

Architen Lightframe





Light and sound are two of the most important phenomena in any civilization. They have a tremendous influence on our well-being whether we are at work or leisure.

Architen Lightframe

Architen Lightframe is a modular frame system for fabrics, translucent ceilings and wall elements. The sophisticated frame design, covered with light diffusing and acoustically engineered membranes produces attractive effects in both artificial and natural light as well as qualitative improvements in spatial acoustics. Extremely narrow seams and an elliptic profile ensure illuminated surfaces are practically shadow-free.

A new generation of fabrics

High-tech fabrics are being increasingly employed in modern architecture. Drawing on a small range of materials engineered specifically for light diffusion, special finishing and coating techniques ensure a high UV durability without fading, while the materials remain extremely tough and long-lasting. All fabrics offered are highly flame resistant B1 according to EN 13501-1, producing very little smoke and no burning droplets.

Useful adjustments

An interesting additional feature: by being able to control the lighting or acoustic atmosphere, it is possible to offset the negative effect of factors such as unattractive, functional objects or deficiencies caused by the surroundings.



Car check point,
Frankfurt, Germany



Pavillon, St.Gallen, Switzerland



The system at a glance

Construction

The Architen Lightframe system conforms to the modular construction principle. It consists of single frame elements (variable in shape and size) which can be self-supporting, assembled using a suitable substructure, or deployed as single elements.

To ensure the range of application possibilities, we use different types of profile which vary in terms of their cross-section, assembly procedure, seam width and removability for servicing. The adjustable frames are tightly spanned with fabric chosen for the required application by means of beading piping. To optimize the light, technical and acoustic properties of the elements, a translucent or opaque ETFE-foil or alternatively a second layer of fabric can be attached to the reverse side of the frame if desired. This also helps prevent penetration by dirt or insects.

Shape and size

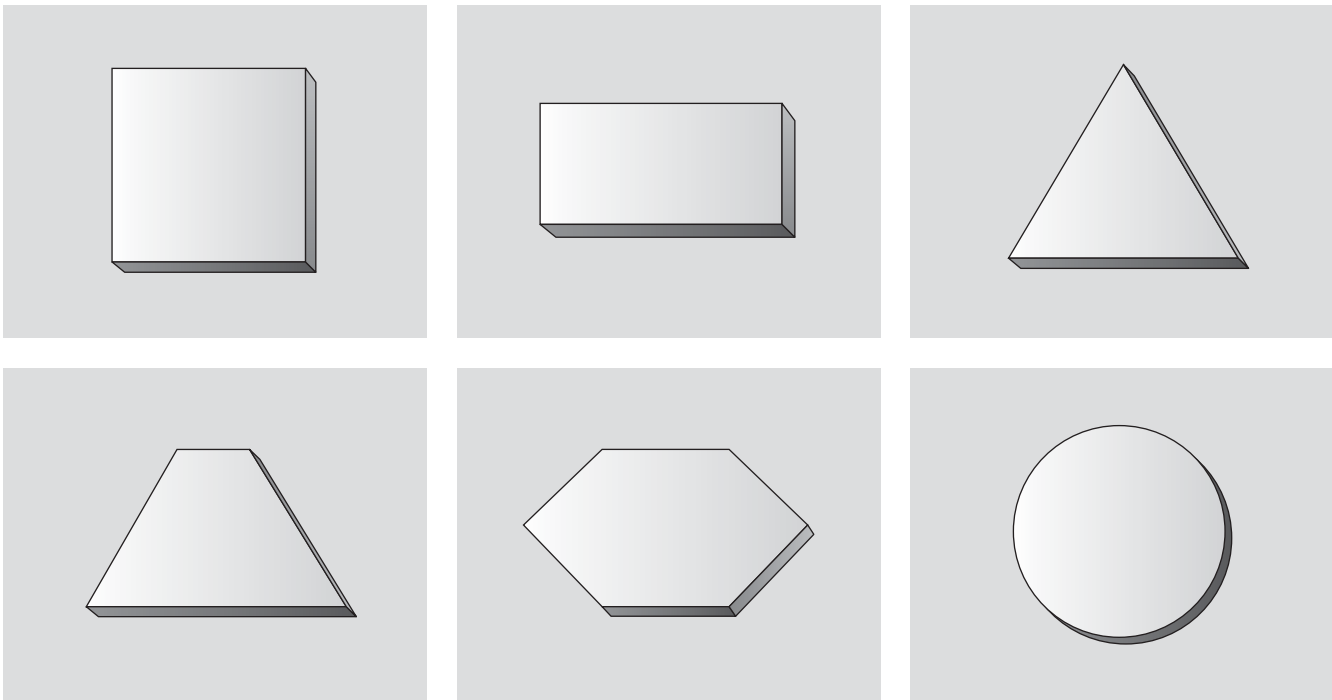
The size of the single module is arbitrary since all elements are manufactured to your specifications. The maximum length is 6000mm and maximum width 3200 mm depending on the available fabric width, the type of profile, and installation site accessibility. Special sizes are possible on request.

The various profile types make it possible to produce individual light ceiling modules in virtually any geometrical shape from the common square or rectangular panels to triangular shapes or spherical elements. There really is no limit to the design possibilities for your ceiling.

Multiple applications

Depending on the choice of fabric and the profile type, a wide range of innovative applications are possible for the Architen Lightframe system, from translucent ceiling and wall elements both internally and externally, to acoustic ceilings and free-spanning false ceilings. Another additional attraction is that the material is printable.

Possible application shapes of frame elements

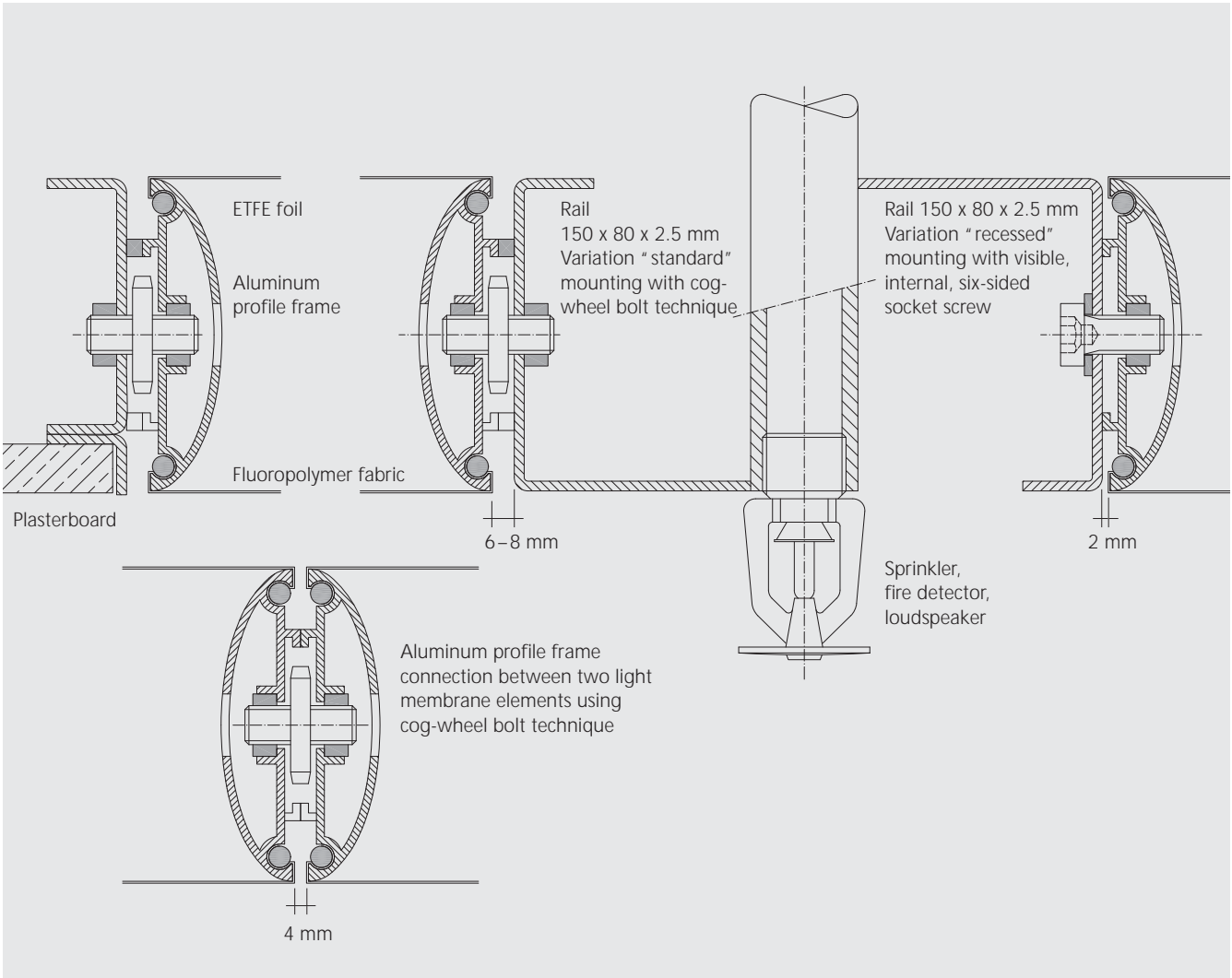


Modular construction principle

The slender design was developed to provide solutions which meet the most demanding building requirements.

Modules sizes according to individual specification. Standard sizes approx. 2500mm x 1500mm.

Max. 6000mm in length and 3200mm wide, depending on fabric width and installation site accessibility.



Installation details

Comparison	Profile Type A	Profile Type B	Profile Type C
Slender profile	XXX	XX	X
Removability/Servicing	XX	XXX	XXX
Narrow seam profile	XXX	X	X
Frame size	XX	XX	XXX
Joining individual frames together	XXX	X	X
Net weight	XXX	XX	X

XXX = very good
XX = good
X = satisfactory



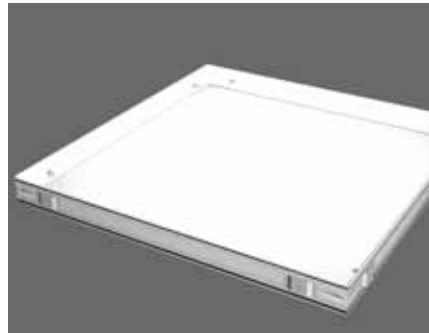
Profile Type A

Technical advantages:

- Assembly and pre-stressing technology concealed in a light, metal frame
- extremely narrow profile for minimum loss of light
- Half-elliptical profile minimizing shadows even with background lighting
- Extremely small gap between the panels (approx. 2 mm)
- Simple to construct or disassemble.
- Modular shapes: square, rectangular, triangular, hexagonal, round
- Wrinkle-free, pre-stressed, smooth membrane fabric
- Suitable for outdoor use without cross studs

Assembly and Maintenance:

Thanks to its lightweight and simple supporting structure, the frame elements can be easily assembled by hand. A simple supporting structure is employed, similar to a suspended ceiling. Locking screws bring the edges of adjacent frames tightly together providing the necessary pre-stress. Disassembly for maintenance is a simple reverse procedure.



FBC Center
Frankfurt, Germany



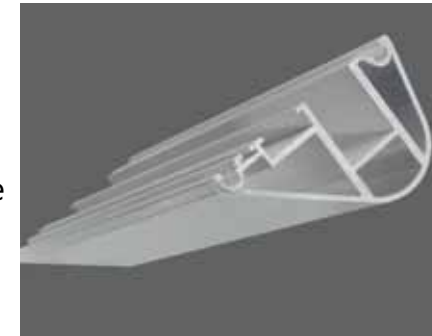
Profile Type B

Technical advantages:

- Rigid single modules meaning no further tensioning required during assembly
- Half-elliptical profile minimizing shadows even with background lighting
- Multiple element coupling possible
- Modular shapes: square, rectangular, triangular, round
- Every module can be disassembled without special tools
- Wrinkle-free, pre-stressed membrane fabric
- Suitable for outdoor use without cross studs

Assembly and maintenance:

Thanks to the rigid frame construction of the single modules, no further fabric tensioning is required during assembly. The elements are hung by hand in an appropriate visible or covered sub-structure. For maintenance purposes, each single element can be folded down. No special tools are required as every module is manufactured with integrated locking bolts.



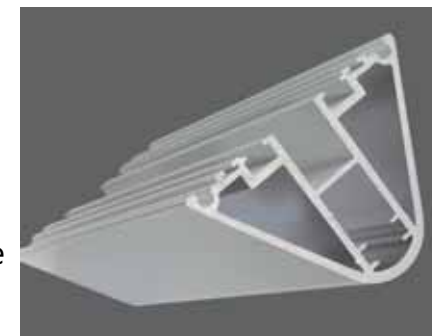
Museum Folkwang,
Essen, Germany

Profile Type C

Technical advantages:

- Rigid single modules meaning no further tensioning required during assembly
- Multiple element coupling possible
- Modular shapes: square, rectangular, triangular, round
- Every module can be disassembled without special tools
- Wrinkle-free, pre-stressed membrane fabric
- Suitable for outdoor use without cross studs

(Assembly and maintenance see profile type B)



Museum Folkwang,
Essen, Germany



Acoustic Fabrics

Building trends & good acoustics

Construction using fabrics has many advantages. In addition to the benefits of being both light in weight and aesthetically pleasing, they also satisfy an increasing demand for materials providing light-technical and acoustic solutions.

Compared with the traditional, hard building products like concrete, glass and metal, tensile fabrics are light, soft and reminiscent of organic materials. The impressions they create lead to some surprising and innovative designs. As well as the temperature of a room, spatial acoustics also strongly influence the working atmosphere and efficiency in the workplace. A good acoustic solution is always aligned with the functional purpose of that room. With architectural fabrics you can target room acoustics directly. Different types of fabrics present new possibilities.

What is reverberation?

Reverberation is the physical vibration of particles in solid, liquid or gaseous bodies, which is spread in waves. This physical oscillation is not only audible but at times also visible and perceptible.

In air molecules, these vibrations cause pressure variations in outwardly expanding wave formations. These fluctuations in the air overlap with the atmospheric pressure and are known as reverberation.

In the construction industry, the relevant properties of reverberation are pitch and its volume. As explained above, reverberation is a wave formation and the number of these waves per time unit is its frequency. Measured in Hertz (Hz), where one wave per second is 1 Hz. Many waves per second means a higher frequency and a higher pitch. Fewer waves per second means a lower frequency and therefore a lower pitch. If the wave is constant, this is known as a “sine tone” but if the wave is irregular, we speak of noise.

Sound absorption

Here we are talking about the reduction of reverberation within a space. Note: Noise generators and sound receivers are situated in a spatial area. Suspended ceiling systems such as the Architen Lightframe system absorb reverberation, thus reducing the noise within that space.

The absorption characteristics of a ceiling are influenced by:

- The nature and composition of the sound absorption surface
- Flow resistance
- Thickness/size of the sound absorption surface
- Free cross-section /perforation of the fabric
- Texture of the ceiling cavity

With sound absorption, mechanical energy (sound) is converted into heat (energy). This happens essentially by means of friction processes in the absorption material. The unit of measurement for sound absorption is the sound absorption coefficient which shows the relationship between the amount

of sound energy falling on a surface and that leaving it. This figure lies between 0 (completely reflected) and 1 (completely absorbed). Absorbers work in different ways but there is a physical interdependency between the material’s properties, the mechanical structure, the absorption coefficient and the wave frequency.

Sound reflection/reverberation period

Sound which is not absorbed is reflected and similar physical laws to those governing optics come into play. Sound reflection in space is known as an echo or reverberation, and reverberation is an important characteristic when considering the acoustic quality of a room. It has a significant influence on the ability to hear speech clearly and therefore greatly affects human well-being.

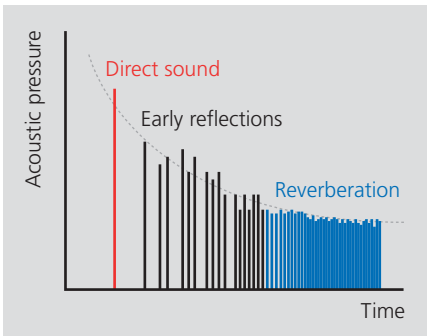
The reverberation period denotes the time period needed for the sound pressure to diminish by 60dB. The measurement is made for various frequencies. Different locations have different requirements and thus recommendations concerning the reverberation period.

Single and double-layered configurations

The absorption coefficient given describes the relationship between un-reflected and received acoustic energy. The fabric was measured in single and double-layered format, as well as with additional insulating material. Within the relevant frequency range of 200 –2500 Hertz, peak values of over 0.9 were recorded. If our architectural fabrics are evaluated according to their absorption class, they achieve a classification from 'high' to 'highest'. The individual results are summarized in the acoustic/light technical information.

Clear test results

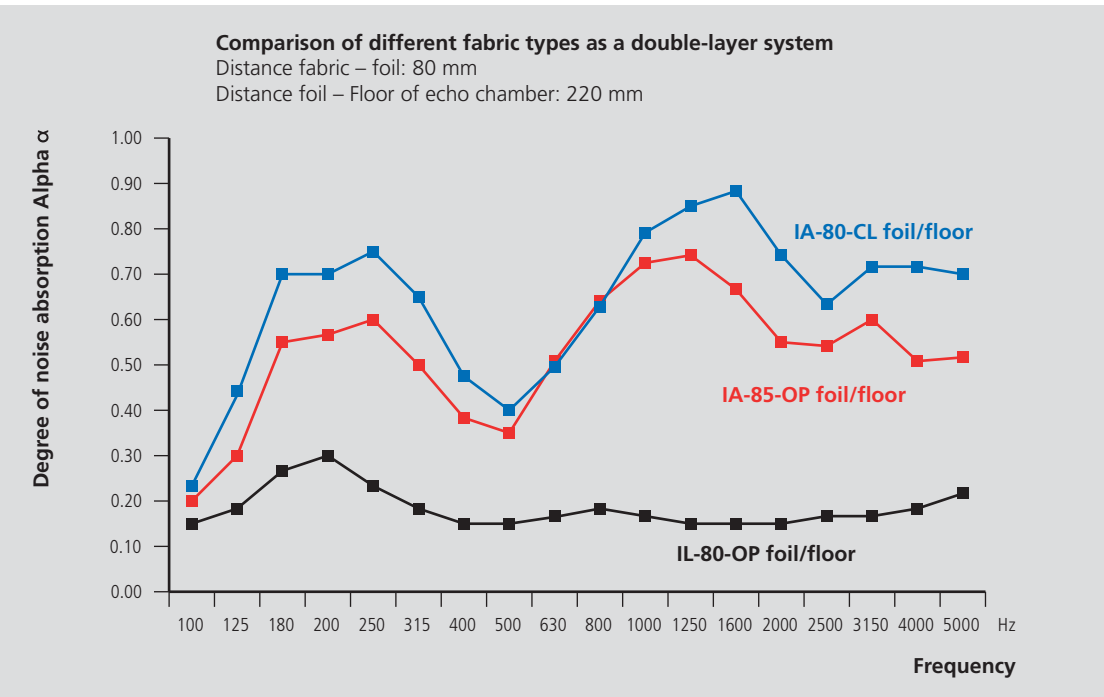
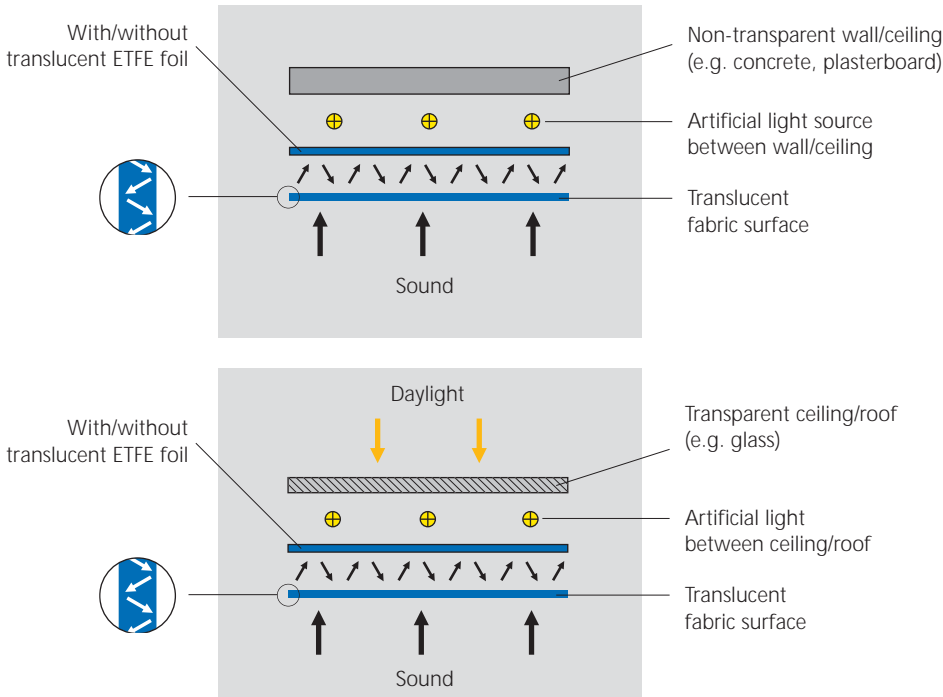
Acoustically optimized, photometric fabrics – perforated or open-pore fabric assemblies – are suitable for improving sound quality. As ceilings, walls or room dividers, they ensure dazzle-free light with a high degree of diffusion while actively reducing reverberation. In other words they are demonstrably sound-reducing. Light transmission coupled with sound reduction is no longer a contradiction in terms.



Direct sound
Directly received sound without noise reflection

Reflection
Noise is reverted back

Reverberation
Sequence of repeated noise reflections, indirect reverberation



Light Technical Fabrics

Light evokes moods and emotions as well as having an influence on our biorhythms with around 80% of the information we receive being in visual form. Light in general terms is the part of the electromagnetic spectrum which is visible to the human eye. Light which penetrates a membrane is affected by many factors.

The parameters governing the reflection and absorption properties of a membrane directly influence the passage of light (transmission ASTM D 1003) through a medium.

Optical spectroscopy concerns itself with wavelength-dependent transmissions and reflections (EN 410 250–2500 nm). Architen Lightframe fabrics have the special property that across the different wavelengths (especially in the visible region), they display no significant fluctuations.

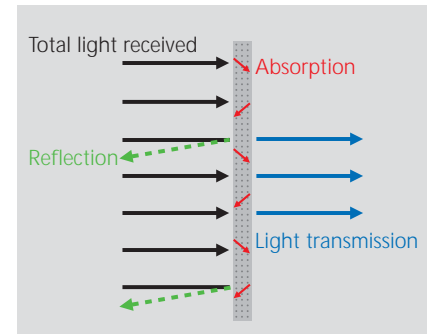
The human senses can also distinguish between two other visual phenomena, namely haze/opacity and clarity.



With haze/opacity, the light passing through a medium is scattered uniformly in all directions. This reduces contrast resulting in a milky appearance.

Textile architecture for indoor areas, employing new generation fabrics, makes it possible to create new designs which are both visually attractive and functional. From constructions

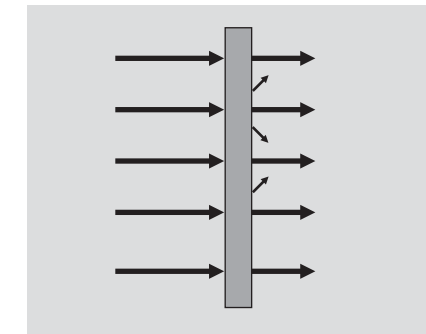
illuminated from the front or behind to lighting controls for programmable light moods, right up to colour temperature controls and dynamic scene sequences – it is all possible. PVDF as a high light transmitting fluoropolymer deployed in photometric fabrics permits a high degree of diffusion of both artificial and natural light without colour displacement.



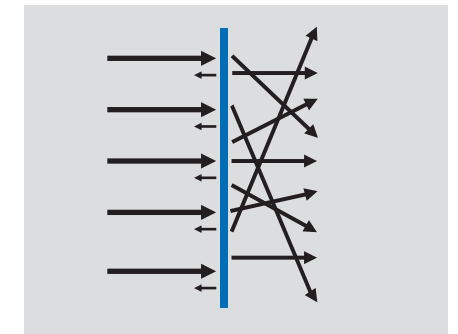
With clarity, the light passing through a medium is scattered to a small degree. Contours are blurred and appear less sharp.

The level of spectral transmission and reflection cannot be achieved with any other product. This unique feature allows architects, designers and lighting planners to set new standards in optical illumination (e.g. solutions for the most demanding photometric challenges, as well as applications in museums, lobbies, showrooms, offices and public spaces).

Lightframe fabrics achieve light transmission rates of $\geq 85\%$. The transmitted light contains a high proportion of diffused light, also known as scattered light. This gives a balanced illumination by reducing contrasts, especially in shaded areas. The fabric gives the impression of being a light source yet functions as a light diffuser for both natural daylight and artificial lighting. Depending on the choice of fabric, the character of the textile can be either enhanced or reduced.



Glass
Glass has a poor light-scattering surface. The amount of dispersion is $< 2\%$

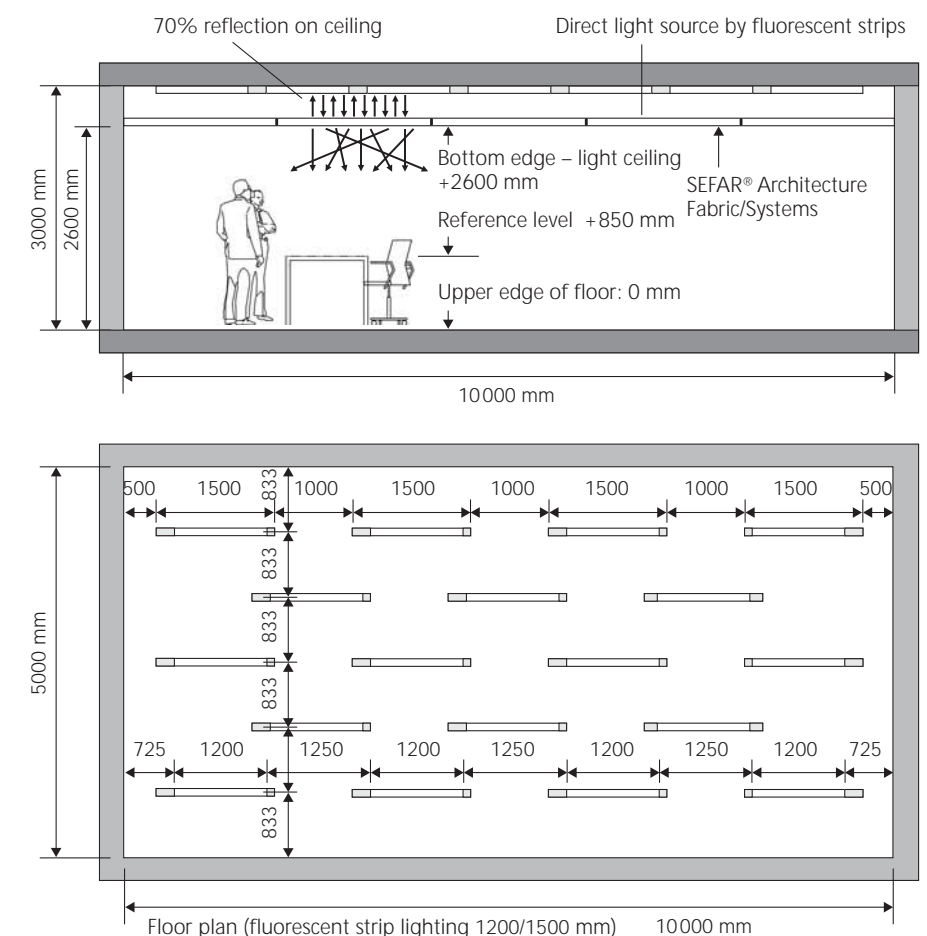


Fabric
Fabric has the ability to disperse light in multiple directions. A fabric surface with a single light source behind it appears uniformly illuminated. Perceived brightness by humans is known as luminous density. The rays of light landing on fabric are reflected, scattered and deflected, or broken.

The excellent light-technical properties the Architen Lightframe fabrics were determined by lighting planners by means of a realistic example situation. The basic conditions were a spatial area 10m long, 5m wide and 3m high, and an Architen Lightframe to lamp distance of 0.4m. The light source was provided by fluorescent strips without reflectors between 1.5m resp. 1.2m in length.

All data from the mean room illumination level relates to a reference level of 0.85m. The test room reflection is taken to be 70%. Subsequently, part of the light reflected by the screen is reflected again by the ceiling and to a large degree penetrates the Architen Lightframe system. This means that the data for the mean illumination level is, in practice, even exceeded.

Example of possible layout



Installation Study 1

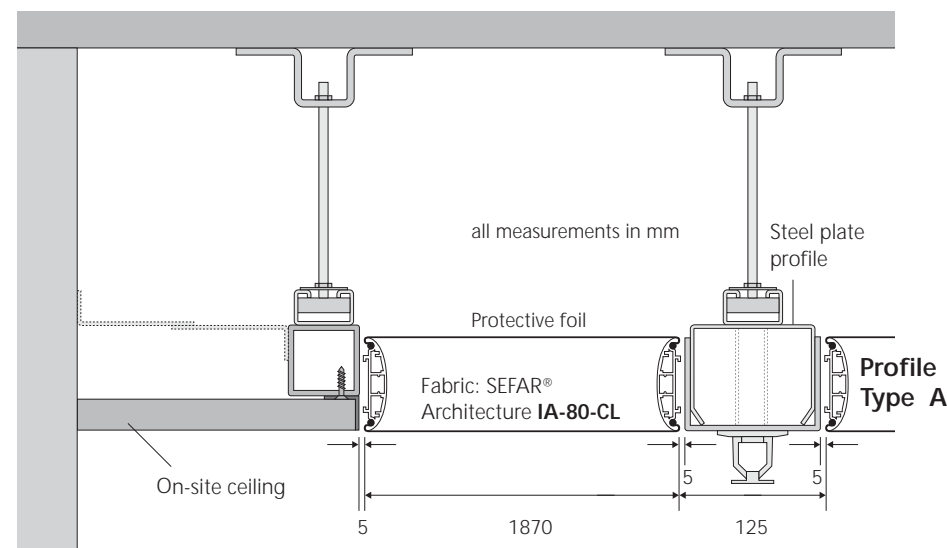
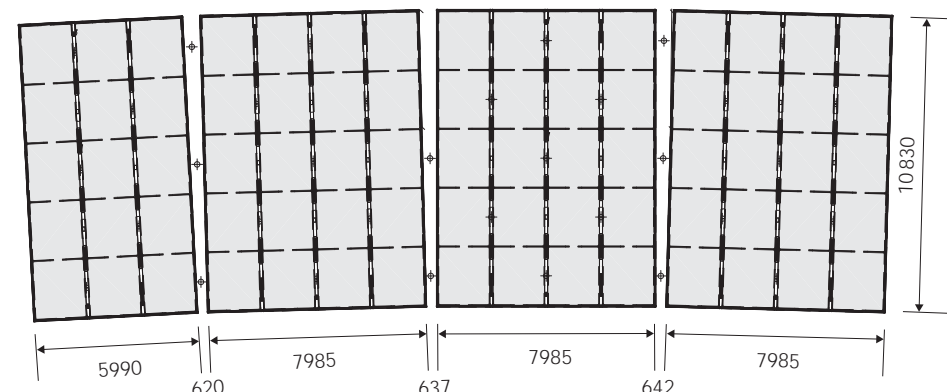
Project: Redesign of the airport shopping concourse at Terminal 1. Covering a surface area of 300 m², this is the first large light-field in Switzerland and the first fabric ceiling at the airport. Guests at Unique the airport should have a sense of well-being whether they are about to take off or have just landed. The same applies to Unique employees and their airport partners, who spend each and every day here.

Concept/Design: Florin Baeriswyl from dai, based in Zürich, has introduced a bright, new symbol: a ceiling that lifts off! With the newly developed light ceiling, the look of a real sky can be simulated through innovative optical variations. A series of light changes imparts a sense of space and natural feeling. This interplay of cold and warm lighting effects coupled with acoustic cushioning has been made possible using IA-80-CL and has a fascination all of its own.

Construction: The technically perfect transformation is a successful first. The modular system with its patented frame design is an attractive artistic element capable of creating natural light effects as well as improving spatial acoustics.



Zürich Airport, Switzerland



Installation Study 2

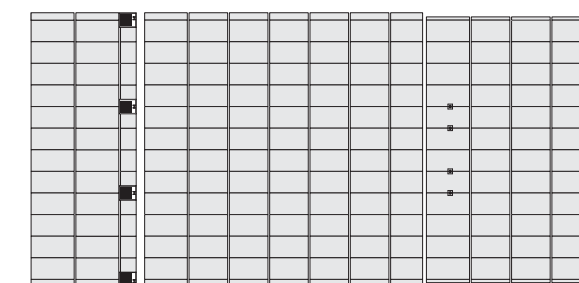
Project: The suggestion by architects, Just Burgeff, to design the forecourt and foyer of the FBC office tower with a continuous light ceiling was accepted by the German Association for Real-Estate Funds (DEGI), the project being completed following two years of planning and construction. The office block itself was designed by the architect Richard Heil from Frankfurt am Main in 1980.

Concept/Design: Just Burgeff conceived the horizontal light canopy as a point of recognition for FBC. It covers the entrance with the glass-fronted Café-Pavillon and continues into the foyer as a light ceiling. The glazed Café-Pavillon opposite the foyer gives the area spatial expression and divides it into two sections: at the front the forecourt onto the Mainzer Land-strasse and behind a quiet, open space in the distance.

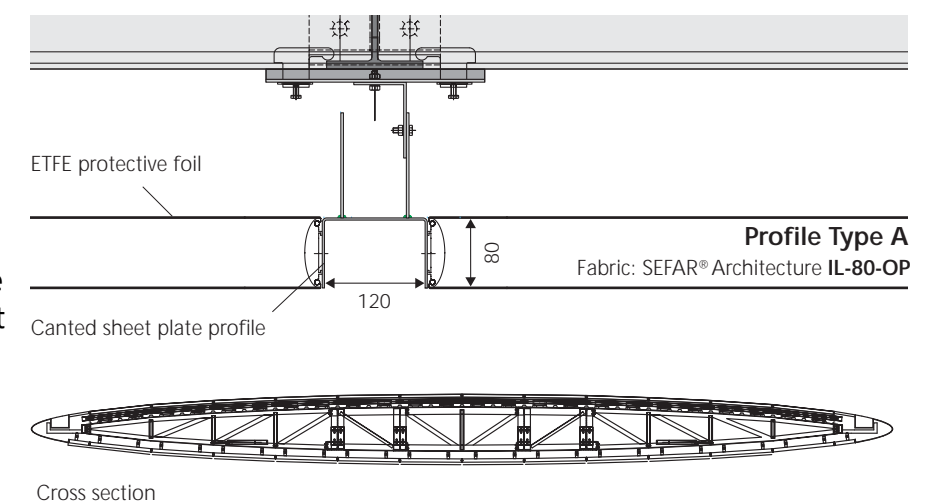
Construction: This enables a display of light depending on the situation. By day, the varying intensity of light and position of the sun cast a shadow onto the underside of the porch canopy. When it is dark outside, the roof is illuminated from inside, lighting up the forecourt. Within the foyer, the architects have limited themselves to a few high-quality materials such as glass, brush-finished steel and the translucent membrane of the light ceiling.



FBC Office Tower, Frankfurt, Germany



Floor plan



Installation Study 3

Wall Connection

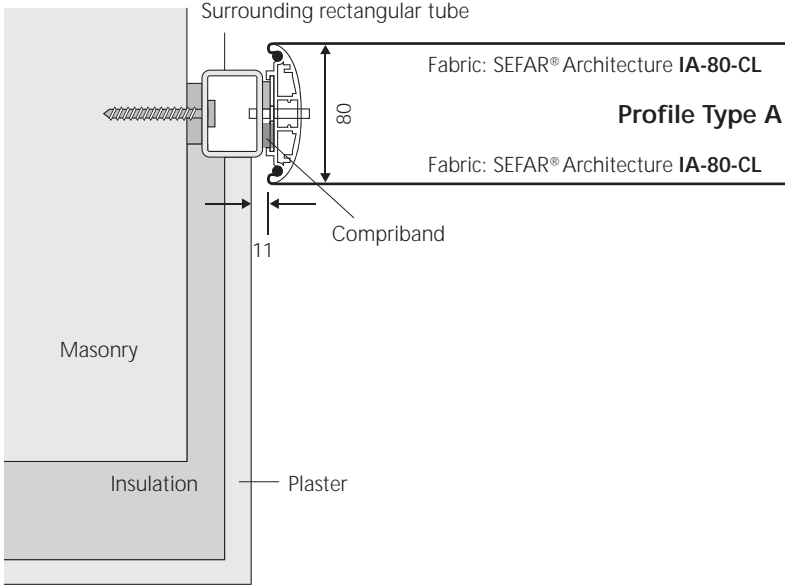
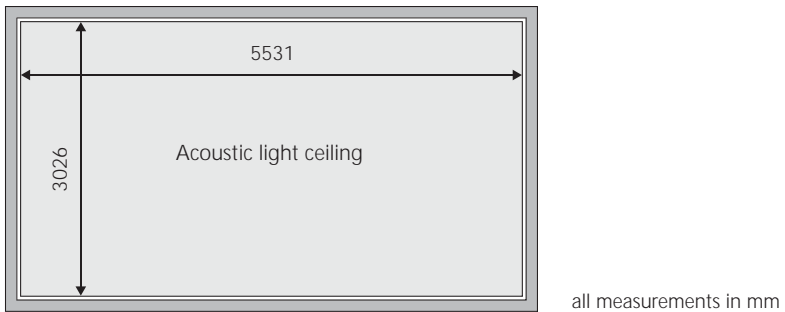
Project: The bank building fits into the structure of Grenzstrasse in St.Margrethen, Switzerland and orientates itself to that structure. The building should mirror the customer concept in that every client is welcome and received warmly.

Concept/Design: In the center of the building is a two-storey high hall with a glazed ceiling. This naturally well-lit central section should also provide light for the counter area by means of glass building blocks. The counter area has a basalt floor, wooden panelling and plaster ceiling in rich tones. To provide an invisible covering for the underside of the glass building blocks, a translucent and acoustically effective fabric was found in the form of Lightframe which satisfied all the criteria. The space between the glass blocks and the Lightframe ceiling is furnished with adjustable FL lighting so that the counter area can be illuminated with or without natural light. The ceiling has the effect of making the counter area seem higher and larger, and is perceived as a homogenous surface. Owing to its double layer, neither the single lights nor the glass blocks above are a distraction. At the same time, the fabric layer reduces reverberation and positively contributes to the spatial acoustics..

Construction: For a light ceiling, the edge construction and attachments are central. Due to its size, the Lightframe module was constructed on-site. Thanks to its intelligent frame, construction without the creation of shadows at the edges was possible.



Raiffeisenbank St.Margrethen, Switzerland



Installation Study 4

Partial, flush-fitting, acoustic light ceiling

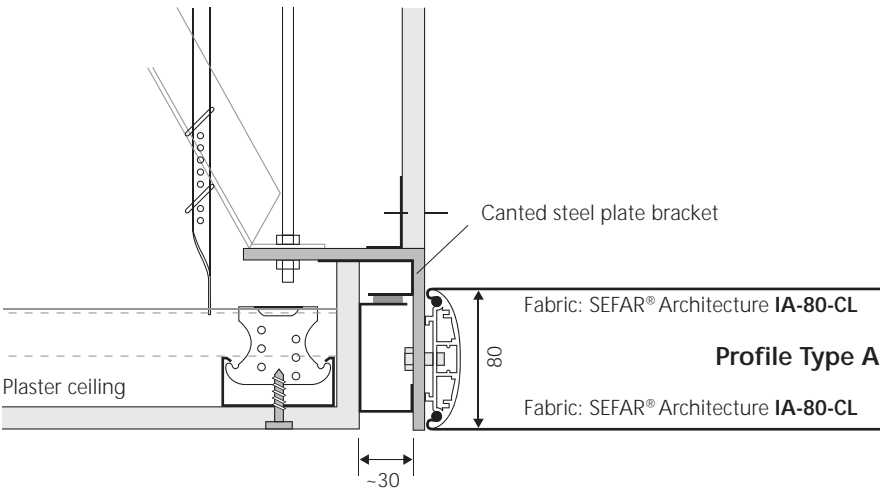
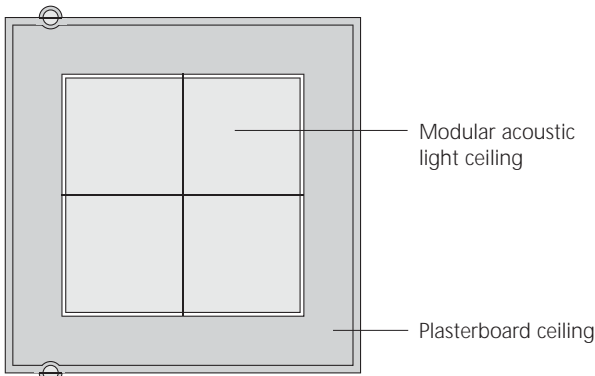
Project: ZF Friedrichshafen AG has constructed a new development centre for utility vehicles in Plant 2 at their Friedrichshafen base in Germany. The contemporary, distinctive characteristics of the city of Friedrichshafen in southern Germany are also mirrored in the ZF brand: cosmopolitan, dependable, strong in identity, and progressive. From outside or inside, the building characterizes transparency.

Concept/Design: The office concept includes optimized working areas in the naturally illuminated facade zones, informal meetings areas with places to talk, and short distances. The intention is to encourage the exchange of personal ideas – including those generated through chance encounters – and foster a team spirit. A centralized community design separates the floor space into socially manageable and acoustically controlled zones. Glass walls between rooms and sub-divisions enhance the internal areas while dull floor areas are avoided. The dedicated internal zones are the lounges, which have a special significance within the overall concept. Because daylight is only available in a reduced and indirect form, it falls to the light ceiling to provide a light source and create the right atmosphere for a meeting area. Alongside the stimulating optics, the fabric also ensures high acoustic quality and the employees who actively use the lounges as an area for communication readily testify to its suitability.

Construction: The ceiling consists of an optical field integrated into a suspended plasterboard-perforated plate ceiling. Its partitions, divided into four square sections, produce an optically standard separation of the ceiling area and at the same time enable ready access for maintenance purposes. The variable lighting control allows adjustments to be made to the brightness of the room.



ZF Cafe, Friedrichshafen, Germany



Installation Study 5

Partial, sunken, acoustic light screen

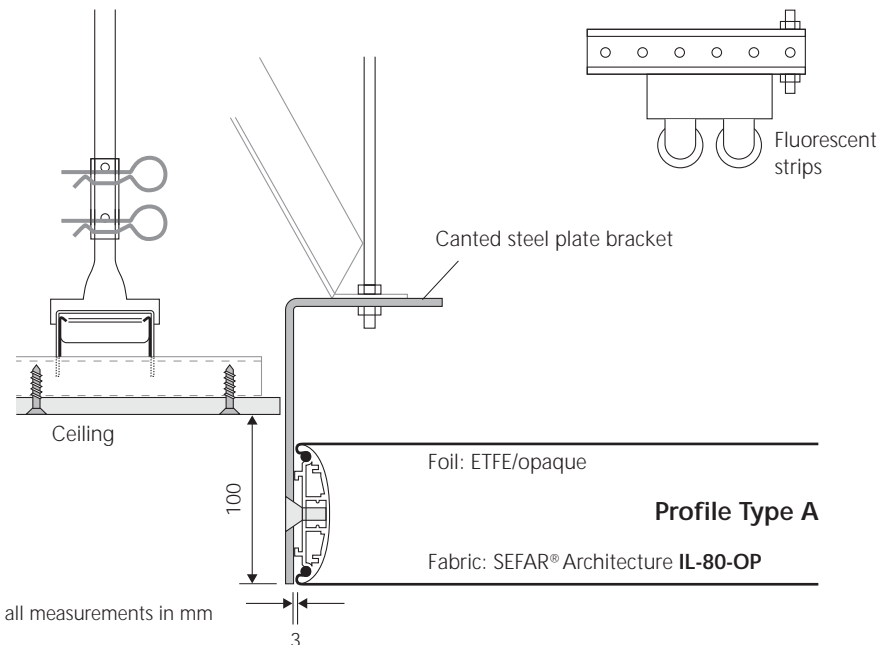
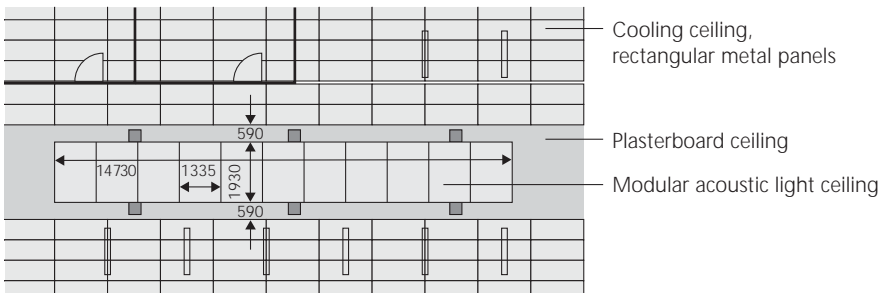
Project: For the rejuvenation of the head offices of DEGI (Deutsche Gesellschaft für Immobilienfonds) in Frankfurt, architects Just Burgeff thoroughly modernized the working area and introduced a contemporary office concept. Due to a modification of the fire prevention plan, the original escape levels could be dispensed with, and an open-plan layout implemented.

Concept/Design: A fundamental aspect of the plan by Just Burgreff Architects lay in the intelligent use of the open-plan floor area. The central section, designed to be an area where colleagues could meet and exchange informally, is zoned-off with light fields. The light ceiling made from acoustically effective fabric meets the demanding requirements of this communication area. Adjustable lighting ensures a constant level of brightness and a pleasant environment.

Construction: The light ceiling, a Lightframe integrated in a suspended gypsum ceiling, provides shadow-free and uniform light thanks to its optimized frame construction. The light source behind the fabric is not noticeable. The delicate Lightframe edges rhythmically divide, but due to their slenderness do not optically separate.



DEGI, Frankfurt, Germany



Installation Study 6

Single illuminated module

Project: The image portrayed by this new construction reflects its different uses within the integrated whole. The Service Centre features in particular a reception area suffused with light through which customers registering their vehicles pass and subsequently avail themselves of the automobile services offered.

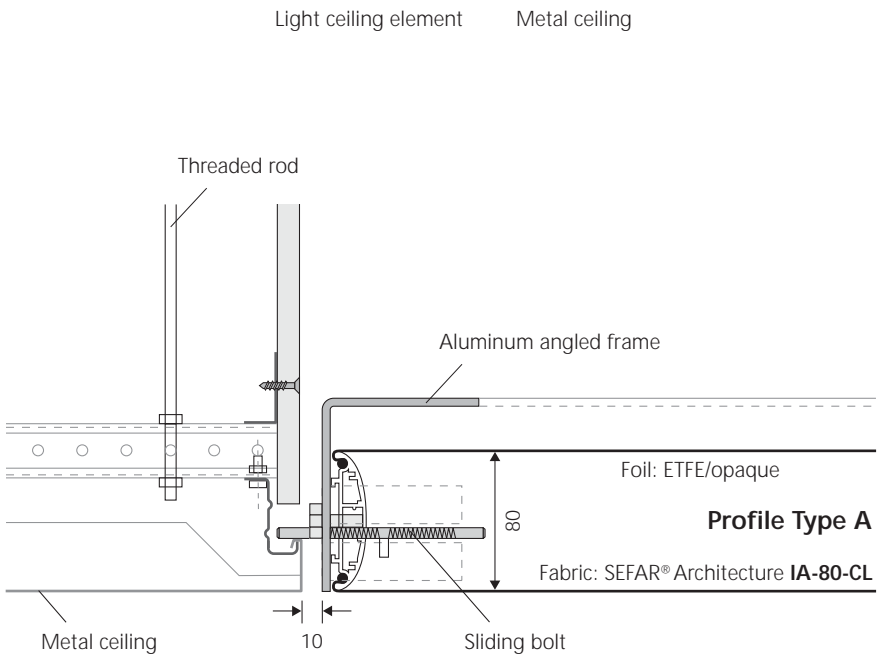
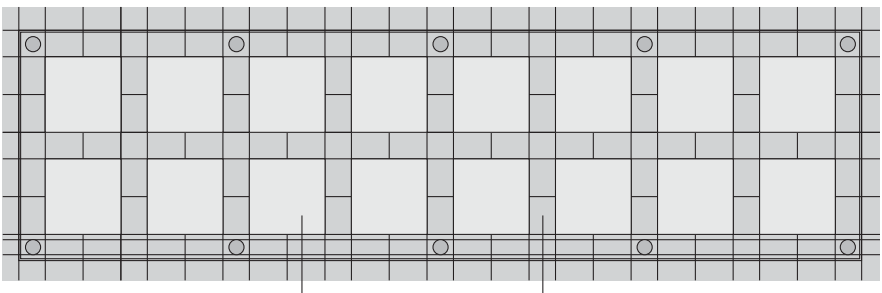
Concept/Design: The spatial concept of the Center presents a predominantly open, bright and customer-friendly architectural style. Special requirements such as an entrance hall, canteen and team rooms are modelled on the cubic base structure of the building and transparently featured. The entrance hall is illuminated by natural light via

a front glass facade and by artificial light via an architecturally diverse ceiling structure material. The diffuse lighting in the first entrance area uses textile light modules combined with selectively placed, circular illumination spots.

Construction: Sixteen square Lightframe modules (2m x 2m) are incorporated into the anthracite-colored expanded metal grid ceiling. Covered with photometric hi-tech fabric, the Lightframes achieve a standard of illumination not possible with other materials. No shadows are cast by the patented modular frame solution, which integrates almost seamlessly into the ceiling structure. The double-layer covering assists acoustic absorption in an otherwise predominantly reverberant architectural design. The individual elements can be easily removed when changing the lights inside.



Service Center „Rund ums Auto“, Frankfurt, Germany



Installation Study 7

Suspended, acoustic light ceiling screen

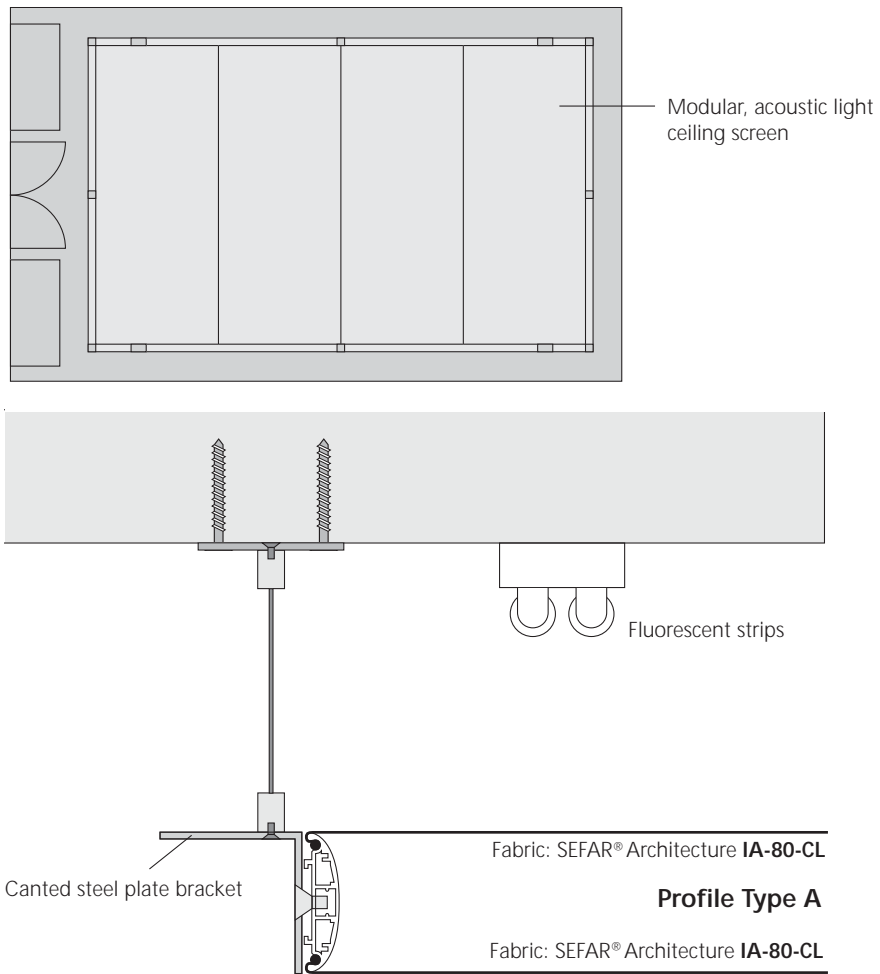
Project: Situated in the museum and theatre district of St.Gallen in eastern Switzerland is the listed building, City Park Pavilion, constructed in 1812. During the summer months, this serves as a venue for cultural events hosted by the local women’s association. The acoustic properties, however – determined by its hard interior surfaces – are qualitatively unsatisfactory for optimum listening or speaking. The city authorities were seeking a better solution for these optical and acoustic deficiencies.

Concept/Design: St.Gallen architects Ch. Keller Design needed to take two major factors into consideration: the unique room atmosphere and its classic architecture. Constructional measures had to satisfy both technical and aesthetic requirements. The solution was found in the special properties of optical and acoustic fabrics. Combined with modular Lightframe design technology, they permit the transmittance of light and absorb reverberation.

Construction: The 4-module light canopy is designed to “float” in a seamless way over the room with virtually invisible suspension cables. The suspended ceiling within in a circumferential frame, set back from the wall and only 80 mm deep, reduces the appearance of the fabric surface enabling the ceiling, manufactured as a module, to float. The Lightframe module inter-space, for increased acoustic absorption, is filled with optical glass insulation. The illumination and contour effect of these fibres behind the acoustic fabric creates an aesthetically pleasing design effect.



Stadtpavillon, St.Gallen, Switzerland



Installation Study 8

Single illuminated module

Project: With its 19th Century paintings and sculptures, classic modernist, contemporary works, and photography, the Folkwang Museum in Essen, has become one of Germany’s most renowned and prominent art collections. With the new construction by David Chipperfield (opened in 2010), the museum wants to raise its profile through the architecture and orientation of the new building in addition to its exhibition activities.

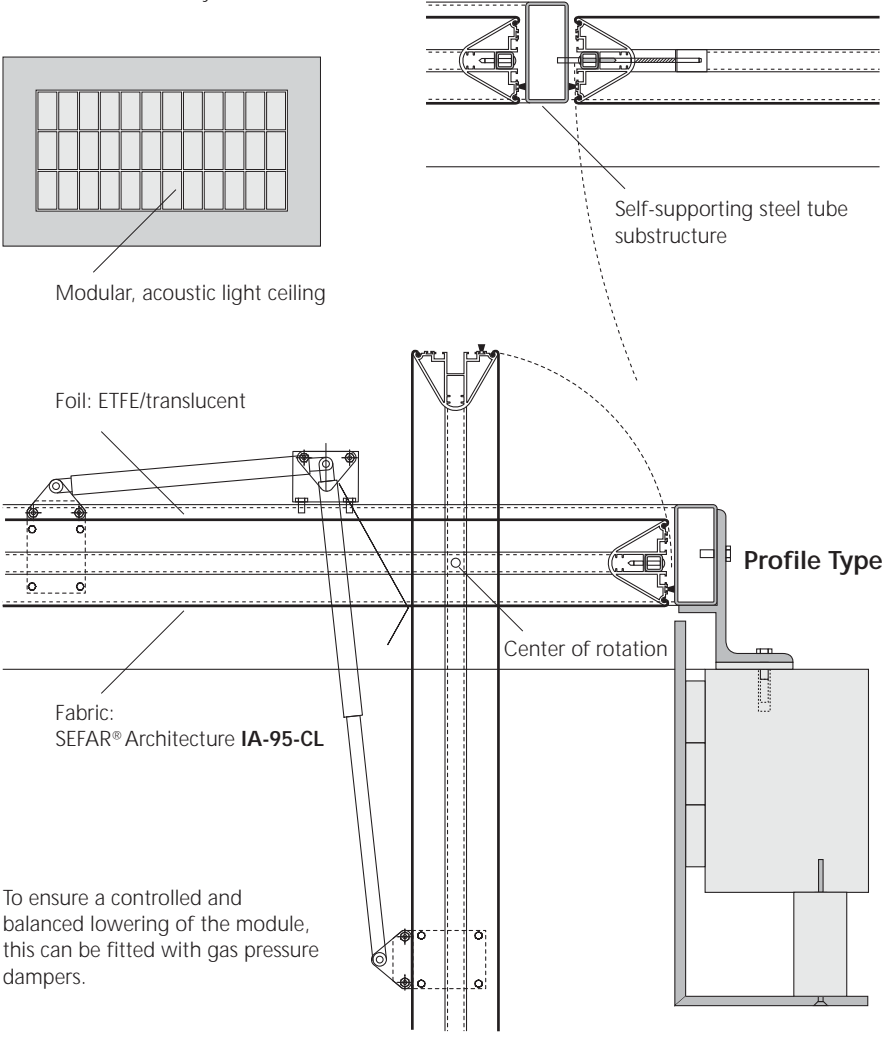
Concept/Design: Of central importance was interior illumination in view of the modern trend towards the utilization of natural light. The courtyard areas make full use of this, and in the exhibition rooms the source of natural light over the course of the day is carefully supplemented by light ceilings and

side windows. The pillar-free 1400m2 hall for temporary exhibitions called for a systematic solution using ceiling modules. The separating wall concept and interior construction were decisive factors in choosing Lightframe. For the light ceiling, only selected PVDF fabrics demonstrated the high functional and aesthetic properties required (textile and light technical specifications, sound absorption).

Construction: The innovative ceiling system satisfies the high demands of exhibiting works of art in both artificial and natural light. At the same time, it takes into account all the other considerations: light transmission is diffuse, the system is easy to adapt, and thanks to narrow seams it makes a positive contribution to the room acoustics and environment, as well as the allowing for all types of installation. The modular configuration of the ceiling grid also accommodates runners for suspended separating wall elements. Engineering company, Schmid GmbH, received an enterprise award in the «product» category from the architecture journal DETAIL for their light/acoustic membrane ceiling.



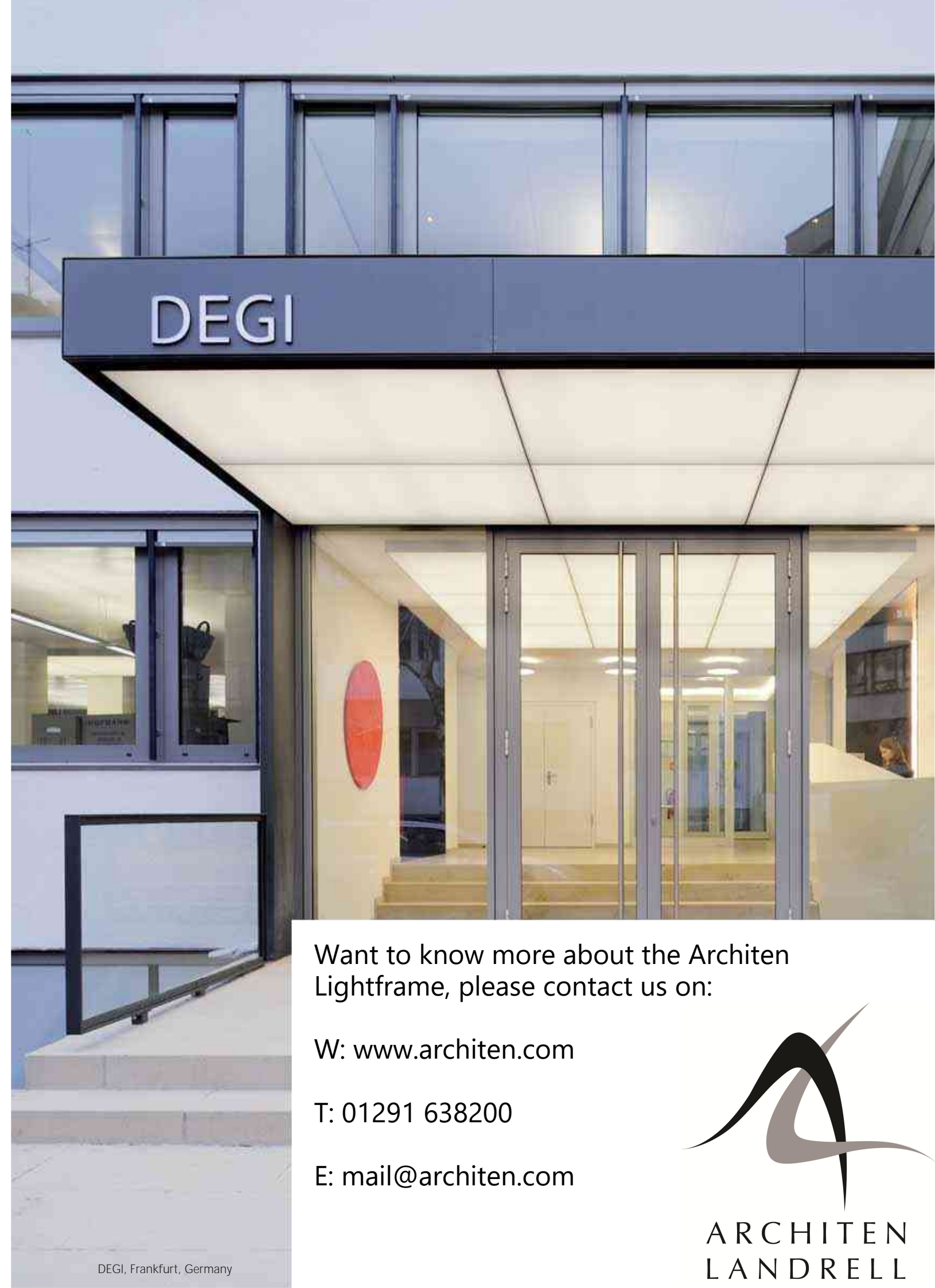
NMFE, Essen, Germany



Haus der Kunst, Urnäsch, Switzerland



Museum Folkwang, Essen, Germany



DEGI, Frankfurt, Germany

Want to know more about the Architen Lightframe, please contact us on:

W: www.architen.com

T: 01291 638200

E: mail@architen.com

