

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-09/0143
of 8 October 2015

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the
European Technical Assessment:

Deutsches Institut für Bautechnik

Trade name of the construction product

LITEWALL-Mono

Product family
to which the construction product belongs

Point supported vertical glazing

Manufacturer

ECKELT GLAS GmbH
Resthofstraße 18
4403 Steyr
ÖSTERREICH

Manufacturing plant

ECKELT GLAS GmbH
Resthofstraße 18
4403 Steyr
ÖSTERREICH

This European Technical Assessment
contains

14 pages including 6 annexes, which form an integral part
of this assessment

This European Technical Assessment is
issued in accordance with Regulation (EU)
No 305/2011, on the basis of

European Assessment Document (EAD)
090017-00-0404 "Point supported vertical glazing"

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Specific part

1 Technical description of the product

LITEWALL-Mono is a system of ECKELT GLAS GmbH for point-supported vertical glazing, in which thermally toughened soda lime silicate safety glass panes, thermally toughened enamelled soda lime silicate safety glass panes or thermally toughened satin-finished soda lime silicate safety glass panes (SATINATO) are used as single glazing or as laminated safety glass. For laminated safety glass the use of heat strengthened soda lime silicate glass is possible as well.

The rectangular glass panes have countersunk drilled holes into which countersunk stainless steel bolts acting as point-fasteners are factory fitted. The pre-installed elements are connected to a sub-structure via a stud screwed into the inner thread of the countersunk bolt. (See Annexes 1 to 4). For manufacturing the countersunk drilled holes the specifications deposited with Deutsches Institut für Bautechnik shall be observed. The position of the drilled holes shall be in compliance with Annex 3 and the tolerances stated there.

The allowable size of the glass panes results from the structural analysis. Contact between glass and steel is avoided by the use of plastic tubes and washers.

The edges of the glass panes shall be in accordance with EN 12150-1 and EN 1863-1 respectively either smooth ground or polished.

The tolerances on width and length of the panes are as follows:

Width/ Length [mm]	Nominal glass thickness $d \leq 12 \text{ mm} \leq$	Nominal glass thickness $d = 15 \text{ mm} \leq$
≤ 1000	$\pm 1,5$	$\pm 2,0$
≤ 2000	$\pm 2,0$	$\pm 2,5$
≤ 3000	$\pm 2,5$	$\pm 3,0$
≤ 4000	$\pm 3,0$	$\pm 4,0$
≤ 5000	$\pm 4,0$	$\pm 5,0$

The laminated safety glass panes are to be used in pairs of the same thickness with an interlayer film of Polyvinyl-Butyral (PVB). When using 8 mm or 10 mm thick glass it is necessary that the PVB-interlayer is at least 0.76 mm, when using 12 mm at least 1.52 mm. The tolerances of the position of the drilled holes related to the corner of the plate shall be at most $\pm 3 \text{ mm}$. The hole mismatch and the plate mismatch at the edge shall be at most 2 mm.

2 Specification of the intended use in accordance with the applicable European assessment Document

The elements can be used for ventilated cladding for external walls or for room-enclosing vertical glazing.

The glass elements are to be installed either vertically or up to a maximum angle of 10° from vertical to the supporting structure. They are excluded from use to stiffen other components or as safety elements to prevent from falling to a lower level.

The performances given in Section 3.1 and 3.2 are only valid if the point-supported vertical glazing is used in compliance with the specifications and conditions given in Section 3.8.

The following use categories are defined:

- 1a Use of monolithic panes (e.g. in Germany at installation height of more than 4 m) of heat-soaked thermally toughened soda lime silicate safety glass according to EN 14179-1 with deviating characteristic bending strength, duration of the holding phase of four hours and involving a notified body for controlling the heat-soaking process.
- 1b Use of monolithic panes (e.g. in Germany at installation height of less than 4 m) of thermally toughened soda lime silicate safety glass according to EN 12150-1,-2 with deviating characteristic bending strength
- 2a Use of laminated safety glass according to EN 14449 and section 2.2.1 as well as Annex A of the EAD. Compound effects are not respected.
- 2b Use of laminated safety glass according to EN 14449. Compound effects are respected regarding $G = 0,4 \text{ N/mm}^2$.
- 3a Restricted use due to national regulations concerning reaction to fire.
- 3b there is no restriction for use according to national regulations concerning reaction to fire.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the point-supported vertical glazing of at least 25 years, provided that the conditions laid down in section 3.8 for the use/maintenance are met. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and references to the methods used for its assessment

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Thermally toughened soda lime silicate safety glass panes according to EN 12150-1,-2 and with deviating characteristic bending strength according to EN 1288-3	155 N/mm ² (5 % fractile at 95 % probability)
Thermally toughened enamelled soda lime silicate safety glass panes according to EN 12150-1,-2 and with deviating characteristic bending strength according to EN 1288-3	103 N/mm ² enamelled surface 155 N/mm ² surface without enamel coating (5 % fractile at 95 % probability)
Thermally toughened satin-finished soda lime silicate safety glass panes according to EN 12150-1,-2 and with deviating characteristic bending strength according to EN 1288-3, referred to as SATINATO. The method of processing the full faced satin-finishing, one-sided, is deposited at DIBt.	155 N/mm ² both surfaces (5 % fractile at 95 % probability)
Heat-soak-test according to EN 14179-1 respecting duration of the holding phase of four hours and involving a notified body for controlling the heat-soaking process for use category 1a).	155 N/mm ² both surfaces (5 % fractile at 95 % probability, prior to heat-soaking)

Essential characteristic	Performance
<p>Laminated safety glass is composed of the above mentioned glass products with PVB-interlayer. In addition heat strengthened soda lime silicate glass according to EN 1863-1.-2 is used. Notes for the use categories:</p> <p>Use category 2a) EN 14449, respecting the following property of PVB-interlayer</p> <p>Tensile strength $\geq 20 \text{ N/mm}^2$</p> <p>Elongation at break $> 250 \%$</p> <p>In addition Annex A of the EAD shall be respected</p> <p>Use category 2b) EN 14449, respecting the following property of PVB-interlayer</p> <p>Tensile strength $\geq 20 \text{ N/mm}^2$</p> <p>Elongation at break $> 250 \%$</p>	<p>Use category 2a) Laminated safety glass without respecting compound effects for shear</p> <p>Use category 2b) Laminated safety glass with respecting compound effects for shear, $G = 0.4 \text{ N/mm}^2$</p>
Point fastener made of stainless steel (material No. 1.4305 or 1.4404), Annexes 1 and 2	Strength class S460
Adapter for hinge bolt made of stainless steel (material No. 1.4305), Annex 4	Strength class S460
Properties of the silicone ring	Modulus of elasticity = 285 N/mm^2 Poisson's ratio = 0,40
Properties of the conical spacer	Modulus of elasticity = 2000 N/mm^2 Poisson's ratio = 0,35

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire for glass panes and metallic devices of the point fastener according to Commission Decision 96/603/EC	A1
Reaction to fire for laminated safety glass with PVB-interlayer and compositions according to section 1	C – s1,d2

3.3 Hygiene, health and the environment (BWR 3)

Not applicable

3.4 Safety and accessibility (BWR 4)

Not applicable

3.5 Protection against noise (BWR 5)

Not applicable

3.6 Energy economy and heat retention (BWR 6)

Not applicable

3.7 Sustainable use of natural resources (BWR 7)

Not applicable

3.8 General aspects

3.8.1 Requirements concerning design calculation

The verification of durability is part of testing the essential characteristics. Durability is only ensured if the specifications of intended use according to the following requirements and provisions are taken into account.

For the structural design calculation regarding load-bearing capacity and check at serviceability limit state appropriate structural design models are needed (finite element method). The chosen model should be able to comprehend the reaction forces and the stress and deformation behaviour of the glass pane at the hole precise enough. All relevant effects like contact between glass and silicone ring as well as conical spacer, peak stress at the edge of the bore hole, eccentricities, flexibility of the substructure and where necessary other influences shall be taken in consideration. The point fasteners are modelled three-dimensional on the basis of their material parameters using contact algorithm for all joint faces. If the adapter for hinge bolt is used, the calculation should allow for the hinge and the excentricity according to Annex 4.

If the adapter for hinge bolt isn't used, for the dimensioning of the glass panes both limiting cases for the bolt – pin-jointed and rigid jointed – should be analysed. In this case also the sub-structure should be analysed by taking into account the pin-joint and alternatively the rigid joint.

Between the glass pane and the silicone ring or the conical spacer the structural design model may not allow frictional or tensile forces.

The deflection of the glass pane between two point fasteners may not exceed 1/100 of the appropriate span between two point fasteners in case of service load.

A positive compound effect for shear stress between two panes of the laminated safety glass is subject of national safety requirements and may be considered in the structural design calculation according national regulations.

For the steel of the sub-structure the coefficient of thermal expansion applies: $\alpha_T = 12 \cdot 10^{-6} \text{ 1/}^\circ\text{K}$

Additional notes for structural design calculation see Annexes 5a and 5b.

3.8.2 Requirements concerning the sub-structure

The sub-structure (»Facade supporting structure«) to which the LITEWALL-Mono system is fixed shall fulfil the following requirements.

The self-weight of the glazing and the wind loads shall be carried by the sub-structure. This shall be verified by calculation. In addition, the load transmission induced by temperature (+/- 30 K) shall also be verified. For this case it shall be assumed that the glass panes fixed to the sub-structure are braced as the worst case for load.

The deformation of the sub-structure is required to be limited to 1/300 of the height of the facade.

While designing the details for the fixing of the LITEWALL-point fasteners to the sub-structure, it is important to allow for installation tolerances. The size of the tolerances depends on the design of the sub-structure and the size of the glass panes. It is necessary to use fixed points, single axial and double axial movable supports according to Annex 4. The movability shall not be restrained either by collision (such as insufficient slots for movement or insufficient remaining space after installation), or by poor installation (like too high a torque setting; inappropriate material). All the details for mounting and fixing according to the above requirements shall be clearly defined.

The widths of the joints shall be determined in such a way to avoid glass to glass or glass to metal contact.

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

According to Decision of the Commission of 12 September 2003 (2003/656/EC) (OJ L 231 of 17.09.2003, p.15), the system of assessment and verification of constancy of performance (see Annex V and Article 65 Paragraph 2 to Regulation (EU) No 305/2011) given in the following table applies.

Product	Intended use(s)	Level or class	System
Single point supported vertical glazing	In building works		1
	For uses subject to regulations on reaction to fire		1/3/4

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

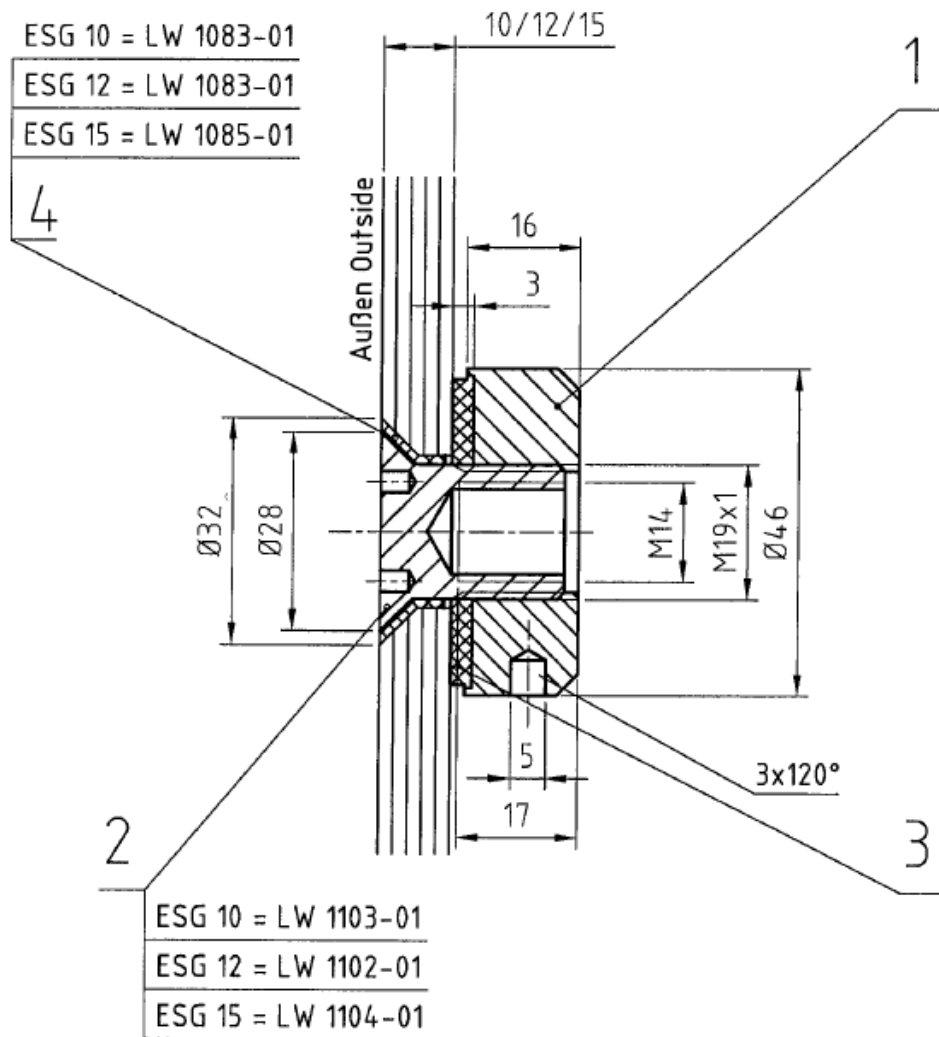
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 8 October 2015 by Deutsches Institut für Bautechnik

Uwe Bender
Head of Department

beglaubigt:
Herr

Pos.	Bezeichnung / Description	Stk. / Unit	Teile-Nr. / Part No.	Werkstoff / Material
1	Mutter / Screw nut	1	LW 1101-01	1.4404 (1.4305)
2	Senkkpfschraube / Countersunk screw	1	LW *	1.4404 (1.4305)
3	SILIKONRING / silicon ring	1	LW 1081-01	Silikon-schwarz / Silicon-Black
4	Zwischenring / Spacer ring	1	LW *	PA 6 -schwarz / PA 6-Black

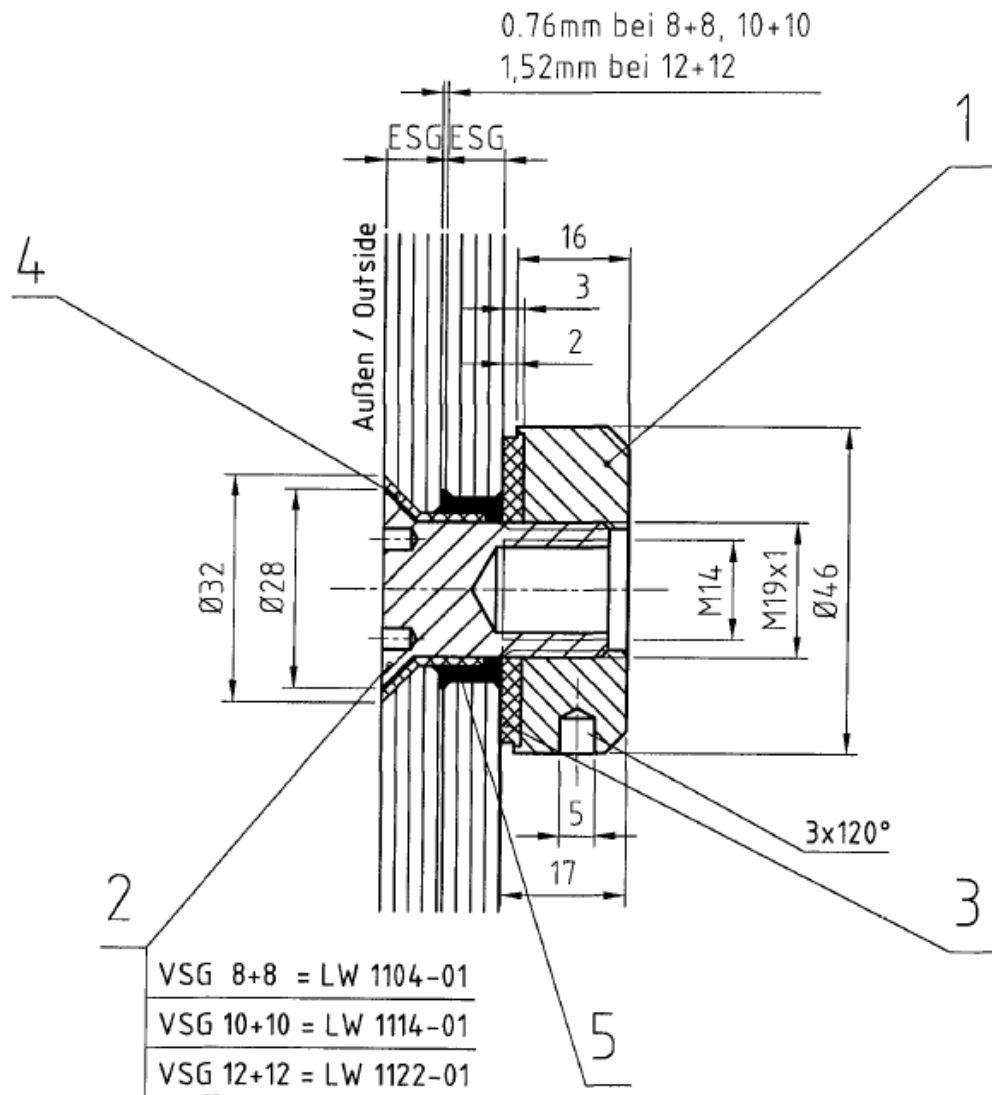


LITEWALL-Mono

Mono-panes

Annex 1

Pos.	Bezeichnung / Description	Stk. Part No.	Teile-Nr.	Werkstoff
1	Mutter / Screw nut	1	LW 1101-01	1.4404 (1.4305)
2	Senkkopfschraube / Countersunk screw	1	LW *	1.4404 (1.4305)
3	Silikonring / Silicon ring	1	LW 1081-01	Silikon-Schwarz / Silicon black
4	Zwischenring / Spacer ring	1	LW 1085-01	PA 6-Schwarz / PA6 Black
5	Füllmasse / Filling compound	-	HILTI	HIT HY 70



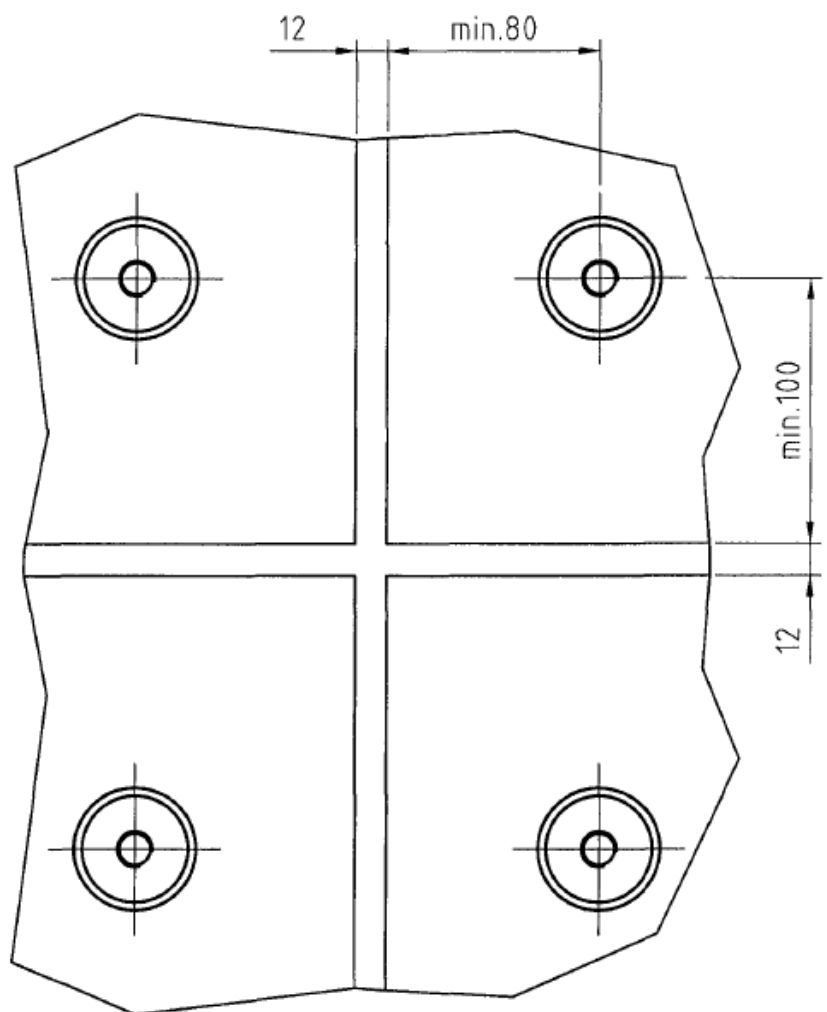
LITEWALL-Mono

Laminated glass panes

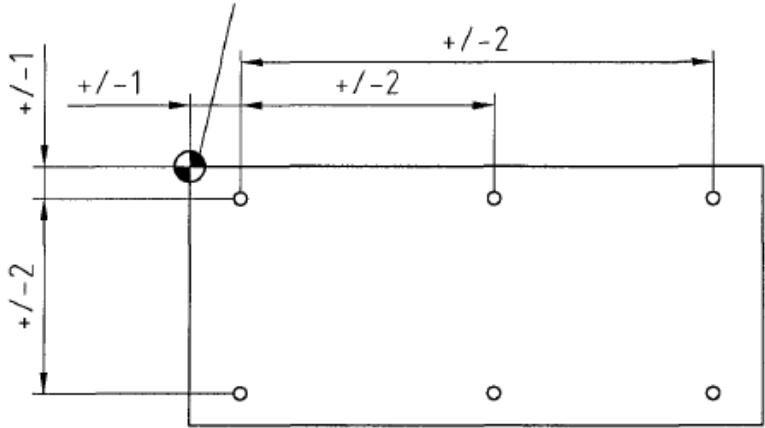
Annex 2

English translation prepared by DIBt

Ansicht von innen / View from inside



Referenzpunkt / Reference point [mm]



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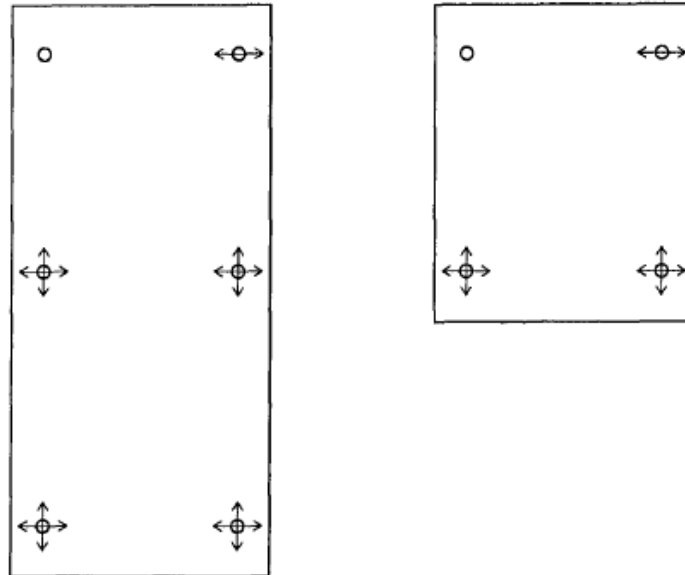
LITEWALL-Mono

Drilling positions – tolerances

Annex 3

SCHEMA - SCHEIBENLAGERUNG

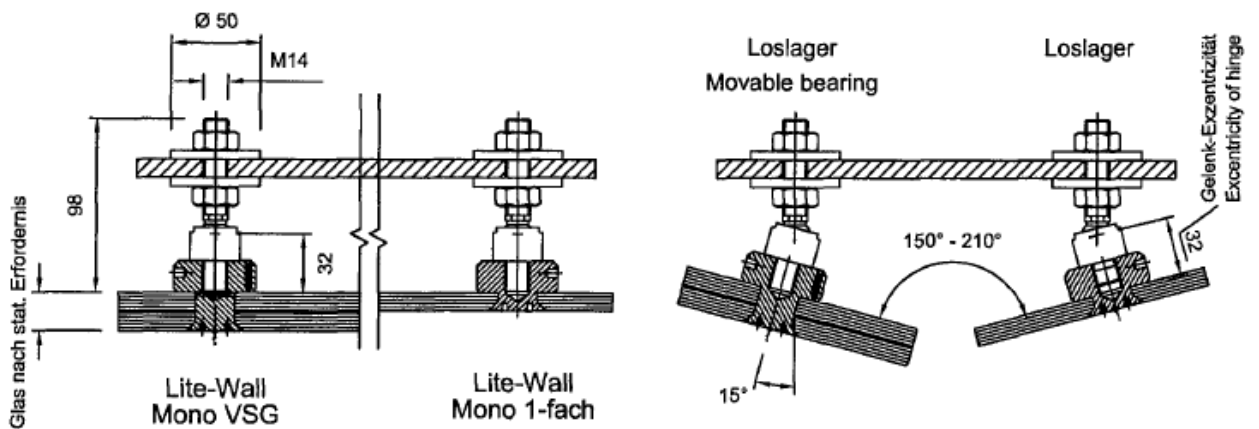
(Bezüglich der Lagerverschieblichkeit parallel zur Scheibenebene)
(In-plane bearing principle)



- Festlager / Fix point
- ←○→ Horizontales Loslager / movable bearing in horizontal direction
- ↕ Loslager in alle Richtungen / Movable bearing in two directions

Senkrecht zur Scheibenebene alle Lager unverschieblich
Perpendicular to glass plane all fixings unmovable

Gelenkadapter (Option)
Hinge bolt (option)



LITEWALL-Mono

Fitting – hinge bolt

Annex 4

Notes for structural design calculation

The following diagram (Annex 5b) shows an example that is taken out of the design calculation. The diagram should help to verify the structural model used to calculate the specific application of LITEWALL-Mono.

Two points of the diagram should be verified before executing the structural calculation.

In addition you find some test results (Annex 6) which also should be used to verify the finite element model.

The characteristic bending strengths of the thermally toughened soda lime silicate safety glass panes according EN 1288-3 are according to section 3.1.

If a global safety concept is used for the structural design calculation regard the following allowable principal tension stress:

Thermally toughened glass panes	all. $\sigma = 60 \text{ N/mm}^2$
Thermally toughened enamelled glass panes, enamelled on tension-side	all. $\sigma = 40 \text{ N/mm}^2$
Thermally toughened satin finished glass panes, satin-finished on tension-side	all. $\sigma = 60 \text{ N/mm}^2$

LITEWALL-Mono	Annex 5a
Verifying of FE-modelling	

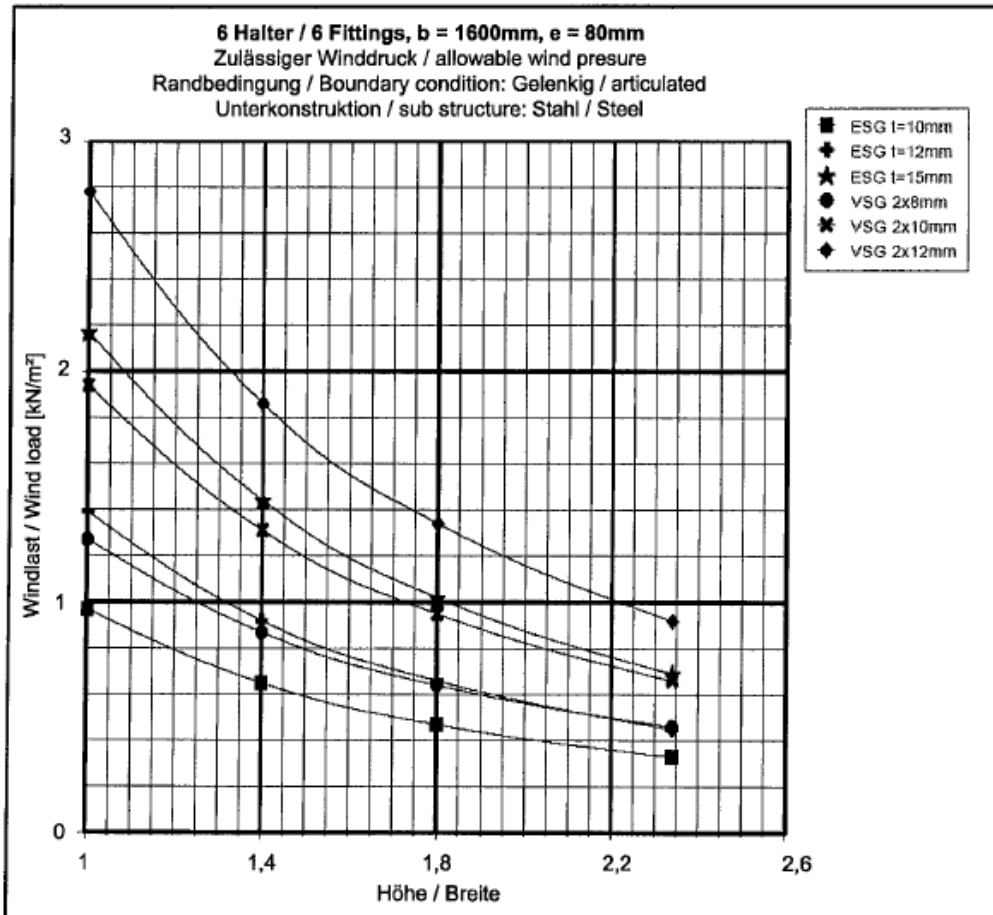
English translation prepared by DIBt

Darstellung der zulässigen Winddrucklasten für gelenkig angeschlossene Halter, Klarglas
Exposition for allowable wind load with articulated fitting, clear glass

Pane width / Tafelbreite 1600
Number of fittings / Halteranzahl 6
Excentricity / Exzentrizität $e = 80$

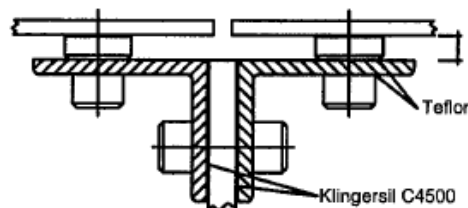
Zulässige Winddrucklasten in Abhängigkeit des Verhältnisses h/b ; [kN/m²]
Allowable wind pressure with respect to ratio h/b ; [kN/m²]

h/b	1	1,4	1,8	2,34
ESG t=10mm	0,97	0,65	0,47	0,33
ESG t=12mm	1,39	0,92	0,66	0,45
ESG t=15mm	2,17	1,44	1,02	0,69
VSG 2x8mm	1,27	0,87	0,64	0,46
VSG 2x10mm	1,94	1,31	0,95	0,66
VSG 2x12mm	2,78	1,86	1,34	0,92



Exemplarische Anschlußkonstruktion zur
Erläuterung der Exzentrizität e

Example for fixing device to explain
excentricity e



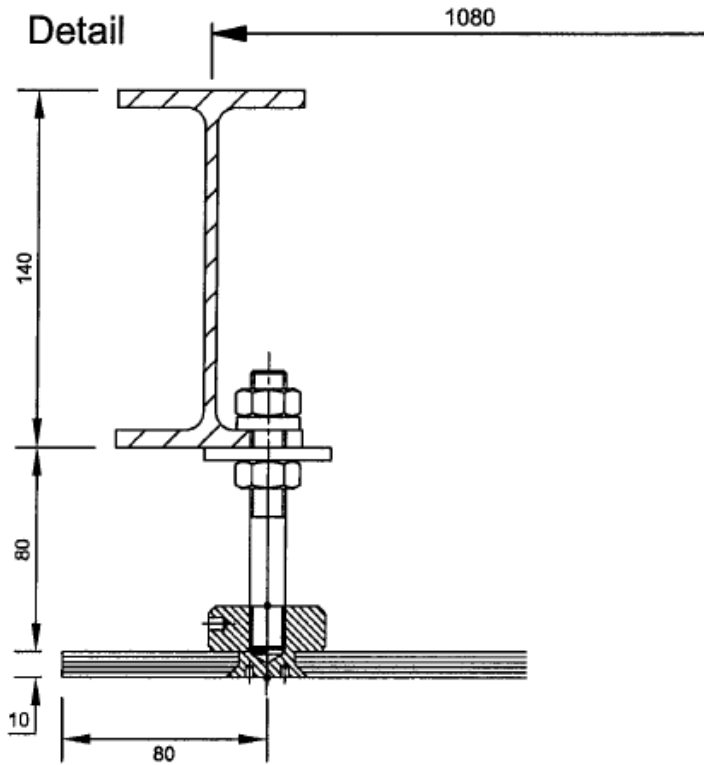
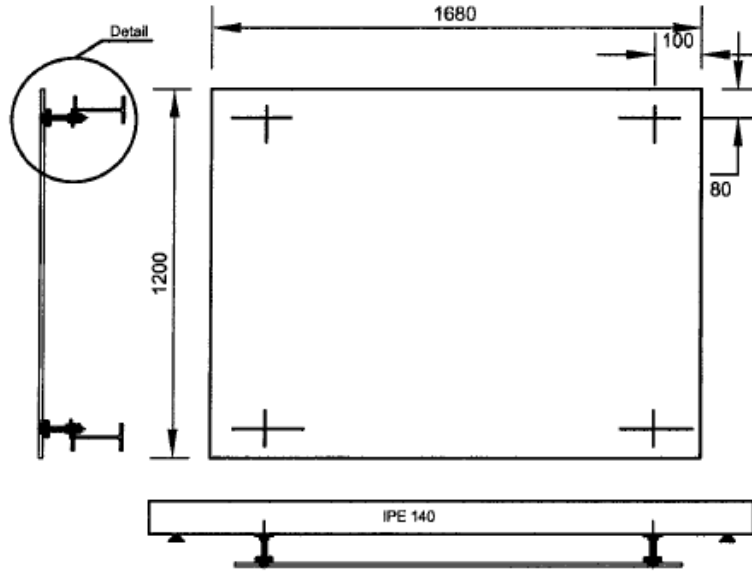
LITEWALL-Mono

Verifying of the FE-modelling

Annex 5b

English translation prepared by DIBt

Versuchsaufbau: Glasabmessung $h / b = 1,4$ $t = 10$ mm ESG klar
 Test mock up: glass size $h / b = 1,4$ $t = 10$ mm toughened clear glass



Belastung: Eigengewicht mit Nutzlast = 4,52 kN/m²
 Verformung: 34,4 mm in Tafelmitte

Load: Dead weight and test load 4,52 kN/m²
 Deflection: 34,4 mm at glass center

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LITEWALL-Mono

Verifying of the FE-modelling

Annex 6