BUILDING
COMMON GROUND

MAX FRANK®

Building acoustics

Impact sound insulation

International edition

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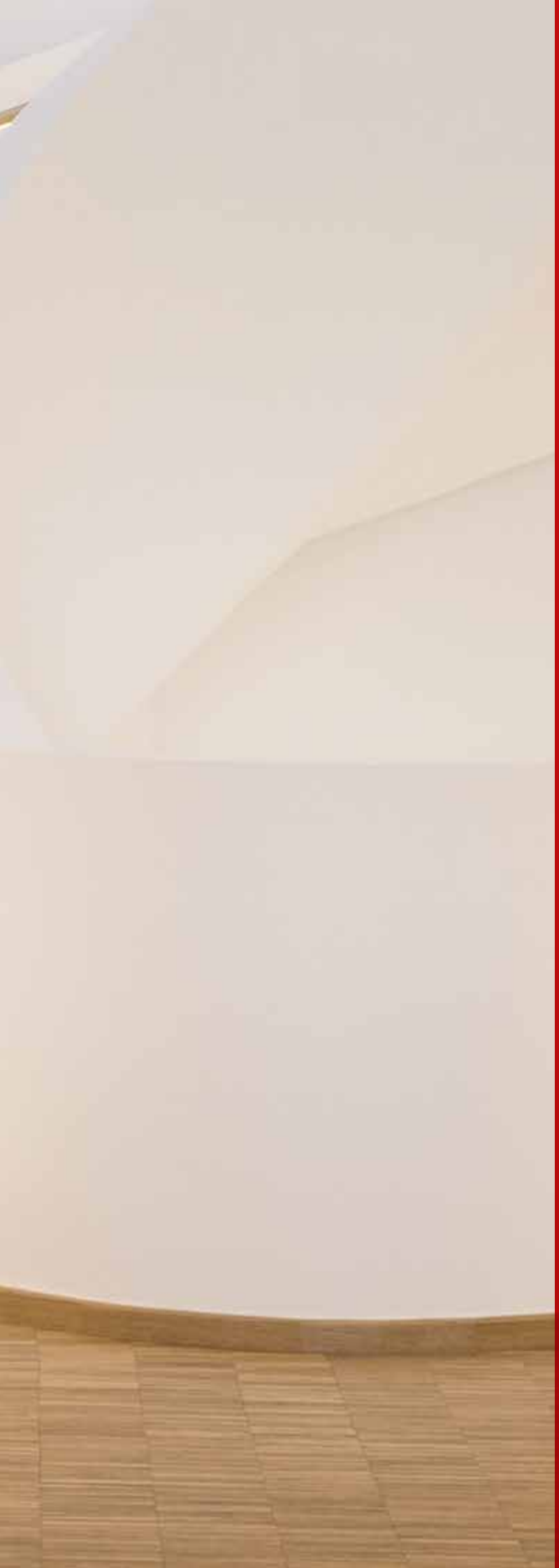

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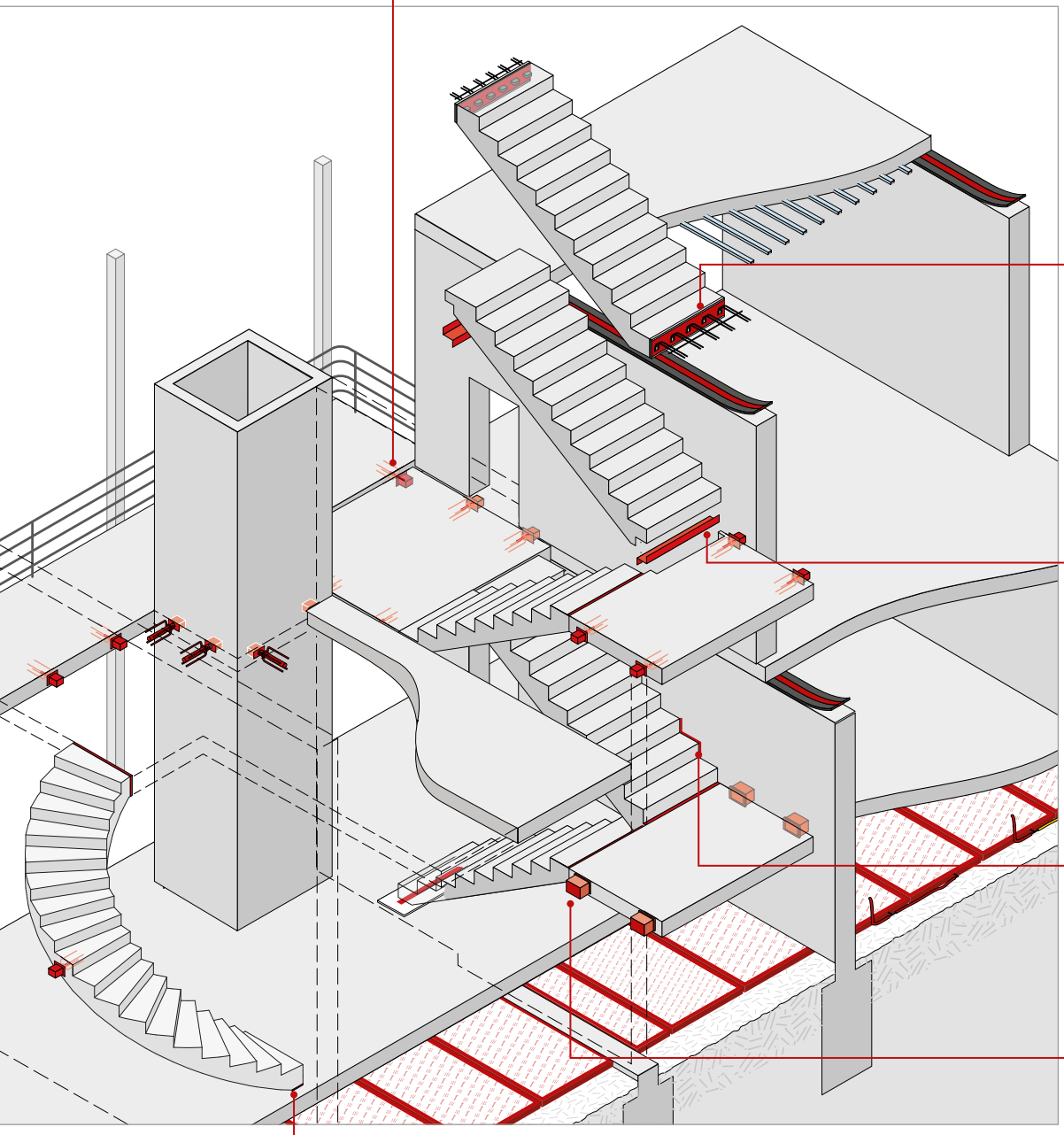
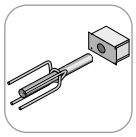
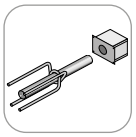
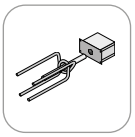

Egcopal SPX
Egcopal SPH
Egcopal SP
Egcopal SP light
Egcostep®
Egcoscal T stair bedding
Egcoscal S shape
FDPL distance plate
Egcosono
Egcoscal F shape
Egcoscal TD staircase dowel

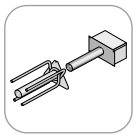
Egcopal impact sound insulated shear force dowel


Egcopal SPX for in-situ concrete

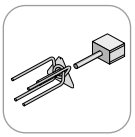

Egcopal SPH for in-situ concrete

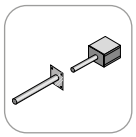

Egcopal SP for in-situ concrete


Egcopal SP light for in-situ concrete


Egcopal SPX for precast element


Egcopal SPH for precast element


Egcopal SP for precast element


Egcopal SP light for precast element

Egcosono stair landing bearing

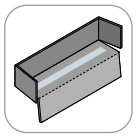

Egcosono for in-situ concrete platforms


Egcosono for precast platforms

Egcostep® stair flight decoupling


Egcostep®

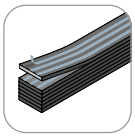
Egcoscal stair beddings


Egcoscal S shape


Egcoscal F shape


Egcoscal TD staircase dowel


Egcoscal T stair bedding


FDPL distance plate

Explanations

Sound insulation

In everyday life, people are exposed to a wide variety of noise pollution. They spend most of the day (> 80%) indoors. It is therefore all the more important that all the necessary soundproofing measures for a building have been taken into account in advance, and that they function effectively, especially during individual recovery phases.

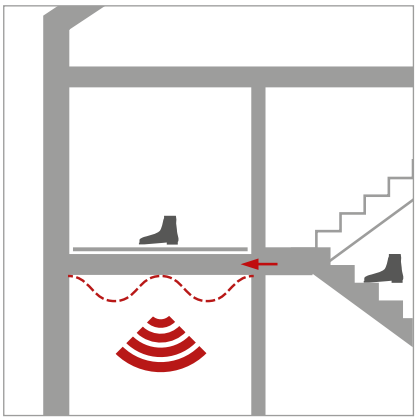
The sound insulation measures on a building can be divided as follows:

- Sound insulation measures against external noise (windows, external walls, roofs, balconies, loggias and arcades, etc.)
- Sound insulation measures against interior noise
  - Airborne sound insulation of interior walls, ceilings, doors, etc.
  - Impact sound insulation of ceilings, stairs, landings, etc.
  - Protection against building service noises such as elevators, building service rooms, etc.

Effective sound insulation is an important precondition in the field of building construction, both for health protection and for achieving certain comfort conditions.

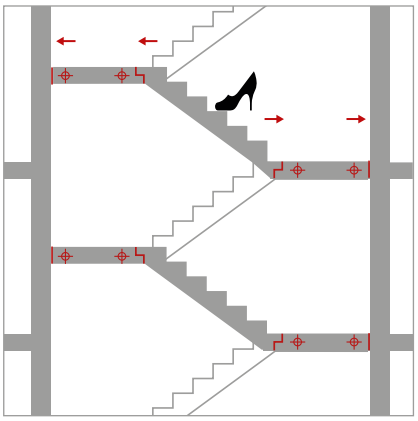
This can be ensured in advance by integral and professionally coordinated planning between building owners, architects and building physicists. Finally, in building practice, it must be ensured that the previously defined sound insulation requirements are achieved through professional installation.

Impact sound



Sound from spoken language spreads through the air in the form of airborne sound. At the same time, it is reduced to varying degrees at the room boundary surfaces by the sound insulation properties of the various building components (walls, windows, doors, floors and ceilings - and their individual sound insulation effect). Impact sound, on the other hand, is transmitted e.g. by walking and knocking noises or the movement of chairs on building ceilings or in stairwells. Impact sound is a special form of structure-borne sound. Impact sound is initially introduced into the building in the form of structure-borne sound. For humans, impact sound only becomes audible again through the radiation of ceiling and wall surfaces in the form of airborne sound.

Impact sound insulation in selected areas of application



In areas such as stairwells, balconies, loggias and arcades, inadequate impact sound insulation can lead to unwanted disturbances and disputes among the occupants. To avoid this, the available impact sound products for this purpose (e.g. stair flight or stair landing decouplers) must be specified in accordance with the agreed sound insulation requirements and then installed both professionally and without structure-borne noise.

Requirements

In principle, construction requirements can be based on standards, guidelines, generally accepted rules of technology or the wishes of the client. The requirements for sound insulation are initially divided into requirements under building regulations and those under private law.

Building authority requirements

The requirements of the building authorities can be found in DIN 4109-1 Sound insulation in Building Construction - Part 1: Minimum Requirements (January 2018 edition). The defined requirement levels are mandatory under building law and may not be undercut according to the building regulations. The aim of minimum sound insulation is to protect people in living spaces from unacceptable noise pollution in order to protect their health. The EU Construction Products Regulation (CPD) describes this in Annex I, paragraph 5, as follows:
“The construction works shall be designed and constructed in such a way that the sound perceived by the occupants or by persons in the nearby areas is kept at a level which is not dangerous to health and which ensures satisfactory conditions for night-time rest, leisure and work.”

DIN

DIN 4109-1

Private law requirements

In addition to the minimum requirements of the building authorities, a higher quality level or target value is often agreed in a contract for work between the specialist planner and the architect or the client. These requirements under private law must then also be complied with.
The following standards or guidelines can be used to define increased sound insulation levels:

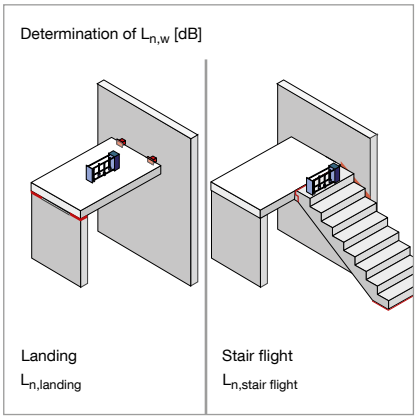
- DIN 4109-5:2020-08
  Sound insulation in buildings - Part 5: Increased requirements
  Note: This standard replaces the withdrawn DIN 4109 supplementary sheet 2 of November 1989 and DIN SPEC 91314 of January 2017.
- VDI 4100:2012-10
  Sound insulation between rooms in buildings - Dwellings - Assessment and proposals for enhanced sound insulation between rooms.
- DEGA Recommendation 103
  “Sound insulation in the housebuilding - Sound insulation identity card”.

DIN 4109-5
VDI 4100
DEGA 103

Laboratory test procedure according to DIN 7396

The acoustic properties of products used for impact sound decoupling of solid stair flights and stair landings are tested according to a laboratory test procedure described in DIN 7396.

DIN 7396 - Building acoustics testing - Test method for acoustic labelling of decoupling elements for solid stairs - June 2016 edition. The tests in accordance with DIN 7396 are carried out in a decoupled test bench in connection with a standard staircase wall. During the measurements, the reference test assemblies for the decoupled stair landing and the decoupled stair flight, which are precisely specified in the test procedure in terms of dimensions, must be used.



According to DIN 7396, for each tested impact sound decoupling element, three sound insulation values are received:

Explanation for weighted impact sound pressure level difference $\Delta L^*_{landing}$ or $\Delta L^*_{stair\ flight}$

The impact sound pressure level difference is the normative value and is used for a direct comparison of products. The improvement of the impact sound insulation by the decoupling element is the better, the higher the evaluated impact sound pressure level difference $\Delta L^*_{landing}$ or $\Delta L^*_{stair\ flight}$ is.

Explanation for weighted impact sound pressure level reduction $\Delta L_{landing}$ or $\Delta L_{stair\ flight}$

The impact sound pressure level reduction is an informative value. The weighted impact sound pressure level reduction $\Delta L_{landing}$ or $\Delta L_{stair\ flight}$ indicates how much the standard wall impact sound level has been improved by the installation of the reference stair landing with the decoupling to be tested or it indicates how much the standard stair landing impact sound pressure level was improved by the installation of the reference stair flight with the decoupling to be tested.

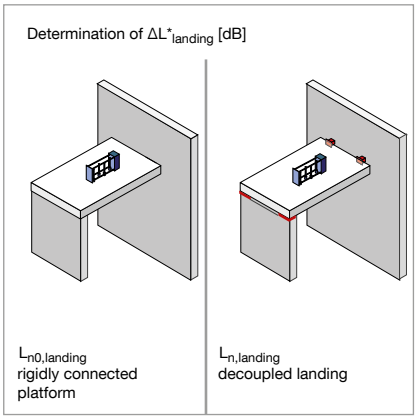
The improvement of the impact sound insulation by the decoupling element is the better, the greater the weighted impact sound pressure level reduction $\Delta L_{landing}$ or $\Delta L_{stair\ flight}$ is.

Explanation for weighted standard impact sound pressure level $L_{n,w,landing}$ or $L_{n,w,stair\ flight}$

The impact sound insulation is better, the lower the weighted standard impact sound pressure level of the tested construction $L_{n,w,landing}$ or $L_{n,w,stair\ flight}$ is.

LANDING decouplings

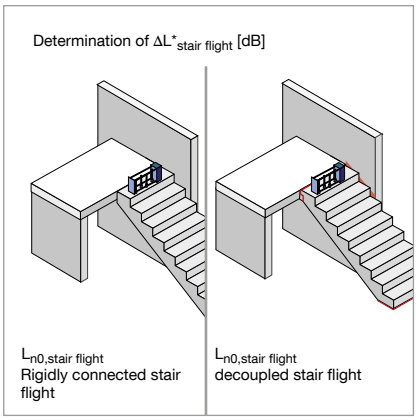
- Landing impact sound pressure level difference $\Delta L^*_{landing}$ [dB]
- Landing impact sound pressure level reduction $\Delta L_{landing}$ [dB]
- Weighted standard impact sound level in the reception room $L_{n,w}$ [dB]



STAIR FLIGHT decouplings

- Stair flight impact sound pressure level difference $\Delta L^*_{stair\ flight}$ [dB]
- Stair flight impact sound pressure level reduction $\Delta L_{stair\ flight}$ [dB]
- Weighted standard impact sound pressure level in the receiving room $L_{n,w}$ [dB]

The impact sound insulation effect of each impact sound decoupling element is investigated at different load levels (e.g. minimum load or dead load, load level 1, load level 2, maximum load).



Overview of the building authority requirements according to DIN 4109 Part 1

Building type	Building component	$L'_{n,w}$ DIN 4109 Part 1 Edition 2018-01	Comments
Apartment buildings, office buildings and mixed-use buildings	Stair flights and landings	≤ 53 dB	-
	Apartment separation ceilings (including stairs)	≤ 50 dB	Apartment separation ceilings are building components that separate apartments from each other or from external workrooms.
	Separating ceilings (including staircases) between third-party workrooms or comparable units of use	≤ 53 dB	-
	Ceilings and staircases within apartments extending over two floors	≤ 50 dB	The requirement applies to impact sound transmission into other occupied spaces, in all sound propagation directions.
	Ceilings under arcades	≤ 53 dB	
	Balconies	≤ 58 dB	
Semi-detached and terraced houses	Stair flights and landings	≤ 46 dB	The requirement applies only to impact sound transmission into other occupied spaces in the horizontal or oblique direction.

Comparison of impact sound insulation requirements of staircases and arcades in apartment buildings

	$L'_{n,w}$	DEGA Recommendation 103 Edition 2018-01		VDI 4100 Edition 2012-10		DIN 4109-5 Edition 2020-08
	[dB]	Classes	How disrupting is walking noise?	Sound insulation levels	How disrupting is walking noise?	Increased requirements
Increasing impact sound requirements	≤ 33 dB	A*	Not audible DEGA (≤ 33 dB)			
	≤ 37 dB	A	Not audible DEGA (≤ 38 dB)	SSt III (≤ 37 dB)	Not disturbing	
	≤ 38 dB	A				
	≤ 43 dB	B	Still audible DEGA (≤ 43 dB)			
	≤ 44 dB	C	Audible DEGA (≤ 48 dB)	SSt II (≤ 44 dB)	Generally not disruptive	
	≤ 45 dB	C				≤ 45 dB apartment separation ceilings (stairs)
	≤ 47 dB	C				≤ 47 dB Stair flights and landings
	≤ 48dB	C				≤ 48 dB Ceilings under arcades
	≤ 50 dB	D	Clearly audible DEGA (≤ 50 dB)	SSt I (≤ 51 dB)	Generally non-disruptive	

Comparison of impact sound insulation requirements for balconies in apartment buildings

	$L'_{n,w}$	DEGA Recommendation 103 Edition 2018-01		VDI 4100 Edition 2012-10		DIN 4109-5 Edition 2020-08
	[dB]	Classes	How disrupting is walking noise?	Sound insulation levels	How disrupting is walking noise?	
Increasing impact sound requirements	≤ 33 dB	A*	Not audible			
	≤ 38 dB	A	Not audible	SSt III	Not disturbing	
	≤ 43 dB	B	Still audible			
	≤ 48 dB	C	Audible	SSt II	Not disturbing	
				SSt I	Hardly disturbing	
	≤ 50 dB	D	Clearly audible			Minimum requirements audible

Comparison of impact sound insulation requirements of stairs in terraced and semi-detached houses

	$L'_{n,w}$	DEGA Recommendation 103 Edition 2018-01		VDI 4100 Edition 2012-10		DIN 4109-5 Edition 2020-08
	[dB]	Classes	How disrupting is walking noise?	Sound insulation levels	How disrupting is walking noise?	Increased requirements
Increasing impact sound requirements ↑	≤ 32 dB	A*	Not audible DEGA (≤ 33 dB)	SSt III (≤ 32 dB)	No data	
	≤ 33 dB	A*				
	≤ 38 dB	A	Not audible DEGA (≤ 38 dB)			
	≤ 39 dB	A		SSt II (≤ 39 dB)	No data	
	≤ 41 dB	B	Still audible DEGA (≤ 43 dB)			≤ 41 dB Stair flights and landings
	≤ 43 dB	B				
	≤ 46 dB	C	Audible	SSt I (≤ 46 dB)	No data	
	≤ 48 dB	C				

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Egcopal

Impact sound insulated shear force dowel

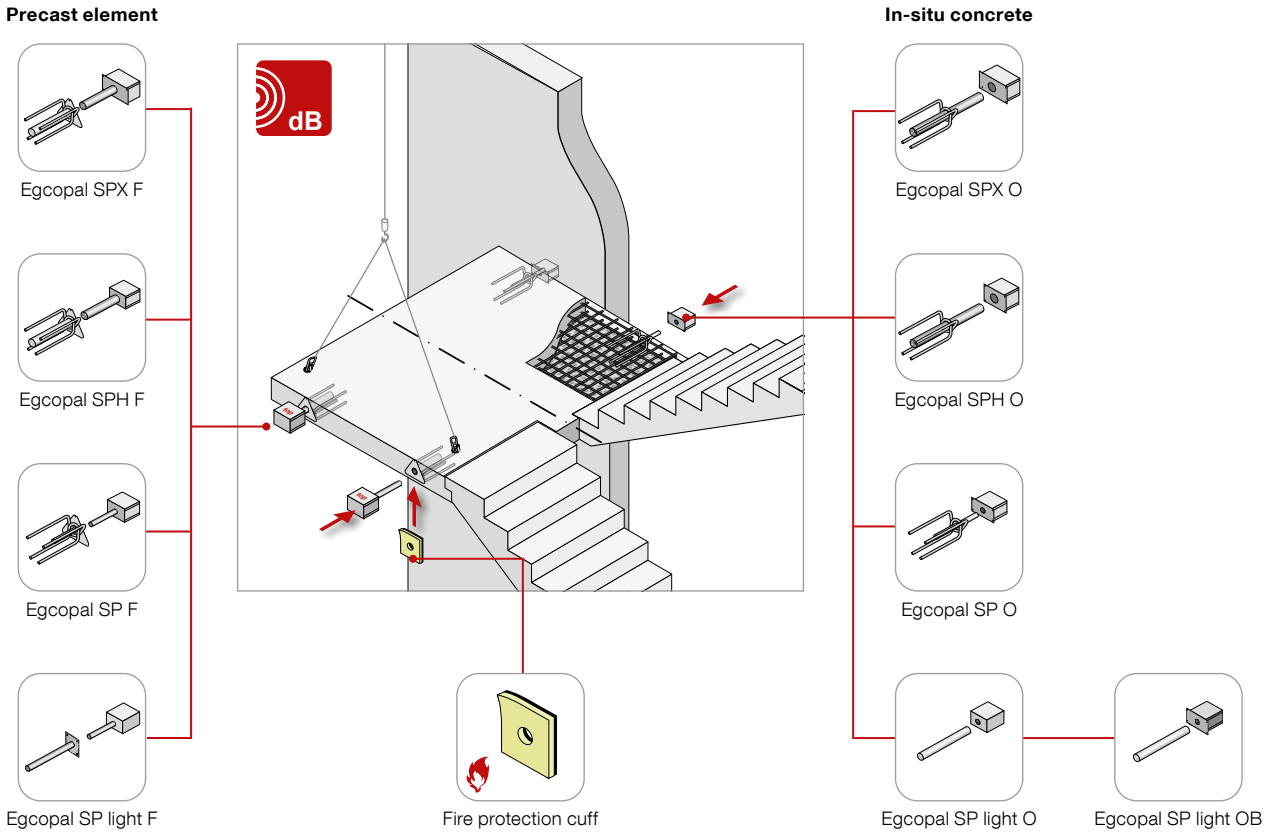
Egcopal impact sound insulated shear force dowel

Support of stair landings and arcades

The requirements for sound insulation in buildings have been increasing for years. To meet the requirements, impact sound insulation of stairs and stair landings must be certified. The impact noise insulated Egcopal shear force connector reduces impact sound by decoupling components. It is used for the bedding of stair landings, arcades and cantilever balconies and transmits the shear forces acting in the connection joint. At the same time, the acoustically decoupled bedding ensures that the transmission of disturbing noises into adjacent rooms is insulated – this increases the comfort and well-being of the residents.

Advantages

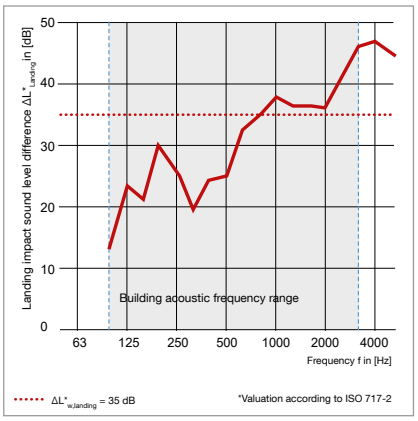
- National technical approval for Egcopal SP, Egcopal SPH, Egcopal SPX
- Impact sound properties tested in an accredited test laboratory according to DIN 7396
- Impact sound level difference of stair landing $\Delta L^*_{w,\ stair\ landing}$ up to 35 dB
- Fire protection rating F120
- Stainless steel version
- No restrictions of the exposure class acc. to EC2



Technical Information

Sound insulation

The impact sound improvement contribution for the different Egcopal variants was determined in accordance with DIN 7396 in an accredited test laboratory and adapted to the respective area of application.

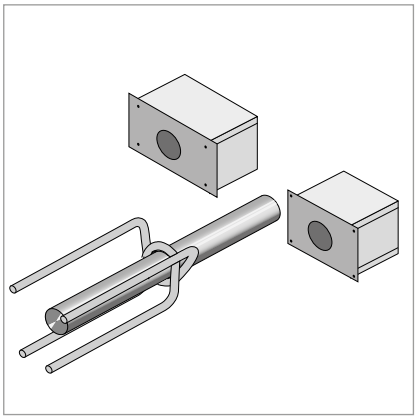


Egcopal SPX and SPH

If, in addition to effective impact sound reduction, a good thermal insulation effect must also be taken into account, e.g. for arcades and loggia slabs, then the use of Egcopal SPH or Egcopal SPX is recommended. Egcopal SPH achieves here a landing impact sound pressure level difference $\Delta L^*_{w,\,landing}$ of 30 dB up to 31 dB.

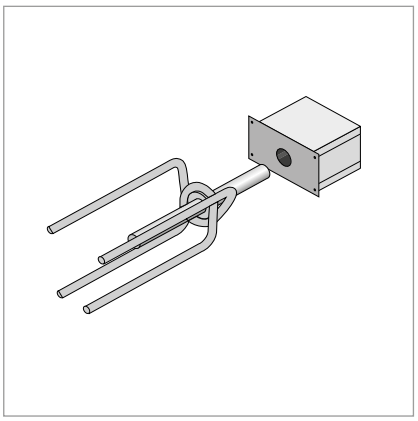
With Egcopal SPX, which can also be used for a load-bearing capacity of up to 60.3 kN/element, landing impact sound level differences $\Delta L^*_{w,\,landing}$ of 26 dB up to 29 dB were achieved.

With these two Egcopal variants, thermal insulation joints of up to 100 mm can be realised without loss of load-bearing capacity. When used in facades, significant advantages for a better thermal insulation effect can be achieved.



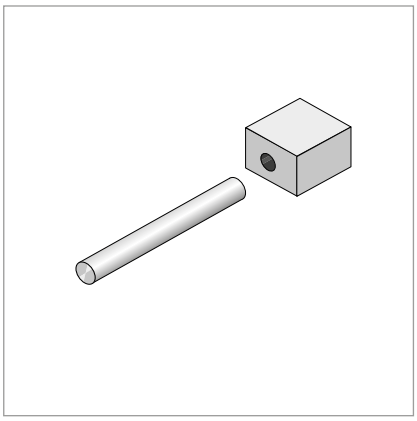
Egcopal SP

If a high impact sound reduction is required for the connections of stairs or stair landings, the Egcopal SP shear dowel connection in the standard version is ideal. With a landing impact sound pressure level difference $\Delta L^*_{w\ landing}$ of 32 dB up to 35 dB, it meets the very highest sound insulation requirements.



Egcopal SP light

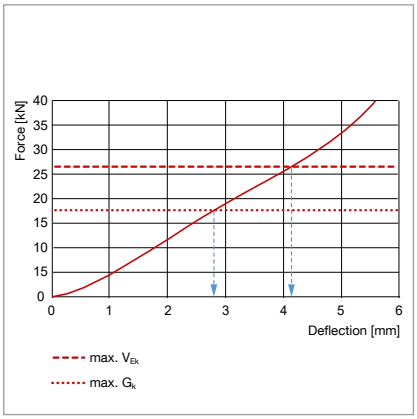
If impact sound reduction is required for joint widths up to 60 mm, Egcopal SP light can be used. Landing impact sound pressure level differences $\Delta L^*_{w,\ landing}$ of 30 dB up to 31 dB have been determined.
The details for all Egcopal variants can be found in EMPA test report no. 5214021956 (available at www.maxfrank.com).



Deflection behavior of the elastomeric bearing

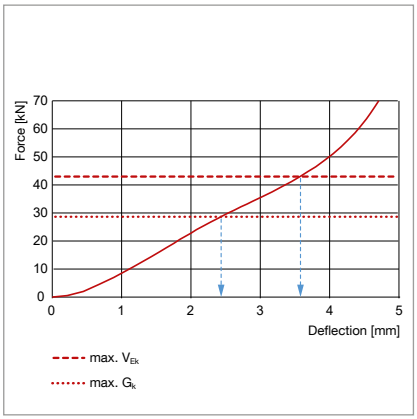
Notes for Egcopal SPX

- Reference values instantaneous deformation of the elastomeric bearing with centric force application
- Additionally consider time-dependent and other deformations (creep deformation additionally amounts to about 50% of the momentary deformation from permanent load)
- For $\gamma = 1.4$, applies $\max.V_{Ek} = \max.V_{Ed} / \gamma$
- $\gamma = 1.4$ is valid under the following assumption that $\max.V_{Ed}$ is composed of 2/3 dead load and 1/3 traffic load.
- This means that $\max.V_{Ek}$ is the maximum service load and the maximum dead weight is calculated from $G_k = 2/3 * \max.V_{Ek}$



Notes for Egcopal SP, Egcopal SPH and Egcopal SP light

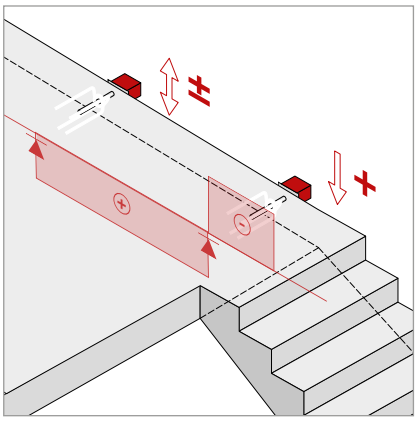
- Reference values instantaneous deformation of the elastomeric bearing with centric force application
- Additionally consider time-dependent and other deformations (creep deformation additionally amounts to about 50% of the momentary deformation from permanent load)
- For $\gamma = 1.4$, applies $\max.V_{Ek} = \max.V_{Ed} / \gamma$
- $\gamma = 1.4$ is valid under the following assumption that $\max.V_{Ed}$ is composed of 2/3 dead load and 1/3 traffic load.
- This means that $\max.V_{Ek}$ is the maximum service load and the maximum dead weight is calculated from $G_k = 2/3 * \max.V_{Ek}$



Load-bearing behavior

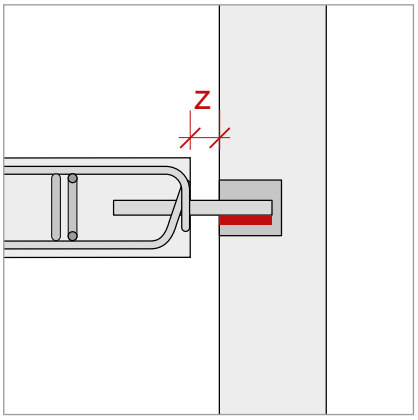
Lifting forces

Depending on the design and stress on the supporting structure parts, lifting forces can arise in individual areas that must be carried by the Egcopal. This is possible with the PlusMinus (PM) design variant, in which a separating layer is additionally installed in the upper part of the acoustic box to decouple impact sound. The load-bearing capacity is then identical for positive and negative shear forces.

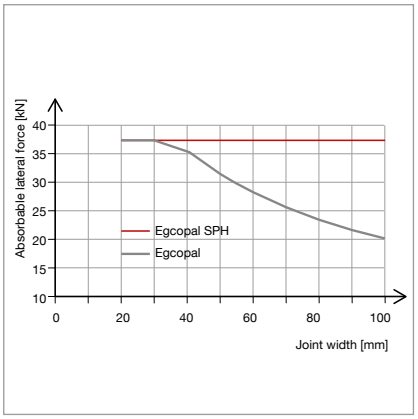


Joint width

While Egcopal SP light can be used for joint widths of up to 60 mm, Egcopal SP, Egcopal SPH and Egcopal SPX can be used for joint widths of up to 100 mm. The load-bearing capacity of the connection for larger joint widths is significantly limited by the bending load-bearing capacity of the steel mandrel.

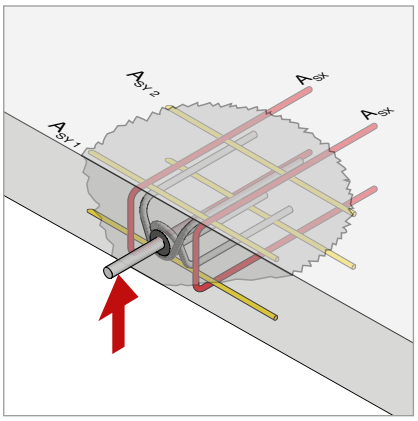


With an enlarged mandrel cross-section, the SPH and SPX variants offer the possibility of fully exploiting the maximum load-bearing capacity of the system, even for large joint widths of up to 100 mm. In particular, when placed in the insulation level, Egcopal SPH and Egcopal SPX show their full advantages with maximum load transfer and minimum thermal bridges.



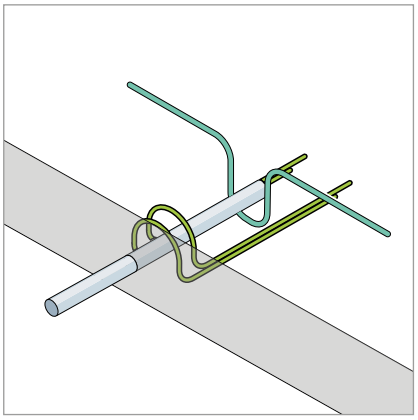
Additional reinforcement Egcopal

The safe load transfer from the Egcopal shear force support into the component to be connected is ensured by an additionally inserted reinforcement. This reinforcement is provided in the form of A_{sx} restraint stirrups running vertically to the side of the mandrel and A_{sy} long bars running orthogonally to the mandrel axis. Additional stirrups are arranged in the rear part of the anchor body.



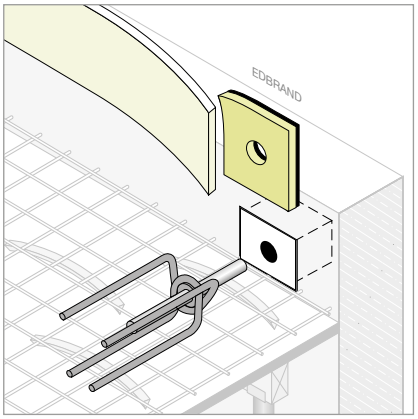
Additional reinforcement Egcopal SP light

For the Egcopal SP light product variants, there is also the option of anchoring with loop and cap stirrups as an alternative.



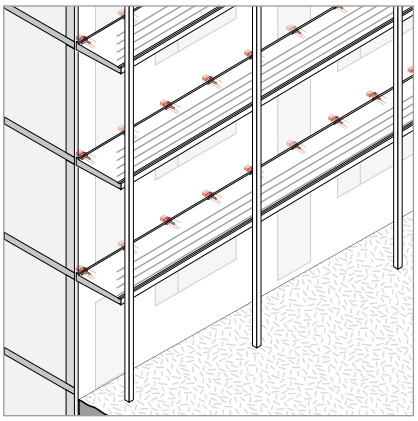
Fire protection

In combination with the fire protection cuff, the impact sound insulated shear force dowels Egcopal SP, Egcopal SPH, Egcopal SPX and Egcopal SP light can withstand fires for a long time. The system has been classified by MPA Braunschweig as fire resistance class F120 for joint widths up to 70 mm. The required fire protection cuffs can be ordered in addition to the shear force dowels by specifying the respective joint width.

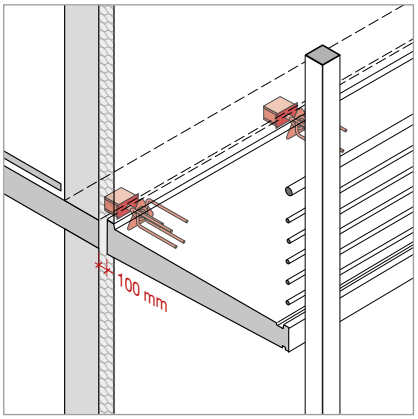


Thermal protection

Due to its design, the Egcopal shear force dowel is able to minimize heat transfer via the shear force connection. The thermal insulation properties of Egcopal SP and Egcopal SPH were determined by the Forschungsinstitut für Wärmeschutz e.V. München (FIW). The punctual heat transfer coefficients rach values of χ (SP) = 0.085 [W/K] and χ (SPH) = 0.125 [W/K]. Egcopal SP and Egcopal SPH are therefore excellently suitable for arcades, loggia slabs or uninsulated staircases.

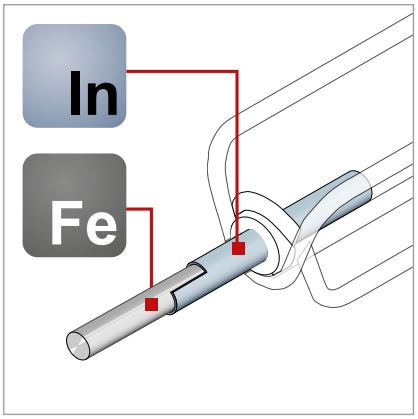


Multi-story residential buildings are often accessed via arcades. In contrast to interior staircases, the connections here have to meet not only the requirements for load-bearing function and sound insulation, but also the increased requirements for thermal insulation.
The Egcopal SPH offers the solution for this: Vertical loads from pre-stiffened arcades are reliably transferred into the building wall, thermal bridges are minimized and, in addition, the Egcopal SPH ensures that the occupants are protected from the impact sound of others.



Corrosion protection

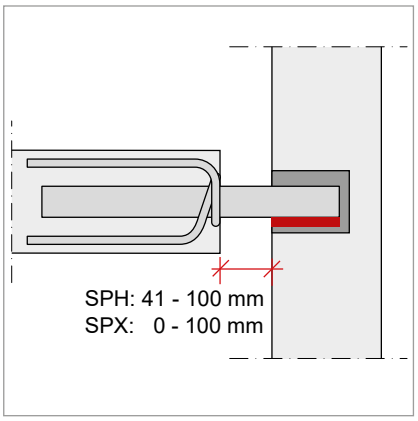
The in-joint shear force mandrel is manufactured from a core and a jacket material in a unique mechanical process. The high-strength, load-bearing mandrel core has excellent mechanical properties, while the stainless steel jacket material offers optimum corrosion protection. By sealing the mandrel ends, the core material is also permanently protected against corrosion. The anchor bodies used with Egcopal SP, Egcopal SPH and Egcopal SPX are also made of stainless steel, so that they are also safely protected against corrosion in their position within the concrete cover.



Egcopal SPH and Egcopal SPX

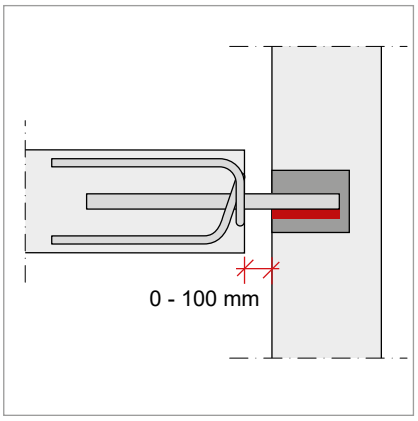
The SPH variant of the impact sound insulated shear force dowel offers the transfer of maximum loads, even with the largest joint widths of up to 100 mm. Due to the enlarged dowel diameter, high loads can be transferred safely and with low deformation even with joint widths of 100 mm, which makes the arrangement in the insulation plane a good choice.

The Egcopal SPH and Egcopal SPX have a national technical approval by the DIBt and offer the same advantages in terms of fire protection, corrosion resistance and planning as the Egcopal SP. While Egcopal SPH is suitable for joint widths between z = 41 and 100 mm and a load capacity of up to 37.3 kN/element, Egcopal SPX can be used for joint widths between z = 0 and 100 mm with a load capacity of up to 60.3 kN/element.



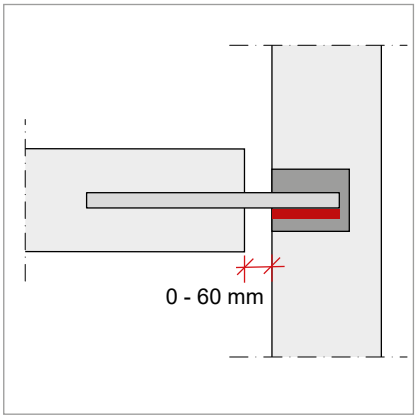
Egcopal SP

The impact sound insulated shear force dowel Egcopal SP is used for the acoustic decoupling of building components. It is used for the support of stair landings, arcades and cantilevered balconies and transmits the shear forces acting in the connection joint. At the same time, the acoustically decoupled support ensures that the transmission of disruptive noises into adjacent rooms is excellently insulated - this increases the living comfort and the well-being of the occupants.



Egcopal SP light

Egcopal SP light can be used for joint widths up to 60 mm. Due to the missing anchor body, Egcopal SP light offers advantages in geometrically demanding installation situations (e.g. spiral staircases). A type static analysis can be provided for the static verification. In addition to anchoring with vertical high-hanging reinforcement, anchoring with loop reinforcement guided around the mandrel is also possible as an alternative.



Product variants

Egcopal SPX impact sound insulated shear force dowel for in-situ concrete

Joint widths up to 100 mm for in-situ concrete construction

- Shear force connection (consisting of mandrel part and acoustic box) separates the components from each other in terms of sound and heat, for example in arcades
- Landing impact sound pressure level difference $\Delta L^*_{w,\ landing}$ 26 to 29 dB
- Mandrel diameter Ø = 52 mm
- Heat transfer coefficient 0.125 [W/K]
- Fire resistance class F120 for joint width up to 70 mm
- Max. load-bearing capacity V_{Rd} 60.3 [kN/element]
- From panel thicknesses ≥ 160 mm
- National technical approval by the DIBt

Egcopal SPH impact sound insulated shear force dowel for in-situ concrete

Joint widths from 41 to 100 mm for in-situ concrete construction

- Shear force connection (consisting of mandrel part and acoustic box) separates the components from each other in terms of sound and heat, for example in arcades
- Landing impact sound pressure level difference $\Delta L^*_{w,\ landing}$ 30 to 31 dB
- Mandrel diameter Ø = 52 mm
- Heat transfer coefficient 0.125 [W/K]
- Fire resistance class F120 for joint width up to 70 mm
- Max. load-bearing capacity V_{Rd} 37.3 [kN/element]
- From panel thicknesses ≥ 160 mm
- National technical approval by the DIBt

Egcopal SP impact sound insulated shear force dowel for in-situ concrete

Joint widths up to 100 mm for in-situ concrete construction

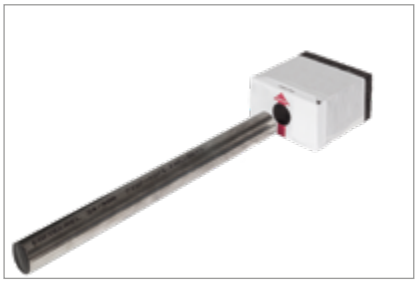
- Shear force connection (consisting of mandrel part and acoustic box) separates components from each other in terms of sound, for example in stairwells
- Landing impact sound pressure level difference $\Delta L^*_{w,\ platform}$ 32 to 35 dB
- Mandrel diameter Ø = 32 mm
- Thermal transmittance 0.085 [W/K]
- Fire resistance class F120 for joint width up to 70 mm
- Max. load-bearing capacity V_{Rd} 37.3 [kN/element] depending on joint width z [mm]
- From panel thicknesses ≥ 160 mm
- National technical approval by the DIBt

Proof of usability

The German National test certificate for a construction product is a verification of fitness for use according to German Standards, which declares product properties and product performance. The construction product is then to be marked with the Ü-mark. Comprehensive tests and verifications guarantee a product which is ideally suited to the requirements.

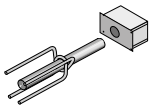
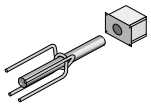
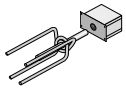
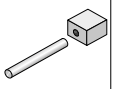
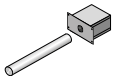
Egcopal SP light impact sound insulated shear force dowel for in-situ concrete

Joint widths up to 60 mm for in-situ concrete construction



- Shear force connection with missing anchor body offers advantages especially in geometrically demanding installation situations (e.g. spiral staircases)
- Design variant SP light O for masonry walls and SP light OB in conjunction with cast-in-place concrete walls
- Landing impact sound pressure level difference $\Delta L^*_{w,\,landing}$ 30 to 31 dB
- Mandrel diameter Ø = 34 mm
- Joint width up to 60 mm
- Max. load-bearing capacity V_{Rd} 37.3 [kN/element] depending on joint width z [mm]
- From panel thicknesses ≥ 160 mm

Type overview

		Egcopal SPX O		Egcopal SPH O		Egcopal SP O				Egcopal SP light O	
											
Type		**SPX O**	**SPX O±**	**SPH O**	**SPH O±**	**SP O**		**SP O±**		**SP light O**	**SP light OB**
Direction of load	▲ ▼	▼	▲ ▼	▼	▲ ▼	▼		▲ ▼		▼	
Joint width	[mm]	0 - 100		41 - 100		0 - 40	41 - 100	0 - 60	61 - 100	0 - 60	
Dowel diameter	[mm]	52				32				34	
Landing impact sound pressure level difference $\Delta L^*_{w,\,landing}$	[dB]	26 - 29	26 - 29	30 - 31	30 - 31	32 - 35	32 - 35	32 - 35	32 - 35	30 - 31	30 - 31
Max. Load-bearing capacity V_{Rd} up to	[kN/Element]	60.3		37.3			34.9	37.3	27.7	37.3	

Egcopal SPX impact sound insulated shear force dowel for precast element

Joint widths up to 100 mm in precast construction

- Load-bearing element with excellent impact sound reduction and corrosion resistance for the requirements of precast construction
- Landing impact sound pressure level difference $\Delta L^*_{w,\ landing}$ 26 to 29 dB
- Mandrel diameter Ø = 52 mm
- Heat transfer coefficient 0.125 [W/K]
- Fire resistance class F120 for joint width up to 70 mm
- Max. load-bearing capacity V_{Rd} 60.3 [kN/element]
- From panel thicknesses ≥ 160 mm
- National technical approval by the DIBt

Egcopal SPH impact sound insulated shear force dowel for precast element

Joint widths from 41 to 100 mm in precast construction

- Load-bearing element with excellent impact sound reduction and corrosion resistance for the requirements of precast construction
- Landing impact sound pressure level difference $\Delta L^*_{w,\ landing}$ 30 to 31 dB
- Mandrel diameter Ø = 52 mm
- Heat transfer coefficient 0.125 [W/K]
- Fire resistance class F120 for joint width up to 70 mm
- Max. load-bearing capacity V_{Rd} 37.3 [kN/element]
- From panel thicknesses ≥ 160 mm
- National technical approval by the DIBt

Egcopal SP impact sound insulated shear force dowel for precast element

Joint widths up to 100 mm in precast construction

- Load-bearing element with excellent impact sound reduction and corrosion resistance for the requirements of precast construction
- Landing impact sound pressure level difference $\Delta L^*_{w,\ platform}$ 32 to 35 dB
- Mandrel diameter Ø = 32 mm
- Thermal transmittance 0.085 [W/K]
- Fire resistance class F120 for joint width up to 70 mm
- Max. load-bearing capacity V_{Rd} 37.3 [kN/element] depending on joint width z [mm]
- From panel thicknesses ≥ 160 mm
- National technical approval by the DIBt

Proof of usability

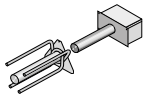
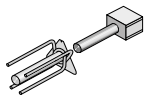
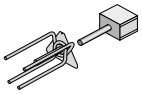
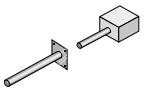
The German National test certificate for a construction product is a verification of fitness for use according to German Standards, which declares product properties and product performance. The construction product is then to be marked with the Ü-mark. Comprehensive tests and verifications guarantee a product which is ideally suited to the requirements.

Egcopal SP light impact sound insulated shear force dowel for precast element

for joint widths up to 60 mm in prefabricated construction

- Shear force connection with missing anchor body offers advantages especially in geometrically demanding installation situations (e.g. spiral staircases)
- Platform impact sound level difference $\Delta L^*w_{,\ platform}$ 30 to 31 dB
- Mandrel diameter Ø = 34 mm
- Max. Load-bearing capacity$_{VRd}$ up to 37.3 [kN/element]
- From panel thicknesses ≥ 160 mm

Type overview

		Egcopal SPX F		Egcopal SPH F		Egcopal SP F				Egcopal SP light F
										
Type		**SPX F**	**SPX F±**	**SPH F**	**SPH F±**	**SP F**		**SP F±**		**SP light F**
Direction of load	▲ ▼	▼	▲ ▼	▼	▲ ▼	▼		▲ ▼		▼
Joint width	[mm]	0 - 100		41 - 100		0 - 40	41 - 100	0 - 60	61 - 100	0 - 60
Dowel diameter	[mm]	52				32				34
Landing impact sound pressure level difference $\Delta L^*_{w,\ landing}$	[dB]	26 - 29		30 - 31		32 - 35				30 - 31
Max. Load-bearing capacity V_{Rd} up to	[kN/Element]	60.3		37.3			34.9	37.3	27.7	37.3

Accessories

Fire protection cuff

- Protects Egcopal from the effects of fire
- Fire resistance class F120 for joint width up to 70 mm
- Egcopal type and the selected joint width z [mm] necessary for selection

MAX FRANK®
BUILDING
COMMON GROUND

Egcosono

Stair landing bearing

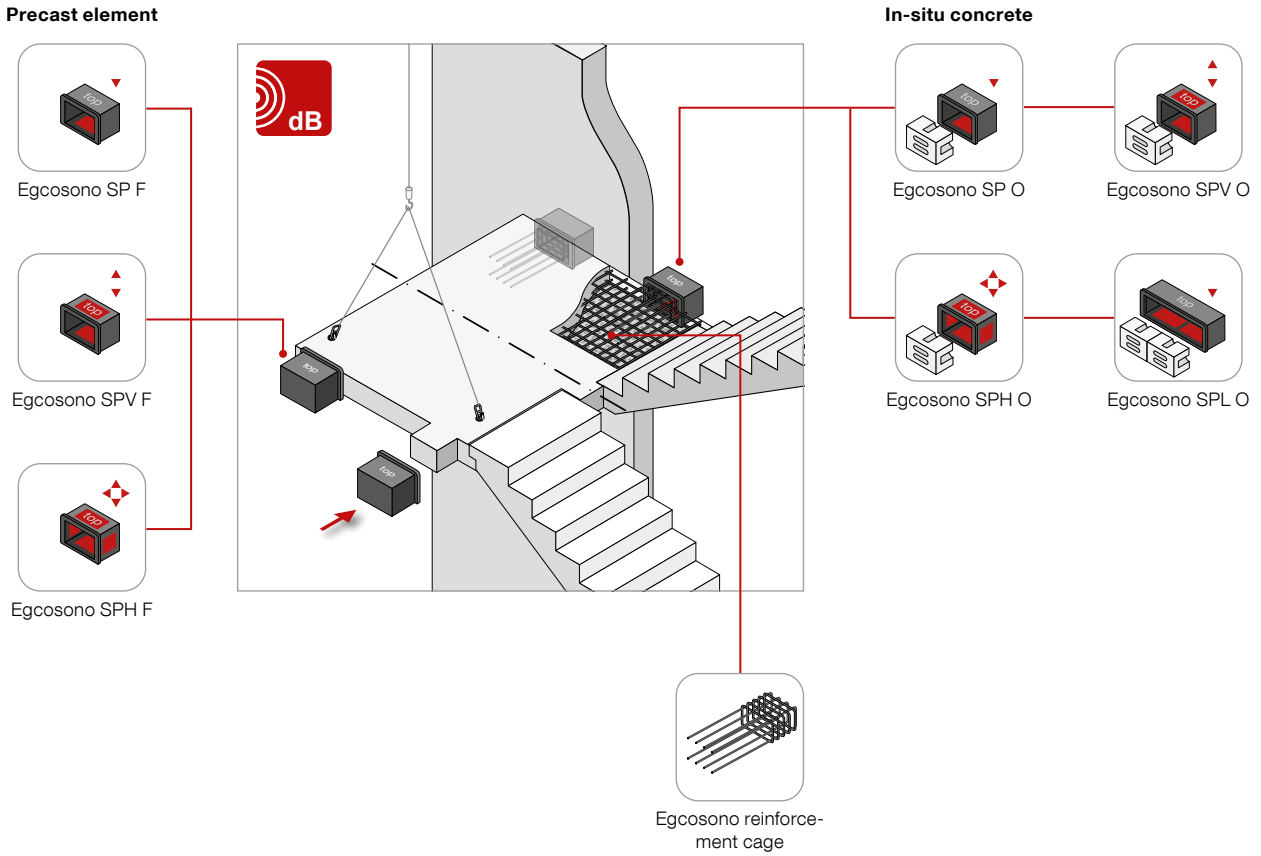
Egcosono stair landing bearing

Connection between stair landing and staircase wall

The requirements for sound insulation in buildings are regulated in country-specific sound insulation standards. The Egcosono landing support effectively reduces unwanted impact sound transmission in the stairwell by acoustically decoupling the landing, supporting it and consistently separating it from other building components.

Advantages

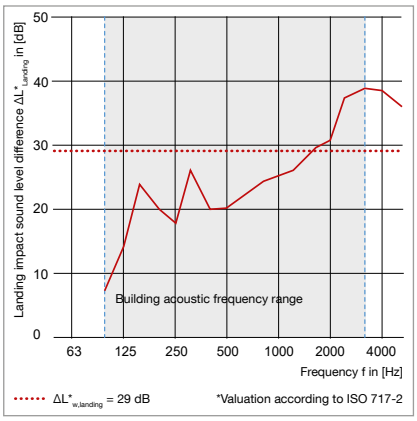
- Impact sound properties tested in an accredited test laboratory according to DIN 7396
- Type testing on the basis of EC2
- For in-situ concrete/precast landings
- Load-bearing capacity V_{Rd} = 87.4 kN
- Fire resistance rating R90



Technical Information

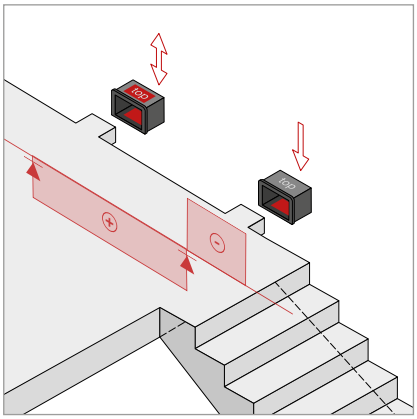
Sound insulation

The acoustic contribution of Egcosono to impact sound reduction was determined in accordance with DIN 7396 in an accredited test laboratory. With a landing impact sound pressure level difference $\Delta L^*_{w,\,landing}$ of 25 dB up to 29 dB, it meets the highest sound insulation requirements. Details can be found in the EMPA test report (available at www.maxfrank.com).



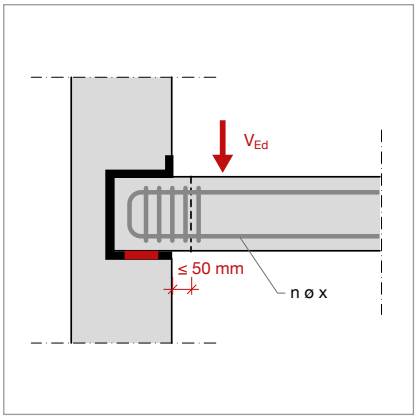
Load-bearing behaviour

In the case of landing bearings, the main focus from a structural design view is on the transfer of vertically downward shear forces. With a load-bearing capacity of 87.4 [kN/element], this is the strength of Egcosono. Depending on the situation on site, uplifting forces or horizontal forces can occur; they can be absorbed up to 23.8 [kN/element]. To facilitate and secure planning, the load-bearing capacities have already been determined within the scope of a type static analysis.



Plug-in bracket n ø x	Design value, shear force resistance max.V_{Rd} [kN/element] Concrete quality C20/25	C25/30	C30/37
2 Ø 8	38,9	45,1	50,9
3 Ø 8	57,3	66,5	75,1
4 Ø 8	75,8	87,4	87,4
5 Ø 8	87,4	87,4	87,4
2 Ø 10	47,4	55,0	62,1
3 Ø 10	70,3	81,6	87,4
4 Ø 10	87,4	87,4	87,4
5 Ø 10	87,4	87,4	87,4
2 Ø 12	55,9	64,9	73,2
3 Ø 12	83,2	87,4	87,4
4 Ø 12	87,4	87,4	87,4

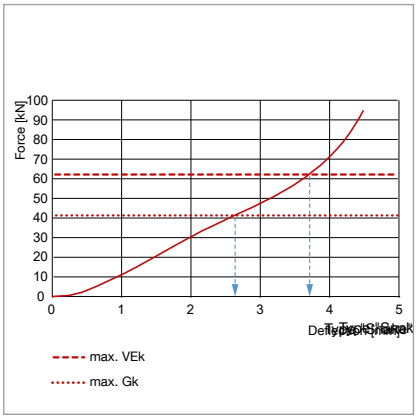
Table applies to vertical downward shear forces for the standard box.
Shear force bracket: 5 Ø 8, $c_{nom} \geq 20$ mm. The distance between the wall and the pedestal plate must not exceed 50 mm.
The load-bearing capacity of the long box corresponds to twice these values.
The type test must be observed.



Deflection behavior of the elastomeric bearing

Notes for Egcosono SP

- Reference values instantaneous deformation of the elastomeric bearing with centric force application
- Additionally consider time-dependent deformations (creep deformation additionally amounts to about 50% of the momentary deformation from permanent load)
- For γ = 1.4 applies max. V_{Ek} = max. V_{Ed} / γ
- γ = 1.4 is valid under the following assumption that max.V_{Ed} is composed of 2/3 dead load and 1/3 live load
- This means that max. V_{Ek} is the maximum service load and the maximum dead weight is calculated from G_k = 2/3 * max. V_{Ek}



Product variants

Egcosono stair landing bearing for in-situ concrete stair landings

With mounting body

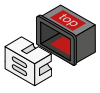
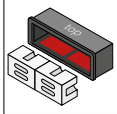
- Reduces impact sound transmission in the stairwell
- Landing impact sound pressure level difference $\Delta L^*_{w,\ landing}$ 25 to 29 dB
- Fire resistance class R90
- Max. Load-bearing capacity V_{Rd} up to 87.4 [kN/element]
- Type testing based on EC2
- Supplied with mounting body
- After concreting, the polystyrene body is easily and quickly removed with the ergonomic grip hole

Egcosono stair landing bearing for precast landings

Without mounting body

- Connects stair landing and staircase wall in a sound-insulating manner and improves sound insulation in adjacent rooms
- Landing impact sound pressure level difference $\Delta L^*_{w,\ landing}$ 25 to 29 dB
- Fire resistance class R90
- Max. Load-bearing capacity V_{Rd} up to 87.4 [kN/element]
- Type testing based on EC2
- Supplied without mounting body
- Polystyrene disposal not applicable

Type overview

		In-situ concrete landings				Precast element landings		
								
Type		**SP O**	**SP V± O**	**SP H± O**	**SP L O**	**SP F**	**SP V± F**	**SP H± F**
Direction of load		▼	▲▼	◆	▼	▼	▲▼	◆
Max. Load-bearing capacity V_{Rd} up to	**[kN/Element]** ▲▼	87.4	87.4 / -23.8	87.4 / -23.8	174.8	87.4	87.4 / -23.8	87.4 / -23.8
Max. load capacity H_{Rd} up to	**[kN/Element]** ◀▶	-	-	± 23,8	-	-	-	± 23,8
Stair landing thick-ness	**[mm]**	≥ 160						

Accessories

Egcosono reinforcement cage

- The prefabricated reinforcement cage is concreted into the pedestal
- Shear forces and resulting misalignment moments are transferred into the walls
- To achieve the maximum load capacity, the standard basket consists of 4 plug-in brackets Ø 12 mm and 5 shear force brackets Ø 8 mm

MAX FRANK®
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Egcostep®

Stair flight decoupling

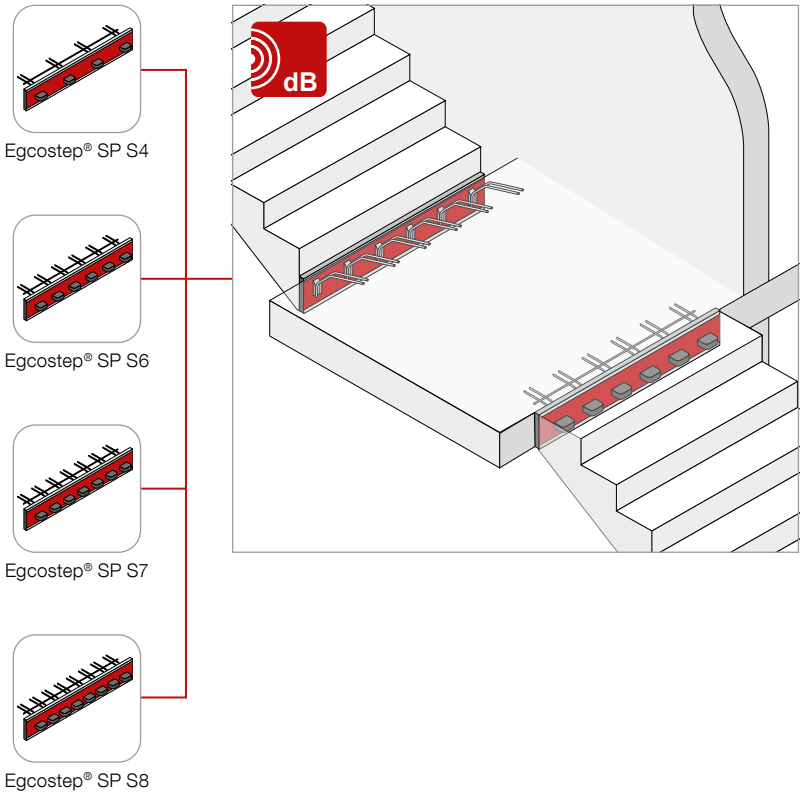
Egcostep® stair flight decoupling

Impact sound separation of stair flight / landing

Safe load transfer and high requirements for sound insulation are the challenges when installing concrete stairs. Egcostep® acoustically separates the flight of stairs from the landing and reduces impact sound transmission in the stairwell.

Advantages

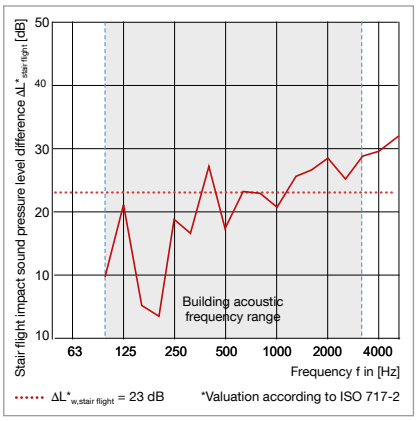
- Impact sound properties tested in an accredited test laboratory according to DIN 7396
- In-situ concrete/precast element execution
- Fire resistance rating R90
- Type testing on the basis of EC2



Technical Information

Sound insulation

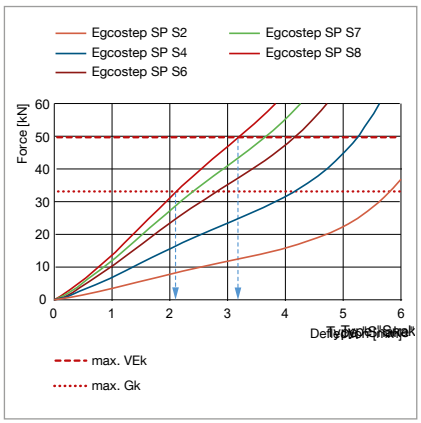
The impact sound reduction contribution of Egcostep® was determined in accordance with DIN 7396 in an accredited test laboratory. With a flight impact sound pressure level difference $\Delta L^*_{w,\,flight}$ of 21 dB up to 23 dB it meets the highest sound insulation requirements. Details can be found in the EMPA test report (available at www.maxfrank.com).



Deflection behaviour of the elastomeric bearing

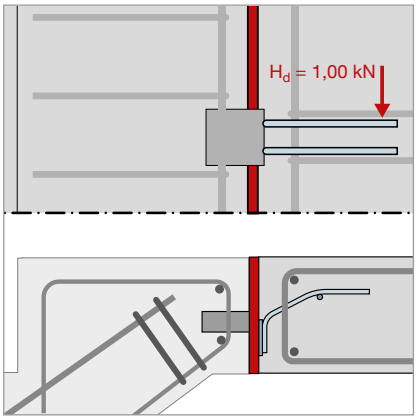
Notes for Egcostep® SP

- Reference values instantaneous deformation of the elastomeric bearing with centric force application
- Additionally consider time-dependent and other deformations (creep deformation additionally amounts to approx. 50% of the momentary deformation from permanent load)
- For $\gamma = 1.4$ applies $\max.V_{Ek} = \max. V_{Ed} / \gamma$
- $\gamma = 1.4$ is valid under the following assumption that $\max.V_{Ed}$ is composed of 2/3 dead load and 1/3 traffic load
- This means that $\max. V_{Ek}$ is the maximum service load and the maximum dead weight is calculated from $G_k = 2/3 * \max. V_{Ek}$



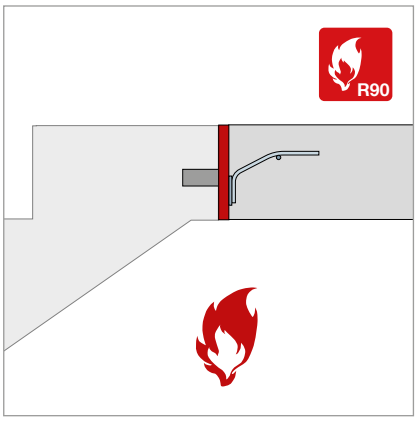
Load-bearing behaviour

The static load transfer is verified by the type test report based on EC2. Each bearing can support a design load of 8.7 kN/element vertically and 1.0 kN/element horizontally. The type and thus the number of bearings can be selected according to individual requirements.



Fire protection

According to the expert opinion TP 14-041 dated 04.03.2016, Egcostep® can be classified in fire resistance class R90 according to DIN 4102.

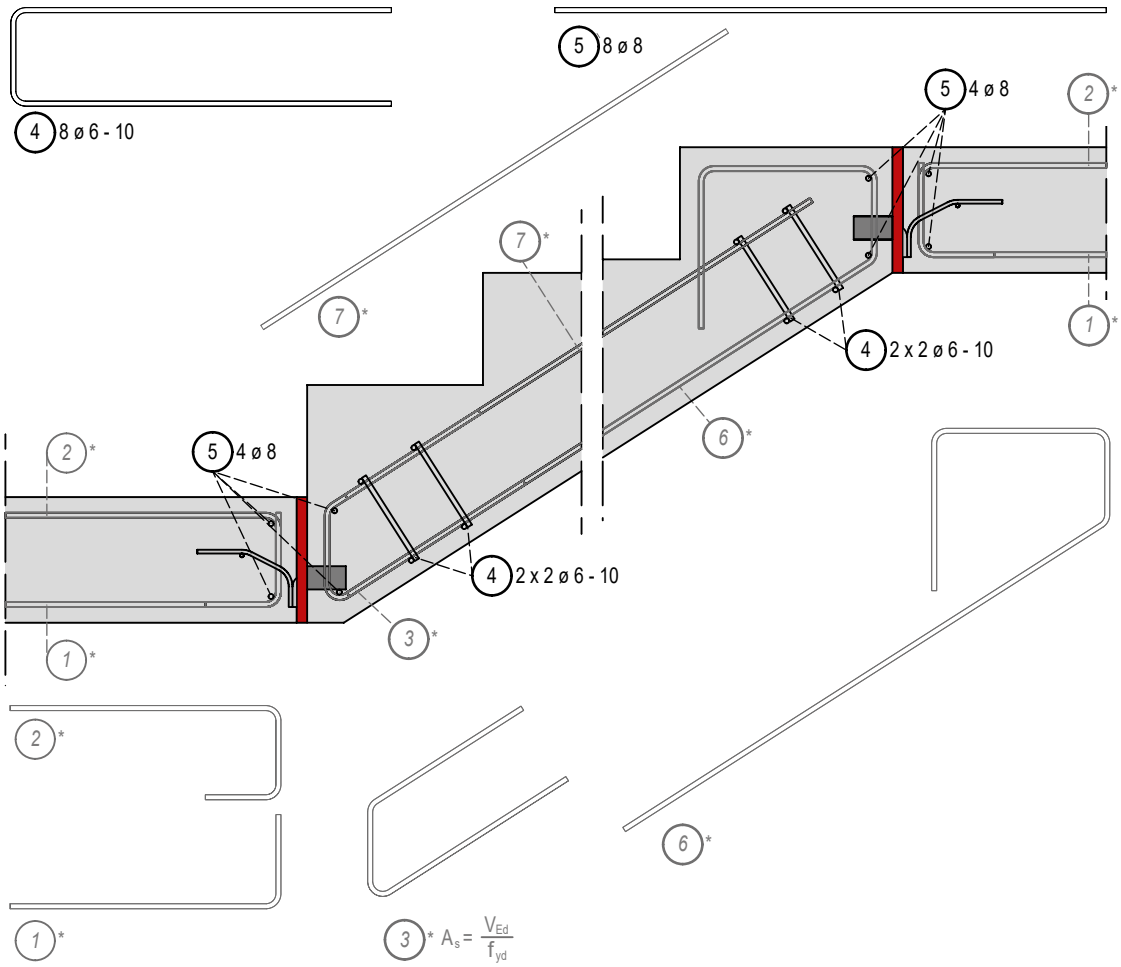


Product structure and supplementary reinforcement

For safe load transfer, on-site reinforcement to be determined according to static requirements is required in the adjacent structural components. The following figure shows a suggestion for the principle reinforcement layout.

Legend

1. Lower reinforcement layer stair landing
2. Upper reinforcement layer stair landing
3. Stirrup with bending up as suspension reinforcement
4. Stirrup each 2 x 2 Ø 6 - 10
5. Bar steel 4 Ø 8
6. Lower reinforcement layer stair flight
7. Upper reinforcement layer stair flight



*The reinforcement shown is only a suggestion; the actual reinforcement required must be determined by the responsible structural engineer.

Additional reinforcement according to type testing:

Type	Max. Load-bearing capacity V_{Rd} up to kN/element	required suspended reinforcement A_S cm²	offset moment capacity M_{Ed} kNm/element
SP S2	17,4	0,40	0,45
SP S3	26,1	0,60	0,68
SP S4	34.8	0,80	0,90
SP S5	43,5	1,00	1,13
SP S6	52.2	1,20	1,36
SP S7	60.9	1,40	1,58
SP S8	69.6	1,60	1,81
SP S9	78,3	1,80	2,04
SP S10	87,0	2,00	2,26

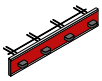
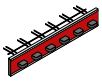
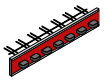
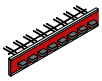
Product variants

Egcostep® stair flight decoupling

In-situ concrete and precast construction

- Standard elements up to 1.60 m long, 250 mm ceiling thickness and 69.6 kN max. load capacity per element
- Stair flight and stair landing are acoustically separated
- Reduces impact sound transmission in the stairwell

Type overview

		In-situ concrete/precast																	
Type		SP S4						SP S6							SP S7		SP S8		
																			
Max. Load-bearing capacity V_{Rd} up to	[kN/Element]	34.8						52.2							60.9		69.6		
Max. load capacity H_{Rd} up to	[kN/Element]	4						6							7		8		
Flight impact sound pressure level difference $\Delta L^*_{w,flight}$ up to	[dB]	23						22							22		22		
Height	[mm]	160	180	200	220	200	220	180	200	220	180	200	220	250	200	220	200	220	
Length	[mm]	1000				1300		1000			1300				1200		1300		

MAX FRANK BUILDING COMMON GROUND

Egcoscal

Stair bedding

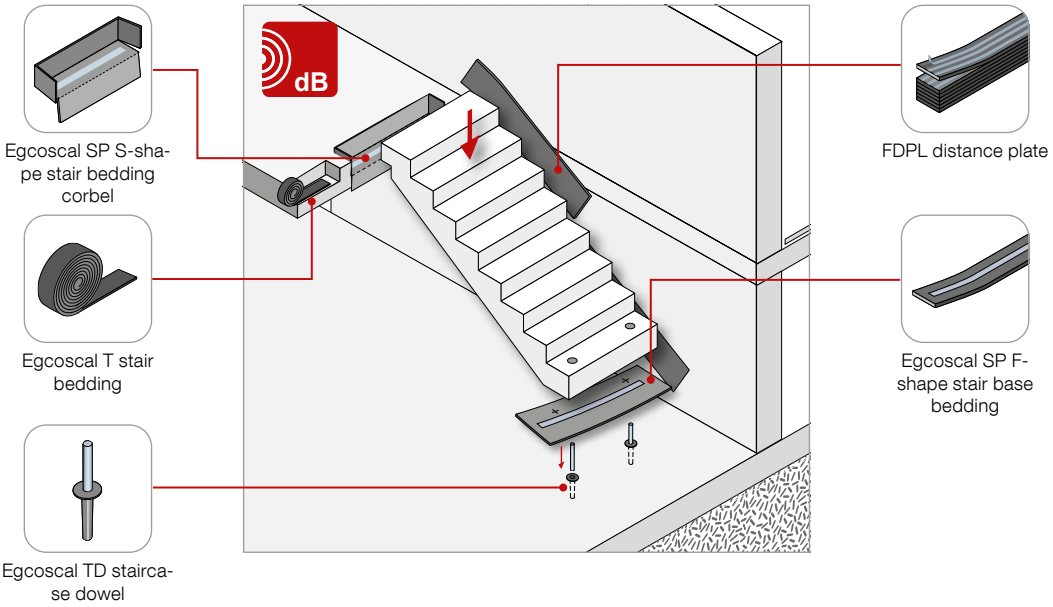
Egcoscal stair beddings

Impact sound separation of stair flight / landing

The Egcoscal building acoustics system decouples the prefabricated stair flight from the landing over the entire surface and demonstrably reduces impact sound transmission. In addition to sound insulation in the area of the concrete stairs, the Egcoscal system also supports positional stability in the stair flight connection. The matching spacer plates protect the joints from dirt and reduce sound transmission to the staircase wall.

Advantages

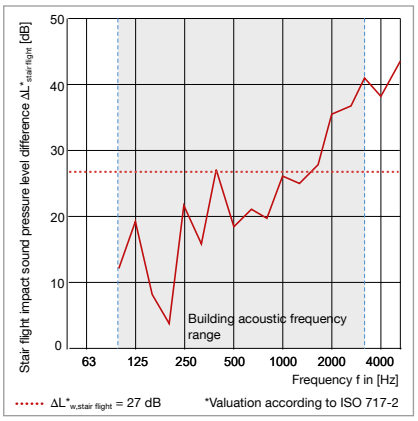
- Impact sound properties tested in an accredited test laboratory according to DIN 7396 (S-shape, F-shape and FDPL)
- Bearings can be selected in two load levels
- Fire resistance rating F90



Technical Information

Sound insulation

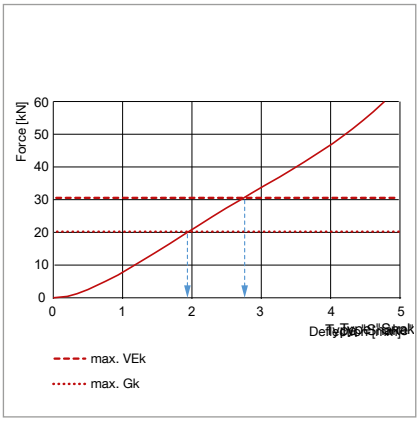
The impact sound reduction contribution of Egcoscal was determined in accordance with DIN 7396 in an accredited test laboratory. With a flight impact sound pressure level difference $\Delta L^*_{w,\,flight}$ of 24 dB up to 27 dB, it meets the highest sound insulation requirements. Details can be found in the EMPA test report (available at www.maxfrank.com).



Deflection behavior of the elastomeric bearing

Notes for Egcoscal SP - bearing width 26 mm

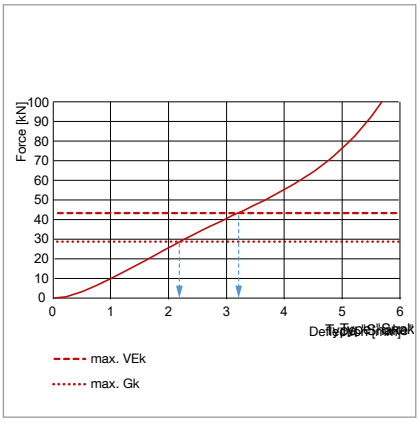
- Reference values instantaneous deformation of the elastomeric bearing with centric force application
- Additionally consider time-dependent deformations (creep deformation additionally amounts to about 50% of the momentary deformation from permanent load)
- For $\gamma = 1.4$ applies $\max.V_{Ek} = \max.V_{Ed} / \gamma$
- $\gamma = 1.4$ is valid under the following assumption that max. V_{Ed} is composed of 2/3 dead load and 1/3 traffic load
- This means that max. V_{Ek} is the maximum service load and the maximum dead weight is calculated from $G_k = 2/3 * \max. V_{Ek}$



Deflection behavior of the elastomeric bearing

Details for Egcoscal SP - bearing width 31 mm

- Reference values instantaneous deformation of the elastomeric bearing with centric force application
- Additionally consider time-dependent deformations (creep deformation additionally amounts to approimately 50% of the momentary deformation from permanent load)
- For $\gamma = 1.4$ applies $\max. V_{Ek} = \max. V_{Ed} / \gamma$
- $\gamma = 1.4$ is valid under the following assumption that max. V_{Ed} is composed of 2/3 dead load and 1/3 traffic load
- This means that max. V_{Ek} is the maximum service load and the maximum dead weight is calculated from $G_k = 2/3 * \max. V_{Ek}$

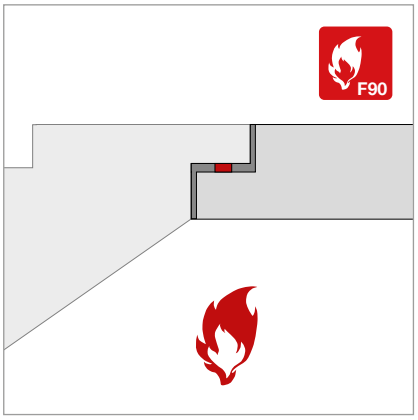


Load-bearing behavior

Load transfer is ensured by elastomeric bearings approved by the building authorities. DIBt approval Z-16.8-468.

Fire protection

Based on GA-2016/029a-YN dated 26.04.2021, the Egcoscal stair support can be classified in fire resistance class F90 according to DIN 4102-2, taking into account certain installation conditions.



Product variants

Egcoscal stair bedding - S-shape

for stair connection or landings in precast construction

- Impact sound properties tested in an accredited test laboratory according to DIN 7396
- For acoustic decoupling between prefabricated staircase and landing
- Can be adapted to the installation conditions on site

Type overview

Max. load-bearing capacity V_{Rd}	[kN/m]	43					61				
Length	[mm]	1000	1100	1200	1300	1500	1000	1100	1200	1300	1500
Thickness	[mm]	15									

Egcoscal stair bedding - F-shape

for stair base or floors in prefabricated construction

- Impact sound properties tested in an accredited test laboratory according to DIN 7396
- For acoustic decoupling between prefabricated staircase and floor slab
- Can be adapted to the installation conditions on site

Type overview

Max. load-bearing capacity V_{Rd}	[kN/m]	43					61				
Length	[mm]	1000	1100	1200	1300	1500	1000	1100	1200	1300	1500
Width	[mm]	500									
Thickness	[mm]	15									

Egcoscal TD staircase dowel

Securing into position

- Impact sound decoupling element for structural positional stability
- Stainless steel version
- Position securing in combination with Egcoscal F-shape

Egcoscal T stair bedding

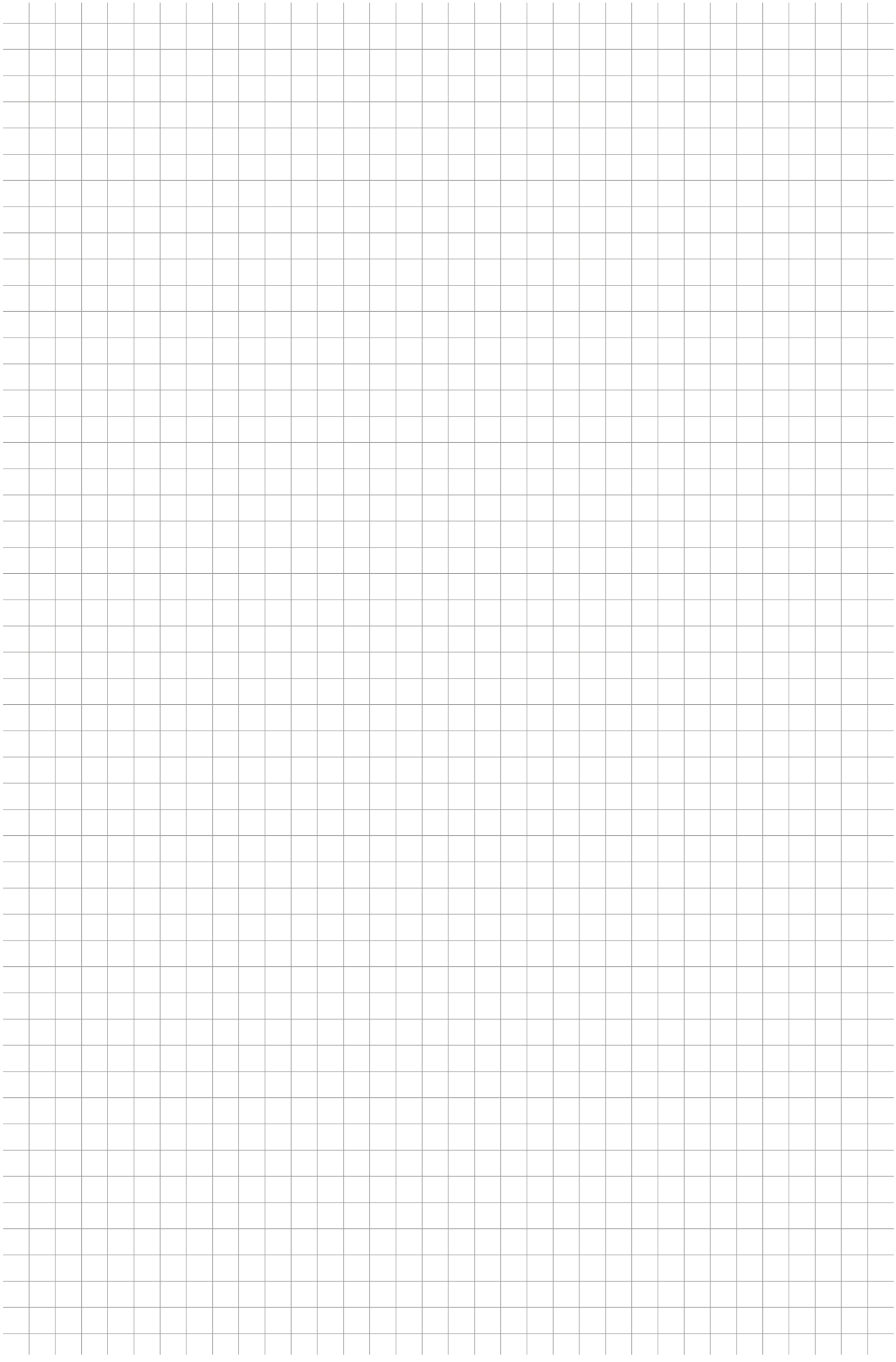
Precast construction

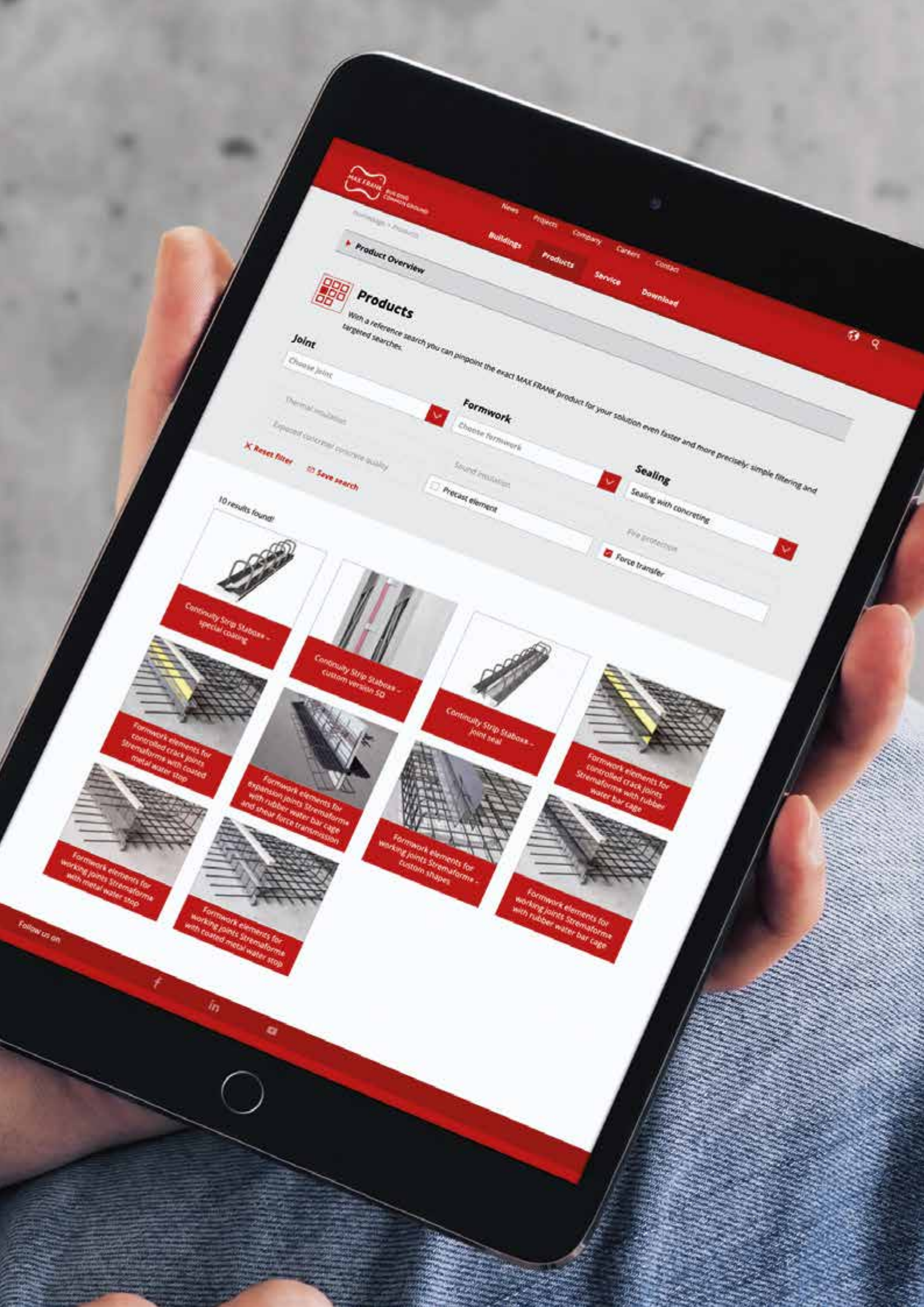
- Stair bedding for precast concrete staircases
- Strip bearing made of an elastomer that is specially adapted to the application
- Rolled goods

FDPL distance plate

Joint protection and structure-borne sound decoupling in stairwells

- Use in the installation of stair flights and stair landings
- Avoid sound bridges and contribute to structure-borne sound decoupling
- Distance plates secure the joints and prevent soiling
- Density: 30 ± 4 kg/m³
- Fire protection: Class E according to DIN EN 13501-1 / building material class B2 according to DIN 4102-01

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MAX FRANK Group
Headquarters:
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Mitterweg 1
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