Hail Register (HR)

ACFI Test Specifications No. 24 Linear skylights

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Table of contents

24 Linear skylights

24.1 General information

A linear skylight (often called a light band) differs from a skylight (a dome-type product) by means of its length, which is theoretically unlimited. In general the shapes of linear skylights are flat, arched, or saddle-like. Two types of construction installations are recognized: linear skylights installed on roofs or on façades, and linear skylights installed as part of shed roofs. Linear skylights installed on roofs or façades consist of elements that are fully light transparent, whereas linear skylights that are part of shed roofs have a non-transparent (i.e., opaque) section.

This test specification for “linear skylights” is applicable to all the types cited above. But in the case of shed roof constructions, it is applicable only to the light transmitting section of the component. The non-transparent section must be tested according to the relevant component-specific test specification. This test specification for the “linear skylight” component category includes additional, component-specific provisions for the standard test, which are not governed by the general test specifications.

The component category includes linear skylights made of the following materials:

- Glass
- Plastics such as thermoplastics and reinforced thermosets

The following requirements always apply to glass and plastic linear skylights, unless reference to an exception is made in any subsection.

24.2 Intended use

Linear skylights are installed on roofs or on façades and are intended to provide sufficient daylight in vast halls and rooms.

24.3 Test specimen

The test specimen has a length of at least 1 m. One side must contain the end of the skylight-band. The width of the specimen depends of the linear skylight system. For a modular construction, the test specimen must also contain the fasteners and a part of the element connecting the modules. If the linear skylight has an opening and closing mechanism, it must be included as part of the test specimen. The size of this mechanism must correspond to that used in practice.

24.4 Test set-up

The test set-up is constructed in accordance with the manufacturer’s instructions using original frames, glazing, and fasteners. It is positioned on a solid substructure.

24.5 Specimen storage prior to testing (conditioning)

24.5.1 Linear skylights with glass glazing

None

24.5.2 Linear skylights with plastic glazing

The test specimen must be stored under the test conditions for at least 3 days (Reference to Part A).

24.6 Specimen treatment prior to testing

24.6.1 Linear skylights with glass glazing

The glass surface is moistened using a sponge before impacting.

24.6.2 Linear skylights with plastic glazing

The surface is cooled with ice flakes for 3 minutes before projectiles are fired.

24.7 Target area and angle of impact

A linear skylight is impacted at 5 target areas (Figure 1):

- Field of the Glazing: The general glazing area including the crest line at its weakest location. In case of doubt, additional component-specific test specifications are to be consulted.
- Edge: At a distance from the edge that is 1/5 of the projectile diameter
- Corner: At a distance from the corner that is 1/5 of the projectile diameter
- Opening and closing mechanism, if present
- Joint area between modular elements
- Skylight frame
- Lateral side: (optional)

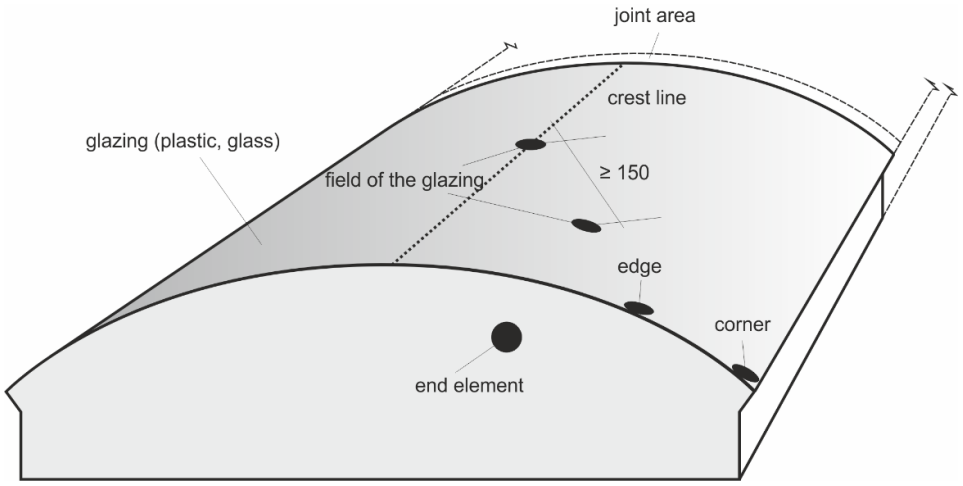

Figure 1 Target areas, using as an example a slightly arched skylight-band (dimensions in millimetres)

The target areas also apply to semi-circular shaped linear skylights, saddle-shaped glazings or special glazings.
A test specimen can be impacted multiple times. The distance between target areas must be at least 150 mm.

For linear skylights installed on roofs, a 90° angle of impact, relative to the glazing surface, is required for these target areas: field of the glazing, edge, corner, and the opening and closing mechanism.

For linear skylights on façades, the angle of impact is 45° (tolerance ±10°) for target areas on vertical surfaces. Otherwise, the angle is 90°. If any other critical target areas (e.g., exterior blinds or shading devices) are present, they must also be tested (Reference to Part A).

24.8 Component function

24.8.1 Linear skylights with glass glazing

The component is tested for watertightness, mechanical performance (i.e., the functional efficiency of the opening and closing mechanism, if present), and appearance.

24.8.2 Linear skylights with plastic glazing

The component is tested for watertightness, light transmission, mechanical performance (i.e., the functional efficiency of the opening and closing mechanism, if present), and appearance.

24.8.3 Skylight frame

The skylight frame is tested for watertightness and appearance.

24.9 Damage criterion

24.9.1 Linear skylights with glass glazing

Watertightness: The watertightness function is met provided no cracks or fractures are visible. If any crack or fracture is present, the component is considered to be damaged regarding watertightness.

Mechanical performance: If the linear skylight can be opened and closed 5 times, the component is considered to be undamaged regarding the mechanical performance function. If opening and closing 5 times is not possible, the component is damaged regarding mechanical performance.

Appearance: The appearance of a linear skylight with glass glazing is visually examined under all possible light conditions and at various angles at a distance of 5 m from the test specimen. The appearance must be inspected from the outside and inside.

24.9.2 Linear skylights with plastic glazing

Watertightness: The watertightness function is met provided no stretching, cracks, or fractures are visible. In addition, gaskets may not be displaced from their original position. If any

stretching, cracks, or fractures, or displacement of gaskets is present, the component is considered to be damaged regarding watertightness.

Mechanical performance: If the linear skylight can be opened and closed 5 times, the component is considered to be undamaged regarding the mechanical performance function. If opening and closing 5 times is not possible, the component is damaged regarding mechanical performance.

Light transmission, appearance: The plastic skylight is visually inspected under all possible light conditions and at various angles at a distance of 5 m from the test specimen. If no changes are visible, the component is considered to be undamaged. If changes (e.g., dents, compressions, blemishes, light reflections, etc.) are visible, the component is considered to be damaged.

24.9.3 Linear skylight frame

Watertightness: The watertightness function is met provided no leaks are present. In addition, gaskets may not be displaced from their original position. If any water penetration or displacement of gaskets is present, the component is considered to be damaged regarding watertightness.

Mechanical performance: If the linear skylight can be opened and closed 5 times, the component is considered to be undamaged regarding the mechanical performance function. If opening and closing 5 times is not possible, the component is damaged regarding mechanical performance.

Appearance: The skylight frame is considered as undamaged, if no dents, deformations, or fractures are present. If a dent, deformation, or fracture is visible, the frame is considered to be damaged.

24.10 Measuring method

Watertightness: The test specimen is examined visually for material separations, overstretching, cracks or fractures (the maximum distance between test specimen and examiner is 0.5 m). The tightness of the gasket is visually checked. In case of doubt, a leak test should be performed at the location in question using a maximum 1 m water column.

Mechanical performance: The linear skylight’s opening and closing mechanism is operated to test it.

Light transmission, appearance: Light transmission and appearance are determined by examining the specimen visually under all possible light conditions and at various angles at a distance of 5 m. For this, the specimen is positioned on the test floor.

Visual examinations for internal material defects and micro-stretching are made under daylight or artificial light at a distance of 5 m.

24.11 Existing standards and regulations (not exhaustive)

DIN EN 14963-2006-12: Dachlichtbänder aus Kunststoff mit oder ohne Aufsetzkränze.

DIBt: Deutsches Institut für Bautechnik; Mitteilung Nr. 2/2014 /News no. 2/2014

Roof construction systems are listened in „Bauregeln“ part 1 (ed. 2012/2). ETAG 010 published in “Bundesanzeiger, year 56, no. 89a, 12.05.2004 is valid. In addition, annex 01 should be respected for practical applications.