1. What is BI-LightColor Combi and BI-LightColor ?

BI-LightColor is a specially coated semi-transparent glass which scatters light ideally in the visible light area. In connection with matched lighting and correspondingly designed joist profiles, luminous ceilings can be manufactured, which apart from their use as a individual design element also ensure neutral and uniform lighting for rooms.

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2. TYPE OF GLASS AND PROPERTIES

2.1 **BI-LightColor Combi**

2.1.1 Description

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The guidelines from the upper building regulation authorities for linear-supported glazing can also be used for luminous ceilings. BI-LightColor Combi possesses important safety aspects due to its splinter-binding film and thereby meets the increased safety regulations issued by the upper building authorities.

2.1.2 Thermal and mechanical properties

BI-LightColor Combi can be **cut, ground and drilled after manufacture.**

Its chemical, mechanical and thermal properties correspond with those of traditional laminated glass.

Additional decoration using opaque colours is only feasible if the laminated glass is not processed or treated again afterwards.

2.2 **BI-LightColor**

2.2.1 Description

BI-LightColor is a luminous ceiling glass which has already proved itself over many years and which has very good scatter properties for extremely uniform room lighting.

BI-LightColor is a monolithic pane made of a low iron oxide base glass. During processing the glass is given an inorganic semi-transparent colour coating.

In the installed state the uncoated side faces the room. The appearance of the luminous ceiling is characterized by the slightly-lustrous glass surface. BI-LightColor can also be decorated with opaque colours. The BGT collection of suitable décors gives an overview of the numerous standard décors. On top of this we would be happy to realize your own ideas for décor.

2.2.2 Thermal and mechanical properties

Due to its manufacturing process BI-LightColor is classified as a full-quality safety glass with its increased impact and bending strength and its resistance to thermal shocks. As a full-quality safety glass it cannot be processed or treated again after manufacture. The chemical, mechanical and thermal properties correspond with DIN 1249 Parts 10 and 12. More accurate values can also be found in the BGT product information sheet BI-TENSIT for tempered glass.

The semi-transparent colour coating is colour and age resistant, scratchproof and can be cleaned without problems with standard commercial non-scuffing cleaning agents.

3. LIGHT TRANSMISSION

3.1 **BI-LightColor Combi**

Due to the special high white coating in the glass laminate BI-LightColor Combi provides an exceptional light transmission value of approx. 54 % ! In addition to this the Technical Lighting Institute of the University of Karlsruhe classifies the laminated safety glass as strongly scattering.

3.2 **BI-LightColor**

BI-LightColor, according to DIN 5036 Part 4, is very transparent. Independent measurements by the Technical Lighting Institute of the University of Karlsruhe confirm a degree of transmission of 37 %. This is a very good value since the glass is fully opaquely coated, so that ceiling beams etc. cannot be seen through it. The total degree of transmission corresponds largely with the degree of scattered transmission. This classifies the luminous ceiling glass as strongly scattering.

4. APPLICATIONS

In the design of a room the ceiling has become a very significant design element. Daylight or daylight-like lighting linked to uniform non-reflective room lighting are demanded more and more frequently for the optimum utilization of the room. The installation of luminous ceilings provides the option of solving these demands to the satisfaction of the customer. Wherever suspended ceilings are installed, optimum lighting conditions can be created with the

installation of luminous ceilings. Amongst the preferred applicational areas are for example:

- Museums
- Booking halls
- Hotel foyers
- Open-plan offices
- Lecture theatres
- Exhibition and sales areas

Naturally there are many other possible uses, for example for VDU workstations, where non-reflective room lighting is the main consideration.

Single the shape and colour variations of luminous ceilings are almost limitless very individual designs are possible. Different requirements such as three-dimensional shapes can also be fulfilled with correspondingly-designed supporting profiles.

5. DESIGN AND INSTALLATION RECOMMENDATIONS

5.1 **Supporting structure**

For the substructure of the luminous ceiling it is possible to use standard commercial structural elements made of wood, aluminium or steel. The dimensions are established by the respective structural strength calculations.

Recommended grid size: 0,5 - 0,7 m.

This grid size ensures problem-free handling during assembly and later cleaning operations.
For more ambitious designs however larger dimensions and special shapes can be supplied. Please ask us and we will be pleased to advise.

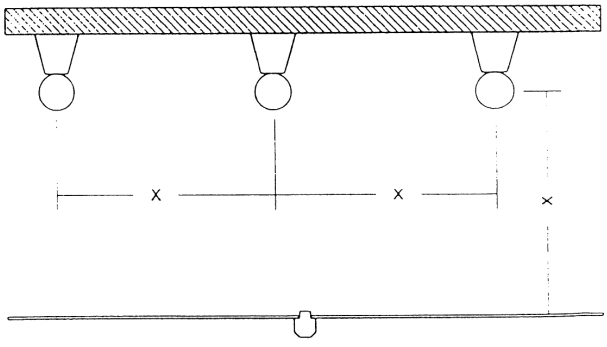
The supporting width for the panels in the substructure is selected according to the glass dimensions but must not be less than 10 mm. To avoid contact between glass and metal a separating device such as an elasto-cellular strip should be provided.

5.2 **Point uniformity**

To determine the minimum distance between luminous ceiling and lighting fixtures for uniform, shadow-free lighting a series of tests have been carried out on a sample luminous ceiling with several test personnel. Thereby it was found that the observers found a point light density contrast of more than 6.18 % to be disturbing and unpleasant. If the contrast increases above this percent value shadows start to form between the lights.

During trials on the sample luminous ceiling it has been found that if the light fixtures are arranged at a distance apart which is the same as the distance between the centre of the lamp and the surface of the glass, this percentage value is not exceeded (see Figure 1)

Fig.: 1



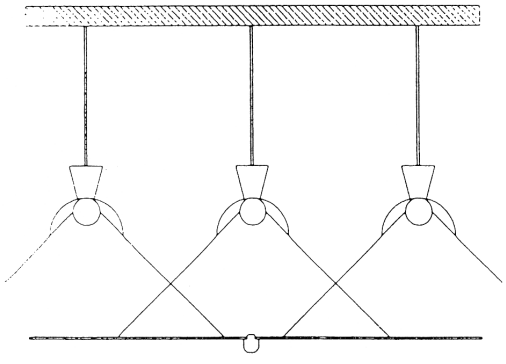
The minimum distance between ceiling and glass surface is 18 cm. A reduction in this minimum spacing is not advisable since in such a case the proportion of directed transmission increases and accordingly the light fixtures become recognizable.

5.3 **Surface uniformity**

The retention of surface uniformity is not difficult in practice as long as a sufficiently-large ceiling spacing is provided and the assembly of the lights is carried out in accordance with the dimensions given in Section 4.1. If the minimum ceiling spacing is more than 25 cm, then even ceiling joists and conduits between the lights will have no significant effect on the surface uniformity. The ideal spacing between ceiling and the glass surface is between 25 and 30 cm.

If the ceiling spacing is more than 30 cm, the light fixtures should be suspended on pendants. To improve the lighting efficiency however lights with reflectors should be used instead of general diffuser lighting. (Figure 2).

Fig.: 2

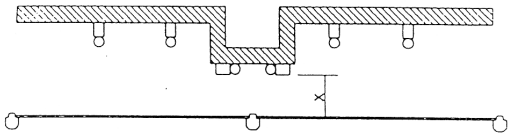


5.4 **Ceiling joists**

As described in Section 4.2, where ceiling joists are present the ceiling spacing should also never be less than 18 cm. Up to this limiting distance there is the option of lightening the ceiling joist through the installation of lights.

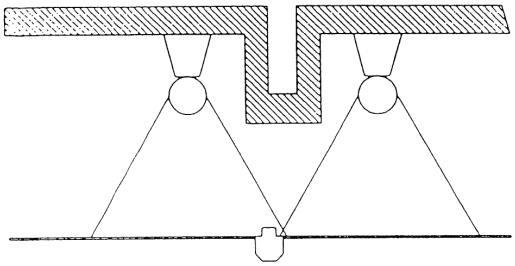
In the case of a smaller distance the lights can be arranged as shown in Figure 3. During corresponding trials however a slight shadow formation occurred, caused by the lighting housing.
A reduction in the spacing between the lights does indeed reduce the corresponding shadow formation but it results in the fact that the surface uniformity can no longer be retained.

Fig.: 3



In the case of narrow ceiling joists close to the luminous ceiling it is possible to avoid the need to install lights directly on the joist in many cases. Shadow formation can often be prevented by a reduced distance between the light fixtures and surface uniformity can be retained by fitting the lights somewhat higher.

Fig.: 4



5.5 **Lamps and environmental influences**

In practice the following types of lamp have proved themselves:

- Standard fluorescent lamps, light colour 25
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To increase the degree of reflection all joists should be painted white.

Walls and borders within the luminous ceiling should be partitioned off from the other ceiling structures. Here it is recommended that this partitioning is covered with strongly-reflective foil to achieve optical expansion of the luminous ceiling.

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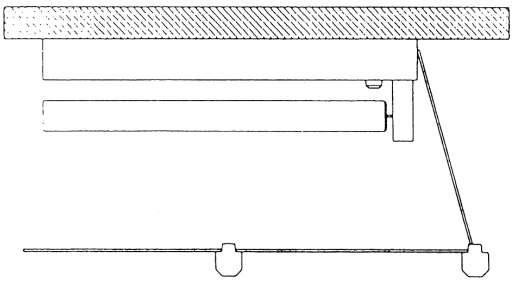

6. DIMENSIONS

6.1 **Maximum manufacturing sizes**

BI-LightColor	
Glass thickness	max. size in mm
4 mm	1000 x 2000
5 mm	1200 x 2000
6 mm	1400 x 3000
8 mm	1800 x 3800

BI-LightColor Combi	
Glass thickness	max. size in mm
from 6 mm	2400 x 3800

6.2. **Recommendations for max. installation size in the case of 4-sided support**

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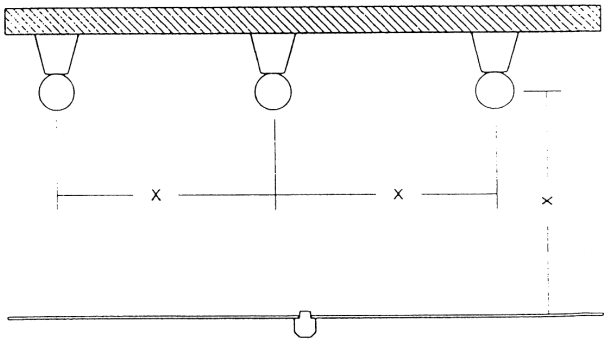

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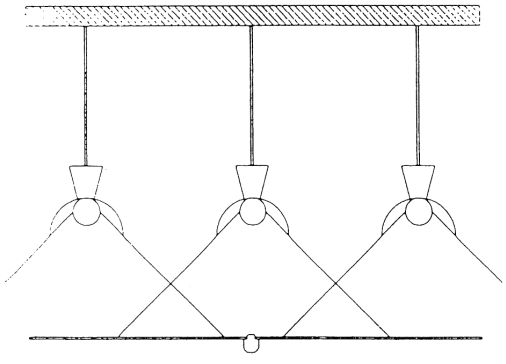

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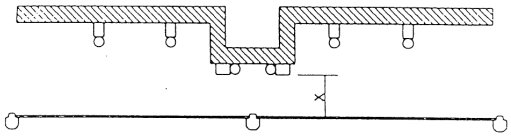

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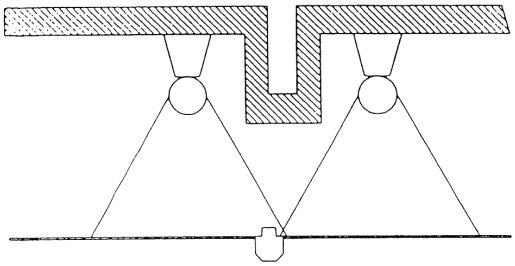

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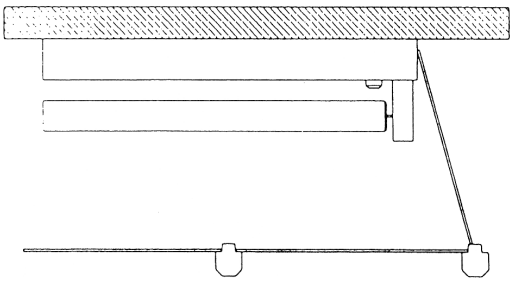

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