

# Elastic solutions for **stairs and landings**



# 1 | Reduction of transmissions

## Stairs and Landings

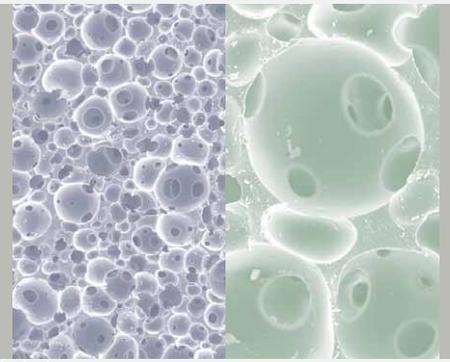
**Buildings experience the diversity of life. However, in addition to relaxing and working, life also means motion, and this often leads to problems in buildings. People create noise by walking which can be transmitted to the neighboring rooms as structure-borne noise. One particularly frequent but easy to prevent disturbance is the noise from the staircase.**

**T**he transmission takes place through the bordering walls and floors. To protect the residents from unnecessary noise, either the disturbance or the transmission must be reduced. A reduction of the transmission is technically possible through elastic separation of the flights and the landings. The impact noise generation can be reduced, for instance, through the use of soft floor covering. However, the use is problematic for a variety of reasons.

The requirements for impact noise protection are specified e.g. in DIN 4109. The permissible impact noise (foot fall) levels at the recipient are each specified as single values, with respect to a 10 m<sup>2</sup> comparison area. The single value is determined from the one-third octave band level of the secondary airborne noise, measured between 100 and 3150 Hz, and in comparison with a reference curve. The excitation for impact noise (foot fall) measurements is provided by a standardised striking mechanism.

The required impact noise improvement is determined by the transmission behavior of the structure without measures to improve the impact noise and the values required e.g. in the DIN. The magnitude is generally 10 dB for the requirements as per DIN 4109 and 17 dB for the increased requirements as per DIN 4109 Addendum 2. For sufficient impact noise (foot fall) protection, the increased requirements should absolutely be applied.



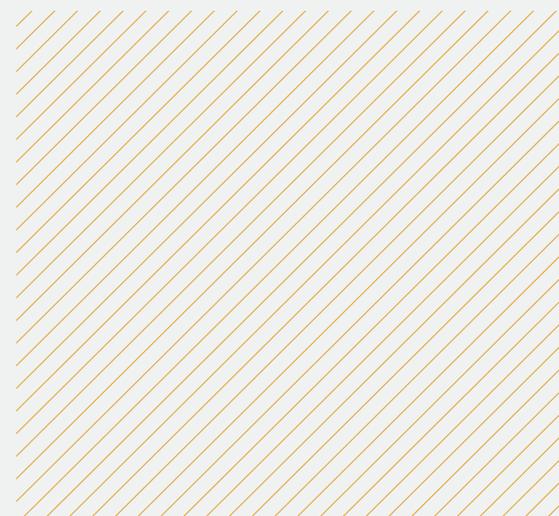


## Material

**W**ith Sylomer®, the consultant has access to a high-quality technical material for the elastic separation of stair flights and landings which easily allows for various designs. The increased requirements as per DIN 4109 Addendum 2 are already safely fulfilled under typical installation conditions with a 12 mm bearing thickness. The bearing can be laid in bearing strips or at individual bearing points. The volume required for deformation is provided "within" the microcellular structure of the material. Sylomer® bearings therefore remain effective without limitations even if they are installed completely enclosed. Areas not occupied by the bearings can be filled up with soft, non-supporting material. This significantly reduces the risk of sound bridges.

The dimensioning of the bearing is determined in accordance with the bearing dimensions, the dead weight of the structure and the expected traffic load. A wide-ranging type selection ensures that the bearing can be adapted optimally to the specified bearing surfaces and loads. Short-term load peaks are easily accepted by Sylomer®.

Bearings of Sylomer® have proven themselves for decades. With correct dimensioning, no dynamic stiffening of the bearing takes place. The effectiveness of the measure is therefore maintained even after decades.



## 2 | Solutions by Getzner



### Bearings for stairs flights and landings

The bearings are situated on the upper and lower supports of the stair flight. Typically, Sylomer® bearings strips with a thickness of 12 mm are used, installed across the entire width of the flight.

**B**earings for landings can be laid as continuous bearing strips or as individual bearing points. The large range of permissible loads and the availability of Sylomer® bearings delivered in almost any dimensions, mean that the bearings can be optimally adapted to the existing conditions. The bearing thickness is typically 12 mm.

#### Suggestion for Tender Text

Delivery and laying of elastic PUR strip/point bearings for the acoustic separation of the stair flights/landings. Installation according to the specifications of the planner.

**Material type:** Sylomer® ..... or equivalent suitable for static permanent loads up to ..... N/mm<sup>2</sup>

**Impact noise (foot fall) improvement:**  $\Delta L_w = \dots$  ( $\geq 17$  dB)

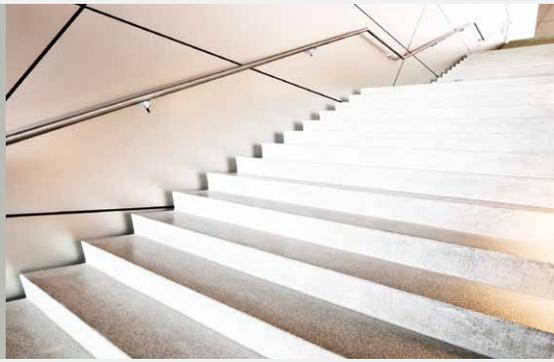
**Verifications:** Confirmation of the effectiveness and the material suitability by a recognized testing institute.

**Standard delivery form:** Rolls 5.0 m x 1.5 m

**Required dimensions:** Length: ..... mm  
Width: ..... mm  
Thickness: ..... mm

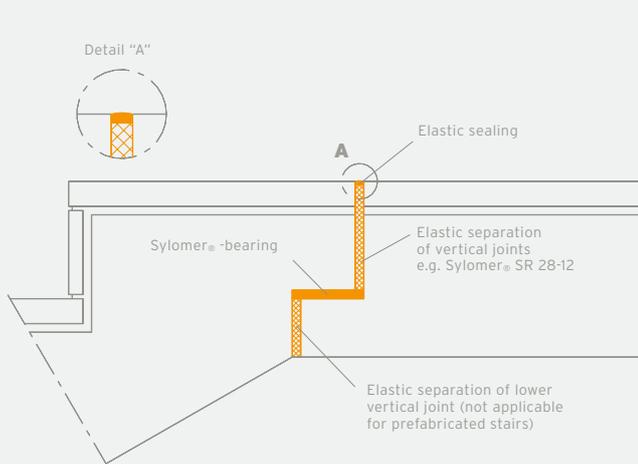
**Quantity:** ..... units

The stair flight/landing must be completely separated from the bordering structures. Separation of the vertical joints with an elastic bearing strip of Sylomer® SR 28-12 or equivalent. Sound bridges must be absolutely avoided.

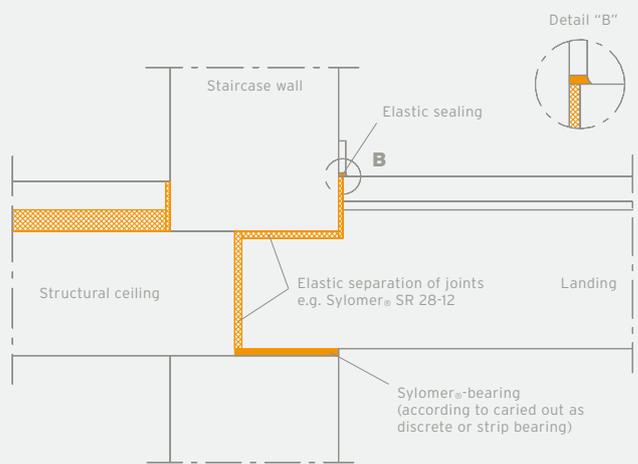


- The bearings can be strip or point bearings.
- The basis for the dimensioning of the bearing is generally the load from the dead weight of the structure.
- The Sylomer®-type and bearing surface should be selected such that the bearing pressure from the dead weight is at the load limit for the static permanent load.
- The static spring deflection is approximately 1 mm with correct design.
- The stairs or landing must be completely separated from the bordering structures. Sound bridges must absolutely be avoided.
- The increased requirements as per DIN 4109 Addendum 2 are fulfilled under typical installation conditions with a bearing thickness of 12 mm.

### Elastically beared stairs



### Elastically beared landing



# 3 | Installation and effectiveness

For installation, the bearing strips are simply laid onto the prepared surface and bonded to the substrate in a pointwise manner, as required.

The bearing surfaces must be level and free of sharp edged elevations or depressions. To prevent sound bridges, areas not filled up with the bearing should be filled out with a soft fiber insulation.

The measure is only effective if the stair flight or landing is completely elastically separated from the bordering structures. All joints must also be permanently elastically separated. The side separation is typically achieved using an elastic strip, such as Sylomer® SR 28-12. The strips should be installed such that sound bridges are avoided even during the construction phase.

The stair flights and landings can be created with onsite-mixed concrete or prefabricated concrete slabs may be used.

## Dimensioning

The dead weight of the stairs or the load from the landing, the actually expected traffic load and the available bearing surface are of primary significance in the design of the bearings. The bearings should be dimensioned through variation of the material type and bearing surface such that the load from the dead weight is at the load limit for the static permanent load.

To prevent a “floating sensation”, the additional rate of deflection from walking should not be greater than 0.6 mm for normal use. The increased requirements as per DIN 4109 Addendum 2 are safely fulfilled under typical installation conditions with a bearing thickness of 12 mm.

## Certifications/Tests

Applications for Sylomer®-bearings are classified as bearing class 2 according to DIN 4141 (ISO 6446). These are bearings which do not endanger the stability of the structure in the event of overloading or failure. A building inspection certification is not required for this bearing class.





Certified EN ISO 9001

SYLOMER® TYP	BEARING THICKNESS [MM]	COLOR	STATIC PERMANENT LOAD FROM DEAD WEIGHT [N/MM²]	LOAD LIMIT* [N/MM²]	RATE OF DEFLECTION AT STATIC PERMANENT LOAD [MM]
SR 110-12	12	brown	0.11	0.16	1.0
SR 220-12	12	red	0.22	0.35	1.2
SR 450-12	12	grey	0.45	0.7	1.4
SR 850-12	12	turquoise	0.85	1.3	1.1
SR 1200-12	12	violet	1.2	1.8	1.4

Material-specific values for typical Sylomer® stair and landing bearings.

The permissible loads for individual bearing strips and bearing points are calculated from the material-specific values and the planned dimensions.

SYLOMER® TYP	LENGTH x WIDTH x HEIGHT [MM] x [MM] x [MM]	STATIC PERMANENT LOAD FROM DEAD WEIGHT [KN]	LOAD LIMIT* [KN]	RATE OF DEFLECTION AT STATIC PERMANENT LOAD [MM]
SR 110-12	1200 x 100 x 12	13	19	1.0
SR 1200-12	200 x 100 x 12	147	220	1.4

Example for typical bearing dimensions and permissible loads. Other dimensions and thickness can be delivered. The permissible loads vary with the bearing surface.

The suitability of Sylomer® materials for the use as elastic bearings was thoroughly investigated both in our laboratory as well as by external institutes. Tests of the use of Sylomer® as a landing bearing and as an elastic bearing for track troughs were performed, among others. The tests of the suitability for use were performed at the Technical University of Munich, Testing Institute for Construction of Permanent Way Transportation Routes.

Tests on the use as stair bearing were performed by the Fraunhofer Institute for Building Physics in Stuttgart and the Testing and Research Institute of Section 39 of the City of Vienna. The material properties were investigated by Müller-BBM in Planegg near Munich, the Federal Testing and Research Institute, Vienna Arsenal, and TÜV Rheinland, among others.

The fire behavior of Sylomer® materials is classified as class B2 (normally flammable) as per DIN 4102. The flammability of the bearing when installed is of primary significance for fire protection. The fire behavior of the entire structure can be significantly improved by sealing the joints with a flame-resistant elastic jointing compound.

\* The load limit indicates the maximum bearing load from the static and realistically expected traffic load. However, the basis for the bearing design should be the expected spring deflection. Sylomer® can easily accept shortterm load peaks, such as through extraordinary use.

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