission, UV resistance, and relatively low area density was more than able to satisfy the given requirements. Once constructed, the appearance of the architecture fabric even ensures a special feeling of space inside the tent. Unwanted noise is absorbed while the character of the textile imparts a pleasant, warm ambience.

Targeted, controlled lighting effects

Back to the lighting characteristics of SEFAR® Architecture IL-90-CL: the highly translucent architecture fabric surprises you from inside and outside with its constantly changing moiré effect. LED light switchers installed in special sockets beneath the tent illuminate its body from the inside out with different visual variations. Thanks to the exceptional light-technical properties of the material, colors can be very precisely controlled, directed, and mixed. With the right idea and the optimum SEFAR® Architecture Fabric, even the most challenging of projects can be easily and airily implemented.

Swisscom Event Tent, Zurich

Architect

Designculture AG
Zurich, Switzerland,
www.designculture.ch

Engineering,

Manufacturing/Printing

Luft & Laune GmbH, Zurich,
Switzerland, www.luftundlaune.ch

Fabric

SEFAR® Architecture IL-90-CL

SEFAR® Architecture IL-90-CL

Fabric material

PVDF (polyvinylidene fluoride)

Material coating

100% fluoropolymer

Material width (cm) 160

Highest tensile strength

warp/weft (N/5 cm)

1,050/1,050 as per EN ISO

13934-1

Highest tensile elongation

strength warp/weft (%)

40/25 as per EN ISO 13934-1

Fire resistance

B1 as per DIN 4102; B-s1, d0 as
per DIN EN 13501-1

Light transmission (%)

≥ 90 as per ASTM D 1003

Reflectance (%) 9

Absorption (%) 1

CENTRE COURT WIMBLEDON

Rain doesn't stop play at the



Centre Court, Wimbledon

A sliding roof made of 5200 m² SEFAR® Architecture
TENARA® Fabric ensures uninterrupted action.





Tournament matches held on the Centre Court at the world-famous All England Lawn Tennis & Croquet Club in Wimbledon rank among the highlights of the tennis calendar. But even when the world's best players measure up, there is never any guarantee concerning the weather. For many years, matches were suspended whenever rain fell, with tournament delays – and additional costs – an all too frequent occurrence. Today, both players and spectators can enjoy uninterrupted tennis even when it's raining in South London.

The objectives for covering the Centre Court were explicit: to preserve the historical ambience of the sporting arena dating back to 1922, to provide shelter from unfavorable weather conditions, to permit high light transmission without creating bright or dark spots, and to maintain an open-air feel. SEFAR® Architecture TENARA® Fabric was more than able to fulfill all these requirements and continues to deliver in terms of its practical suitability. When retracted, the roof is barely visible, but once open it provides reliable protection for the grass court and 1,200 spectator seats from wind and rain.

Uniform translucence

To guarantee uniform light transmission, two different fabrics were employed: SEFAR® Architecture TENARA® Fabric 4T20HF with 20%, and 4T40HF with 40% light transmission. These high-frequency welded fabrics are fastened to ten steel girders which can be moved using wheels running on rails. In less than ten minutes, approximately 5,200 m² of fabric with a span of 77 meters can be extended or retracted at a height of 16 meters above the famous Wimbledon grass.



Wimbledon from an unusual perspective. The retractable roof protects the grass court and 1,200 spectator seating area from wind and weather.

Retractable roof at Centre Court, Wimbledon, London, England

Architect

Global Design Firm Populous
London, England
www.populous.com

Engineering

Tensys Ltd., Bath, UK

General contractor

Galliford Try plc, England
www.gallifordtry.co.uk

Manufacturer

Hightex, Rimsting, Germany

Fabric

SEFAR® Architecture TENARA®
4T20HF and 4T40HF

SEFAR® Architecture TENARA® Fabric 4T20HF and 4T40HF

Fabric material

Fluoropolymer-coated fabric
made from PTFE-fibers

Area density

1,080 g/m²

Thickness

0.55 mm

Width

1.575 m

Highest tensile strength

Warp 4,000 N/5 cm

Weft 4,000 N/5 cm

Light transmission

38% (4T40HF), 19% (4T20HF)

Exceptional properties

This line of PTFE fabrics possesses very special properties for this visually sensational project: absolute water tightness and good mechanical resilience, but above all excellent light transmission, guaranteed tear resistance, and resistance to mold growth – an important factor in the application of retractable weather protection systems. As SEFAR® Architecture TENARA® Fabric does not crease and virtually cleans its own dirt-repellant fluoropolymer surface in the rain, the Centre Court roof will remain flawless in appearance for many years to come.

Reference project with a worldwide profile

The retracting roof at Wimbledon is one of the reference projects using SEFAR® Architecture TENARA® Fabric that is beamed to the world by TV transmissions each and every year. The special material properties and high-precision construction of the two moveable roof segments – made from four and five fabric elements respectively – ensure that matches played on the “hollowed turf” of the Centre Court are not rained off in the future. From now on, players and spectators alike can concentrate on the ball, and not on the clouds forming in the sky above.

Shade in its most elegant form

The 450 m² architectural canopy at Dresden Ammonhof.

Viewed from above, the shape of this modern office building resembles a drop of water. In actual fact, the Dresden Ammonhof exhibits an organic form in many respects, and was designed in its entirety to be very economical and energy-efficient. This "shell and core" project (the office buildings form a ring around an internal atrium) focuses on the natural retention of warmth and energy. The inner courtyard functions as a passive retainer of warmth: its volume has the same effect in summer and in winter. But what does this mean for the active utilization of the courtyard area? When the midday sun shines, the atrium heats up very quickly, and for staff working here this popular place to socialize and communicate rapidly loses its appeal. The solution: a specially designed architectural canopy made from SEFAR® Architecture EL-35-T1 (100% fluoropolymer-coated PTFE fabric). With a total surface area of 450 m², this large

awning is tensioned beneath glass elements and side wall attachments. In this way, it is both stable and secure as well as ensuring a very spacious and airy ambience.

With SEFAR® Architecture EL-35-T1, an architecture fabric is used which – in every sense of the word – is well worth seeing. The fluoropolymer fabric, with $\geq 35\%$ light transmission, an extremely high proportion of diffuse light, and very low discoloration, satisfies all the demands of this sweeping sunshade. Whether uncoated or water-proofed, with integrated UV protection or without: because of its low intrinsic weight combined with high resistance to tearing, this material is the perfect solution for challenging applications.

Another benefit of this special architectural canopy is one which cannot be seen, but it can be heard. In addition to

its function as a sunshade and temperature regulator, the suspended 450 m² ceiling also provides an acoustic dampening effect. Footsteps, conversations, and any other noise made in the all-round glazed atrium is optimally absorbed – the fabric therefore makes a positive contribution to the practical utility of the whole area. Thanks to SEFAR® Architecture EL-35-T1, there really is no dark side for the occupants of the Dresden Ammonhof.



SEFAR® Architecture EL-35-T1

Fabric material

PTFE (polytetrafluoroethylene)

Material coating

100% fluoropolymer

Area density (g/m²)

320

Highest tensile strength

warp/weft (N/5cm)

2,000/2,050 as per EN ISO 13934-1

Highest tensile elongation

strength warp/weft (%)

11/10 as per EN ISO 13934-1

Tear force warp/weft (N)

not tearable according to ISO 13937-2

Fire resistance

B1 as per DIN 4102; B-s1, d0 as per DIN EN 13501-1

Light transmission (%)

> 35 as per ASTM D 1003

Reflectance (%) 64

Absorption (%) < 1

Ammonhof Dresden, Germany

Engineering

aeronautech GmbH, Seeon,
Germany, www.aeronautech.de

Manufacturing/

Implementation and Sales

aeronautech GmbH

Fabric

SEFAR® Architecture EL-35-T1



The art of showing art in the right light

The Sefar light ceiling at the Museum Folkwang combines aesthetics and functionality.

The Museum Folkwang in the city of Essen is one of the most significant art institutions in Germany. As well as housing collections of 19th century paintings and sculptures, classical modern art, post-1945, and photographic exhibits, the new building by David Chipperfield is also an architectonic highlight in itself: a 1400 m² light ceiling which, without supporting columns interrupting the view, allows the works on display to be seen in just the right (natural or artificial) light.







The SEFAR LIGHTFRAME® enable quick and easy access to lighting and building technology.

Natural light is omnipresent in the new museum building designed by David Chipperfield. The courtyard surroundings are filled with as much of it as possible and the exhibition rooms were so designed as to make full use of the natural light spectrum when presenting the art. Accordingly, the works enter into a special dialogue with ever-changing light situation over the course of the day. The interior lighting ambi-

ence inside the museum is controlled by means of side windows and light ceilings. For architectural reasons, it was decided to use a Lightframe concept – an optimal combination of SEFAR® Architecture IA-95-CL Fabric and intelligent ceiling modules, resulting in convincing added value.

Large dimensions – intelligent solutions

The Lightframe concept is based on a modular system. So as not to change the characteristics of the room, both the light metal frames with their tensioning devices and the edges of the fabric are invisible. Supports, lighting units, and cables are housed in a special track. When connecting multiple elements as is the case in the Museum



MUSEUM FOLKWANG

Folkwang Museum

Essen, Germany
www.museum-folkwang.de

Realization

Neubau Museum Folkwang Essen GmbH, an undertaking of the Wolff Group

Building owner

Neubau Museum Folkwang Essen GmbH

Architect

David Chipperfield Architects
London/Berlin
www.davidchipperfield.co.uk

Implementation planner

PLAN FORWARD GmbH

Engineering, Manufacturing/ Implementation

Schmid GmbH
Weiler-Simmerberg, Germany
www.schmidgmbh.de

Fabric

SEFAR® Architecture IA-95-CL

Lightframe module

3,200 × 1,520 mm

SEFAR® Architecture IL-95-CL

Fabric material

PVDF (polyvinylidene fluoride), perforated

Material coating

100% fluoropolymer

Fabric width (cm)

160

Highest tensile strength

warp/weft (N/5 cm)

800/800 as per EN ISO 13934-1

Highest tensile elongation

strength warp/weft (%)

35/20 as per EN ISO 13934-1

Fire resistance

B1 as per DIN 4102; B-s1, d0 as

per DIN EN 13501-1

Light transmission (%)

≥ 95 as per ASTM D 1003

Reflectance (%)

4

Absorption (%)

1



Folkwang, locking screws ensure the necessary tensioning to cope with the large surface area. A total of 514 “floating” Lightframe modules were used to cover the 1400 m² light ceiling of the column-free hall for temporary exhibitions.

Lightframes as basic elements

At the same time, the Lightframe light ceiling meets all the exhibition-specific requirements. The modular arrangement of the ceiling grid makes it possible to include running rails for suspending wall-separating elements. In this way, the light ceiling also serves as a divider for the changeable room structure. What's more, in addition to its light-technical properties with transmission



rates over 95%, SEFAR® Architecture IA-95-CL Fabric is also known for its noise absorption qualities – a basic requirement when planning reduced exhibition space without its own “breaks” to dampen reverberation. Above all, the nature of the textile imparts an unseen yet noticeably pleasant atmosphere to the room within the clear design form of the entire building.

Well presented

In collaboration with Sefar manufacturing partner Firma Schmid GmbH in Weiler-Simmerberg, Germany, art is successfully kept as the center of attention. Although the dimensions and the clear structure of the light ceiling actually play an important role in the overall museum visit experience, the architectonic refinements are kept discreetly in the background. The Lightframe concept and

SEFAR® Architecture IA-95-CL Fabric see themselves as a means to an end – and in these selected frames are visually well presented.

SEFAR LIGHTFRAME® – Special features and development history

An interview with system inventor Dr. Ing. Switbert Greiner

Mr. Greiner, you run an international engineering practice and have developed the light ceiling system SEFAR LIGHTFRAME® in close collaboration with Sefar AG in Heiden. What were your goals during development?

Switbert Greiner: I got to know this marvellous light-technical fabric by Sefar AG about 7 years ago, and began to develop architectural solutions for covering surfaces. On the one hand, there was the fabric and on the other there were architects who recognized the potential for these materials, were excited about their particular properties, and inspired to create a host of applications for it. What was unclear was how the fabric could be fitted and tensioned so that the mechanical parts of the construction functioned properly, were easy to install, and would not be too visible.

Why use technical fabric in architecture?

Switbert Greiner: I think there are many reasons in this case. Architects are always looking for unprecedented solutions – design and a passion for innovation are very close to one another. There are also purely technical reasons. It is almost impossible otherwise to construct large backlit surfaces which radiate such lightness, have so few seams and visible construction elements, and have such a pleasant feel to them. The smooth haptic of Sefar fabric is especially noticeable – but perhaps the more so subconsciously.

And here you have – as SEFAR LIGHTFRAME® demonstrates – a field of activity for constructive thinking, inventive engineers. How long did it take from conceptual formulation to a marketable product?

Switbert Greiner: It was a very long journey. I studied already established products and solutions but was not happy with any of them. Time and again I said to myself it had to be more elegant and maybe even lighter. I was looking for answers to such questions as how it could be produced and fitted, how the membrane could be secured, how it could be tensioned, and how the edge profile could be made as filigree as possible.

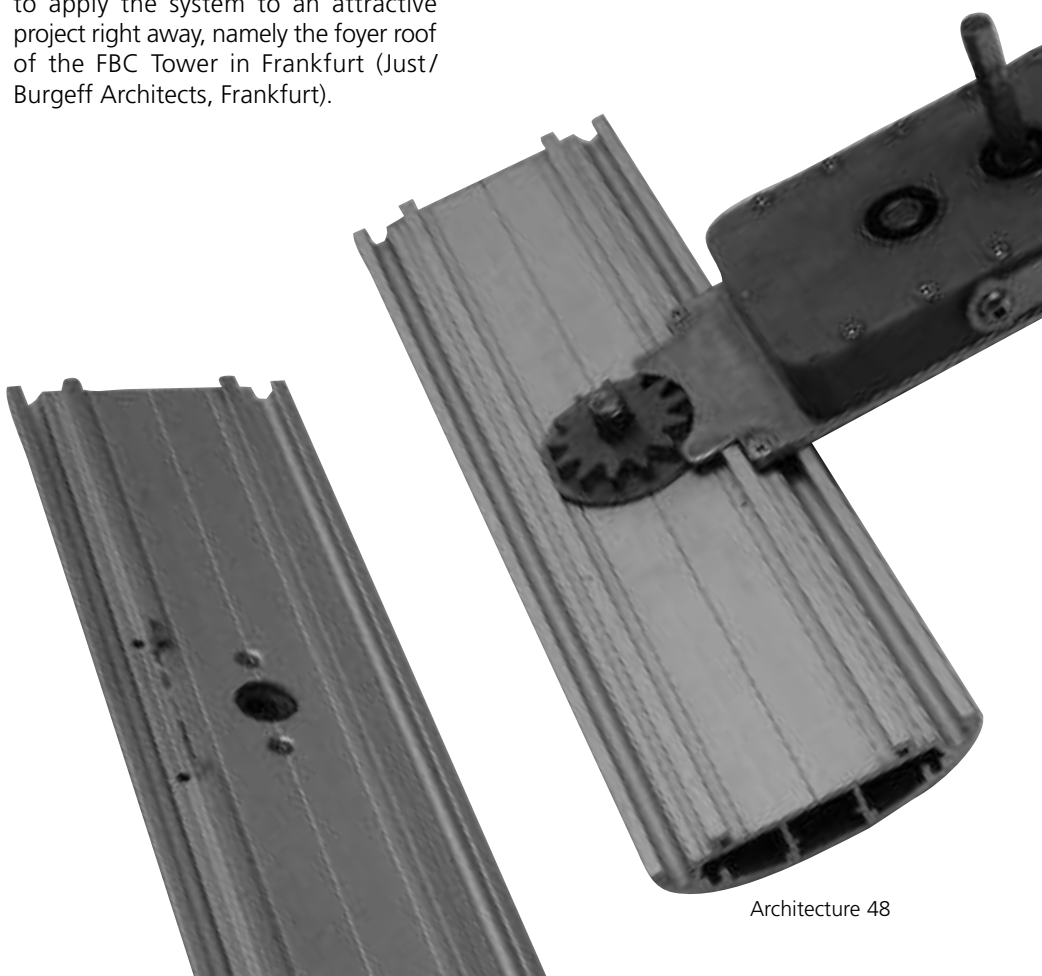
I discovered solutions, began to make designs, and then create the first prototypes together with Dr. Gutmann from Pollux. At the same time, I made sure we had trademark rights. Luckily it transpired that we had the opportunity to apply the system to an attractive project right away, namely the foyer roof of the FBC Tower in Frankfurt (Just/Burgeff Architects, Frankfurt).

What distinguishes this solution of yours? What is so special about it?

Switbert Greiner: Other solutions secure the membrane to a frame made from rigid profiles. Such frames have bulky crosssections determined by the system. With an opaque fabric, this does not really matter very much – except that the frame material can be quite costly. But with light-technical fabrics you can see the profile when it is fixed behind the fabric membrane. We wanted to make sure that the profile was completely invisible or at least barely visible.

There is not just the one ingenious idea which has made it possible to hide the tensioning and support structure. First came the basic idea: let's do away with the rigidity of the supporting profile. That way we can make it very thin.

The welt channels are easily recognizable in this illustration.





Yes, but then surely the frames will bend under the tensioning force of the membrane! How do you prevent that happening?

Switbert Greiner: This can be prevented by connecting neighboring panels together to ensure the tensioning force of the membrane is passed on, so to speak. Then the edge profile becomes a continuous carrier with correspondingly small span widths and no visible bending deformation – despite being extremely slender.

That is really exciting. But how is such a connection achieved? In most cases, they cannot be fitted from the rear side – and I have never seen a screw or anything similar on a SEFAR LIGHTFRAME® ceiling.

Switbert Greiner: For this we developed a connecting element that works like a screw and can be turned by means of a cog-wheel mechanism from the front or rear side using a special tool I invented myself. The connecting screws are not visible in their finished state. The special assembly tool and many other manual aids were developed together by Dr. Gutmann and me. The tool accesses the gear wheel via an extremely narrow visible seam between the panels.

How is the membrane actually secured to the edge profile?

Switbert Greiner: The membrane is drawn over the SEFAR LIGHTFRAME® profile with the help of a welt connection. Care is taken to ensure the membrane is slightly shortened when fitted so that the desired pretensioning of the membrane areas can be set when securing the frames together.

I didn't think that so much had to be taken into consideration when attaching a piece of material neatly to a rectangular area. Were there other things which you had to take into account when developing the product?

Switbert Greiner: Yes, absolutely! For example, take the rounded form of the profile, which together with the silver-colored eloxadized coating optically reduces the shadow-forming edges of the profile. Furthermore, great care was taken to ensure the panels could be removed for maintenance purposes and the textile areas could be opened individually – so as to be able to carry out repairs on the lights behind. Another very important feature of the SEFAR LIGHTFRAME® is the option of having another membrane made from fabric or film on the reverse side. This means you can prevent the buildup of dust on the front side of the membrane and because of the intentional diffusion effect of the back membrane, dirt and even dead insects can be rendered invisible. A second membrane layer makes the acoustic properties noticeably better as well.

Which properties and possibilities of SEFAR LIGHTFRAME® are especially convincing to architects when they are at the planning stage?

Switbert Greiner: The architect can plan the layout of the ceiling and wall elements largely independently since the panels are generally rectangular. It helps when the architect can take account of the working width of the fabric, and take off about 2 × 4 cm for the welt. Frequently the panels measure about 1.5 × 3.0 m². But much longer and wider panels are also feasible. Before construction, an engineer with detailed knowledge of the system should be consulted in order to specify and fine-tune the particulars. More often than not, the engineer is with the contract partner (manufacturer) anyway. We are also happy to take on the detailed technical planning in tricky cases.

Where do you see potential for possible applications?

Switbert Greiner: The range of applications for SEFAR LIGHTFRAME® generally consists of coverings for flat ceiling and wall surfaces. Polyhedron structures are also conceivable and have already been created (see Sefar exhibition stand 2007), and circular panels are viable too. If you want to avoid seams in fabric, the width of the elements is restricted to about 1.5 to 3.0 meters. The length of the panels can be very large and this comes down to a question of handling capability. SEFAR LIGHTFRAME® displays a special brilliance in combination with light. The word "light" in the brand name stands for light in terms of its optical brightness, weight, and filigree.

What kind of feedback do you get from partners who work with and fit SEFAR LIGHTFRAME®?

Switbert Greiner: We maintain close contact with users and respond to design modification requests from those in the field. Of course we have to train these people thoroughly and support them now and then with problems which arise. We listen carefully to any criticism from users and carry out detailed improvements. For example, some fitters had difficulty using the special assembly tool. As a result, we made some modifications to both the tensioning tool and the feeding mechanism for the connecting screws. Otherwise, we receive very positive feedback from our partners and the fitters who work with and assemble SEFAR LIGHTFRAME®.


250 sunshades for pilgrims

Each year, millions of pilgrims flock to the mosque in Medina al-Munawwarah. In recent years, the traditional time of pilgrimage has been in the cooler fall and winter months. This time frame is changing gradually, however. According to the lunar calendar, the time of pilgrimage is returning to the extremely hot summer months, making a sunshade absolutely essential. The answer: 250 giant umbrellas covered with Sefar PTFE fabric now providing pilgrims with plenty of shade.

A total of 143,000 m² PTFE ensures plenty of shade for the Medina Haram Piazza.







High-tech functions
concealed in an
elegant design.
If required, the
sunshades retract
automatically.





Impressive dimensions. When open, the sun umbrellas can be seen in all their glory as they create an unbroken area of shade.

As general contractor, the Saudi Binladin Group contracted the architectonic planning of this project to SL-Rasch GmbH in Leinfelden-Echterdingen (Germany). It was clear from the beginning that only PTFE fabric would be able to meet the exceptional situational demands. Other materials would not provide full protection from the aggressive UV radiation or satisfy the stringent standards required by the customer. In addition to UV-stability, the material had to have an extremely high tensile strength owing to wind load, maximum flexibility, colorfastness, fire resistance, as well as effective shading and appropriate light transmission.



Extra tough PTFE fabric

The extra tough PTFE fabric developed by Sefar especially for this huge project could not remain pure white owing to the intensity of the light since the strong transmission would have blinded people beneath the sunshade. For this reason, the customer chose a sand-colored fabric. In addition, oriental patterns made from blue PTFE-ribbons should be applied to the underside of the umbrella. With careful adjustment of the weaving machine, the consistent quality of the giant fabric surface was also guaranteed.

The outcome of this combination: by shading with PTFE fabric, the ambient temperature is reduced by at least 8 °C.

143,000 m² shade

The final "go" for the project, however, was given only after the production of four actual-size prototypes. They were tested under real conditions in collaboration with the umbrella control system manufacturer, Liebherr from Ehingen in Germany. Since September 2010, a total of 250 umbrellas, each one with a surface area of 25.5 × 25.5 m (when open) and 15 meters high, have been installed in the area surrounding the mosque in Medina al-Munawwarah. These umbrel-

las work together to form a shaded area of 143,000 m² – greater than the floor area of the mosque itself. When closed, each umbrella – including its working parts – is encased in a narrow, elegant column. The opening and closing procedure only takes three minutes.

MOSQUE MEDINA

**Client**

Saudi Arabian Ministry of Finance

General Contractor

SBG – Saudi Binladin Group

Architect:

SL-Rasch, Germany

Umbrella manufacturer

Liebherr, Germany

Manufacturing

Taiyo Kogyo, Japan

PTFE fabric producer

Sefar, Switzerland

A specially extra tough PTFE fabric was developed by Sefar for this project.



Applications made from blue PTFE-ribbons form oriental patterns on the underside of the umbrellas.



A shining example
of a good concept





Architecture fabric as light wall, presentation surface, and room divider

Achema in Frankfurt is one of the leading trade fairs and world forums for the process industry, and a trendsetting technology summit for chemical engineering, environmental protection, and biotechnology. Sefar AG is also an exhibitor at Achema – and naturally utilizes its own architectural materials to generate interest among the fair's specialist visitors. SEFAR® Architecture IA-80-CL is a material which more than meets the multiple requirements of these corporate appearances.

"Why search far and wide when the good things are right here?" These words from a German motto seem appropriate for Sefar AG during the planning and implementation of their exhibition stand for Achema 2009, and

using their own innovative products to promote themselves. In conjunction with a stand concept, the architecture fabric SEFAR® Architecture IA-80-CL is used together with "constructive PON," a node-rod system with magnetic connectors, where it clearly demonstrates its material properties and strengths.

Fabric and metal

The fabric is attached to the frame construction by means of hook ties. This allows the construction of walls, cubes, or columns. The three-dimensional construction elements are illuminated with free-hanging neon tubes from the inside out. A high light transmission of $\geq 80\%$ guarantees maximum luminance, ensuring the harmonious appearance of light walls and columns. Together with "constructive PON" in aluminum, the fabric performs an emotional interplay between the

Exhibition Stand Sefar AG

Achema 2009, Frankfurt, Germany

System

Burkhardt Leitner, Stuttgart, Germany
www.burkhardtleitner.de

Design

Buob & Schiess GmbH, St.Gallen, Switzerland, www.buobundschiess.ch

Manufacturing/Implementation

Retailpartners AG, Wetzikon, Switzerland
www.retailpartners.ch

Fabric

SEFAR® Architecture IA-80-CL

SEFAR® Architecture IA-80-CL

Fabric material

PVDF (polyvinylidene fluoride), calendared, open-pore

Fabric width (cm) 146, 270, 340

Highest tensile strength warp/weft (N/5 cm)

1,800/1,000 as per EN ISO 13934-1

Highest tensile elongation strength warp/weft (%)

35/27 as per EN ISO 13934-1

Fire resistance

B1 as per DIN 4102; B-s1, d0 as per DIN EN 13501-1

Light transmission (%)

> 80 as per ASTM D 1003

Reflectance (%) 19

Absorption (%) 1

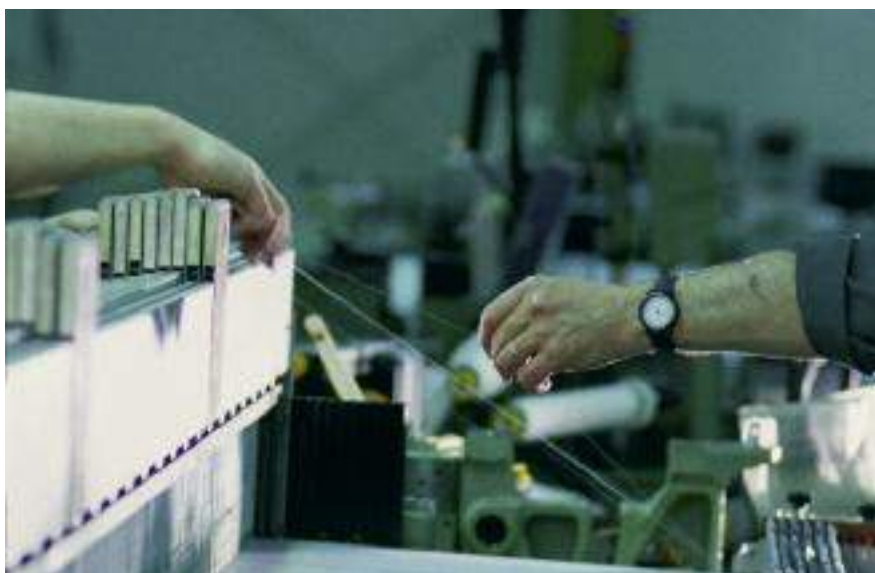
impressions of "warmth" and "technology."

Presentation surface and sound absorber

On account of its nature and quality, the textile fabric is suitable for preprinting with logos or messages. The graphics can be added by means of digital or screen printing, and thanks to its back-lighting this appears homogenous. Last but not least, SEFAR® Architecture IA-80-CL ensures a perceivable and audible dampening of the constant background noise associated with a busy trade fair. The fabric absorbs unwanted reverberation, providing a comfortable place in which to talk to on-site Sefar representatives. In this way, Sefar scores highly with discerning visitors who appreciate an especially striking – but nonetheless high-quality – display.

From threads to SEFAR® Architecture VISION

Precision in production, finishing, and manufacturing.



With SEFAR® Architecture VISION technical precision fabrics, it is now possible to make architectonically and creatively unique façades. A look behind the scenes reveals the steps required to transform extremely delicate filament yarn (a thread) into a metal-coated fabric combined with glass and plastic.

Yarn, also known as thread

The starting point for every fabric whether it is a conventional material or technical precision fabric is the yarn – generally known as “thread.” For technical applications, (synthetic) filament yarn is used as this is superior in terms of fineness, evenness and strength to (natural) staple filaments. To produce filament yarn or monofilament, the thermoplastic synthetic material is melted in

an extruder, homogenized, and in a viscous state forced through a nozzle under high pressure and then drawn out. This extrusion spinning procedure makes it possible to create exceptionally fine filaments with a length of several thousand kilometers.

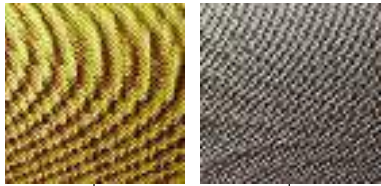
Monofilament yarns have a minimum diameter of 20 µm while the single filament of a multifilament yarn can be finer than 1 µm. Sefar subsidiary Mono-suisse AG has many years of extensive experience in the production of monofilaments from a wide range of polymers. The most recent product, a monofilament made using PVDF, is especially well suited for creating architecture fabrics for internal and external applications. The choice of yarn depends on the nature of the application for which it is

to be used. SEFAR® Architecture VISION uses black, flame-retardant monofilament with a diameter of 140 or 260 micrometers (1 µm = 1/1000 mm). By comparison, a human hair measures about 60 micrometers in diameter.

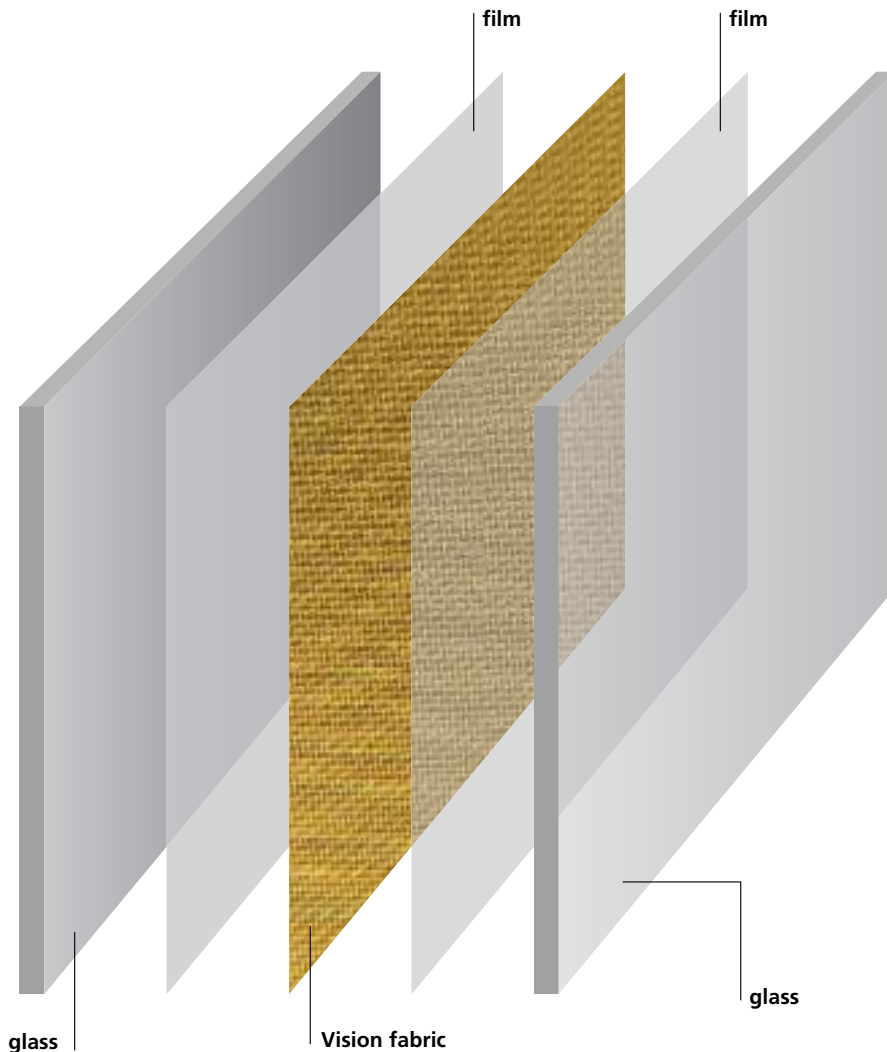
Warp and weft form the fabric

On the weaving machine the yarn turns into fabric, which by definition is “a regular textile material.” A fabric is always made from yarns which are aligned in different ways; the fibers which follow the lengthwise direction of the material are the “warp” and those in the transverse direction are the “weft” (or filling yarns). The way the warp and weft are combined is known as the “weave.” All the warp yarns are manually pulled into the heddles and healds of the weaving machine. Here it

SEFAR® Architecture VISION Fabric



Fabric (coating) Fabric (reverse side)



is important to ensure there are no errors since crossed fibers inevitably lead to uneven results. For SEFAR® Architecture VISION, between 1,000 and 3,000 warp yarns are manually drawn for each meter of fabric width.

“Open area” determines transparency

During the weaving process, the healds containing the warp yarn are raised and lowered to enable the weft or filler yarn to pass through the “shed” which has been created. The width of the mesh formed determines the “open area” – for SEFAR® Architecture VISION Fabrics between 25% and 70% – to ensure transparency (e.g. for use in façade elements). After weaving, further finishing procedures are necessary: cleaning, dyeing, heat treatment, and influencing

its final outer surface properties – in the case of SEFAR® Architecture Vision this might mean a metal coating for both sides of the fabric. In addition, SEFAR® Architecture VISION can be digitally printed or calendared for special reflection effects (polishing and compressing).

Fabric in laminated or insulating glass

SEFAR® Architecture VISION is laminated in glass when used in façade elements, whereas the fabric is tensioned between two panes and set into a frame when used in conjunction with insulating glass. In both cases if desired, the fabric can be presented as a single layer, two moiré-looking layers, or crumpled by hand to create the ultimate unique effect.

SEFAR® Architecture VISION competence partner

Bischoff Glastechnik AG
BGT
Bretten (Germany)

BGT Bischoff Glastechnik AG has been a partner of Sefar AG for a number of years. Founded in 1936, BGT is today one of the leading European corporations for flatglass processing and finishing.

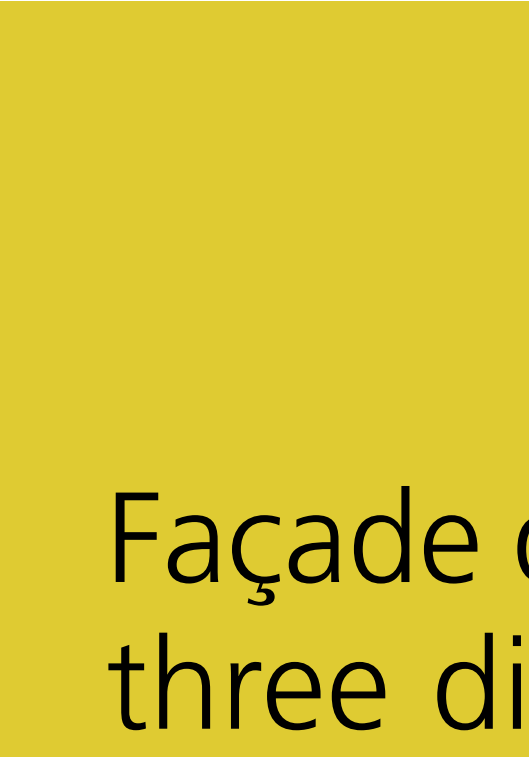
250 staff are employed at their premises in Bretten where standard and high-tech glass is manufactured for industry and project constructions in a production area covering 50,000 m².

BI-Vision® special glass with laminated, coated technical fabric by Sefar already characterizes to a high degree the architectonic appearance of many buildings worldwide.

The competence of both organizations coupled with extensive know-how forms the basis of innovative glass solutions, which continue to impress architects and planners owing to their unique advantages for façade construction.

For more information about BGT go to:
www.bgt-bretten.de

By combining open surfaces, colors, different finishes, or free design by digital printing, the architectonic possibilities are virtually endless.



Façade design in three dimensions.

The simultaneous interplay of light and shadow both enlivens and cools.

When constructing the new head offices of one of the world's largest fashion houses, architect Rafael de La-Hoz decided to use timeless design concepts rather than something currently in trend. The curtain-like glass frontage has a harsh structure. Alternating between transparent glass and glass finished with SEFAR® Architecture VISION Fabric lends a third dimension to the building façade. The fabric type AL 260/50 "shines" with its special reflective properties, enlivening the structure from outside while maintaining a comfortable climate inside.





The first commercial application in Europe of the extraordinary SEFAR® Architecture VISION Fabric in connection with laminated glass has been realized in the Spanish capital, Madrid. Architect Rafael de La-Hoz decided to employ this



Light and shade, reflection, and absorption. The façade creates a fascinating third dimension, resulting in an energized city feature.

special, technical fabric for the design of the new headquarters because it fulfills several architectonic functions. Explaining his concept, he says: "My idea was to give the project a neutral, abstract façade which brings to life the changes in light and shade in the course of the day and of the seasons."

Optimum combination

It is a fact that in this project SEFAR® Architecture VISION Fabric displays product-technical strengths in practically every respect. The fabric type AL 260/50 is a project-specific advancement of the AL 260/55, whose aluminum-coated surface is calendared to further enhance its reflective qualities. This fabric is used in conjunction with Sentry Glass® and laminated to safety glass in a 3,440 × 1,950 mm format. "The interplay between shade and reflection is subject to constant change, with the dark rectangles of the internal covering mixing with reflections," says architect La-Hoz concerning the façade design which is in the form of a moving, three-dimensional chessboard.

Creative and practical added value

By coating with metal and calendaring the SEFAR® Architecture VISION Fabric, the enhanced reflective properties reduce the amount of warmth received from the sun, leading in turn to a positive and sustainable effect on energy balance. At the same time, the transparent fabric allows for an almost unrestricted view of the streets of Madrid. In SEFAR® Architecture VISION AL 260/50, this prominent project has found the optimum refinement and simultaneously had the properties of the architectural material glass further improved. Great advantages have been achieved through creative and physical construction characteristics which are clearly disassociated from contemporary trends.

Preview

In the next "Sefar Architecture" we will report on ...



**David Chipperfield Architects
proudly presents – SEFAR®
Architecture VISION at the London
Design Festival**

The prestigious London Design Festival took place for the ninth time in 2011. Architects, designers, and artists exhibit temporary installations.

SEFAR® Architecture VISION was the formative component of the temporary installation "Two Lines," which was exhibited at Southbank Centre Square on the south side of the River Thames.



**www.formfinder.at is an excellent
support tool for planners and
implementers**

Step by step from draft to the implementation of sophisticated shapes. As simple as paper and pencil – the design software of www.formfinder.at is an excellent support tool for planners and implementers.



**BC Place in Vancouver –
a stadium roof of truly Olympic
proportions**

BC Place Stadium was the first stadium in Canada with inflatable roofing. Following some serious damage, a radical renovation was carried out. SEFAR® Architecture TENARA® Fabric is now incorporated into the 7,500 m² retractable stadium roof – the largest of its kind in the world. The roof construction consists of 18 roof elements, each one approx. 200 meters long and attached to 47-meter-high masts. The opening and closing procedure takes only 20 minutes.

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