

Allgemeine bauaufsichtliche Zulassung

Zulassungsstelle für Bauprodukte und Bauarten

Bautechnisches Prüfamt

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Applicant:

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Subject of approval:

sedak TVG

The subject of approval named above is herewith granted an *allgemeine bauaufsichtliche Zulassung* ('national technical approval'). This *allgemeine bauaufsichtliche Zulassung* ('national technical approval') consists of nine pages and one annex.

Translation authorized by DIBt

DIBt

I GENERAL PROVISIONS

- 1 With the *allgemeine bauaufsichtliche Zulassung* (‘national technical approval’) the fitness for use and the applicability of the subject of approval in accordance with the *Landesbauordnungen* (‘Building Codes of the *Länder*’) have been verified.
- 2 If in the *allgemeine bauaufsichtliche Zulassung* (‘national technical approval’) requirements are made concerning the special expertise and experience of persons entrusted with the manufacture of construction products and types of construction in accordance with the relevant provisions of the Land following Section 17, Sub-section 5, of the *Musterbauordnung* (‘Model Building Code’), it shall be noted that this expertise and experience can also be proven by equivalent verifications from other Member States of the European Union. If necessary, this also applies to verifications presented within the framework of the Agreement on the European Economic Area (EEA) or other bilateral agreements.
- 3 The *allgemeine bauaufsichtliche Zulassung* (‘national technical approval’) does not replace the permits, approvals and certificates prescribed by law for carrying out building projects.
- 4 The *allgemeine bauaufsichtliche Zulassung* (‘national technical approval’) is granted without prejudice to the rights of third parties, in particular private property rights.
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- 7 The *allgemeine bauaufsichtliche Zulassung* (‘national technical approval’) is granted until revoked. The provisions of the *allgemeine bauaufsichtliche Zulassung* (‘national technical approval’) can subsequently be supplemented and amended, in particular if this is required by new technical findings.

II SPECIAL PROVISIONS

1 Subject of approval and field of application

1.1 Subject of approval

The subject of approval is flat glass composed of heat strengthened soda lime silicate glass (TVG) manufactured in the manufacturing plant of Sedak GmbH & Co. KG. This glass shall be used for manufacturing laminated safety glass (VSG) using a polyvinyl butyral (PVB) interlayer or other approved interlayer. By derogation from *Bauregelliste* (Construction Products List) A¹, Part 1, No. 11.14, heat strengthened soda lime silicate glass shall be used for manufacturing the laminated safety glass.

This *allgemeine bauaufsichtliche Zulassung* (‘national technical approval’) shall also apply to glass panes with drilled holes, coatings in accordance with DIN EN 1096-4² and enamel coatings.

Construction products manufactured in accordance with this *allgemeine bauaufsichtliche Zulassung* (‘national technical approval’) shall be designated ‘sedak TVG’.

1.2 Field of application

The construction products covered by this *allgemeine bauaufsichtliche Zulassung* (‘national technical approval’) shall only be approved for use as laminated glass or laminated safety glass. Any use beyond the approved use shall require an additional *allgemeine bauaufsichtliche Zulassung* (‘national technical approval’).

VSG in accordance with this *allgemeine bauaufsichtliche Zulassung* (‘national technical approval’) may be used within the scope of DIN 18008-2³.

VSG covered by this approval may also be used within the scope of DIN 18008-3⁴. Point fixed glazing deviating from the above scope shall require an additional *allgemeine bauaufsichtliche Zulassung* (‘national technical approval’).

2 Provisions for the construction product

2.1 Composition and characteristics

2.1.1 Base products used in the production of heat strengthened soda lime silicate glass(TVG)

Float glass (soda lime silicate glass) with CE marking in accordance with DIN EN 572-9⁵ and a national conformity mark (‘Ü mark’) in accordance with *Bauregelliste* (Construction Products List) A¹, Part 1, No. 11.10, shall be used as a base product in the production of TVG.

Coated float glass with CE marking in accordance with DIN EN 1096-4² and a national conformity mark (‘Ü mark’) in accordance with *Bauregelliste* (Construction Products List) A, Part 1, No. 11.11, may also be used as long as the coating is suitable for heat strengthening.

Drilled holes in the TVG shall be allowed. These holes shall be drilled in the base product. The provisions laid down in Section 2.1.5 shall be observed.

2.1.2 Coatings and enamel coatings

A coating may be applied to TVG in accordance with this *allgemeine bauaufsichtliche Zulassung* (‘national technical approval’). Solely coatings in accordance with DIN EN 1096-4² shall be allowed.

1 *Bauregelliste* (Construction Products List) A and B as well as List C, issue 2014
 2 DIN EN 1096-4:2005-01 Glass in building - Coated glass – Part 4: Evaluation of conformity/Product standard
 3 18008-2:2011-04 Glass in Building – Design and construction rules
 Part 2: Linearly supported glazing
 4 18008-3:2013-07 Glass in Building – Design and construction rules
 Part 3: Point fixed glazing
 5 DIN EN 572-9:2005-01 Glass in building - Basic soda lime silicate glass products – Part 9:
 Evaluation of conformity/Product standard

The coating may be applied before or after the heat strengthening process. For all coated construction products in accordance with this *allgemeine bauaufsichtliche Zulassung* (‘national technical approval’), the provisions of *Bauregelliste* (Construction Products List) A, Part 1, No. 11.11, including Annex 11.6, shall apply.

For coated TVG used for manufacturing VSG, the orientation of the coating in relation to the PVB film is not regulated by this *allgemeine bauaufsichtliche Zulassung* (‘national technical approval’).

Single-sided full-surface or partial-surface enamelling of TVG shall be allowed. When laminating such glass panes to form VSG, the enamelled glass surface may face the PVB film.

2.1.3 Heat strengthened soda lime silicate glass (TVG)

Base products as described in Section 2.1.1 shall be used for manufacturing TVG. The panes shall have nominal thicknesses of 6, 8, 10 and 12 mm.

The requirements of DIN EN 1863-1⁶ pertaining to dimensional tolerances and edge finishing of the panes shall be observed.

Table 1 lists the glass thickness-dependent maximum dimensions with which heat strengthened soda lime silicate glass may be manufactured in accordance with this *allgemeine bauaufsichtliche Zulassung* (‘national technical approval’) for the heat strengthening process system (PS) used. Further information pertaining to the heat strengthening process system is deposited with DIBt.

Table 1: Maximum dimensions for unenamelled and uncoated TVG

Nominal thickness in mm	Maximum dimensions in [mm] x [mm]
	PS I
6	15,000 x 3,200 ⁷⁾
8	15,000 x 3,200 ⁷⁾
10	15,000 x 3,200 ⁷⁾
12	15,000 x 3,200 ⁷⁾

⁷⁾ The enamelled TVG had already undergone successful initial type-testing when the approval was granted.

Moreover, a minimum edge length/component size of 300 x 400 mm shall be observed. In the test in accordance with DIN EN 1288-3⁷, TVG shall exhibit the minimum values of characteristic mechanical strength specified in Table 2. The stated values shall relate to a 5% probability of breakage at the lower limit of the 95% confidence interval.

Table 2: Minimum mechanical strength values of heat strengthened soda lime silicate glass

Construction product in accordance with this approval		Minimum in [N/mm ²]
TVG with untreated glass surfaces		70
Coated TVG (as per Section 2.1.2)		
Enamelled TVG	Enamel on side under compression	45
	Enamel on side under tension	

For the manufacture of TVG with coated or enamelled glass surfaces the provisions of Section 2.1.2 shall apply.

⁶ DIN EN 1863-1:2012-02

Glass in building - Heat strengthened soda lime silicate glass – Part 1: Definition and description

⁷ DIN EN 1288-3:2000-09

Glass in building - Determination of the bending strength of glass – Part 3: Test with specimen supported at two points (four point bending)

The fragmentation pattern of heat strengthened soda lime silicate glass shall satisfy the following requirements for all products and glass pane thicknesses regulated herein:

- When testing test panes (360 mm x 1100 mm) in accordance with the fragmentation test procedure described in Section 8 of EN 1863-1⁶, the requirements specified therein shall be met. When testing test panes having the dimensions specified in Annex 1, the requirements for the fragmentation pattern specified therein shall be met.

The overall bow and the local distortions in the end product shall satisfy the requirements of DIN EN 1863-1⁶.

2.1.4 Laminated safety glass (VSG)

TVG as described in Section 2.1.3 may be further processed to form VSG in accordance with *Bauregelliste* (Construction Products List) A¹, Part 1, No. 11.14. The TVG may also be combined with other glass products approved for the manufacture of VSG in accordance with the *Bauregelliste*. For the manufacture of VSG using coated TVG, the provisions given in Section 2.1.2 shall be observed.

All provisions of the *Bauregelliste* (Construction Products List) A, Part 1, No. 11.14, ‘Laminated safety glass with PVB film’, shall be met for the VSG. All tests required therein shall be carried out; the test specimens may also be manufactured from glass which has not been heat strengthened. Initial type-testing for VSG made from TVG may be omitted for ‘laminated safety glass with PVB film’ in accordance with *Bauregelliste* (Construction Products List) A, Part 1, No. 11.14 if it has already undergone successful initial type testing.

2.1.5 Minimum requirements for round holes

The diameter of holes shall not be less than the glass thickness.

The hole edges shall be bevelled with a side length of 0.5 to 1.0 mm and a bevel angle of 45°.

The holes shall be smooth and free of score marks. The quality of the hole edges shall correspond to a ‘polished edge’ as defined in DIN 1863-1⁶.

The minimum distance between the hole edges and the glass edges shall be 80 mm. The minimum distance between hole edges shall be 80 mm.

Derogation from these requirements shall be allowed if an additional *allgemeine bauaufsichtliche Zulassung* (‘national technical approval’) exists covering the use of such panes in connection with point fixed constructions within the scope of DIN 18008-3⁴ which provides for other spacings. Derogation shall also be allowed if the design resistance of the respective base glass is used at the hole edge for dimensioning in accordance with DIN 18008-2³.

The hole positions shall be selected such that no significant tensile stresses are generated in the glass. The structural integrity of the glass pane with holes shall be verified.

The hole position tolerances shall be taken from Section 7.4.5 and Table 2 of DIN EN 1863-1⁶.

For holes of nominal diameter ≤ 20 mm, hole diameter tolerances of ± 1.0 mm shall apply. For holes of nominal diameter > 20 mm, the allowable tolerances shall be ± 2.0 mm.

In accordance with *Bauregelliste* (Construction Products List) A¹, Part 1, Annex 11.8, the offset in the hole regions for VSG shall be no larger than ± 2.0 mm.

For countersunk holes, the requirements for the countersunk hole shall be taken from the provisions of the *allgemeine bauaufsichtliche Zulassungen* (‘national technical approvals’) for point fixed glazing with countersunk point fixing.

For use as per DIN 18008-3⁴, enamelled TVG in accordance with this *allgemeine bauaufsichtliche Zulassung* (‘national technical approval’) shall not be enamelled in the hole regions. For point fixed glazing in accordance with an *allgemeine bauaufsichtliche Zulassung* (‘national technical approval’), the requirements set out in said standard shall apply.

2.2 Manufacture, packaging, transport, storage and marking

2.2.1 Manufacture

The heat strengthened soda lime silicate glass in accordance with this *allgemeine bauaufsichtliche Zulassung* (‘national technical approval’) shall be manufactured in the manufacturing plant of the company Sedak GmbH & Co. KG.

The heat strengthening process parameters set during initial type-testing shall be determined and recorded by the external surveillance body. In order to guarantee the uniform quality of the TVG, the parameters of the heat strengthening process shall be continuously adapted during manufacture. The following factors shall be taken into account:

- glass dimensions and glass thickness,
- temperature of blow and ambient air,
- filling degree,
- enamel coatings and coatings.

The factors and the associated process parameter settings shall be documented within the scope of factory production control.

Only heat strengthening process systems that have been verified by the external surveillance body shall be permitted for use. Any modifications or major repairs made to a heat strengthening process system shall be reported to the external surveillance body. This body shall then decide on the necessary measures (e.g. repeating product tests, increasing the number of samples used in factory production control or additional inspection).

As a principle rule, TVG shall not be machined (e.g. ground or polished) after the heat strengthening process. This shall also apply to the hole regions.

2.2.2 Packaging, transport, storage

The glass elements shall be transported only with appropriate material handling equipment. For temporary storage at the construction site, appropriate padding shall be provided to protect the glass edges.

2.2.3 Marking

TVG in accordance with this *allgemeine bauaufsichtliche Zulassung* (‘national technical approval’) shall be marked by the manufacturer with the national conformity mark (‘Ü mark’) in accordance with the *Übereinstimmungszeichen-Verordnungen* (‘Conformity Marking Ordinances’) of the *Länder*. This mark shall be applied directly to the construction product or the delivery note for the construction product.

TVG shall at least be permanently marked with ‘TVG Z-70.4-215’.

Marking with the national conformity mark (‘Ü mark’) shall only be allowed if the requirements given in Section 2.3 are met.

The delivery note shall additionally contain details regarding the key characteristics of the supplied construction product (glass pane type, nominal thicknesses, coatings, enamel coatings etc.). If the manufacturer has several manufacturing plants in which production in accordance with this approval is permitted the manufacturing plant concerned shall be indicated.

2.3 Attestation of conformity

2.3.1 General

To certify the conformity of TVG as described in Section 2.1.3 with the provisions of this *allgemeine bauaufsichtliche Zulassung* (‘national technical approval’), a certificate of conformity shall be issued for every manufacturing plant, based on factory production control and regular external surveillance, including initial type-testing of the construction product, in accordance with the following provisions. To issue the certificate of conformity and for external surveillance, including the associated product testing, the manufacturer of the construction product shall use a testing, inspection and certification body recognised for these purposes.

By affixing the national conformity mark (‘Ü mark’), indicating the intended use, the manufacturer declares that the certificate of conformity has been granted.

The manufacturer shall send copies of the initial type-testing report and the certificate of conformity to Deutsches Institut für Bautechnik upon request.

The provisions of the *Übereinstimmungszeichen-Verordnungen* (‘Conformity Marking Ordinances’) of the *Länder* shall be observed.

2.3.2 Factory production control

A factory production control system shall be set up and implemented in each manufacturing plant for TVG as described in Section 2.1.3. Factory production control is understood to be continuous surveillance of production by the manufacturer to ensure that the manufactured construction products satisfy the provisions of this *allgemeine bauaufsichtliche Zulassung* (‘national technical approval’).

The factory production control shall at least include the measures listed below:

- description and verification of the starting material:
 - float glass or coated float glass as described in Section 2.1.1
 - PVB film as described in Section 2.1.4
 - applied coatings and enamel coatings as described in Section 2.1.2
- checks and tests to be carried out on each heat strengthening process system during manufacture:
 - deviations for the difference between diagonals, edge finishing, flatness, dimensional accuracy, hole position(s) and surface condition shall be regularly inspected.
 - The fragmentation pattern shall be examined weekly for two test panes taken during production in accordance with the Section 8 of DIN EN 1863-1⁶ (‘Assessment of fragmentation’). The test pane thicknesses shall be selected to ensure that per quarter at least two test panes of each produced thickness are examined.
 - In each quarter, the fragmentation pattern shall be examined on two test panes of minimum dimensions 1000 x 1500 mm in accordance with Annex 1; by derogation, for panes with areas greater than 18 m², two test panes each with an area of approx. 6 m² with dimensions of approx. 2000 x 3000 mm shall be examined; the test pane thicknesses shall correspond to those of the largest and second-largest production volumes in the quarter.
 - Every second week, the mechanical strength in accordance with DIN EN 1288-3⁷ shall be tested on two panes each of minimum and maximum thickness; following testing of 16 panes of one thickness, the corresponding 5% breakage probability shall be determined.

The results of factory production control shall be recorded and evaluated. The records shall at least include the following information:

- influencing factors and selected heat strengthening process parameters for the manufacture of glass as described in Section 2.2.1,
- type of check or test,
- date of manufacture and testing of the construction product or the starting material,
- result of the checks and tests and comparison with the requirements,
- signature of the person responsible for factory production control.

The records shall be kept for at least five years and submitted to the inspection body used for external surveillance. They shall be presented to Deutsches Institut für Bautechnik and the competent supreme building authority upon request.

If the test result is unsatisfactory, the manufacturer shall immediately take the necessary measures to resolve the defect. Construction products which do not meet the requirements shall not be used. After the defect has been resolved the relevant test shall be repeated immediately, where technically feasible and necessary to show that the defect has been eliminated.

2.3.3 External surveillance

In each manufacturing plant in which TVG as described in Section 2.1.3 is manufactured, the factory production control shall be checked regularly, i.e. at least twice a year, by an external surveillance body.

Within the scope of external surveillance initial type-testing shall be conducted on the construction products as described in Section 2.1.3 (including coated and enamelled TVG) for each heat strengthening system. The tests listed in Table 3 shall be carried out for each pane thickness.

Table 3: Scope of initial type-testing for each construction product and glass thickness

Test	Sample count
Mechanical strength in accordance with DIN EN 1288-3 ⁷	≥ 10
Fragmentation pattern in accordance with Section 8 of DIN EN 1863-1 ⁶ ('Assessment of fragmentation')	≥ 5
Fragmentation pattern in accordance with Annex 1 using test panes of dimensions 1000 x 1500 mm	≥ 5
Fragmentation pattern in accordance with Annex 1 for maximum dimensions ($W_{max} \times L_{max}$)	≥ 2
For all specimens insofar as is feasible, the compliance with the specifications pertaining to allowable overall and local distortions given in DIN EN 1863-1 ⁶ shall be checked.	

The mechanical strength corresponding to the 5% probability of breakage at the lower limit of the 95% confidence interval shall be determined on the basis of the test results. The determined values shall comply with the specifications given in Table 2.

If 'critical fragmentation patterns' (fragmentation patterns which were borderline or did not pass) are found during assessment of the fragmentation, the heat strengthening process parameters shall be modified and the test series shall be repeated.

Initial type-testing of coated TVG shall only be required if the base product used is coated float glass as described in Section 2.1.1. In the determination of the mechanical strength, both specimens with the coating on the side under tension (≥ 10) and specimens with the coating on the side under compression (≥ 10) shall be tested. The statistical analysis shall be carried out separately for the two test series. For TVG coated after the heat strengthening process, the provisions of the *Bauregelliste* (Construction Products List) A¹, Part 1, No. 11.11, Annex 11.6, shall be observed.

In the determination of the mechanical strength of enamelled TVG, the enamel shall always be on the side under tension in the tests. Tests with the enamelled surface on the side under compression shall not be required.

Both for coated and for enamelled TVG, assessment of fragmentation on specimens with ‘maximum dimensions’ as described in Annex 1 may be omitted during initial type-testing provided that no significant differences have been found between the results of the tests carried out in accordance with DIN EN 1863-1⁶ and Annex 1 (1000 mm x 1500 mm) and the results for TVG with untreated glass surfaces.

The internal factory production control reports shall be presented to the external surveillance body upon request. The external surveillance body may decide, at its own discretion, to take samples, including full-scale samples, itself during inspection visits.

Certification and external surveillance results shall be kept for at least five years. The certification body or inspection body shall present them to Deutsches Institut für Bautechnik and the relevant supreme building authority responsible upon request.

3 Provisions for design, dimensioning and execution

VSG as described in Section 2.1.4 may be used within the scope of DIN 18008-2³ in accordance with Section 1.2. The provisions laid down in DIN 18008-2³ shall apply.

The characteristic mechanical strength f_y shall be taken from Table 2 of this *allgemeine bauaufsichtliche Zulassung* (‘national technical approval’).

Moreover, the material characteristics as described in Section 5.1.2 of DIN 18008-1 shall apply to the TVG without taking into account any coatings or enamel coatings.

VSG as described in Section 2.1.4 may be used within the scope of DIN 18008-3⁴. For point fixed glazing not compliant with the provisions of DIN 18008-3, an additional *allgemeine bauaufsichtliche Zulassung* (‘national technical approval’) shall be required.

Stress concentration at the drilled hole edge shall be taken into consideration in the verification calculations. The characteristic mechanical strengths given in Table 2 shall apply.

All panes shall be checked for damaged edges. Panes with edge damage extending by more than 15% of the glass thickness into the glass volume shall be excluded from use.

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Beglaubigt

1 General

The test described here shall be used to assess the fragmentation pattern of full-scale TVG panes. The fragmentation pattern of TVG essentially determines the residual load-bearing capacity of VSG made from TVG.

2 Test pane dimensions

The dimensions of the test panes shall be defined in conjunction with the external surveillance body. The minimum size shall be 1000 x 1500 mm.

3 Test procedure

The middle of each test pane shall be struck with a sharp steel tool for the purposes of initiating fragmentation. Examples of steel tools are given in Section 8.3 of EN 1863-1⁵. The test pane shall be laid flat on a table without any mechanical forces being exerted on it.

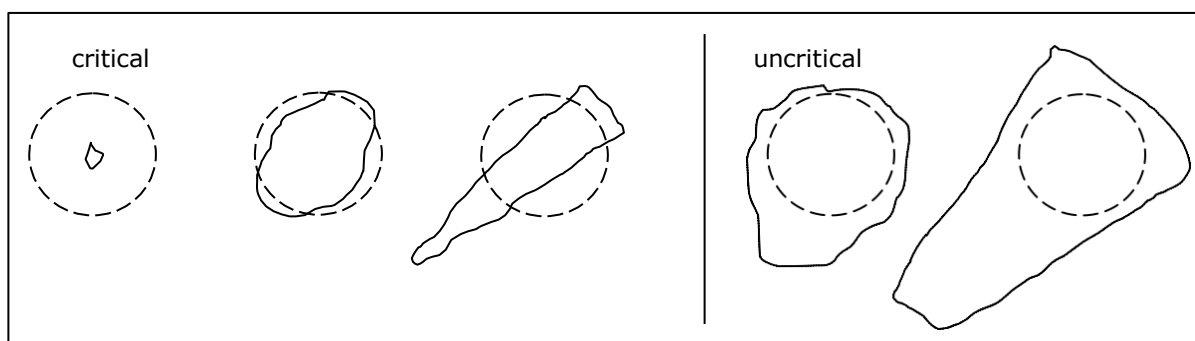
4 Assessment of fragmentation patterns

The fragmentation pattern of each test pane shall be assessed. For this, the fraction of the total area that is made up of critically sized fragments shall be determined. All fragments in which a circle of diameter 120 mm (see sketch) can be drawn may be deemed uncritical.

5 Evaluation of fragmentation patterns

The test shall be considered to be passed if the area covered by fragments of critical size is less than one-fifth of the total area (remark: if fulfilment of this condition cannot be evaluated by simple visual examination, the fraction made up by critical fragments shall be determined by weighing).

Sketch: Examples of fragments



sedak TVG

Assessment of fragmentation of full-scale test panes

Annex 1