

## National technical approval

Approval No.:

**Z-16.8.468**

Applicant:

**Getzner Werkstoffe GmbH**

Validity:

**from: August 4, 2016**

**until: August 4, 2021**

Item of approval:

**Getzner Sylodyn®**

The above mentioned item of approval is herewith granted a general building approval. This general building approval consists of 9 pages.

Translation of the original German version, not verified by the Deutsches Institut für Bautechnik.

## I. General regulations

1. The general building approval is a proof for the usability respectively the applicability of the item of approval according to the federal building norms.
2. Unless the general building approval imposes requirements of particular expert knowledge and experience to persons who are entrusted with the manufacturing of building components and building types acc. to §17 Abs.5 Musterbauordnung (legal norm) according to the regional regulation, it must be taken into account that expert knowledge and experience can also be proved by equivalent certification of other members of the EU. This also applies –if required - to equivalent certification according to agreements in the European Economic Area or other bilateral agreements.
3. The general building approval does not substitute mandatory legal permissions, consents and warrants that are needed for the execution of the planned construction.
4. The general building approval is granted regardless of third parties rights, especially private property rights.
5. Manufacturers and distributors of the items of approval have to supply the user of the item with copies of the general building approval and also point out that a copy must be available at the place of employment; this is regardless of further regulation mentioned in the “special regulatory”. Public authorities must be provided with a copy of the General Building Approval if requested.
6. Only the entire version of the general building approval may be distributed. Publication in extracts demands the permission of the Deutsches Institut für Bautechnik. Texts and drawings of leaflets must not contradict the general building approval. Translations of the general building approval must include the hint “Vom Deutschen Institut für Bautechnik nicht geprüfte Übersetzung der deutschen Originalfassung” („translation of the original German version, not verified by the DIBt).
7. The general construction approval is valid until revoked. The regulations of the general building approval can be complemented or amended ex post, especially if this is required by new technical findings.

## II. Particular regulations

### 1. Item of approval and fields of application

The approved construction product "Getzner Sylodyn" is a compact, unreinforced Elastomer bearing made of Polyurethan (PUR) which is used for superstructural works. The bearings must be of rectangular, point-, strip or square shape.

The bearings may only be used for statically or quasi-statically loaded building components. The general building approval regulates the use of the bearings for applications at temperatures between -25 °C and +50 °C. For short periodic time spaces of less than 8 hours the bearings can be exposed to temperatures of up to 70 °C.

The resultant of the torsions of the bearing may, in dependence of the bearing format and under consideration of the simultaneously acting exposures, add up to 6,1%. Torsions of max. 6,1% are allowed per bearing side.

The general building approval is valid for the absorption of forces and deformations that are vertically effective to the bearing level.

Although Elastomer bearings can absorb shear deformations they must not be exposed to permanent external shear forces.

The evaluation of the effectiveness of the vibration isolation is not subject of this approval. The bearings can be used inside and outside. Through the different colored labelling the single bearing types can be distinguished from each other, bearings that are not in the standard range are of anthracite color.

### 2. Regulations for construction products

#### 2.1 Properties and composition

##### 2.1.1 Dimensions

Point and strip bearings used as multi layers, must be glued with each other. Adhesion for multi layered surface bearings is not necessary. Only the same type of bearings may be piled. The dimensions of the bearings can be taken from the specification and the installation plans of the framework engineer.

There are following constraints for the dimensions of the bearings:

Bearing thickness:  $t=12,5\text{mm}$  to  $25\text{mm}$

$T \leq a/2$

$a \geq 70\text{mm}$ ,  $b \geq 70\text{mm}$

with:

t thickness of the unloaded bearing

a shorter bearing side

b longer bearing side

Tolerances acc. to following standards must be applied:

Length Class L3 acc. DIN ISO 3302-1:1996

Width Class L3 acc. DIN ISO 3302-1:1996

Thickness Class EC3 acc. DIN ISO 3302-1:1996

### **2.1.2 Materials**

The physical properties and the chemical composition as well as the material properties of the bearings and the adhesive are stored at the Deutsches Institut für Bautechnik. The properties of the used basic materials and of the used adhesive must be proved by an inspection certificate 3.1 according to DIN EN 10204:2005-1.

## **2.2 Production, Transport and Labelling**

### **2.2.1 Production, transport**

The bearings are produced regarding the material properties and the geometry.

Detailed information about the manufacturing process is available at the Deutsches Institut für Bautechnik.

Regarding the transport and the installation of the bearings the guidelines of the manufacturers must be followed.

If adhesion is necessary at the construction site, this has to be done accordingly to the data stored at the Deutsches Institut für Bautechnik. Documentation of the adhesion is mandatory. Multi-layer bearings can be glued to a maximum size of 3000 x 1500 mm at the manufacturing site.

### **2.2.2 Labelling**

The delivery note of the warehouse must be labelled with a compliance sign according to the regional compliance-sign-regulations. The labelling may only be done if the conditions of section 2.3 are fulfilled. The labelling with sequential marking must comply with the production procedure of the rolls or slabs according to section 2.2.1.

## **2.3 Proof of compliance**

### **2.3.1 General remarks**

The proof of compliance of the bearings with the regulations of this General Building Approval must be provided with a compliance certificate which is based on a particular production control and a continuous external survey including an original inspection of the bearings according to the following regulation for each product.

The manufacturer of the bearings must authorize an acknowledged certification institute and an acknowledged surveillance institute for the external inspection and product testing in order to be granted a certificate of compliance.

The manufacturer must release a declaration of compliance by labelling the building components with the signs of compliance indicating the purpose of application.

The Deutsches Institut für Bautechnik must be informed by the certification institute with a copy of the issued certificate of compliance.

The Deutsches Institut für Bautechnik additionally requires a copy of the original inspection report.

### 2.3.2 Internal production quality process

Each production plant must install a production inspection and execute them. The definition of plant internal production examination is that the manufacturer grants a continuous surveillance of the production process which assures that the manufactured building components comply with the regulations of the general building approval. The plant-internal production process control must be done according to the testing plans which are stored at the Deutsches Institut für Bautechnik.

The results of the plant-internal production process control must be documented and evaluated. The documentation must contain at least the following data:

- Description of the construction products respectively the raw material and its components
- Type of control or inspection
- Manufacturing data and inspection of the construction products respectively raw materials and components
- Results of the controls and inspections and comparison with the requirements
- Signature of the responsible person who is in charge with the production control

The records must be stored for 5 years at least. They must be shown to the Deutsches Institut für Bautechnik or the supreme construction supervision authority on demand. If the inspection results are not sufficient the manufacturer has to take immediate actions regarding the elimination of the deficiencies. Construction products not compliant to the requirements must be handled so that confusion with complying products is impossible. After elimination of the deficiency the testing has to be repeated immediately unless it is technically possible and necessary to prove the elimination of the mistake.

### 2.3.3 External supervision

Each manufacturing plant producing bearings must supervise the plant internal production process control by an external inspection institute at least twice a year. The results obtained from the examination done by the producer according to section 2.3.2 must be statistically evaluated.

During the external supervision an original inspection of the bearings has to be executed. Further samples for randomized testing must be generated. The samples and tests are subject to the approved inspection department.

Range and frequency of the external supervision can be gathered from the testing plan of the DIfB.

The results of the certification and external supervision must be stored for 5 years at least. If demanded the certification department or the supervision institute must show them to the DIfB or the supreme construction authority.

### 3. Regulation for drafts and dimensioning

#### 3.1 General

A static calculation must in each single case prove the structural safety of the bearings in the margin state of bearing capability for all decisive design and load cases. The concept according to DIN EN 1990:2010-12 in connection with national norms applies in this case.

#### 3.2 Drafts

Type, dimensions and arrangement of the bearings result from the static and quasi static impacts. Depending on the selection of bearings, unless the installation situation requires that, an installation plan must be provided where the exact position in the construction layout can be seen.

The installation has to be done according to the instructions of the manufacturer. If the adjacent building components consist of finished parts the evenness tolerance may be, in relation to the side length and the thickness  $t$  of the bearing, a maximum  $(t/5) \times (a/1000)$ .

#### 3.3 Dimensioning

The possible load combinations can be gathered from the DIN EN 1990:2010-12.

The rated values of the impacts (exposures)  $E_d$  must be determined from the characteristic values of the impacts under consideration of the proportional safety coefficient  $\gamma_f$  and the combination value  $\psi$  according to the technical construction regulations. According to the margin state of the load capacity the following proof must be taken:

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

With:

$E_{\perp d}$  stressing of the bearing vertically to the bearing level

$R_{\perp d}$  Design value of the load capacity of the bearing vertically to the bearing level in dependence of the form factor  $S$  with an upsetting deformation of  $\varepsilon = 40\%$  according to table 1

$S$  form factor for square cross sections  $S = \frac{a \cdot b}{2 \cdot t(a+b)}$

Table 1: structural safety of the bearing with vertical impact on bearing level

Standard type		NB	NC	ND	NE	NF	HRB 3000	HRB 6000 <sup>2</sup>
Rated value of load capacity for optimum vibration isolation [kN/m <sup>2</sup> ]		75	150	350	750	1500	3000	6000
Design value of bearing capacity $t R_{td}$ [kN/m <sup>2</sup> ]	Form factor 0,5 <sup>1</sup>	8	243	527	1029	1338	2400	5000
	Form factor 1,0	146	292	675	1496	2308	4400	9167
	Form factor 1,5	153	315	746	1720	2940	5740	11824
	Form factor 2,0	159	331	794	1872	3482	6889	14230
	Form factor 2,5	162	339	882	1958	3813	7589	15722
	Form factor 3,0	163	345	838	2009	4015	8018	16643
	Form factor 3,5	165	348	848	2042	4145	8292	17233
	Form factor 4,0	165	350	855	2062	4231	8474	17627
	Form factor 4,5	166	352	859	2077	4290	8599	17898
	Form factor 5,0	166	353	863	2087	4332	8688	18091
	Form factor 5,5	167	353	865	2094	4362	8753	18230
	Form factor 6,0	167	354	867	2100	4385	8800	18333
	Form factor $\geq 6,0$	167	354	867	2100	4385	8800	18333
<sup>1)</sup> Bearing with form factor $S < 0,7$ just for glued bearings <sup>2)</sup> Glued bearings of the type HRB 6000 must be decreased by 25% compared to the values mentioned in the table.								

The rated value of the load capacity apply to bearings without bore holes. In order to determine the load capacity of intermediate types linear interpolation can be used.

The bearings adjacent to the building components the interaction with the load behavior must be taken into account. It must be considered that the load of an elastomer bearing leads to a load concentration. The torsion of elastomer bearings leads to eccentricities of the load concentration and thus to a righting moment. The transverse tensile forces caused by the extension hindrance of unreinforced elastomer bearings that are adjacent to the building components must be detected and must be absorbed by appropriate actions.

When determining the impact on the total supporting framework the upsetting deformation of the bearing must be considered as product specific value. If the contact surface of the adjacent construction components deviate from the plan parallelism e.g. due to production and installation tolerances, this must be taken into consideration for the dimensioning of the bearings.

The rotation angle of the adjacent building components under addition of following influences must be taken into consideration unless that no further proof has been detected.

- Oblique angles of 0,01
- Unevenness of  $0,625/a$

If the adjacent construction components consist of steel or site mixed concrete the unevenness can be halved.

Surcharges of angular torsions must be proportionally added on the rating values if torsions over both square bearing sides occur.

The bearing safety must be proved.

The maximum torsion for an axle rotation is determined for point bearings as follows:

$$\alpha_{a,max} = \frac{t}{6 \cdot b}$$

with:

$\alpha_{a, \max}$  max. rotation angle for one rotation around the centre axis that is parallel to side

a

b longer side of the bearing in mm

t thickness of unloaded bearing in mm

$$\alpha_{b,max} = \frac{t}{6 \cdot b}$$

with:

$\alpha_{b, \max}$  max. rotation angle for one rotation around the center axis that is parallel to side

b

t thickness of unloaded bearing in mm

a shorter side of the bearing in mm

if biaxial rotation impacts occur following margin constraints must be met:

$$resultant = \sqrt{\alpha_{a,max}^2 + \alpha_{b,max}^2} \leq 0,061[rad] = 6,1\%$$

The transverse pull force that is caused by the centric load of the bearing at that is adjacent to the building components is determined as follows:

$$Z_a = 1,5 \cdot E_{\perp a} \cdot \frac{t}{a}$$

$$Z_b = 1,5 \cdot E_{\perp a} \cdot \frac{t}{b}$$

with:

$Z_a$ : Transverse tensile force vertical to the shorter side of the bearing a

$Z_b$ : Transverse tensile force vertical to the longer side of the bearing b

The determination of the transverse pull stress is only necessary when using the bearing types Sylodyn NF, HRB 3000, HRB 6000 and intermediate types.

The extension rate of the bearing is depending on its format. When it comes to designing the structure (edge distance ecc.) the extension rate of the bearing must be taken into consideration and it must be checked with the manufacturer beforehand.

The lateral surfaces of the bearings must not be impeded from the regular deformation.



#### 4. Regulations of execution

The bearings must be stored in dry condition. Rolls must be stored upright. Adhesives must be stored according to the requirements of the manufacturer. The bearings must be protected from direct sun radiation. The subsoil must be plain and even. In order to protect the bearings the storing surfaces must be carefully burred. Cavities of adjacent concrete surfaces should be avoided. If necessary the altitude compensation can be done with a mortar bedding. The adjacent construction components must be consistent with the bearing materials. It must be assured that the bearings and the adjacent construction parts are kept away from chemical and physical influences and soil as well. The surfaces of the adjacent construction parts must be clean swept, free from snow, ice and lubricants. Standing water should be avoided.

#### 5. Regulations for use, maintenance and service

The bearings can be installed maintenance free.

Andreas Schult  
Head of division

certified

