Deutsches Institut für Bautechnik

DIBt

Public-law institution jointly founded by the federal states and the Federation

Technical authority granting approvals and permits for construction products and construction techniques

Decision

renewing the national technical approval / general construction technique permit of 8 April 2022

Date: 20 Feb 2023

Reference number: I 32-1.16.32-3/23

Number:
Z-16.32-408

Validity
from: **28 March 2023**
to: **28 March 2028**

Applicant:
ESZ Wilfried Becker GmbH
Weilerhöfe 1
41564 Kaarst

Subject of decision:
ESZ type 200

This decision renews national technical approval (*allgemeine bauaufsichtliche Zulassung*) / general construction technique permit (*allgemeine Bauartgenehmigung*) no. Z-16.32-408 of 8 April 2022. The subject concerned was granted the first national technical approval on 1 December 1992.
This decision contains one page. It applies only in conjunction with the above-mentioned national technical approval / general construction technique permit and shall not be used without it.

Andreas Schult
Head of Section

Drawn up by
Hoppe

Translation authorised by DIBt

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Technical authority granting approvals and permits for construction products and construction techniques

Date: 8 April 2022

Reference number: I 32-1.16.32-15/21

National technical approval / General construction technique permit

Number:
Z-16.32-408

Validity
from: **8 April 2022**
to: **27 March 2023**

Applicant:
ESZ Wilfried Becker GmbH
Weilerhöfe 1
41564 Kaarst

Subject of decision:
ESZ type 200

The subject named above is herewith granted a national technical approval (*allgemeine bauaufsichtliche Zulassung*) / general construction technique permit (*allgemeine Bauartgenehmigung*).
This decision contains eight pages.
This national technical approval (*allgemeine bauaufsichtliche Zulassung)* / general construction technique permit (*allgemeine Bauartgenehmigung*) replaces the decision of 27 March 2018. The subject concerned was granted the first national technical approval on 1 December 1992.

Translation authorised by DIBt

I GENERAL PROVISIONS

1 This decision confirms the fitness for use and application of the subject concerned within the meaning of the Building Codes of the federal states (*Landesbauordnungen*).

2 This decision does not replace the permits, approvals and certificates required by law for carrying out construction projects.

3 This decision is granted without prejudice to the rights of third parties, in particular private property rights.

4 Notwithstanding further provisions in the 'Special Provisions', copies of this decision shall be made available to the user and installer of the subject concerned. The user and installer of the subject concerned shall also be made aware that this decision must be made available at the place of use or place of application. Upon request, copies of the decision shall be provided to the authorities involved.

5 This decision shall be reproduced in full only. Partial publication requires the consent of DIBt. Texts and drawings in promotional material shall not contradict this decision. In the event of a discrepancy between the German original and this authorised translation, the German version shall prevail.

6 This decision may be revoked. The provisions contained herein may subsequently be supplemented and amended, in particular if this is required by new technical findings.

7 This decision is based on the information and documents provided by the applicant. Alterations to this basis are not covered by this decision and shall be notified to DIBt without delay.

II SPECIAL PROVISIONS

1 Subject concerned and field of use and application

1.1 Subject of approval

The subject of approval is the compact unreinforced elastomeric bearing ESZ type 200 used to transfer forces and to compensate deformations perpendicular to the bearing plane. It is made of vulcanised chloroprene rubber (CR).

The bearings may be supplied in point or strip form.

1.2 Subject of the permit

The subject of the permit is the planning, design and execution of the elastomeric bearings used in buildings. The structural members adjacent to the bearing shall be made of steel, concrete or wood. Use of films above or beneath the bearing shall not be permitted. The elastomeric bearings may be used at temperatures between -25 °C and 50 °C. The bearings may be exposed to temperatures up to +70 °C for short-term recurring periods of less than 8 hours.

2 Provisions for the construction product(s)

2.1 Properties and composition

2.1.1 Dimensions

For the bearing dimensions, the following conditions shall be complied with:

bearing thickness: t = 10 mm up to 20 mm

$t \leq a/5$ where t_{max} = 20 mm

$t \geq a/30$ where t_{min} = 10 mm.

For rectangular bearings in point form:

$a \geq 70$ mm, $b \geq 70$ mm.

For bearings in strip form:

$a \geq 50$ mm, $b \geq 100$ mm.

For round bearings:

$r \geq 35$ mm.

For bearings with bore holes:

smallest bearing geometry [mm]:	50 x 100 x 10 or r ≥ 35 mm
maximum percentage of holes:	10 % of the bearing area
maximum diameter of bore hole:	D_{max} = 50 mm
maximum number of bore holes:	n = 4
minimum edge distance:	t
minimum bore hole spacing:	2 · D
type of bore hole:	round hole/slotted hole

with the nominal dimensions:

- a short side of bearing
- b long side of bearing.
- r radius of bearing.
- t thickness of unloaded bearing
- D_i diameter of bore hole i.

Regarding the dimensional tolerances to be adhered to:

length	class M4 in accordance with Table 1 of DIN ISO 3302-1:2018-06
width	class M4 in accordance with Table 1 of DIN ISO 3302-1:2018-06
thickness	class M3 in accordance with Table 1 of DIN ISO 3302-1:2018-08.

2.1.2 Materials

The physical characteristics and the chemical composition as well as the material properties of the bearings are deposited with DIBt.

The properties of the starting materials used shall be verified through inspection certificate type 3.1 in accordance with DIN EN 10204:2005-01.

2.2 Manufacture, transport and marking

2.2.1 Manufacture and transport

The bearing bodies shall be produced in the shape of panels using the vulcanisation technique and then be cut to size as needed.

Detailed information on the manufacturing process is deposited with DIBt.

Regarding the transport and installation of the bearings the manufacturer's specifications shall be observed.

2.2.2 Marking

The manufacturer shall affix the national conformity mark (*Ü-Zeichen*) to the construction product in accordance with the Conformity Marking Ordinances (*Übereinstimmungszeichen-Verordnungen*) of the federal states. The mark shall only be applied if the requirements given in Section 2.3 are met.

2.3 Confirmation of conformity

2.3.1 General

The manufacturer shall confirm for each manufacturing plant that the bearings comply with the provisions of this national technical approval by way of a declaration of conformity based on factory production control and a certificate of conformity issued by a recognised certification body, as well as by way of regular external surveillance, including initial type-testing of the bearings, carried out by a recognised inspection body 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 bearings shall use a certification body and an inspection body recognised for these purposes.

The declaration of conformity shall be submitted by the manufacturer through marking of the construction products with the national conformity mark (*Ü-Zeichen*), including a statement of the intended use. Should this not be possible in a specific case, the instruction sheet of the bearing shall be marked with the national conformity mark in accordance with the Conformity Marking Ordinances of the federal states.

The certification body shall send a copy of the certificate of conformity issued by it to DIBt.

A copy of the initial type-testing report shall also be sent to DIBt.

2.3.2 Factory production control

A factory production control system shall be set up and implemented in each manufacturing plant. 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 national technical approval.

Factory production control shall be carried out in accordance with the test plan deposited with DIBt.

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

- designation of the construction product or the starting material or the components,
- type of check or test,
- date of manufacture and testing of the construction product or the starting material or the components,
- results of the checks and tests as well as, if applicable, comparison with 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 submitted to DIBt 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 be handled in such a way that they cannot be confused with compliant products. After the defect has been remedied, 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

The plant and the factory production control system shall be inspected regularly, i.e. at least twice a year, by means of external surveillance at each manufacturing plant. The results of the checks carried out by the manufacturer in accordance with Section 2.3.2 shall be statistically evaluated.

Initial type-testing of the bearing as specified in the test plan shall be carried out within the scope of external surveillance. Sampling and testing shall be the responsibility of the recognised inspection body. The scope and frequency of external surveillance shall be taken from the test plan deposited with DIBt.

The results of certification and external surveillance shall be kept for at least five years. They shall be presented by the certification or inspection body to DIBt and the competent supreme building authority upon request.

3 Provisions for planning, design and execution

3.1 Planning

The Technical Building Rules (*Technische Baubestimmungen*) shall apply to the planning unless otherwise specified below. The bearings shall be installed in single layers. The dimensions of the bearings shall be taken from the designer's specifications and the installation plans.

Structural analysis shall be carried out in each individual case to verify the structural safety of the bearings in the ultimate limit state for all relevant design situations and load cases.

The verification concept set out in DIN EN 1990:2010-12 in conjunction with the National Annex shall apply. The bearings may only be used for static or quasi-static loads imposed on the structural members.

The type, dimensions and arrangement of the bearing shall result from the verification of stability. Based on the bearing selection, an installation plan which shows the exact position of the bearings in the structural layout shall be drawn up if the installation situation so requires.

Installation shall be carried out in accordance with the manufacturer's specifications.

3.2 Design

3.2.1 General

The Technical Building Rules shall apply to the design unless otherwise specified below.

The possible load case combinations shall be taken from DIN EN 1990:2010-12.

The design values of the effects of the actions (loads) E_d shall be determined from the characteristic values of the actions in consideration of the partial safety factors γ_f and the combination coefficients ψ in accordance with the Technical Building Rules.

The structural members adjacent to the bearing shall be designed such that the interaction with the structural behaviour of the bearing is taken into account. It shall be observed that loading of an elastomer bearing leads to a load concentration. Rotation of the elastomer bearings leads to eccentricities in the load concentration and hence to a restoring moment. The transverse tensile force (see Section 3.2.4) arising in the adjacent structural members as a result of the strain constraint of the unreinforced elastomeric bearing shall be verified and transmitted through corresponding measures.

The compressive strain of the bearing shall be taken into account as a product-specific value in the determination of the actions on the overall structure. If the contact surfaces of the adjacent structural members deviate from planar parallelism, e.g. as a result of manufacturing and installation tolerances, these deviations shall be taken into account in the design of the bearing.

3.2.2 Vertical resistance

In the ultimate limit state, the following verification shall be provided:

$$\frac{E_{\perp d}}{R_{\perp d}} \leq 1$$

where:

$E_{\perp d}$ load acting on bearing perpendicular to the bearing plane [N/mm²]

$R_{\perp d}$ design value of associated bearing resistance [N/mm²] perpendicular to bearing plane

The shape factor shall be determined depending on the geometry of the bearing, with the bore holes provided being taken into account:

shape factor for rectangular bearings: $S = \frac{a \cdot b}{2 \cdot t \cdot (a+b)}$

shape factor for round bearings: $S_{round} = \frac{r}{2 \cdot t}$

shape factor for bearings with bore holes:

S_{hole} = contact area under compressive loading / unloaded circumferential area

where a, b, r, t, D_i in accordance with 2.1.1.

For determining the resistance to horizontal loads and rotations, round bearings shall be designed using the actual base area of the bearing.

Table 1: Bearing resistance for loads perpendicular to bearing plane

	Shape factor range S (S, S_{hole} or S_{round})	**Function for determining the design resistance [N/mm²]**
Bearings in point and strip form	0.88 - 3.75	$R_{\perp d} = 17.17 \cdot S - 11.32$
	3.75 - 4.00	$R_{\perp d} = 35.94 \cdot S - 81.67$
	4.00 - 10.00	$R_{\perp d} = 1.17 \cdot S + 57.39$
	≥ 10.00	$R_{\perp d} = 69.10$
Round bearings	0.88 – 5.00	$R_{\perp d} = 1.85 \cdot S^2 + 11.43 \cdot S - 6.4$
	≥ 5.00	$R_{\perp d} = 96.90$

3.2.3 Rotation

If more detailed verification is not provided, the angle of rotation of the adjacent structural members shall be determined through adding of the following factors:

- obliqueness with 10 ‰
- unevenness with 625 mm/a [‰]

with a in [mm].

If the adjacent structural members are made of steel or in-situ concrete, the unevenness may be halved.

For rotations on both perpendicular sides of the bearing, amounts for angular displacement shall be proportionally added to the respective design values.

The positional stability shall be verified.

For point bearings, the maximum twist for rotation about an axis shall be determined as follows:

$$\alpha_{b,max} = \frac{450 \cdot t}{a} \leq 40\ ‰$$

where:

$\alpha_{b,max}$ maximum angle of twist for rotation about the central axis parallel to side b with a, b, t in mm.

The formula shall be used analogously for determination of the maximum angle of twist about the central axis parallel to side a. Verification that edge contact with the adjacent structural members is avoided at simultaneous occurrence of the maximum compression and the maximum twist shall be provided during the structural design.

For biaxial torsional stress, the following boundary condition shall be adhered to:

$$\alpha_{resultant} = \sqrt{\alpha_{a,max}^2 + \alpha_{b,max}^2} \leq 40\ ‰$$

3.2.4 Transverse tensile force

The transverse tensile force acting on the adjacent structural members due to the central load acting on the bearing shall be determined as follows:

For rectangular bearings:

$$Z_a = 1.5 \cdot E_{\perp d} \cdot a \cdot t$$

$$Z_b = 1.5 \cdot E_{\perp d} \cdot b \cdot t$$

where:

Z_a transverse tensile force perpendicular to the short side of the bearing a [N]

Z_b transverse tensile force perpendicular to the long side of the bearing b [N].

For round bearings:

$$Z = 1.5 \cdot E_{\perp d} \cdot 2r \cdot t$$

where:

Z transverse tensile force [N].

The bulging of the bearing depends on its size and shape. During the structural design (edge distances etc.) the bulging of the bearing shall be taken into account and requested from the manufacturer in advance.

The lateral surfaces of the bearing may not be hindered in their planned deformation.

3.3 Execution

The Technical Building Rules (*Technische Baubestimmungen*) shall apply to the execution unless otherwise specified below.

The bearings shall be stored in a dry condition. The bearings shall be protected from direct sunlight. The substrate shall be smooth and level. The support surfaces shall be carefully deburred for protecting the bearing. Voids in the adjacent concrete surfaces shall be avoided. If necessary, height compensation may be carried out by means of a suitable mortar bed. The adjacent structural members shall be compatible with the bearing material.

It shall be ensured that the bearing and the adjacent structural members are kept free of damaging chemical and physical effects as well as contaminants. The surfaces of the adjacent structural members shall be swept clean and free of snow, ice, grease and bond breakers. Stagnant water shall be avoided. The manufacturer's specifications regarding installation shall be observed.

The executing company shall confirm in writing in accordance with Section 16a(5) in conjunction with Section 21(2) of the Model Building Code (MBO) that the bearings have been installed in conformity with the provisions of the national technical approval covered by this decision.

4 Provisions for use, maintenance and repair

The bearings shall be installed such that they are maintenance-free.

Andreas Schult
Head of Section

Drawn up by
Hoppe