Leviat
A CRH COMPANY

Aschwanden

SILENT GENERAL DOCUMENTATION

Tested Silent product range with innovations in structure-borne sound and impact noise insulation

SILENT

Rating of impact sound to standard DIN 7396:2016

SWISS VERSION

Leviat
A CRH COMPANY

We are one team.
We are Leviat.

Leviat is the new name of CRH's construction accessories companies worldwide.

Under the Leviat brand, we are uniting the expertise, skills and resources of Aschwanden and its sister companies to create a world leader in fixing, connecting and anchoring technology.

The products you know and trust will remain an integral part of Leviat's comprehensive brand and product portfolio. As Leviat, we can offer you an extended range of specialist products and services, greater technical expertise, a larger and more agile supply chain and better, faster innovation.

By bringing together CRH's construction accessories family as one global organisation, we are better equipped to meet the needs of our customers, and the demands of construction projects, of any scale, anywhere in the world.

This is an exciting change. Join us on our journey.

Read more about Leviat at Leviat.com

Our product brands include:

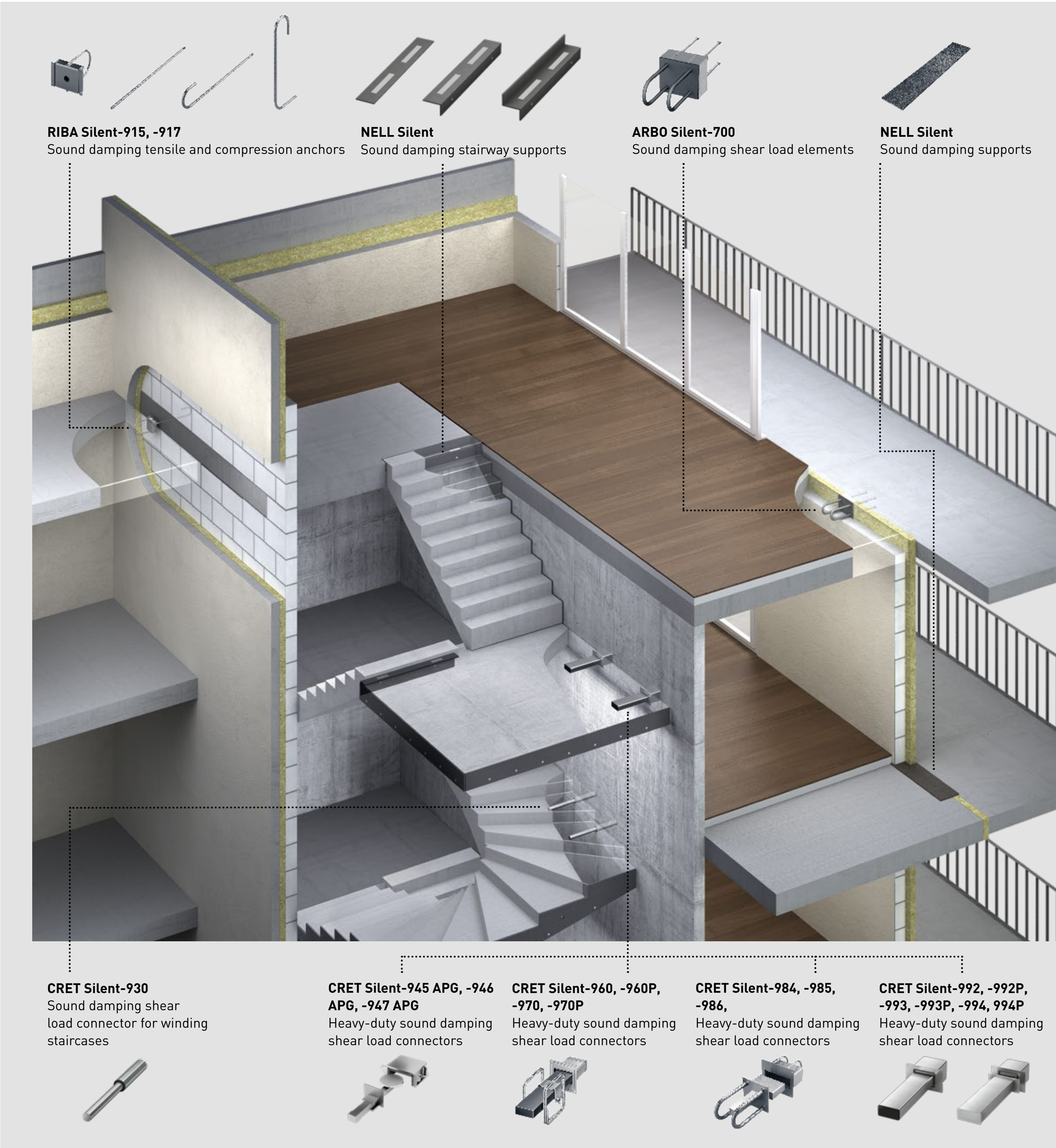
Ancon® Aschwanden HALFEN PLAKA

60
locations

sales in
30+
countries

3000
people worldwide

Silent – optimal products for any application



Content

CRET Silent® shear load connectors
Movement joints prevent uncontrolled crack formation and resulting damage such as leakage and corrosion. CRET Silent connectors not only facilitate shear load transmission and deflection compatibility between adjacent building elements, but also acoustic isolation of building and/or structural elements such as stairways, landings, balconies, pathways etc.

ARBO Silent® shear load elements
Exhibit excellent difference in impact sound pressure level and optimal thermal insulation properties. ARBO Silent shear load elements facilitate the transmission of normal and shear loads between reinforced concrete building components that are separated by thermal damping joints of 80 to 160 mm width.

RIBA Silent® tensile and compression anchors
Free-standing structures such as self-supporting access balconies need horizontal stabilisation. RIBA Silent anchors not only allow normal load transmission in movement joints, but also the acoustic decoupling of impact sound bridges that are created in static load-bearing joints.

NELL Silent® stairway supports
These new sound damping deformation supports with PUR and PE joint foam inlays are designed to support prefabricated stairs and reduce impact sound transmission between landings.

NELL Silent® supports
Noise insulation supports for placement under structural and non-structural walls. Strips of permanently elastic and polyurethane bonded rubber granulate.

Silent – the tested product range that sets new standards in acoustics

We live in a loud world. Noise makes people ill, wears on their nerves, spoils their concentration. The need for greater peace and quiet in our private and professional lives is a legitimate aspiration. With it come higher expectations on noise insulation in buildings. The range of innovative Aschwanden Silent products already allows this factor to be taken into account when planning concrete structures.

Scientifically verified and tested

In structural engineering, the demands on noise insulation are increasing steadily – on one hand through legislation and codes, and on the other hand from owners and principals themselves. In response, our innovative and qualitatively superior load transmission elements are being consistently optimised. Consequently, in close collaboration with institutes of the University of Applied Sciences and Arts Northwestern Switzerland FHNW and the Hochschule für Technik Rapperswil HSR, noise insulating Silent variants of our CRET shear load connectors, ARBO shear load elements, RIBA anchors and NELL supports have been developed. These products are the result of extensive studies of building acoustics.

In the course of testing, a variety of insulation materials were investigated at a wide range of excitation frequencies to determine their vibration and structure-borne noise damping properties – with particular regard to extended service life of the materials used. Subsequently, the acoustical properties of the elements were verified at the Fraunhofer Institute IBP / EMPA. These measurements are also the basis for the product-specific values of the weighted difference in impact sound pressure level [1] ($\Delta L^*_{n,w}$) given below according to the new DIN 7396:2016 standard.

The significantly improved difference in impact sound pressure level of the Silent elements is equivalent to an audibility that is several times lower.

Outstanding quality

In addition to their superb structural properties, the new Silent load transmission elements exhibit enhanced noise reduction characteristics. Outstanding features are the use of new, select-grade materials (PUR) and their completely innovative design. As a result, they allow straightforward and acoustically efficient insulation of structural elements.

Quality assurance is fundamental to safety and trust, and consequently a cornerstone of the success of any product. The engineering, comprehensive planning, procurement and inspection of Silent products are conducted in accordance with the directives of our certified and integral management system to ISO 9001.

Benefits

- ✓ Excellent structural and enhanced sound damping properties.
- ✓ Extensive scientific, building acoustics studies.
- ✓ Very high weighted difference in impact sound pressure level [1] ($\Delta L^*_{n,w}$).
- ✓ Experimental verification of the strength and deflection capacity of the acoustic elements.
- ✓ Tested at the Fraunhofer Institute IBP / at the EMPA / at Schalltechnisches Entwicklungs- und Prüfinstitut (STEP) GmbH.
- ✓ Minimum time and effort in planning and construction work.

[1] without applying the reference floor method

Silent – increased needs of modern society

Thanks to ongoing advances in technology, there are a steadily increasing number of products on offer that reduce noise emission levels. At the same time, however, people are exposed to a greater diversity of sources of noise. Moreover, our modern society longs for peace and quiet. Consequently, inhabitants – owning or renting property – are ever less willing to simply accept the intrusion of noise, and are demanding better levels of protection against noise. In addition, sound insulation also takes on greater importance because of high-density building. Building owners and principals are relaying these demands to planners.

This greater need for quiet, including the more stringent requirements of building codes, is leading increasingly to improved insulation against external noise. However, with lower external noise levels comes a heightened perception of unwelcome internal noise. For this reason, not only the transmission of airborne noise from one internal room to another, but also the transmission of structure-borne and impact noise is of considerable significance.

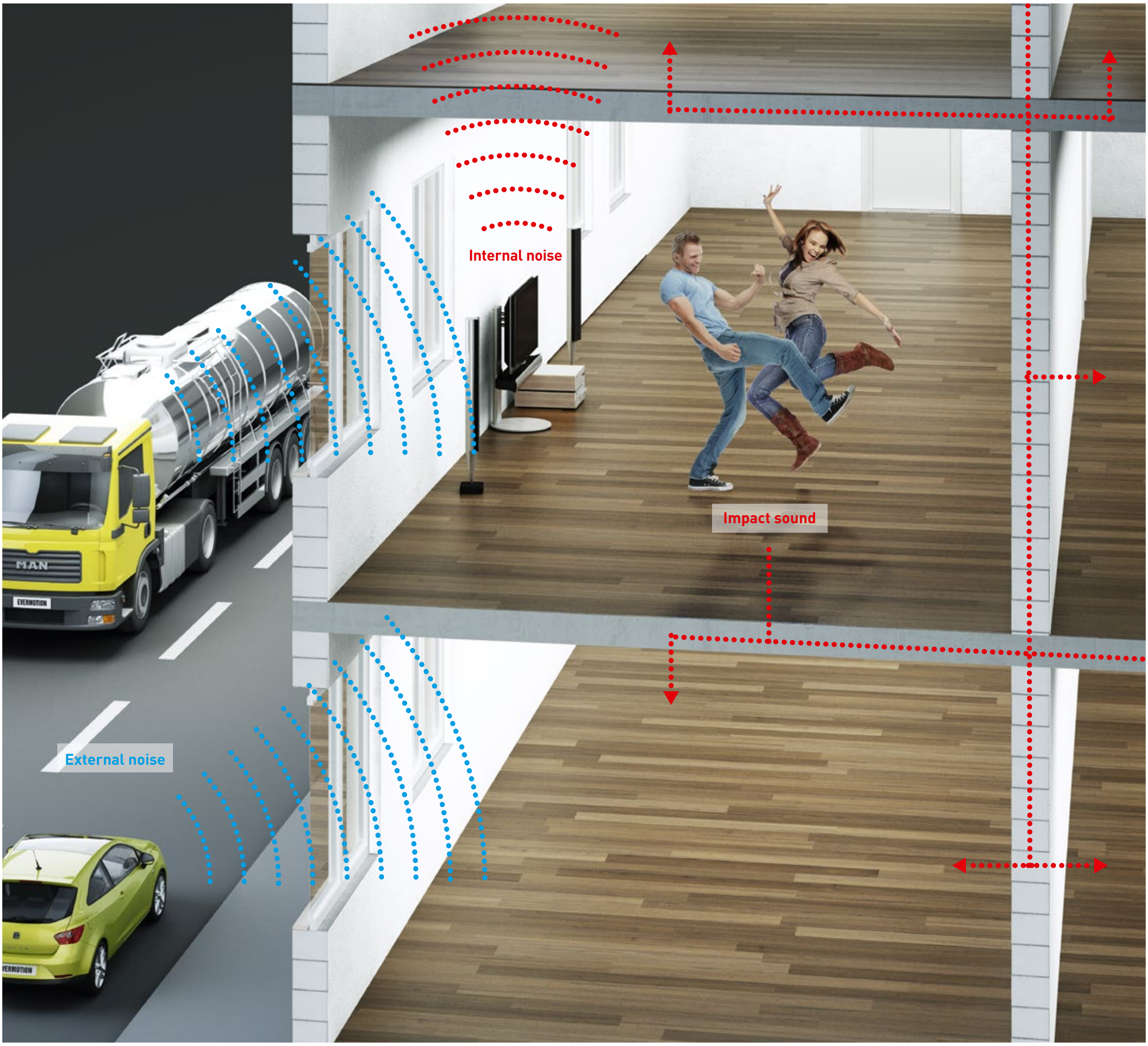
Impact noise is generated by people walking, whereby the floor is deformed locally. Sound waves are created that propagate through the building structure and cause other structural elements to oscillate. These oscillations radiate sound waves that are audible as impact noise (see illustration of sound propagation in buildings).

Laying carpets can significantly reduce impact noise at its source. In contemporary interior design, however, carpets are not fashionable – far more popular are parquet, tiled and natural stone floors. Here, the vibration decoupling of building elements is extremely important. It allows the propagation of structure-borne and impact noise to be reduced and – depending on the acoustic quality of the isolation – the radiated structure-borne noise to be significantly lowered or even eliminated completely.

In addition to the selection of high quality products, the professional installation and application of these products are crucial. Unlike other physical processes such as heat transmission, **even the smallest structure-borne sound bridge can significantly reduce the impact noise insulation effect, or at worst, cancel it entirely. This is because even a modest amount of energy is sufficient to acoustically excite building elements.** There is no need for extensive transmission points; the existence of a small, rigid bridge is enough to trigger the effect.

To avoid creating structure-borne sound bridges during construction work, installation instructions are available for every type of Silent element.

Original German text by Prof. Dr. Ing. Urs Bopp SIA/VDI and Prof. Dr. sc. math. Marcel Steiner,
School of Engineering at the University of Applied Sciences and Arts Northwestern Switzerland FHNW



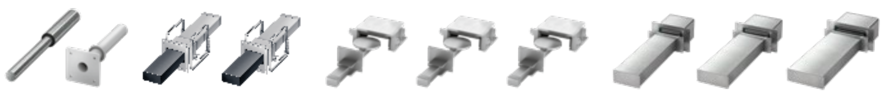
Sound propagation in buildings

Production overview

CRET Silent®
for cast in-situ concrete

Type	Joint gap [mm]	Ultimate resistance F_{Rd} [kN]	Weighted difference in impact sound pressure level [1] ($\Delta L^*_{n,w}$) at maximum load [dB]	Weighted reduction in impact sound pressure level of the landing at maximum load $\Delta L_{w,landing}$ [dB]
CRET Silent-930	10 – 40	12.4 – 9.1	30	35
CRET Silent-960	10 – 60	30.9 – 24.4	23	28
CRET Silent-970	10 – 60	26.1 – 19.9	28	33
CRET Silent-984	10 – 60	25.5 – 15.6	32	38
CRET Silent-985	10 – 60	55.6 – 37.5	29	34
CRET Silent-986	10 – 60	79.7 – 60.0	26	–
CRET Silent-992	10 – 60	43.8 – 39.9	24	29
CRET Silent-993	10 – 60	64.4 – 51.5	23	28
CRET Silent-994	10 – 60	84.6 – 69.0	25	30
BST to CRET Silent-960, -970	Masonry brick with cast-in sleeve			

CRET Silent®
for prefabrications



Type	Joint gap [mm]	Ultimate resistance F_{Rd} [kN]	Weighted difference in impact sound pressure level [1] ($\Delta L^*_{n,w}$) at maximum load [dB]	Weighted reduction in impact sound pressure level of the landing at maximum load $\Delta L_{w,landing}$ [dB]
CRET Silent-930 – for prefabrication in combination with CRET-P	10 – 40	12.4 – 9.1	30	35
CRET Silent-960P	10 – 60	30.9 – 24.4	23	28
CRET Silent-970P	10 – 60	26.1 – 19.9	28	33
CRET Silent-945 APG	10 – 50	22.0	33	40
CRET Silent-946 APG	10 – 50	38.3 – 26.3	34	40
CRET Silent-947 APG	10 – 50	50.0 – 47.2	30	36
CRET Silent-992P	10 – 60	43.8 – 39.9	24	29
CRET Silent-993P	10 – 60	64.4 – 51.5	23	28
CRET Silent-994P	10 – 60	84.6 – 69.0	25	30

ARBO Silent®

Type	Joint gap [mm]	Weighted difference in impact sound pressure level [1] ($\Delta L^*_{n,w}$) at maximum load [dB]	Weighted reduction in impact sound pressure level of the landing at maximum load $\Delta L_{w,landing}$ [dB]
ARBO Silent-700	80 – 160	16	–

RIBA Silent®

Type	Max. joint gap [mm]	Load under tension (F_{Rd}) [kN]	Load area under compression (element restrained in transverse direction) (F_{Rd}) [kN]	Load area under compression (element restrained **not** in transverse direction) (F_{Rd}) [kN]	Weighted difference in impact sound pressure level [1] ($\Delta L^{*}_{n,w}$) at maximum load [dB]	Weighted reduction in impact sound pressure level of the landing at maximum load $\Delta L_{w,landing}$ [dB]
RIBA Silent-915	40 – 200	23.1	25.0 – 23.2	25.0 – 22.5	33	–
RIBA Silent-917	40 – 200	62.8	62.8	62.8 – 57.9	33	–

NELL Silent® stairways supports

Type	Ultimate resistance F_{Rd} [kN]	Weighted difference in impact sound pressure level [1] ($\Delta L^{*}_{n,w}$) [dB]	Weighted reduction in impact sound pressure level $\Delta L_{w,landing}$ [dB]
NELL Silent-Z-2	25.2	31	31
NELL Silent-Z-3	37.8	31	31
NELL Silent-Z-4	50.4	31	31
NELL Silent-L-2	25.2	31	31
NELL Silent-L-3	37.8	31	31
NELL Silent-L-4	50.4	31	31
NELL Silent-F-2	25.2	31	31
NELL Silent-F-3	37.8	31	31
NELL Silent-F-4	50.4	31	31
NELL Silent-W	Designed as spacer	31	31

NELL Silent® supports

Type	Support width	Load of 0.250 N/mm²		Load of 0.375 N/mm²		Load of 0.500 N/mm²		Weighted difference in impact sound pressure level [1] ($\Delta L^{*}_{n,w}$)	Weighted reduction in impact sound pressure level $\Delta L_{w,landing}$
	[mm]	F_{adm} [kN/m¹]	Deformation [mm]	F_{adm} [kN/m¹]	Deformation [mm]	F_{adm} [kN/m¹]	Deformation [mm]	[dB]	[dB]
NELL Silent-Isolmat-125	125	31.2	1.3	46.9	1.9	62.5	2.3	28	–
NELL Silent-Isolmat-150	150	37.5	1.3	56.3	1.9	75.0	2.3	28	–
NELL Silent-Isolmat-175	175	43.8	1.3	65.6	1.9	87.5	2.3	28	–
NELL Silent-Isolmat-200	200	50.0	1.3	75.0	1.9	100.0	2.3	28	–

[1] without applying the reference floor method

Customised models made to order.
See specific product documentation for details, or check our website www.aschwanden.com.

Dowel

For prefabrication in combination with CRET-P sleeve

Sound damping shear load connector for winding staircases

CRET Silent®-930

Function

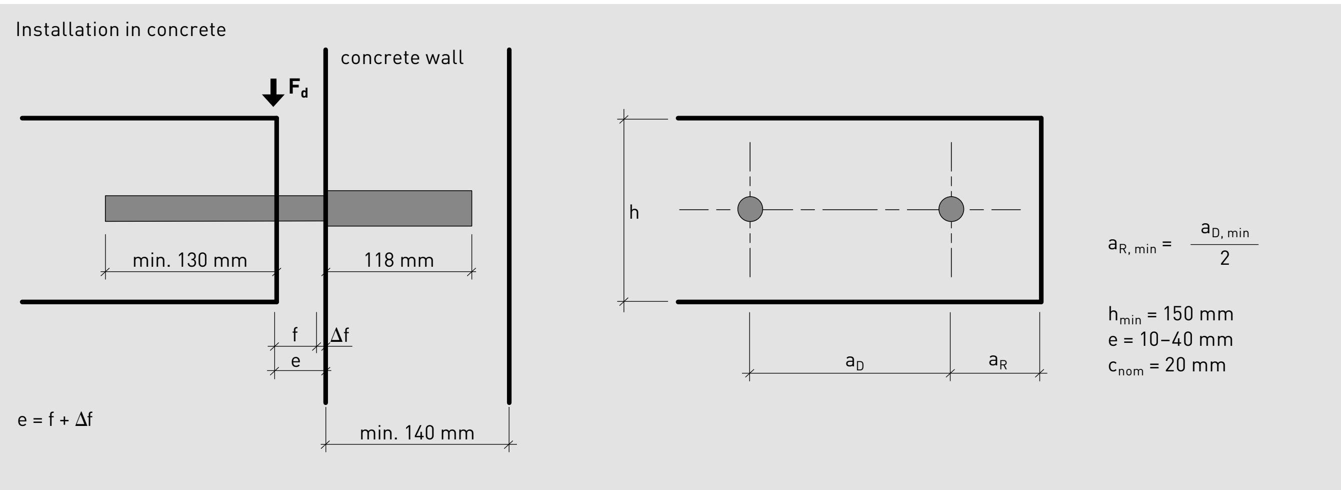
Uniaxial shear load transmission; sound insulation effect. Typical applications: sound damping bearing for concrete staircases cast in-situ and, when combined with the „CRET-P“ sleeve, of precast concrete staircases. It can be used in masonry walls when combined with the MVK load distribution frame.

Based on measurements for the weighted difference in impact sound pressure level [1] $\Delta L^*_{n,w}$ and the weighted reduction in impact sound pressure level of the landing $\Delta L_{w,landing}$ according to DIN 7396:2016 carried out at the Fraunhofer Institute IBP, the following values were derived for CRET Silent-930 connectors:

Type	$\Delta L^*_{n,w}$	$\Delta L_{w,landing}$
CRET Silent-930	30 dB	35 dB

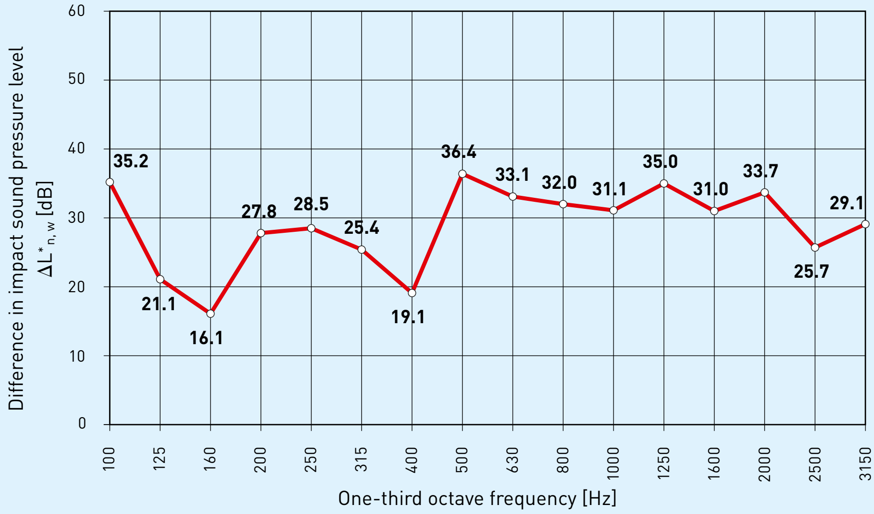
[1] without applying the reference floor method

System diagram



Measurement results of impact sound reduction (one-third octave bands)

The results of the measurements of the Fraunhofer Institute IBP are shown in the graph below for the difference in impact sound pressure level $\Delta L^{*}_{n,w}$ with CRET Silent-930 elements.



Difference in impact sound pressure level for CRET Silent-930 at maximum load. Additional spectral values for the difference in impact sound pressure level of the landing and the reduction in impact sound pressure level of the landing are presented in the measurement report.

Design strength table

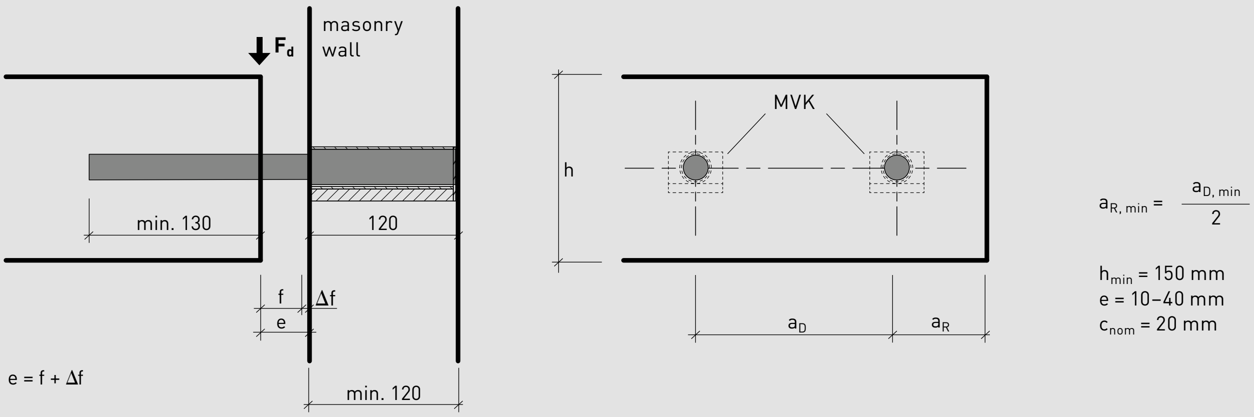
Concrete ≥ C25/30 Type	Joint e [mm]	F_{Rd} [kN]
CRET Silent-930	10	12.4
CRET Silent-930	15	11.8
CRET Silent-930	20	11.1
CRET Silent-930	25	10.6
CRET Silent-930	30	10.1
CRET Silent-930	35	9.6
CRET Silent-930	40	9.1

Validity of strength figures according to GTC.

Optional

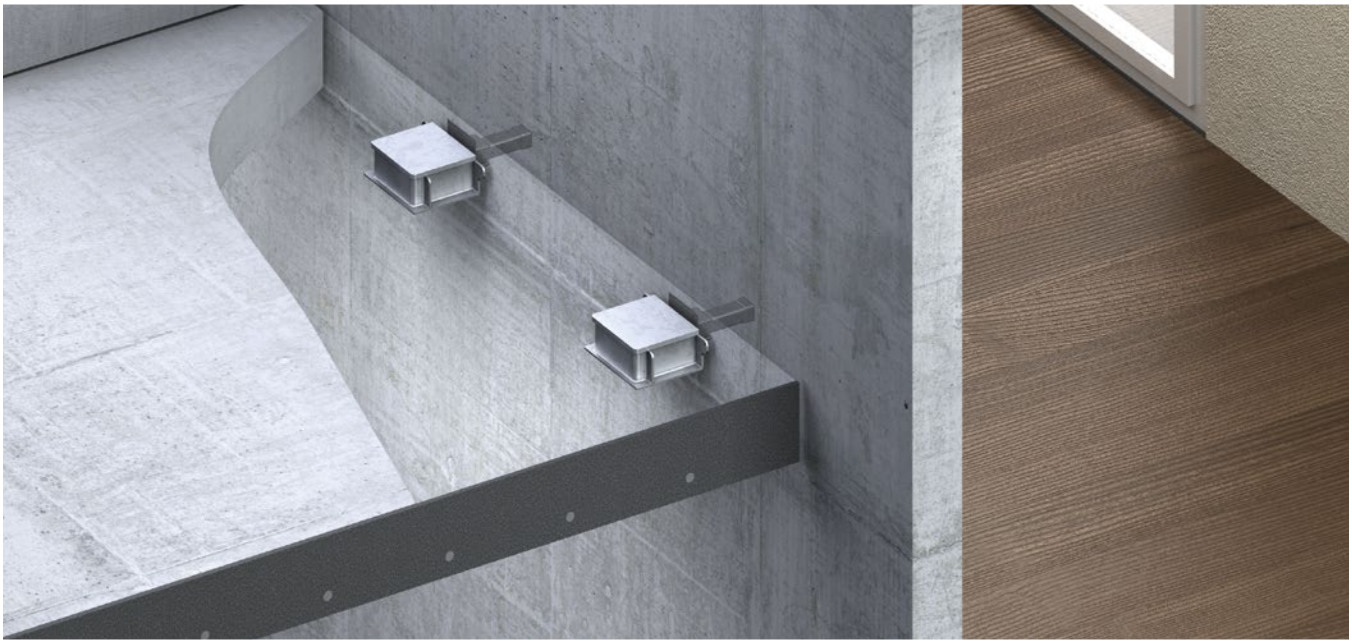
Load distribution frame **MVK** for use in Masonry wall.

Masonry installation



Heavy-duty shear load connectors with sound insulation

CRET Silent®-945 APG, -946 APG, -947 APG



Function

Uniaxial shear load transmission; sound insulation effect. Typical applications: sound damping support of prefabricated building elements such as stairways, landings, balconies, access pathways etc.

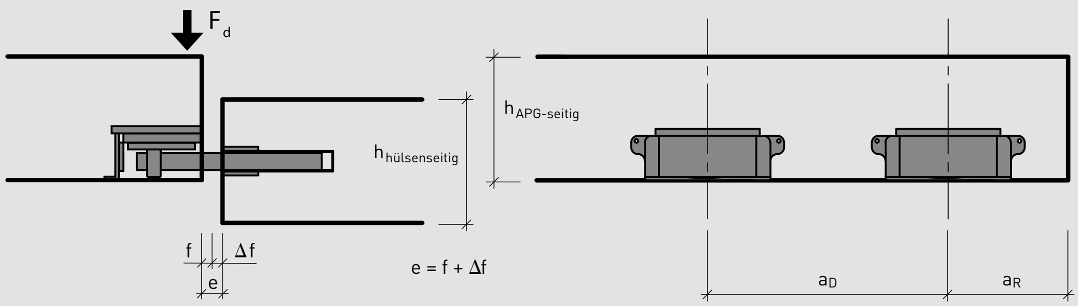
The dowel is height adjustable over a range of approximately 0 to 12 mm. This allows adjustment of prefabricated elements.

Based on measurements for the weighted difference in impact sound pressure level [1] $\Delta L^*_{n,w}$ and the weighted reduction in impact sound pressure level of the landing $\Delta L_{w,landing}$ according to DIN 7396:2016 carried out at the Fraunhofer Institute IBP, the following values were derived for these CRET Silent connectors:

Type	$\Delta L^*_{n,w}$	$\Delta L_{w,landing}$
CRET Silent-945 APG	33 dB	40 dB
CRET Silent-946 APG	34 dB	40 dB
CRET Silent-947 APG	30 dB	36 dB

[1] without applying the reference floor method

System diagram

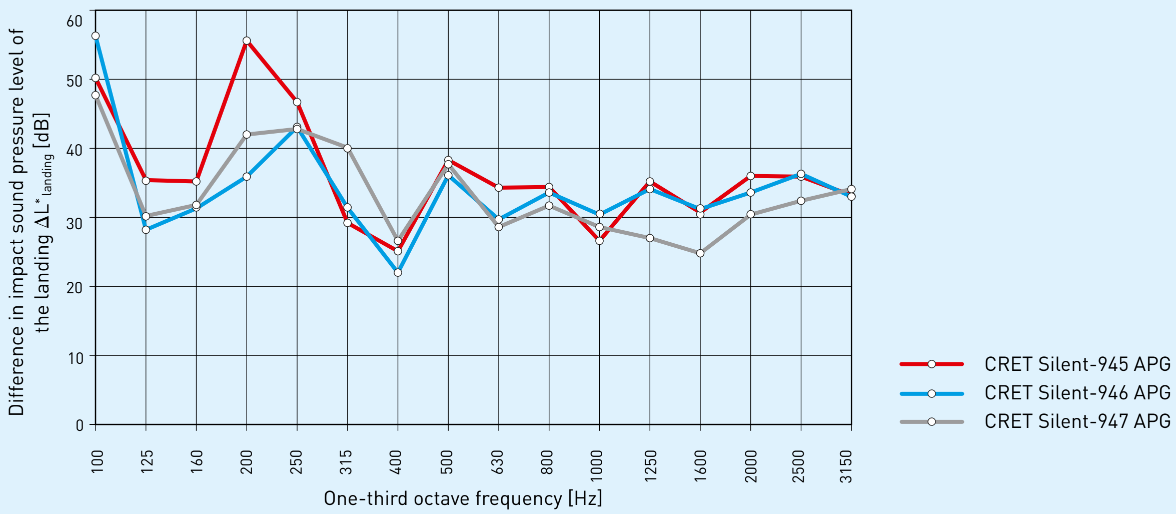


$a_{D,min}$ = 350 mm (CRET Silent-945 APG)
430 mm (CRET Silent-946 APG)
530 mm (CRET Silent-947 APG)

$a_{R,min} = \frac{a_{D,min}}{2}$

Measurement results of difference in impact sound pressure level (one-third octave bands)

The results of the measurements of the Fraunhofer Institute IBP are shown in the graph below for the difference in impact sound pressure level of the landing $\Delta L^*_{landing}$ with CRET Silent-945 APG, -946 APG and -947 APG elements.



Difference in impact sound pressure level of the landing CRET Silent-945 APG, -946 APG, -947 APG at maximum load.
The individual one-third octave band values are given in the product documentation for CRET Silent-945 APG, -946 APG, -947 APG.

Design strength table

Concrete ≥ C25/30 Type	Joint e [mm]	F_{Rd} [kN]
CRET Silent-945 APG	10	22.0
CRET Silent-945 APG	20	22.0
CRET Silent-945 APG	30	22.0
CRET Silent-945 APG	40	22.0
CRET Silent-945 APG	50	22.0
CRET Silent-946 APG	10	38.3
CRET Silent-946 APG	20	34.8
CRET Silent-946 APG	30	31.4
CRET Silent-946 APG	40	28.7
CRET Silent-946 APG	50	26.3
CRET Silent-947 APG	10	50.0
CRET Silent-947 APG	20	50.0
CRET Silent-947 APG	30	50.0
CRET Silent-947 APG	40	50.0
CRET Silent-947 APG	50	47.2

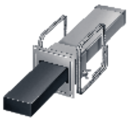
Validity of strength figures according to GTC.

Optional

Covers with different functions are available for CRET Silent-945, -946, -947 (APG):

- **Visual** covers
- **Fire retardant** covers R90
- Covers against **lifting forces**

CRET Silent-960



CRET Silent-960P

Heavy-duty shear load connectors with sound insulation

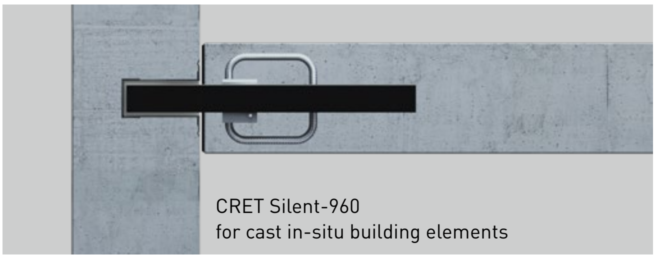
CRET Silent®-960, -960P

Function

Uniaxial shear load transmission; sound insulation effect. Typical applications: sound damping support of cast in-situ or prefabricated building elements such as stairways, landings, balconies, access pathways etc.

Based on measurements for the weighted difference in impact sound pressure level [1] $\Delta L^*_{n,w}$ and the weighted reduction in impact sound pressure level of the landing $\Delta L_{w,\,landing}$ according to DIN 7396:2016 carried out at the Fraunhofer Institute IBP, the following values were derived for CRET Silent-960 and -960P connectors:

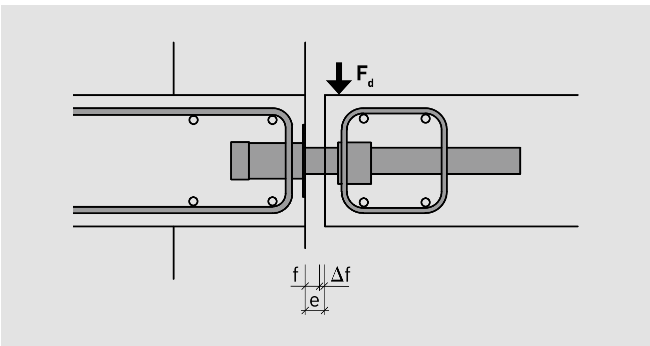
Type	$\Delta L^*_{n,w}$	$\Delta L_{w,\,landing}$
CRET Silent-960, -960P	23 dB	28 dB



CRET Silent-960
for cast in-situ building elements

CRET Silent-960P
for prefabricated building elements

Design strength table



Concrete ≥ C25/30

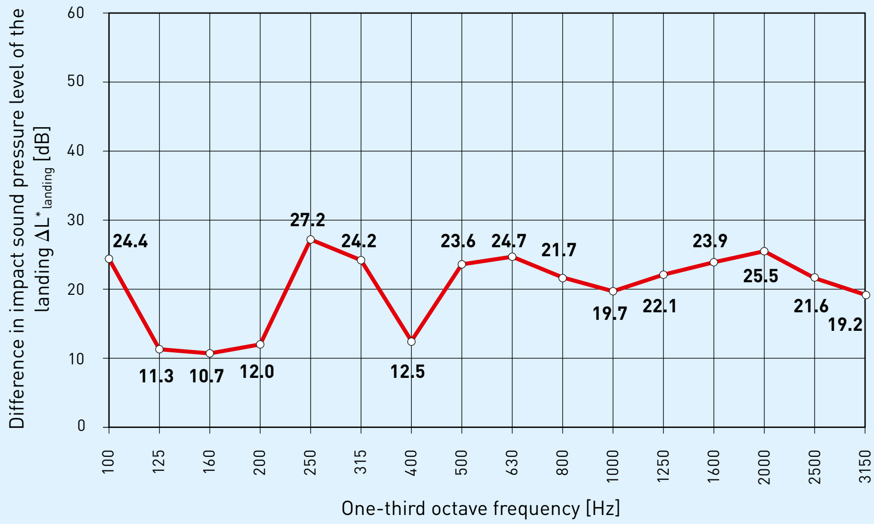
Joint e [mm]	F_{Rd} [kN]	Joint e [mm]	F_{Rd} [kN]
≤ 20	30.9	45	26.6
25	29.9	50	25.9
30	29.1	55	25.1
35	28.2	60	24.4
40	27.4		

Validity of strength figures according to GTC.
For CRET Silent-960 the maximum deformation factor must not exceed Δf = 45 mm.

[1] without applying the reference floor method

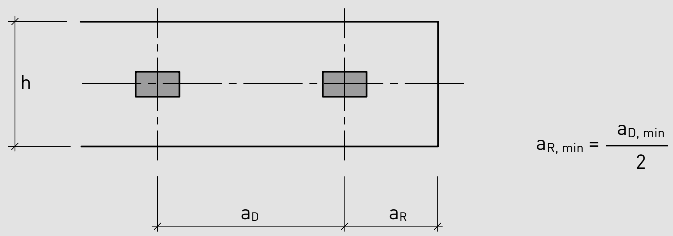
Measurement results of impact sound reduction (one-third octave bands)

The results of the measurements of the Fraunhofer Institute IBP are shown in the graph below for the difference in impact sound pressure level of the landing $\Delta L^*_{landing}$ with CRET Silent-960 and -960P elements.



Difference in impact sound pressure level of the landing CRET Silent-960 at maximum load. Additional spectral values for the difference in impact sound pressure level of the landing and the reduction in impact sound pressure level of the landing are presented in the measurement report.

Distance between connectors



In slabs, distance to edge a_R and distance between connectors a_D should not fall below the following minimum values:

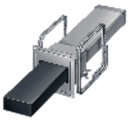
$a_{D, min}$ for slabs without shear reinforcement

Concrete ≥ C25/30

Slab thickness h [mm]	$a_{D,min}$ ρ = 0.2% [mm]	ρ = 0.5% [mm]	ρ = 1.0% [mm]
180	270	240	220
200	240	210	200
220	220	190	180
240	200	170	160
260	190	160	150

Validity of strength figures according to GTC.

CRET Silent-970



CRET Silent-970P

Heavy-duty shear load connectors with sound insulation

CRET Silent®-970, -970P

Function

Uniaxial shear load transmission; sound insulation effect. Typical applications: sound damping support of cast in-situ or prefabricated building elements such as stairways, landings, balconies, access pathways etc.

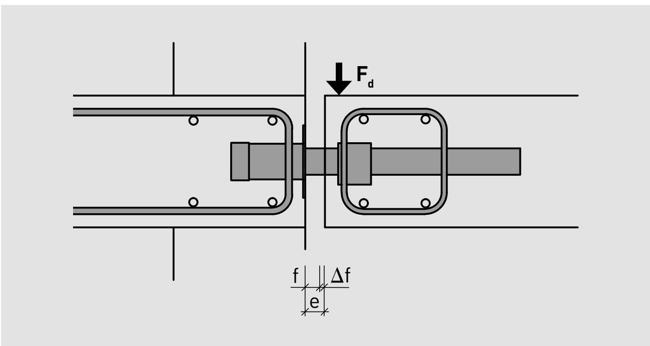
Based on measurements for the weighted difference in impact sound pressure level [1] $\Delta L^*_{n,w}$ and the weighted reduction in impact sound pressure level of the landing $\Delta L_{w,landing}$ according to DIN 7396:2016 carried out at the Fraunhofer Institute IBP, the following values were derived for CRET Silent-970 and -970P connectors:

Type	$\Delta L^*_{n,w}$	$\Delta L_{w,landing}$
CRET Silent-970, -970P	28 dB	33 dB

CRET Silent-970
for cast in-situ building elements

CRET Silent-970P
for prefabricated building elements

Design strength table



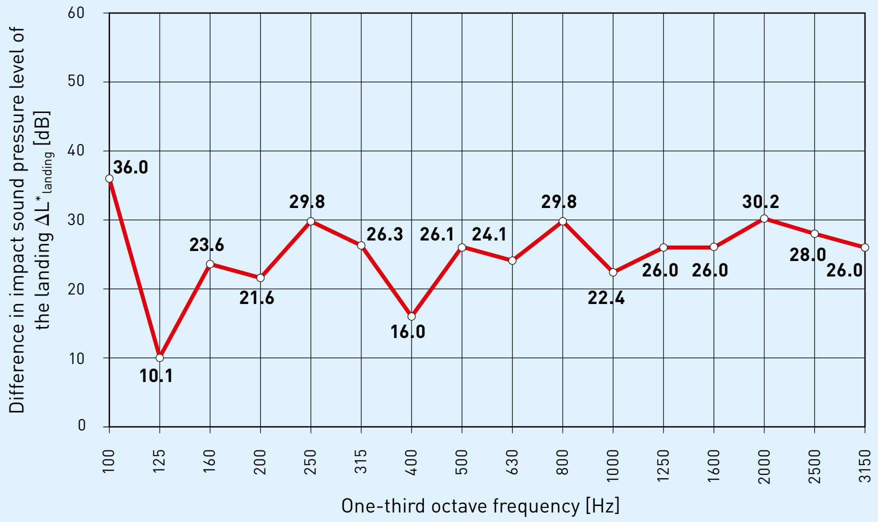
Concrete ≥ C25/30 Joint e [mm]	F_{Rd} [kN]	Joint e [mm]	F_{Rd} [kN]
≤ 20	26.1	45	22.0
25	25.2	50	21.3
30	24.3	55	20.6
35	23.5	60	19.9
40	22.7		

Validity of strength figures according to GTC.
For CRET Silent-970 the maximum deformation factor must not exceed Δf = 45 mm.

[1] without applying the reference floor method

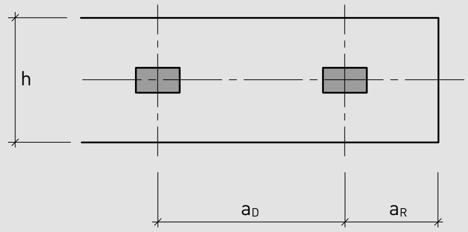
Measurement results of impact sound reduction (one-third octave bands)

The results of the measurements of the Fraunhofer Institute IBP are shown in the graph below for the difference in impact sound pressure level of the landing $\Delta L^*_{landing}$ with CRET Silent-970 and -970P elements.



Difference in impact sound pressure level of the landing CRET Silent-970 at maximum load. Additional spectral values for the difference in impact sound pressure level of the landing and the reduction in impact sound pressure level of the landing are presented in the measurement report.

Distance between connectors



$$a_{R,\,min} = \frac{a_{D,\,min}}{2}$$

In slabs, distance to edge a_R and distance between connectors a_D should not fall below the following minimum values:

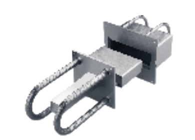
$a_{D,\,min}$ for slabs without shear reinforcement

Concrete ≥ C25/30

Plattenhöhe h [mm]	$a_{D,min}$ ρ = 0.2% [mm]	ρ = 0.5% [mm]	ρ = 1.0% [mm]
180	230	200	190
200	200	180	170
220	180	160	150
240	170	150	140
260	160	140	130

Validity of strength figures according to GTC.

CRET Silent-984

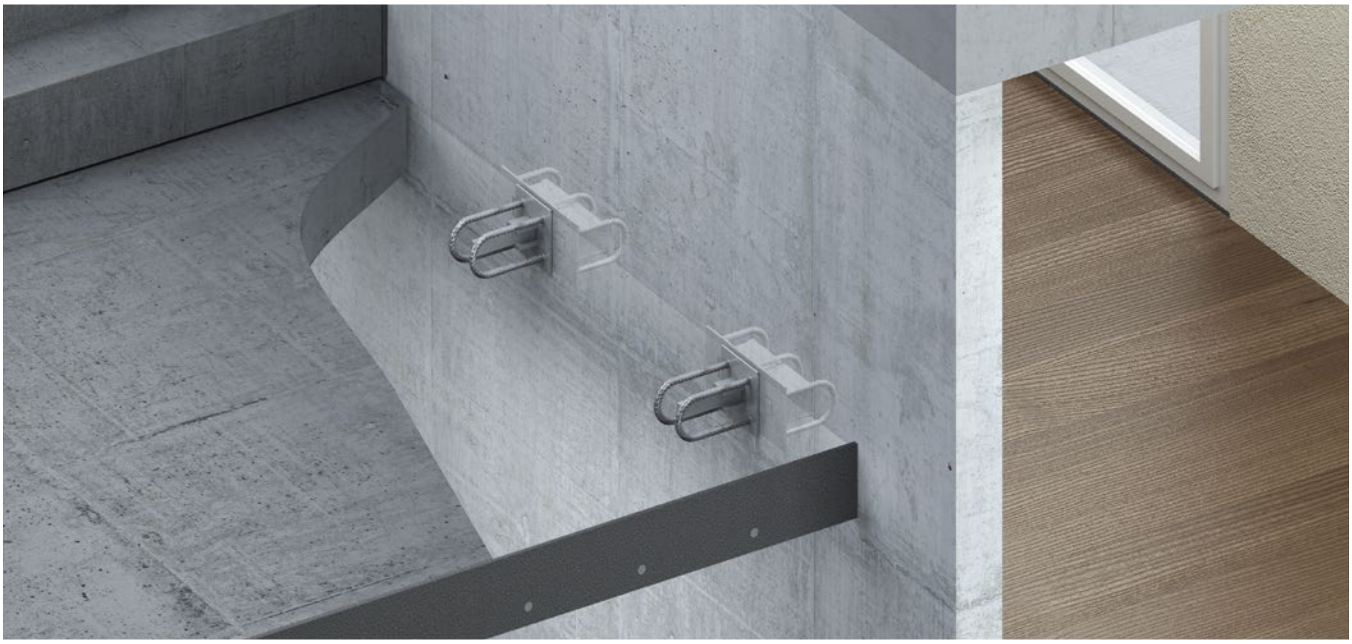


CRET Silent-985

CRET Silent-986

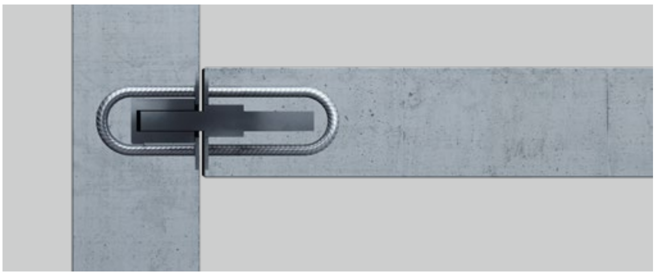
Heavy-duty shear load connectors with sound insulation

CRET Silent®-984, -985, -986



Function

Uniaxial shear load transmission; improved sound insulation effect. Typical applications: sound damping support of cast in-situ or prefabricated building elements such as stairways, landings, balconies, access pathways etc.

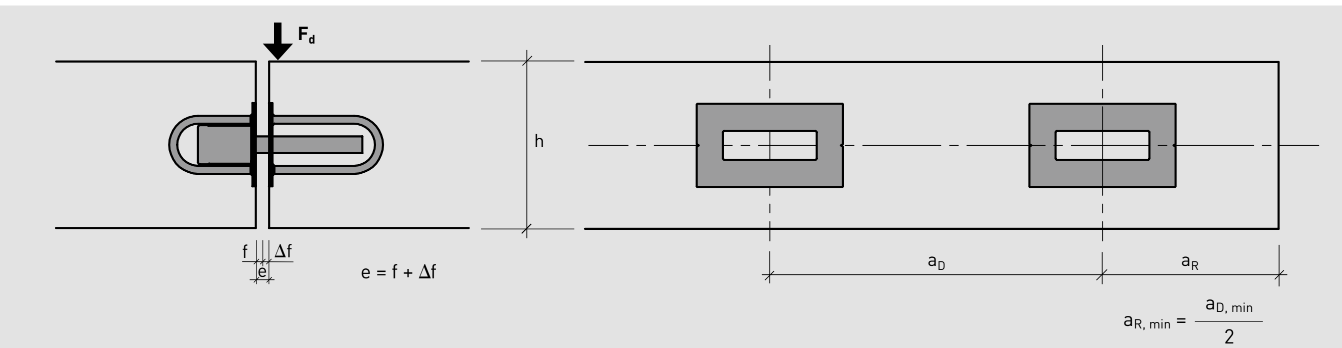


Based on measurements for the weighted difference in impact sound pressure level [1] $\Delta L^*_{n,w}$ and the weighted reduction in impact sound pressure level of the landing $\Delta L_{w,landing}$ according to/based on DIN 7396:2016 carried out at the Fraunhofer Institute IBP, the following values were derived for these CRET Silent connectors:

Type	$\Delta L^*_{n,w}$	$\Delta L_{w,landing}$
CRET Silent-984	32 dB	38 dB
CRET Silent-985	29 dB	34 dB
CRET Silent-986	26 dB	– dB

Note: The measurement with the CRET Silent-986 connector was performed before the DIN 7396:2016 standard appeared. Since the test configuration is largely identical to the standard, however, the results here are given as the weighted difference in impact sound pressure level [1] $\Delta L^*_{n,w}$.

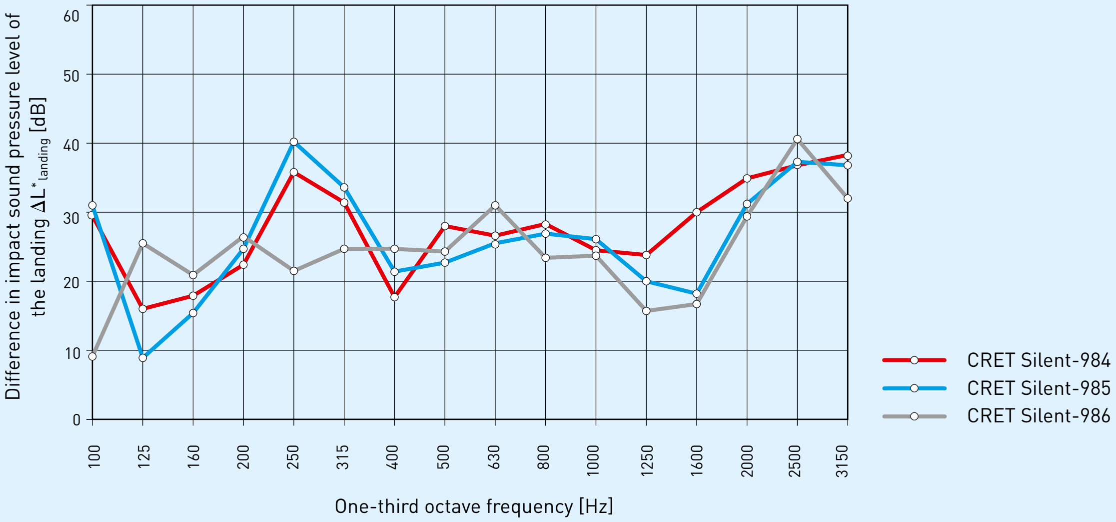
System diagram



[1] without applying the reference floor method

Measurement results of impact sound reduction (one-third octave bands)

The results of the measurements of the Fraunhofer Institute IBP are shown in the graph below for the difference in impact sound pressure level of the landing $\Delta L^*_{landing}$ with CRET Silent-984, -985 and -986 elements.

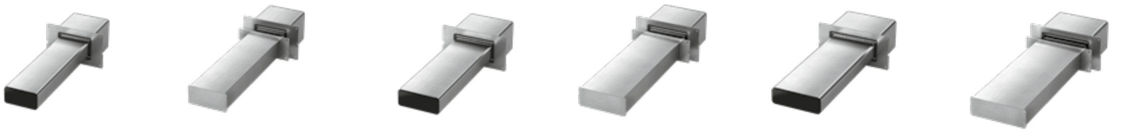


Difference in impact sound pressure level of the landing CRET Silent-984, -985, -986 at maximum load. The individual one-third octave band results are shown in the product documentation CRET Silent-984, -985, -986. Additional spectral values for the difference in impact sound pressure level of the landing and the reduction in impact sound pressure level of the landing are presented in the measurement report.

Design strength table

Concrete ≥ C25/30 Type [kN]	Joint e	F_{Rd} [mm]
CRET Silent-984-10	10	25.5
CRET Silent-984-20	20	25.5
CRET Silent-984-30	30	22.3
CRET Silent-984-40	40	19.5
CRET Silent-984-50	50	17.4
CRET Silent-984-60	60	15.6
CRET Silent-985-10	10	55.6
CRET Silent-985-20	20	55.6
CRET Silent-985-30	30	53.6
CRET Silent-985-40	40	46.9
CRET Silent-985-50	50	41.7
CRET Silent-985-60	60	37.5
CRET Silent-986-10	10	79.7
CRET Silent-986-20	20	79.7
CRET Silent-986-30	30	79.7
CRET Silent-986-40	40	75.0
CRET Silent-986-50	50	66.7
CRET Silent-986-60	60	60.0

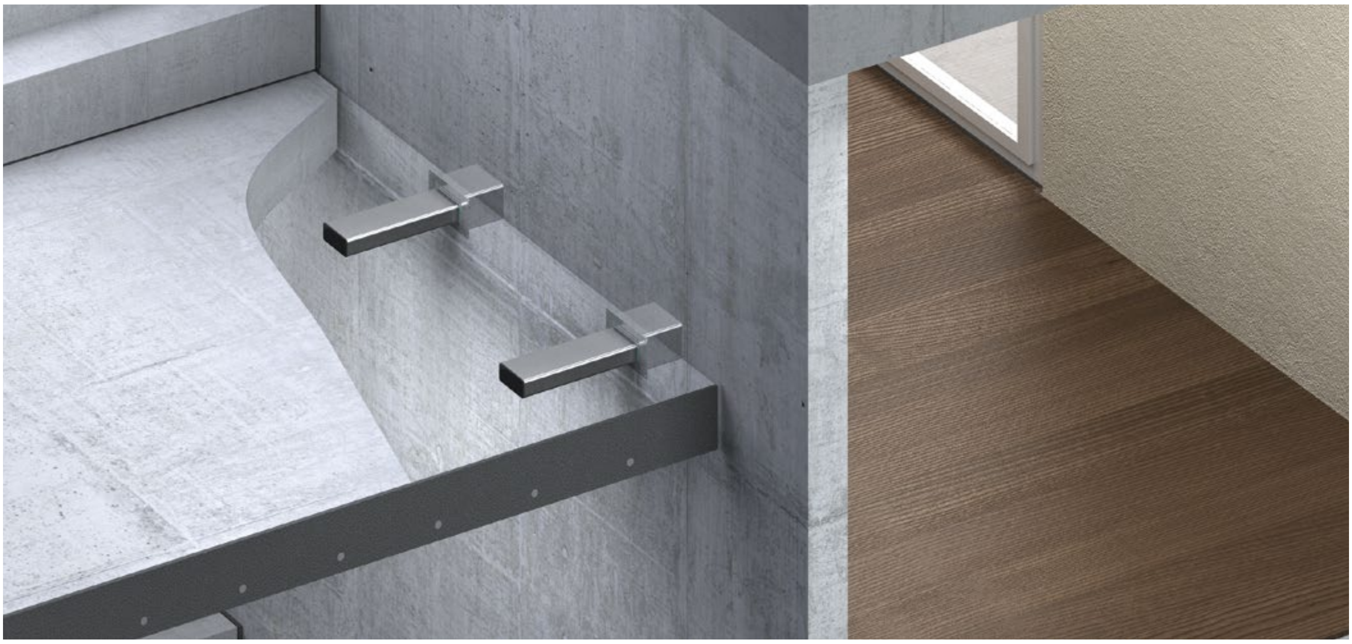
Validity of strength figures according to GTC.



CRET Silent-992 CRET Silent-992P CRET Silent-993 CRET Silent-993P CRET Silent-994 CRET Silent-994P

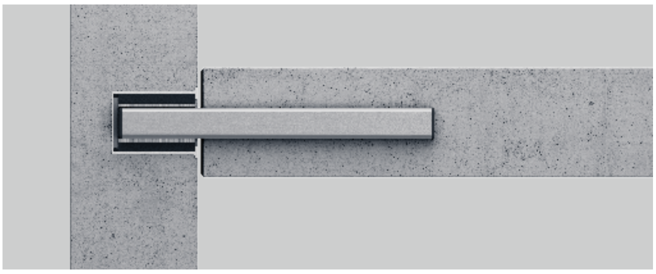
Heavy-duty shear load connectors with sound insulation

CRET Silent®-992, -992P, -993, -993P, -994, -994P



Function

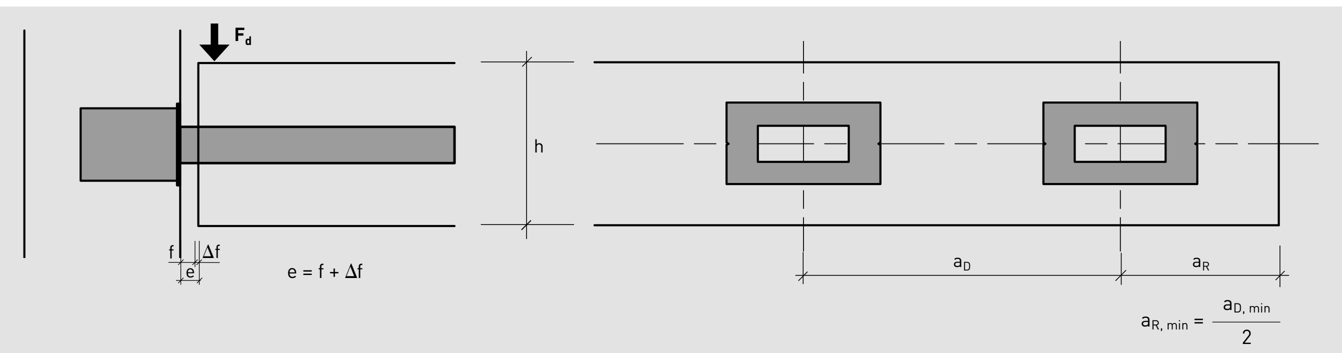
Uniaxial shear load transmission; sound insulation effect. Typical applications: sound damping support of cast in-situ or prefabricated building elements such as stair-ways, landings, balconies, access pathways etc.



Based on measurements for the weighted difference in impact sound pressure level [1] $\Delta L^{*}_{n,w}$ and the weighted reduction in impact sound pressure level of the landing $\Delta L_{w,landing}$ according to DIN 7396:2016 carried out at the Fraunhofer Institute IBP, the following values were derived for these CRET Silent connectors:

Type	$\Delta L^{*}_{n,w}$	$\Delta L_{w,landing}$
CRET Silent-992, -992P	24 dB	29 dB
CRET Silent-993, -993P	23 dB	28 dB
CRET Silent-994, -994P	25 dB	30 dB

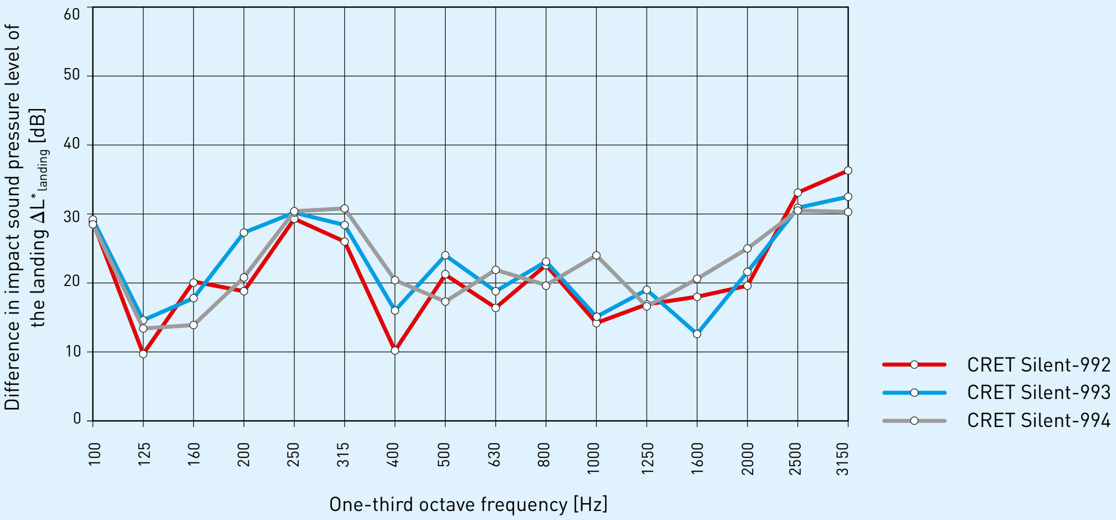
System diagram



[1] without applying the reference floor method

Measurement results of impact sound reduction (one-third octave bands)

The results of the measurements of the Fraunhofer Institute IBP are shown in the graph below for the difference in impact sound pressure level of the landing $\Delta L^*_{landing}$ with CRET Silent-992, -993 and -994 elements.



Difference in impact sound pressure level of the landing CRET Silent-992, -993, -994 at maximum load. The individual one-third octave band results are shown in the product documentation CRET Silent-992, -993, -994. Additional spectral values for the difference in impact sound pressure level of the landing and the reduction in impact sound pressure level of the landing are presented in the measurement report.

Design strength table

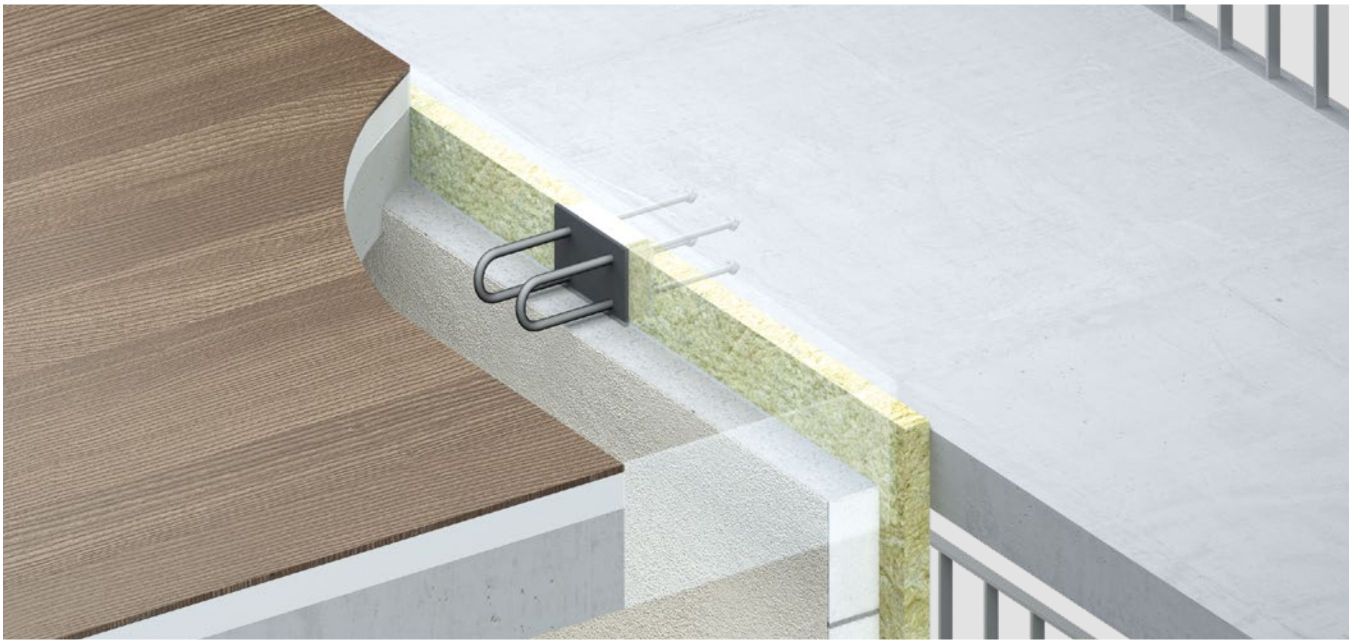
Concrete ≥ C25/30 Type	Joint e [mm]	F_{Rd} [kN]
CRET Silent-992, -992P	10	43.8
CRET Silent-992, -992P	20	43.8
CRET Silent-992, -992P	30	43.8
CRET Silent-992, -992P	40	43.8
CRET Silent-992, -992P	50	41.8
CRET Silent-992, -992P	60	39.9
CRET Silent-993, -993P	10	64.4
CRET Silent-993, -993P	20	61.8
CRET Silent-993, -993P	30	59.2
CRET Silent-993, -993P	40	56.6
CRET Silent-993, -993P	50	54.1
CRET Silent-993, -993P	60	51.5
CRET Silent-994, -994P	10	84.6
CRET Silent-994, -994P	20	81.5
CRET Silent-994, -994P	30	78.3
CRET Silent-994, -994P	40	75.2
CRET Silent-994, -994P	50	72.1
CRET Silent-994, -994P	60	69.0

Validity of strength figures according to GTC.

ARBO Silent-700

Sound and thermally insulating shear load element

ARBO Silent®-700



Function

High-quality sound and thermally insulating shear load element for the connection of reinforced concrete components that are separated by wide thermal insulation joints.

Based on measurements for the weighted difference in impact sound pressure level [1] $\Delta L^*_{n,w}$ based on DIN 7396:2016 carried out at the EMPA, the following value was derived for for ARBO Silent-700 shear load elements:

Type	$\Delta L^*_{n,w}$
ARBO Silent-700	16 dB

Note: These measurements were performed before the DIN 7396:2016 standard appeared. Since the test configuration is largely identical to the standard, however, the results here are given the weighted difference in impact sound pressure level [1] $\Delta L^*_{n,w}$.

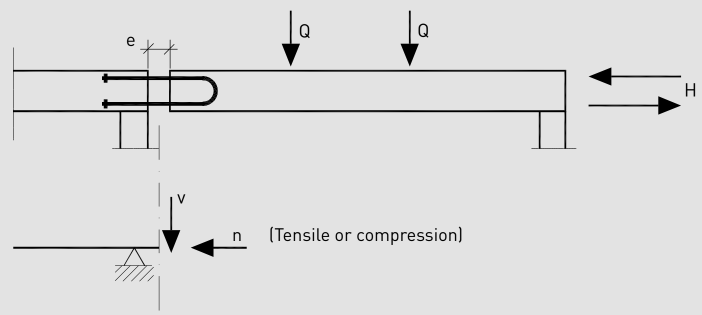
Fire protection

The concrete underside covering is 30 mm. A mineral wool thermal insulation panel is inserted in the underside of the insulation element for the fire protection range up to 750°C.

Behaviour under load

ARBO Silent-700 series elements transfer normal and shear loads between reinforced concrete building components that are separated by insulation gaps of 80 to 160 mm width.

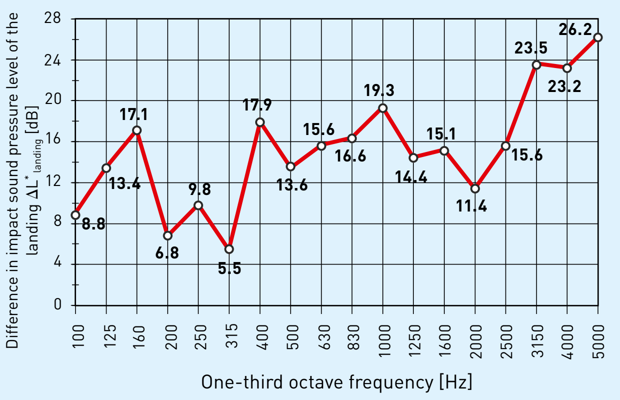
System diagram



[1] without applying the reference floor method

Measurement results of difference in impact sound pressure level (one-third octave bands)

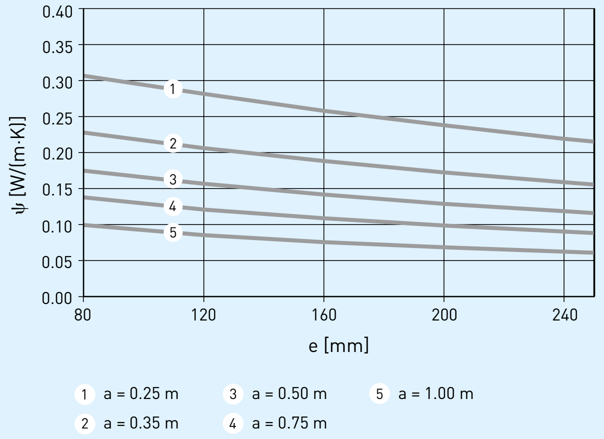
The results of the measurements of the EMPA are shown in the graph below for the difference in impact sound pressure level of the landing $\Delta L^*_{landing}$ with ARBO Silent-700 console elements.



Difference in impact sound pressure level of the landing
ARBO Silent-700

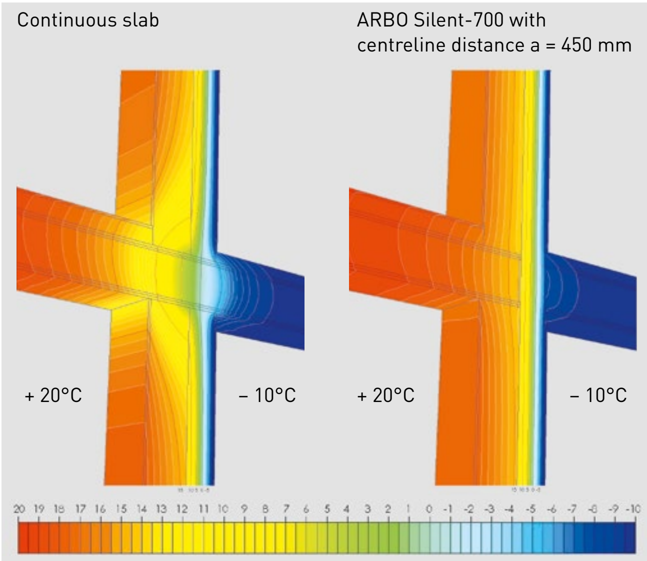
Thermal design

For thermal design, refer to the documentation «Thermally insulated reinforcement elements for connections to reinforced concrete building elements – Introduction to the planning and design of connections using ARBO reinforcement elements». Numerical values for linear thermal transmission coefficients ψ are given in the technical documentation.



Linear thermal transmission coefficient ψ
Example: ARBO Silent-720

The following graphic illustrates the significantly more favourable surface temperatures of the ARBO Silent element. Also evident is the critical location on the inner edge (slab underside).




Box

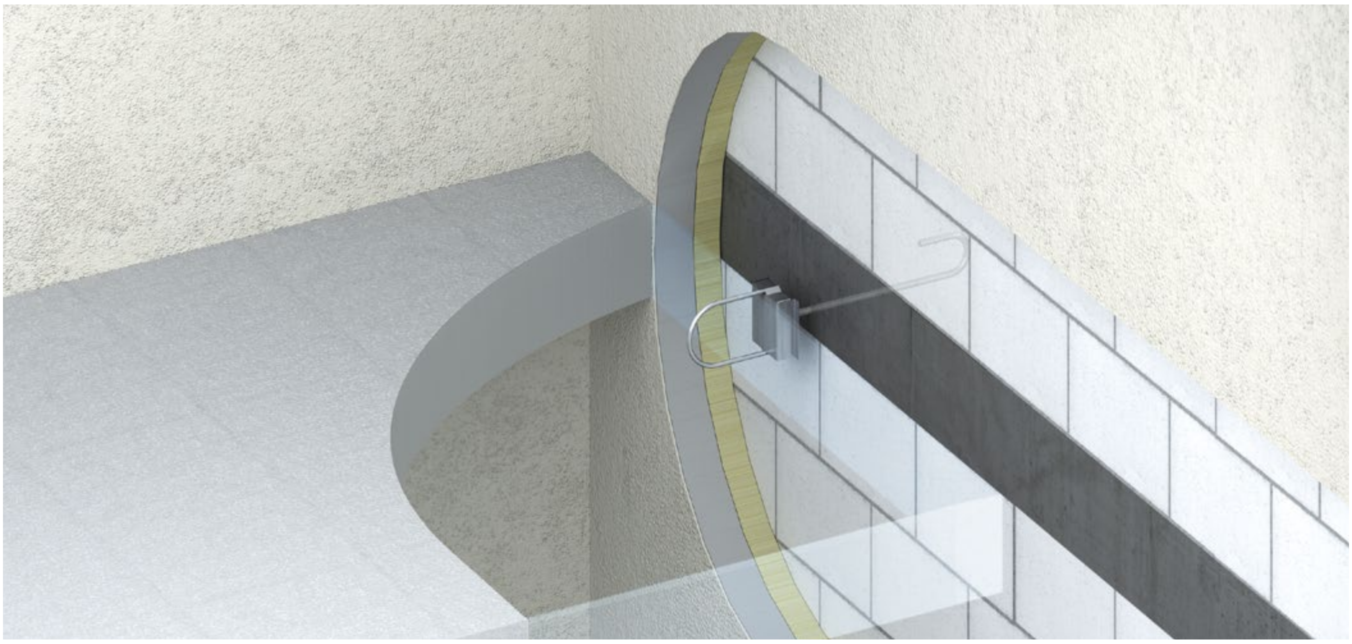

Model A


Model B


Model C

Bolted tension and compression anchors with sound insulation

RIBA Silent®-915, -917

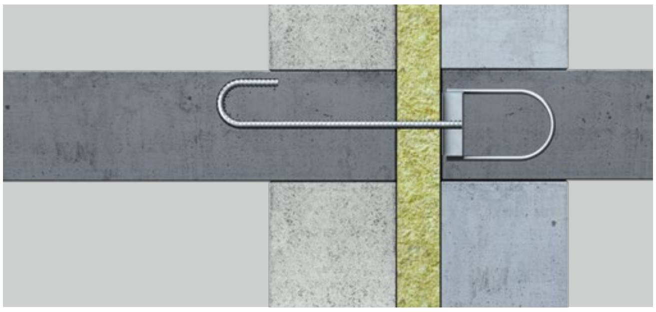


Function

Uniaxial shear load transmission; sound insulation effect. Typical applications: sound damping anchorage of building elements such as parapets, double walls, stabilisation of free-standing balconies and access pathways etc.

Based on measurements for the weighted difference in impact sound pressure level [1] $\Delta L^{*}_{n,w}$ based on DIN 7396:2016 carried out at the Fraunhofer-Instituts IBP, the following values were derived for RIBA Silent:

Type	$\Delta L^{*}_{n,w}$
RIBA Silent-915	33 dB
RIBA Silent-917	33 dB

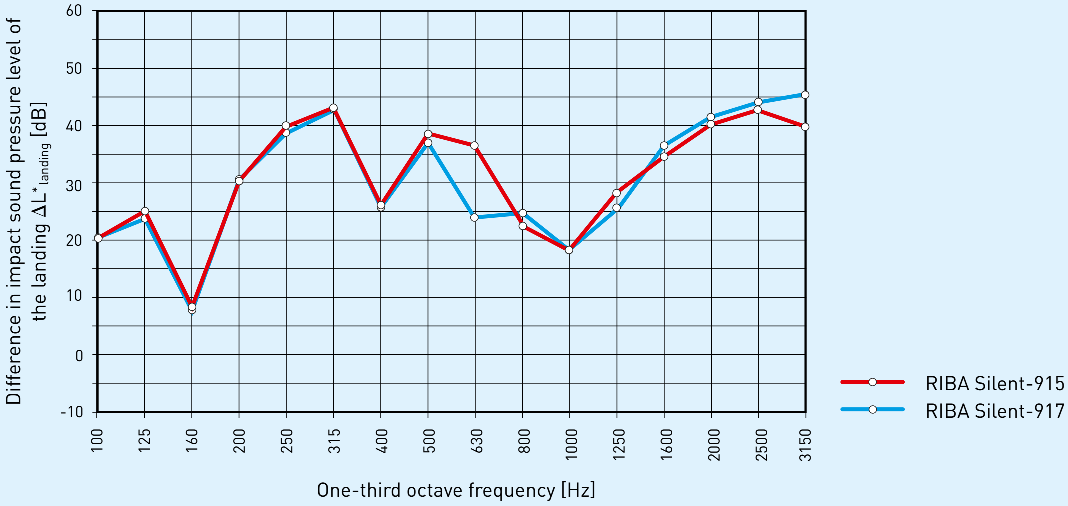


Note: These measurements were performed before the DIN 7396:2016 standard appeared. Since the test configuration is largely identical to the standard, however, the results here are given the weighted difference in impact sound pressure level [1] $\Delta L^{*}_{n,w}$.

[1] without applying the reference floor method

Measurement results of impact sound reduction (one-third octave bands)

The results of the measurements of the Fraunhofer Institut IBP are shown in the graph below for the difference in impact sound pressure level of the landing $\Delta L^*_{landing}$ with RIBA Silent-915, -917 elements.



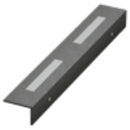
Difference in impact sound pressure level of the landing RIBA Silent-915, -917 at maximum load.
The individual one-third octave band results are shown in the product documentation RIBA Silent-915, -917.

Design strength table

Concrete ≥ C25/30 Type	Tensile and compression anchors ∅ [mm]	Max. Joint gap [mm]	Tensile force (F_{Rd}) [kN]	Compression force (Building element restrained in the transverse direction) (F_{Rd}) [kN]	Compression force (Building element **not** restrained in the transverse direction) (F_{Rd}) [kN]
RIBA Silent-915-10	10	40	23.1	23.2	23.2
RIBA Silent-915-12	12	80	23.1	25.0	25.0
	12	120	23.1	25.0	25.0
RIBA Silent-915-14	14	160	23.1	25.0	25.0
RIBA Silent-915-16	16	200	23.1	25.0	25.0
RIBA Silent-917-16	16	40	62.8	62.8	62.8
	16	80	62.8	62.8	62.8
	16	120	62.8	62.8	57.9
RIBA Silent-917-20	20	160	62.8	62.8	62.8
	20	200	62.8	62.8	62.4

Validity of strength figures according to GTC.


NELL Silent-Z

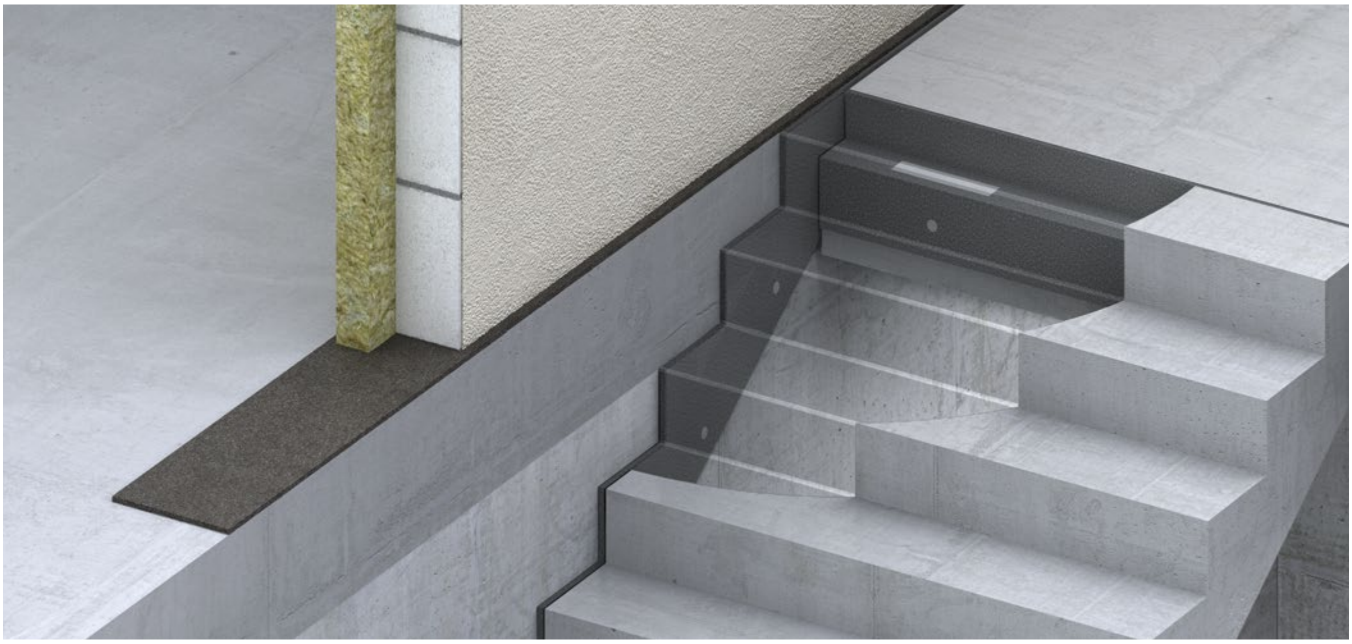

NELL Silent-L


NELL Silent-F


NELL Silent-W

Stairway support with sound insulation

NELL Silent®



Function

Transmission of normal forces; sound damping effect. Typical applications: sound insulating support of pre-fabricated stairs.

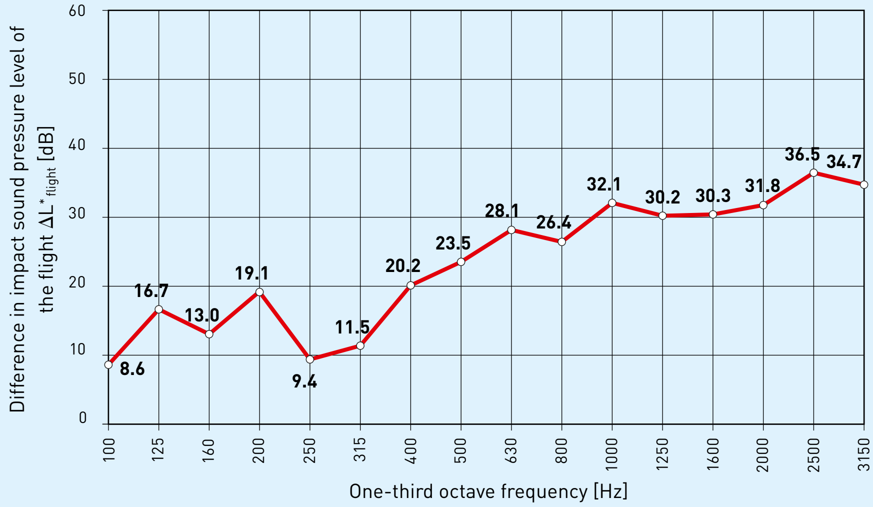
Based on measurements for the weighted difference in impact sound pressure level [1] $\Delta L^*_{n,w}$ and the weighted reduction in impact sound pressure level of the flight $\Delta L_{w, flight}$ according to DIN 7396:2016 carried out at the STEP GmbH, the following value was derived for NELL Silent stairway supports:

Type	$\Delta L^*_{n,w}$	$\Delta L_{w, flight}$
NELL Silent-Z, -L, -F, -W	31 dB	31 dB

[1] without applying the reference floor method

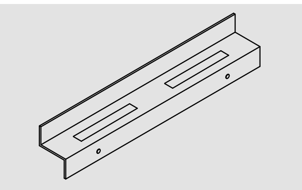
Measurement results of difference in impact sound pressure level (one-third octave bands)

The results of the measurements of the Schalltechnischen Entwicklungs- und Prüfinstitut (STEP) GmbH are shown in the graph below for the difference in impact sound pressure level of the flight ΔL^*_{flight} with NELL Silent-Z, -F stairway support.

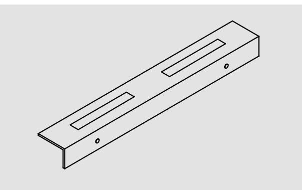


Difference in impact sound pressure level of the flight NELL Silent-Z, -F stairway support.

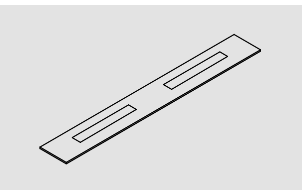
Design strength table



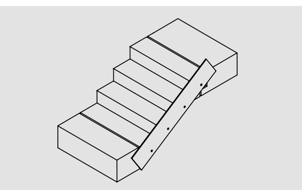
Type	Permissible load F_{adm} [kN]	Ultimate resistance F_{Rd} [kN]	Deformation Δw [mm]
NELL Silent-Z-2	18.0	25.2	1.4
NELL Silent-Z-3	27.0	37.8	1.4
NELL Silent-Z-4	36.0	50.4	1.4



Type	Permissible load F_{adm} [kN]	Ultimate resistance F_{Rd} [kN]	Deformation Δw [mm]
NELL Silent-L-2	18.0	25.2	1.4
NELL Silent-L-3	27.0	37.8	1.4
NELL Silent-L-4	36.0	50.4	1.4



Type	Permissible load F_{adm} [kN]	Ultimate resistance F_{Rd} [kN]	Deformation Δw [mm]
NELL Silent-F-2	18.0	25.2	1.4
NELL Silent-F-3	27.0	37.8	1.4
NELL Silent-F-4	36.0	50.4	1.4



Type	
NELL Silent-W	Designed as spacer

Validity of strength figures according to GTC.

NELL Silent-Isolmat

Sound damping support

NELL Silent®

Function

NELL Silent-Isolmat is a noise insulation support placed under structural and non-structural walls, made of permanently elastic, polyurethane-bonded rubber granulate with adequate ageing properties, temperature resistant between -20°C and +80°C, water resistant. The weighted difference in impact sound pressure level [1] $\Delta L^*_{n,w}$ based on DIN 7396:2016 is comparable to that of the CRET Silent-970 shear load connector.
It amounts to:

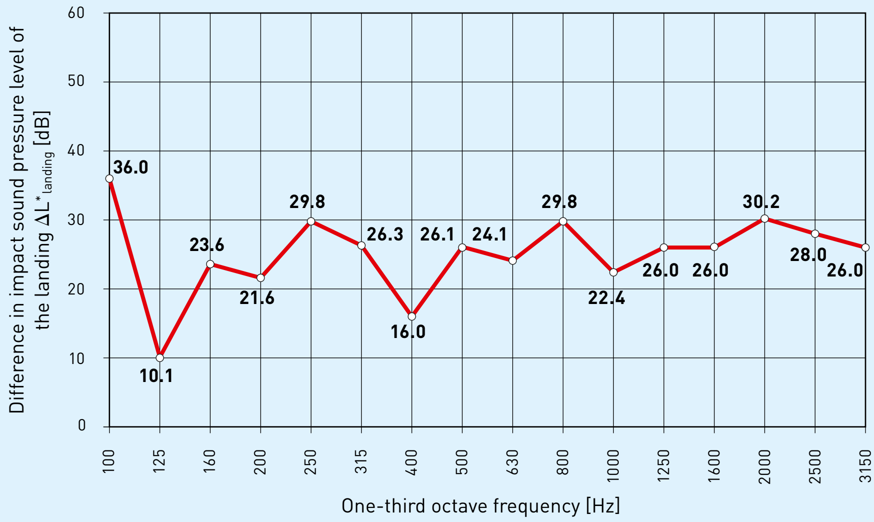
$$\Delta L^*_{n,w} = 28 \text{ dB}$$

Using structure-borne sound and vibration measurements undertaken in the laboratory of the FHNW, insulation properties were determined for NELL Silent-Isolmat noise insulation supports that are similar to the insulation material used in the CRET Silent-970 shear load connectors. For this reason, comparable difference in impact sound pressure level [1] $\Delta L^*_{n,w}$ may be assumed.

[1] without applying the reference floor method

Measurement results of impact sound reduction (one-third octave bands)

The difference in impact sound pressure level $\Delta L^*_{landing}$ achieved with NELL Silent-Isolmat are comparable with those shown in the graphic for CRET Silent-970.



Difference in impact sound pressure level of the landing CRET Silent-970.

Design strength table

Type	Support width	Load of 0.250 N/mm²		Load of 0.375 N/mm²		Load of 0.500 N/mm²	
	[mm]	F_{adm} [kN/m¹]	Deformation [mm]	F_{adm} [kN/m¹]	Deformation [mm]	F_{adm} [kN/m¹]	Deformation [mm]
NELL Silent-Isolmat-125	125	31.2	1.3	46.9	1.9	62.5	2.3
NELL Silent-Isolmat-150	150	37.5	1.3	56.3	1.9	75.0	2.3
NELL Silent-Isolmat-175	175	43.8	1.3	65.6	1.9	87.5	2.3
NELL Silent-Isolmat-200	200	50.0	1.3	75.0	1.9	100.0	2.3

Validity of strength figures according to GTC.

Measurement and evaluation procedure for Silent products

In June 2016 a standardised test method for the acoustical designation of decoupling elements for heavy stairs was introduced for the first time in DIN 7396:2016. This standard defines measuring variables, the measurement configuration and how the measurements are performed and evaluated. For the acoustical characterisation of decoupling elements for heavy stairs, the standard defines two methods for the decoupled landing support and for the decoupled stair support:

- the difference in impact sound pressure level ΔL^* and
- the reduction in impact sound pressure level ΔL.

To differentiate between decoupled landing support and decoupled stair support, the acoustical designation is prefixed by «landing» or «stair» suffixed by the symbol.

The following description is limited to the acoustic testing of the decoupled landing support.

In both test methods (difference in impact sound pressure level of the landing and reduction in impact sound pressure level of the landing) the decoupled landing is measured in the same way: the landing is excited with a standard tapping machine and the transmitted sound pressure level in the adjacent reception area is measured for every one-third octave frequency.

The measured one-third octave level is converted to a standardised receiving room and correspondingly denoted as normalized impact sound pressure level of the landing $L_{n,landing}$.

Reference measurement

The difference between the two test methods lies in the way the reference measurement is performed.
In the test method for determining the difference in impact sound pressure level, the landing is rigidly installed in the reference wall, the landing is excited with the standard tapping machine and the impact sound level is then measured in the adjacent receiving room as the normalized impact sound pressure level of the reference landing $L_{n0,landing}$.

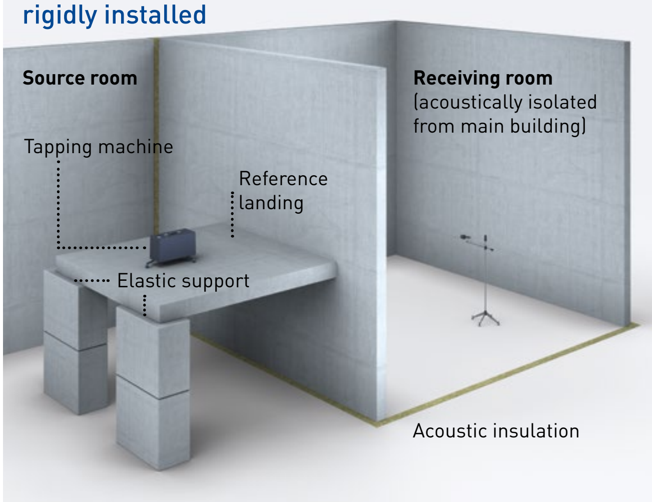
In the test method for determining the reduction in impact sound pressure level, no landing is installed in the reference wall for the reference measurement. The reference wall is excited directly with an electromagnetic tapping machine and the impact sound level is then measured in the adjacent receiving room as the normalized impact sound pressure level of the wall $L_{n0,wall}$.

The difference between the measurement with excitation on the rigidly installed landing and on the decoupled landing (with sound-reducing measure) is calculated for every one-third octave frequency and denoted as the **difference in impact sound pressure level of the landing**:

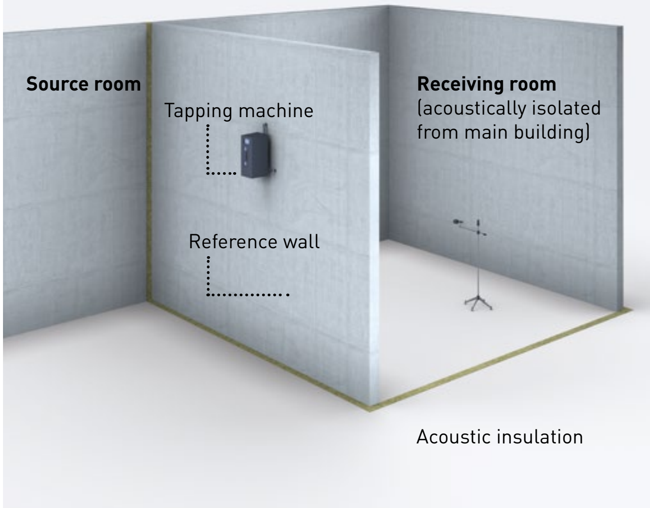
$$\Delta L^*_{landing} = L_{n0,landing} - L_{n,landing}$$

The difference between the measurement with excitation on the reference wall and on the decoupled landing (with sound-reducing measure) is calculated for every one-third octave frequency and denoted as the **reduction in impact sound pressure level**:

Schematic diagram of the measurement of the weighted normalized impact sound pressure level of the landing where the reference stair landing is rigidly installed



Schematic diagram of the measurement of the normalized impact sound pressure level of the wall of the reference wall



$$\Delta L_{landing} = L_{n0,wall} - L_{n,landing}$$

This leads to numerical values of the reduction in impact sound pressure level of the landing $\Delta L_{landing}$ being higher than those of the difference in impact sound pressure level of the landing $\Delta L^{*}_{landing}$.

Single value

For a simpler characterisation of the acoustic effects of the decoupled support, DIN 7396:2016 requires a single value to be calculated in accordance with DIN EN ISO 717-2. The reference floor method is used for this purpose, where the values of the difference in impact sound pressure level of the landing $\Delta L^{*}_{landing}$ (or the reduction in impact sound pressure level of the landing $\Delta L_{landing}$) in the frequency range between 100 Hz and 3150 Hz are subtracted from a curve, defined in the standard, of an "unfinished" reference floor. This is used to determine the curve of a "reference floor with sound insulation measure".

This "curve of the reference floor with sound insulation measure" is compared with a reference curve (see illustration of the weighted impact sound pressure level of the landing using the reference floor method).

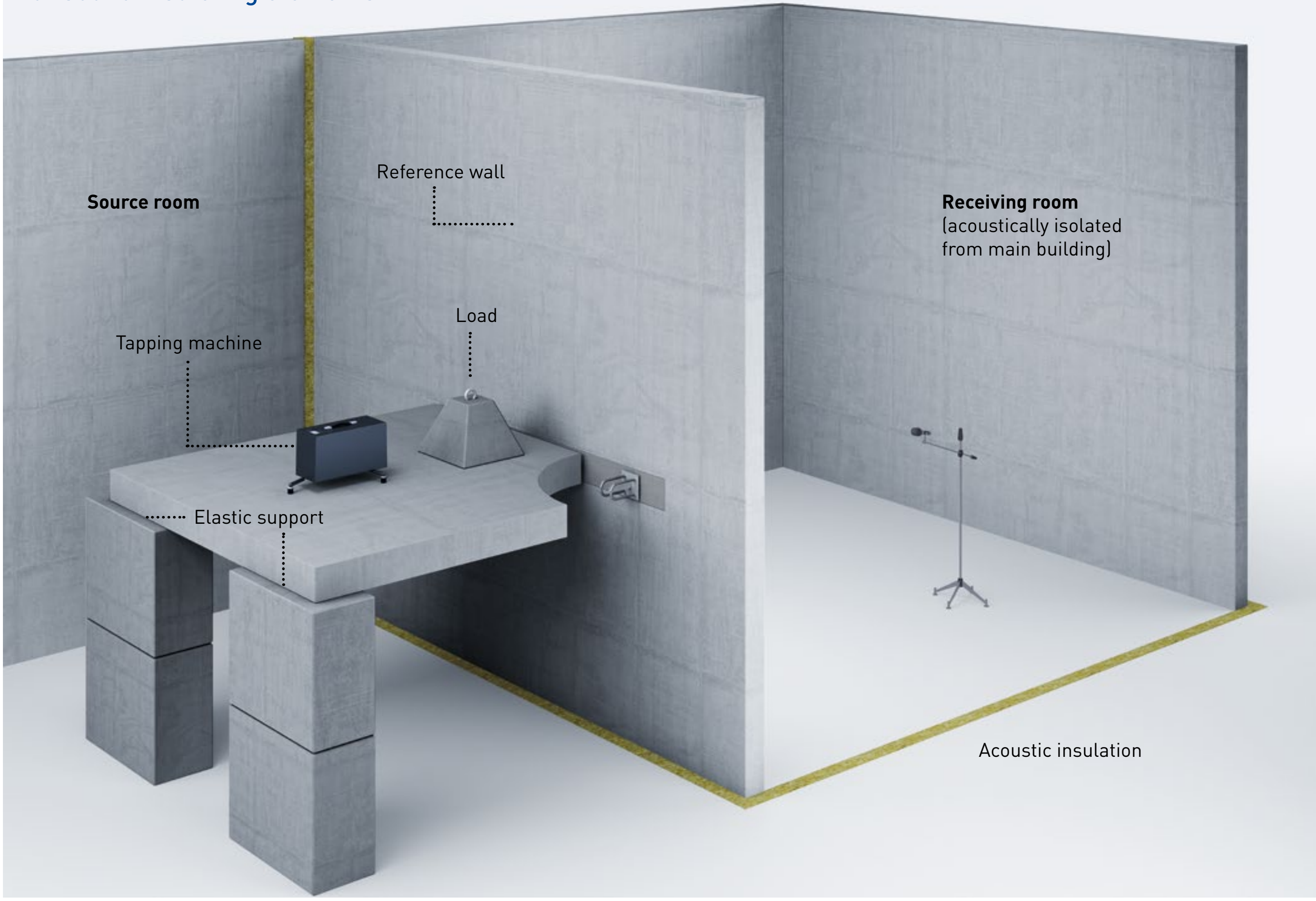
The reference curve is vertically offset in steps of 1 dB until the sum of the differences between the impact sound level and the reference curve in the one-third octaves in which the impact sound pressure levels are higher than the reference curve is less than 32 dB. The level value of the offset reference curve at 500 Hz is then equivalent to the weighted normalized impact sound pressure level of the landing $L_{n,w,\ landing}$.

The weighted difference in impact sound pressure level of the landing is then denoted by:

$$\Delta L^{*}_{w,\ landing} = L_{n,r,0,w} - L_{n,w,landing} = 78\ dB - L_{n,w,\ landing}$$

where $L_{n,r,0,w}$ is the weighted normalized impact sound pressure level of the "unfinished" reference floor. Since these are reference values defined in standards, it is always 78 dB. The weighted reduction in impact sound pressure level of the landing is determined analogously. To enable a comparison with earlier product parameters, it is also possible to calculate the weighted difference in impact sound pressure level $\Delta L^{*}_{n,w}$ without using the reference floor method. In this case the curve of the normalized impact sound pressure level of the reference landing ($L_{n0,w,\ landing}$) is used instead of the normalized curve of an "unfinished" reference floor.

Schematic diagram of the measurement configuration at the Fraunhofer Institute IBP / EMPA for sound insulating elements



As described above, the reference curve is shifted both for the curve of the measured normalized impact sound pressure level of the rigidly installed landing and for the curve of the measured normalized impact sound pressure level of the decoupled landing ($L_{n,w,\,landing}$). The difference in the sound pressure levels of the two correspondingly shifted reference curves at 500 Hz is the weighted difference in impact sound pressure level $\Delta L^*_{n,w}$ (see illustration of the weighted difference in impact sound pressure level of the landing without applying the reference floor method):

$$\Delta L^*_{n,w} = L_{n0,w,Podest} - L_{n,w,Podest}$$

Comparison with previous measurements

We were one of the first companies to have its sound-insulating elements independently tested by the EMPA and the Fraunhofer Institute IBP in Stuttgart. A measurement procedure based on the standard for ceiling constructions (SN EN IS0140-8:1997 or DIN EN ISO 10140 series) was used because at the time there was no international test method for landings or stair supports.

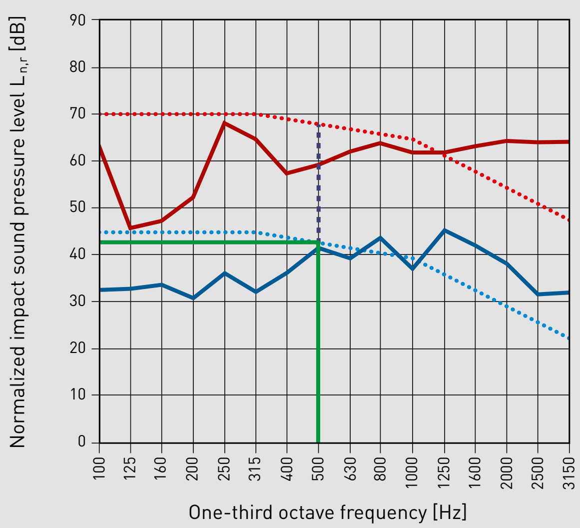
The measurement configuration chosen at that time and the evaluation were largely identical to the recently published DIN 7396:2016; the only changes were a reduction in the landing length from 2.5 m to 2.4 m and in the landing thickness to 0.18 m. For that reason only very minor differences in the measurement results compared with a new measurement according to DIN 7396:2016 can be expected. That is why the earlier measurements were adopted in the product documentation for elements for which no DIN 7396:2016 measurement results are available, with only the notation being changed.

The variable previously denoted as the weighted impact sound reduction ΔL_w is therefore now denoted the weighted difference in impact sound pressure level of the landing $\Delta L^*_{n,w}$ (without applying the reference floor method) until more recent measurements are available.

What DIN 7396:2016 denotes as the weighted reduction in impact sound pressure level of the landing $\Delta L_{w,\,landing}$ is the new acoustic measure. It can be used as the input variable for the theoretical forecast of impact sound transmission according to DIN EN 12354-2.

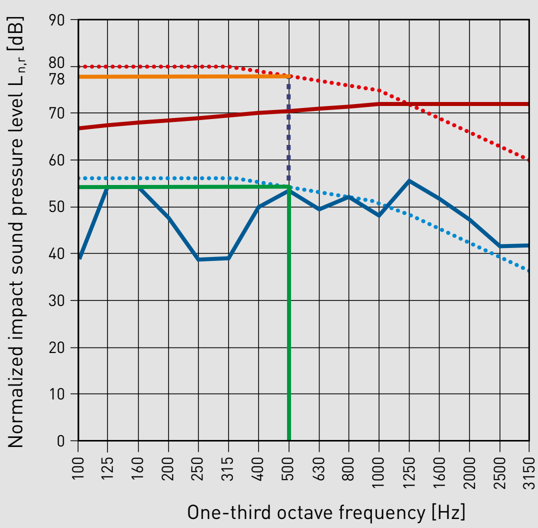
Previous measurements have shown that the numbers obtained for the weighted reduction in impact sound pressure level of the landing $\Delta L_{w,\,landing}$ are 5 to 9 dB higher than for the weighted difference in impact sound pressure level of the landing $\Delta L^*_{n,w}$.
This fact must be taken into appropriate account when selecting the elements. Furthermore, caution is essential if confusion with the notations previously used is to be avoided.

Weighted difference in impact sound pressure level without applying the reference floor method



- Normalized impact sound pressure level of the reference landing $L_{n,0,landing}$
- Offset reference curve for the reference landing
- Normalized impact sound pressure level of the landing with sound insulation measure $L_{n,landing}$
- Offset reference curve of the landing with sound insulation measure
- Weighted difference in impact sound pressure level $\Delta L^*_{n,w}$
- Weighted normalized landing impact sound pressure level $L_{n,w,Podest}$ with sound insulation measure

Weighted difference in impact sound pressure level of the landing applying the reference floor method



- "Unfinished" reference floor
- Offset reference curve of the "unfinished" reference floor
- Weighted norm. landing impact sound pressure level $L_{n,r,0,w}$ of the "unfinished" reference floor
- Calc. impact sound pressure level of the ref. floor with sound insul. measure $L_{n,r}$
- Offset reference curve of the reference floor with sound insulation measure
- Weighted difference in impact sound pressure level of the landing $\Delta L^*_{w,landing}$
- Weighted normalized impact sound pressure level of the landing $L_{n,w,landing}$

Fraunhofer Institute IBP Reports:

- CRET Silent-930 S 11218
- CRET Silent-945 APG S 11218
- CRET Silent-946 APG S 11218
- CRET Silent-947 APG S 11218
- CRET Silent-960 S 10976
- CRET Silent-970 S 10976
- CRET Silent-984 S 10976
- CRET Silent-985 S 10976
- CRET Silent-986 S 10741
- CRET Silent-992 S 10976
- CRET Silent-993 S 10976
- CRET Silent-994 S 10976
- RIBA Silent-915 S 10741
- RIBA Silent-917 S 10741

EMPA Reports:

- ARBO Silent-700 Nr. 172809

Glossary – Designations for single values

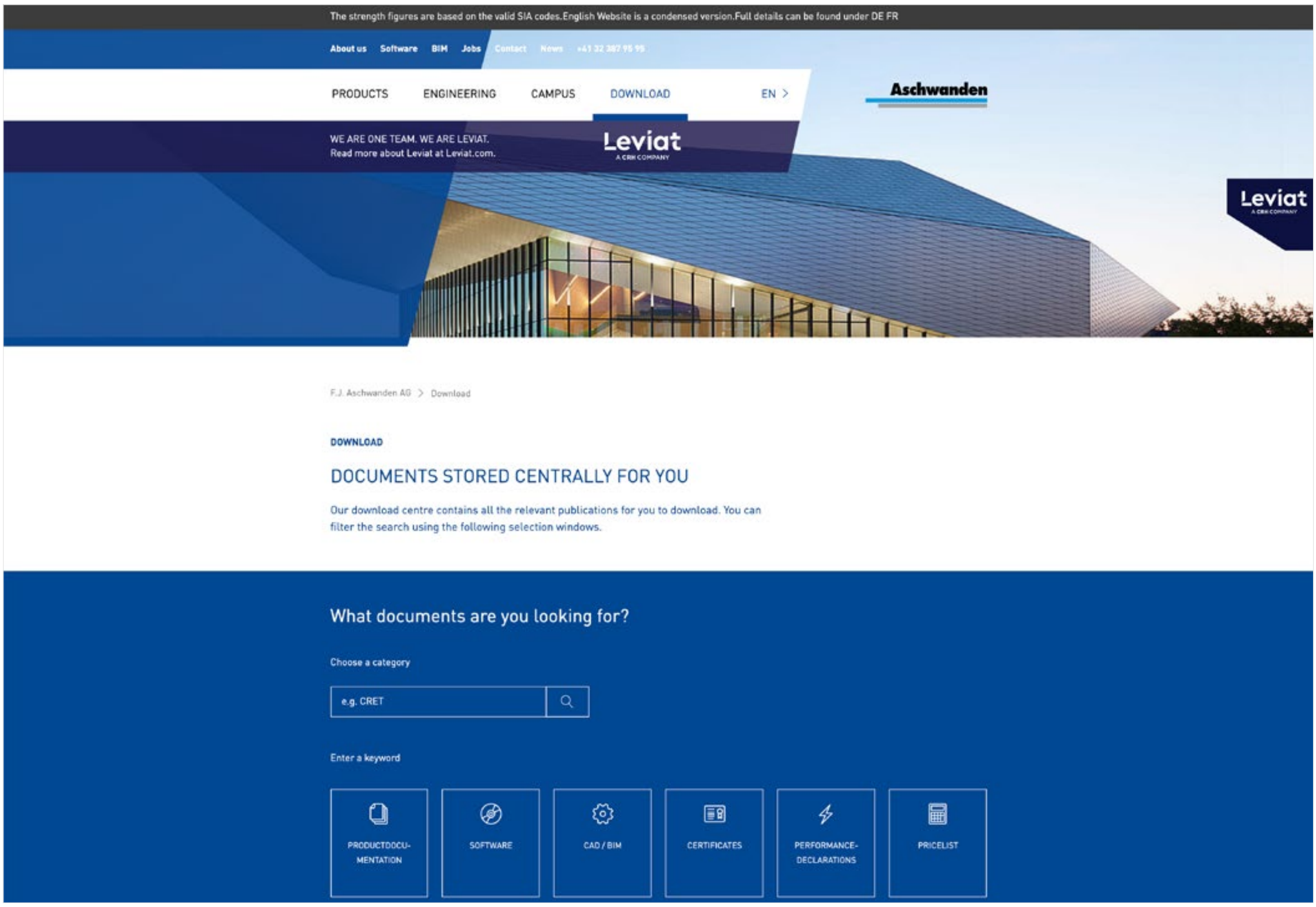
As of 2018: according to DIN 7396:2016	Previously: according to Fraunhofer Institute IBP / EMPA	Reference
Weighted difference in impact sound pressure level $\Delta L^*_{n,w}$	Weighted reduction in impact sound pressure level ΔL_w	
Weighted difference in impact sound pressure level of the landing $\Delta L^*_{w,landing}$		
Weighted normalized impact sound pressure level of the reference landing $L_{n0,w,landing}$	Weighted reduction in impact sound pressure level $L_{n,r,0,w}$ / $L_{n,w,ref}$	Reference measurement
Weighted reduction in impact sound pressure level of the landing $\Delta L_{w,landing}$	–	
Weighted normalized impact sound pressure level of the wall $L_{n0,w,wall}$	–	Reference measurement
Weighted normalized impact sound pressure level of the landing $L_{n,w,landing}$	Weighted reduction in impact sound pressure level $L_{n,r,w}$ / $L_{n,w}$	Measurement with a dowel

Notations

$a_{D,min}$	Minimum connector spacing
Δf	Displacement factor
ΔL^*_{flight}	Difference in impact sound pressure level of the flight according toDIN 7396:2016
$\Delta L^*_{landing}$	Difference in impact sound pressure level of the landing according to DIN 7396:2016
$\Delta L^*_{n,w}$	Weighted difference in impact sound pressure level according to / based on DIN 7396:2016 without applying the reference floor method
$\Delta L^*_{w,flight}$	Weighted difference in impact sound pressure level of the flight according to DIN 7396:2016 applying the reference floor method
$\Delta L^*_{w,landing}$	Weighted difference in impact sound pressure level of the landing according to DIN 7396:2016 applying the reference floor method
$\Delta L_{w,flight}$	Weighted reduction in impact sound pressure level of the flight according to DIN 7396:2016
$\Delta L_{w,landing}$	Weighted reduction in impact sound pressure level of the landing according to DIN 7396:2016
Δw	Deformation under load $F_{d,ser} = F_{Rd} / 1.4$
e	Relevant joint gap for static design
f	Nominal joint gap
F_d	Design value acting on connector to Codes SIA 260 and SIA 261
F_{Rd}	Design value of design strength from the design strength tables
F_{adm}	Admissible service load
h	Slab thickness

Standards

SIA 181:2006 Noise insulation in structural engineering
SIA 260:2013 Basis of structural design
SIA 261:2014 Actions on structures
SIA 262:2013 Concrete construction
SIA 2029:2013 Stainless concrete reinforcement steels
SN EN ISO 140-8:1997 Acoustics – Measurement of sound insulation in buildings and of building elements – Part 8: Laboratory measurements of the reduction of transmitted impact noise by floor coverings on a heavyweight standard floor
DIN EN ISO 717-2:2013 Acoustics – Rating of sound insulation in building and of building elements – Part 2: Impact sound insulation
DIN EN ISO 10140 series:2010 Acoustics – Laboratory measurement of sound insulation of building elements
DIN 7396:2016-06 Testing of acoustics in buildings – Test method for acoustical designation of decoupling elements for heavy stairways



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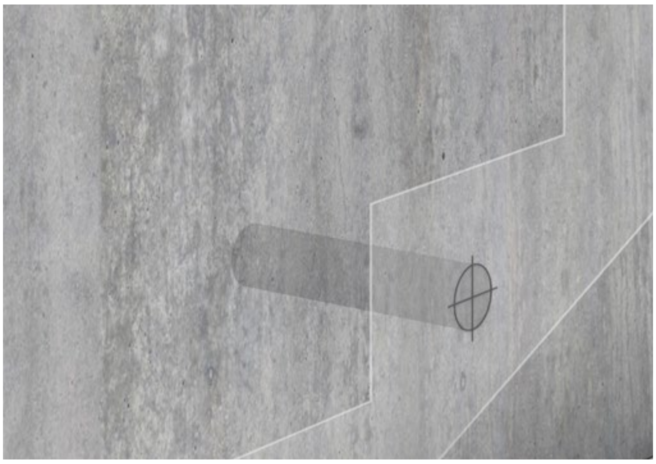
The menu «DOWNLOAD» leads you the shortest way to the technical documents and other product specific information.

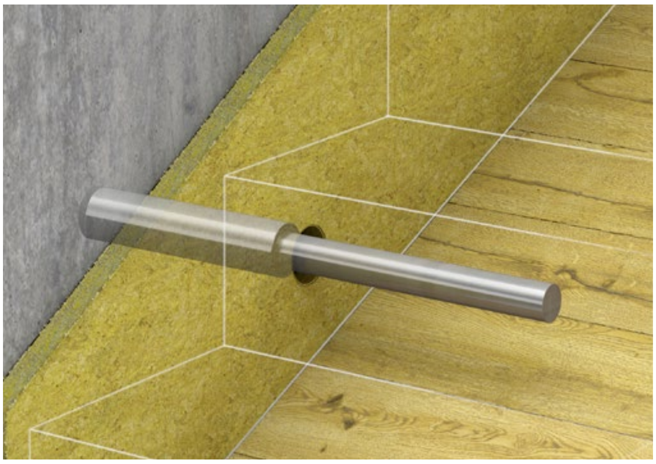
With various selection windows you can refine the search.

General installation configuration for impact noise elements

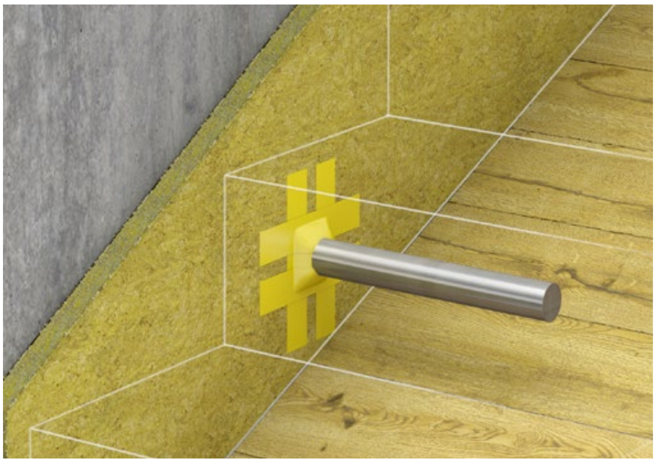
CRET Silent-930 for winding staircases



1. Mark drilling holes on concrete wall and drill holes.



2. Apply max. 100 kg/m^3 mineral wool filler material. Exclude drilling holes. Insert the CRET dowel.

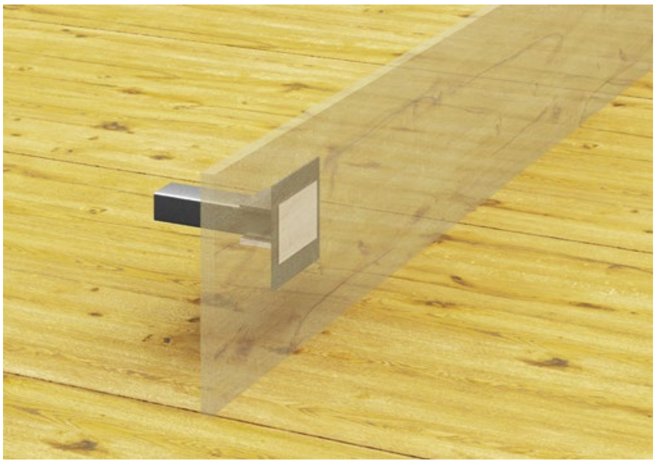


3. Mask the dowel.

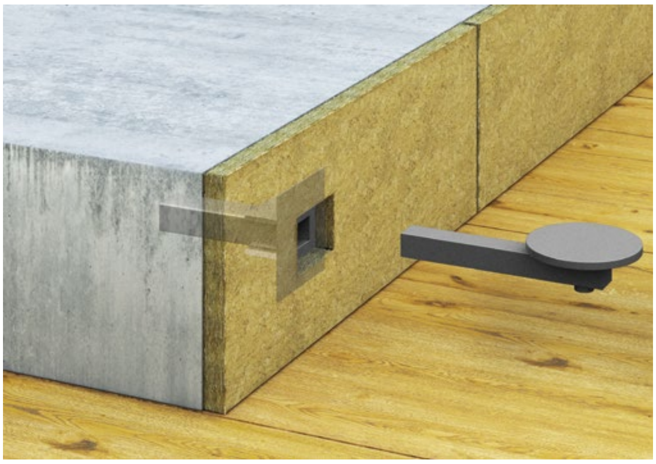
Verlegeanleitungen für die Bauausführung finden Sie auf unserer Webseite.

General installation configuration for impact noise elements

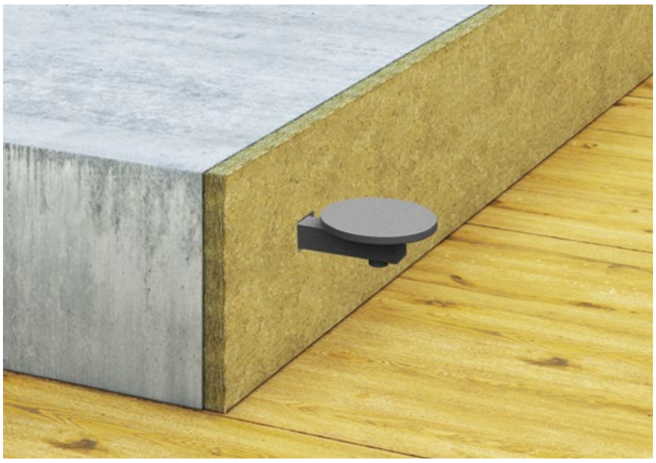
CRET Silent-945 APG, -946 APG, -947 APG



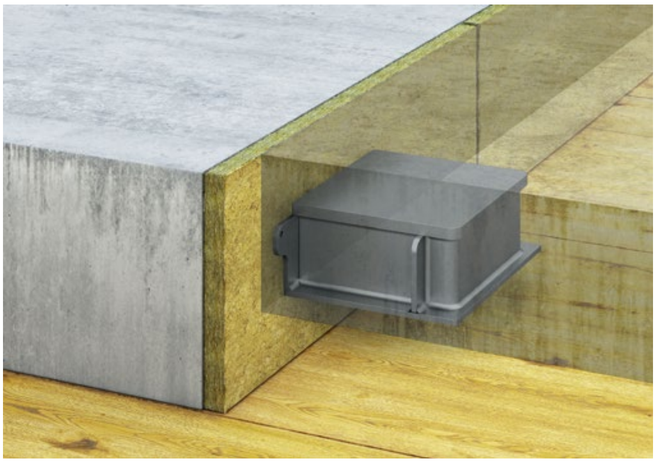
1. Nail CRET sleeve to the shuttering.



2. Remove shuttering and nails, apply max. 100 kg/m^3 mineral wool filler material, insert the CRET dowel.



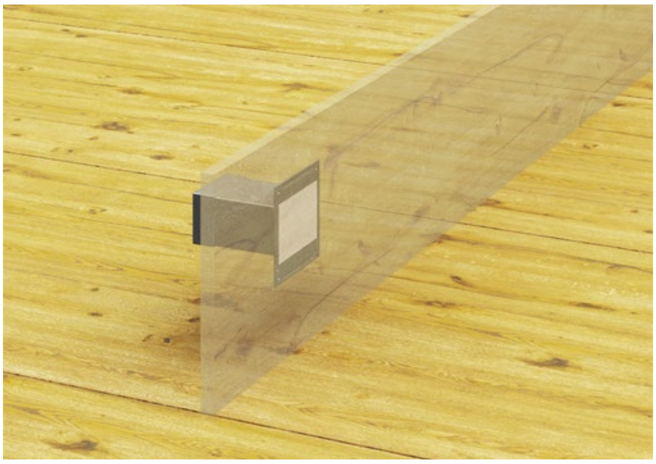
3. The dowel plate is height adjustable over a range of approximately 0 to 12 mm.



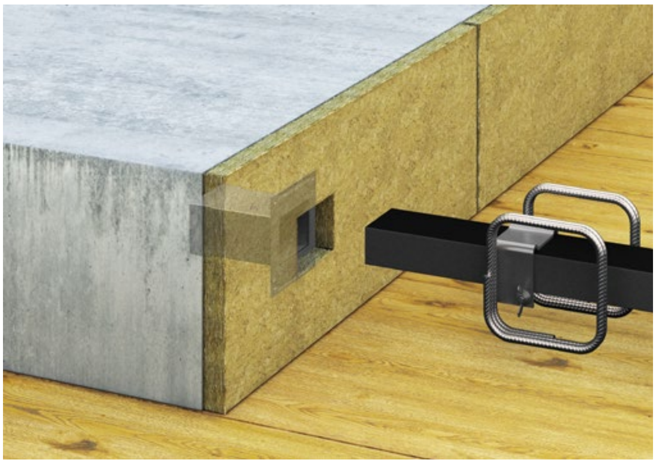
4. Install the precast element and use the dowel plate for fine adjustment.

German-language installation instructions for construction work can be found on our website.

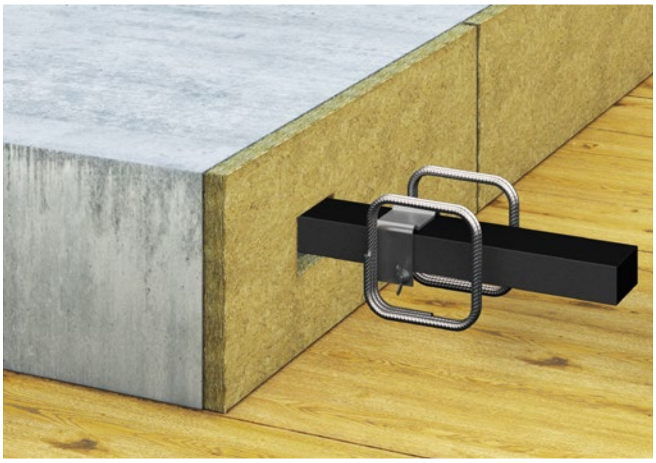
CRET Silent-960, -970



1. Nail CRET sleeve to the shuttering.



2. Remove shuttering and nails, apply max. 100 kg/m^3 mineral wool filler material.



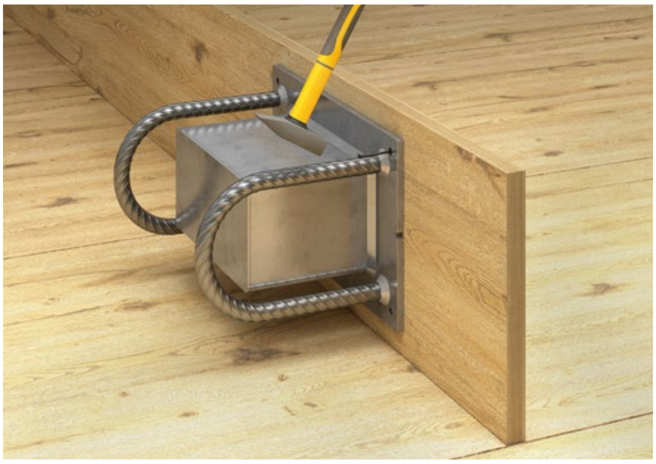
3. Insert the CRET dowel.

4. Mask the dowel plate and filler material joints.

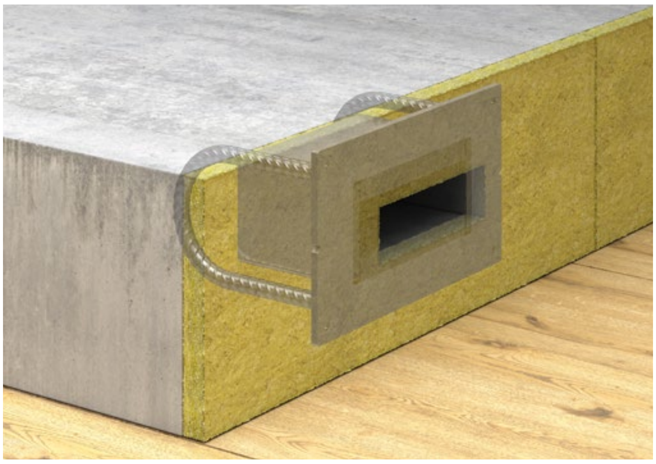
German-language installation instructions for construction work can be found on our website.

General installation configuration for impact noise elements

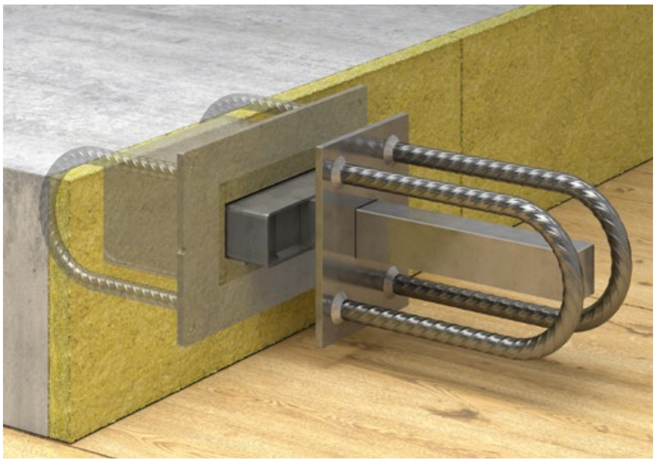
CRET Silent-984, -985, -986



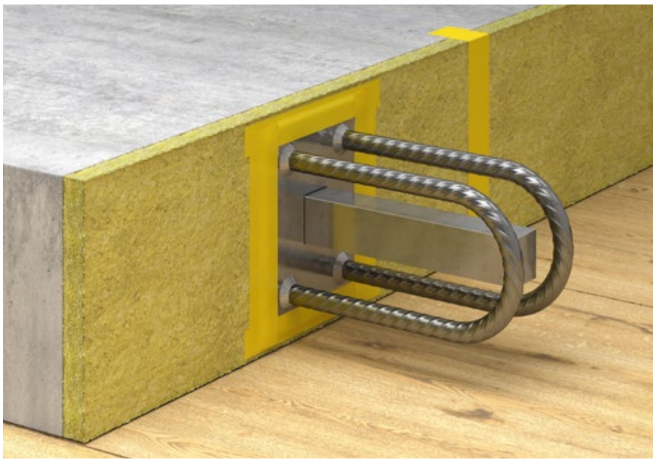
1. Nail CRET sleeve to the shuttering.



2. Remove shuttering and nails, apply max. 100 kg/m^3 mineral wool filler material.



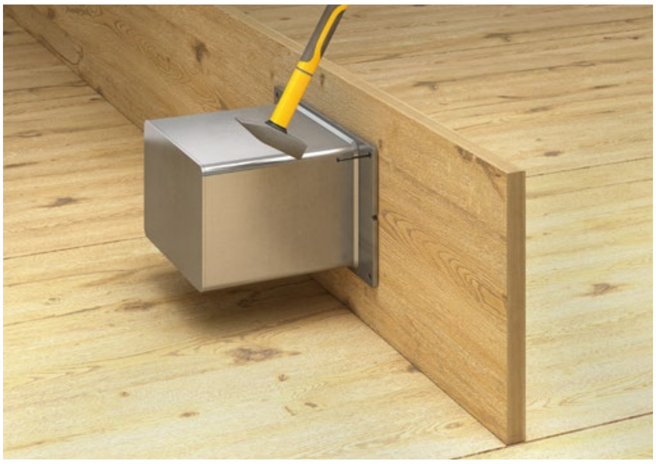
3. Insert the CRET dowel.



4. Mask the dowel plate and filler material joints.

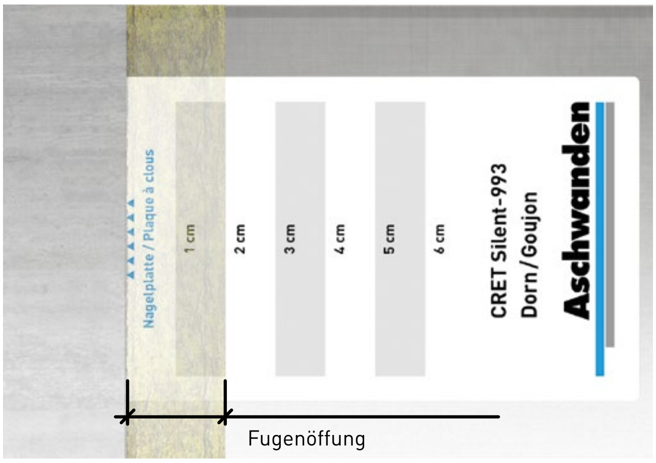
German-language installation instructions for construction work can be found on our website.

CRET Silent-992, -993, -994



1. Nail CRET sleeve to the shuttering.

2. Remove shuttering, nails and transportation lock, apply max. 100 kg/m^3 mineral wool filler material. Insert the dowel.



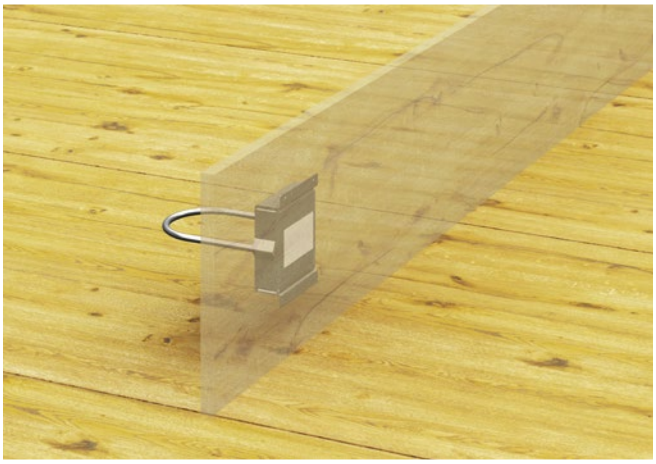
3. Control of the joint gap.

4. Mask the dowel and filler material joints.

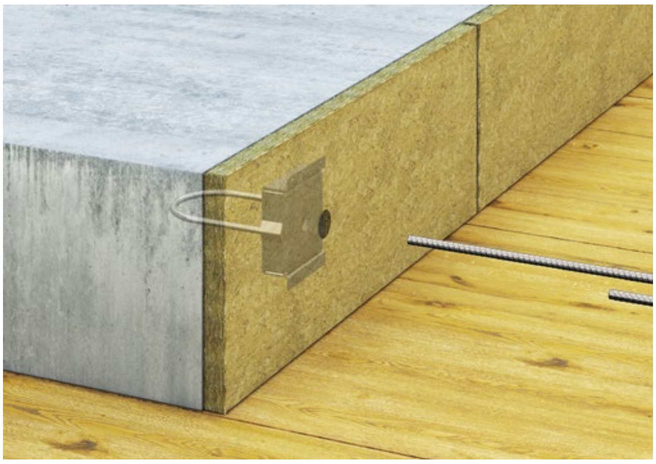
German-language installation instructions for construction work can be found on our website.

General installation configuration for impact noise elements

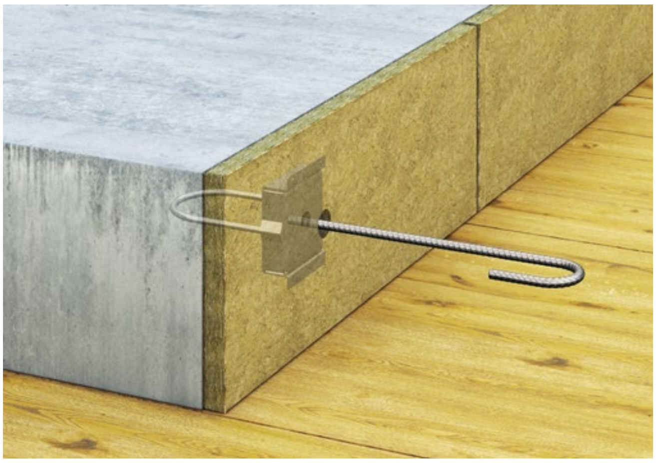
RIBA Silent-915, -917



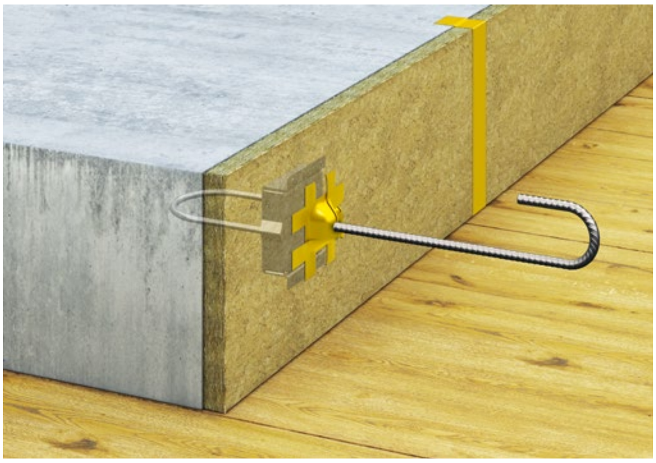
1. Nail RIBA sleeve to the shuttering.



2. Remove shuttering and nails, apply max. 100 kg/m^3 mineral wool filler material.



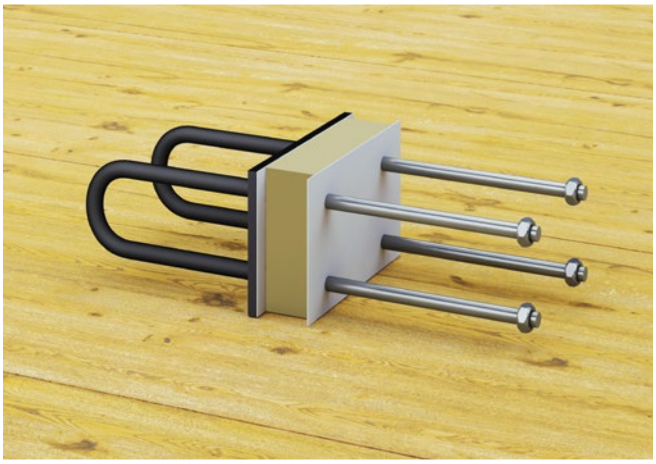
3. Screw in the anchor.



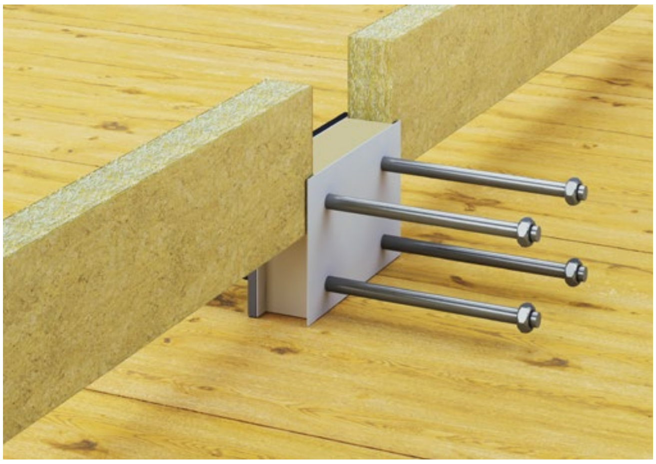
4. Mask the anchor and filler material joints.

German-language installation instructions for construction work can be found on our website.

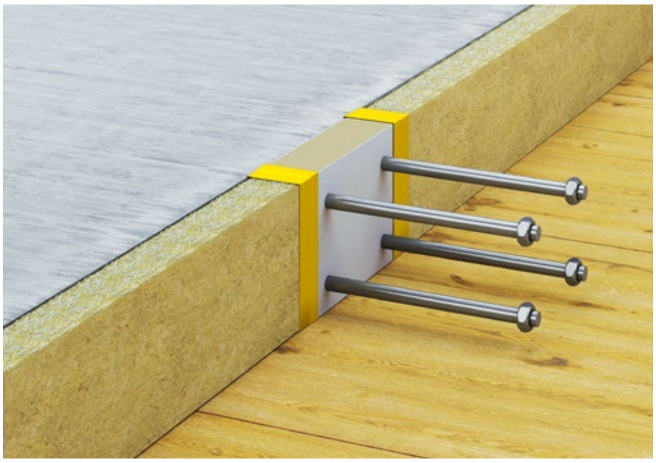
ARBO Silent-700



1. Place the ARBO Silent element on the shuttering.



2. Join up insulation material max. 100 kg/m^3 mineral wool and mask it against the first casting phase.

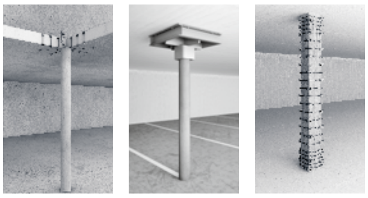


3. Cast the first slab and mask it against the second casting phase.

4. Cast the second slab.

German-language installation instructions for construction work can be found on our website.

Our unique product range



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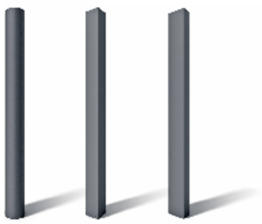

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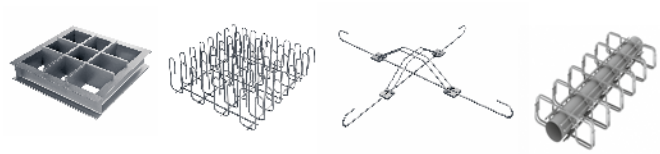

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Steel heads, cages, S-elements and DURA Box. Punching shear and shear reinforcement system for significantly increased strength levels.

RINO® SILENT ORSO® DURA® CRET® RIBA® ARBO®

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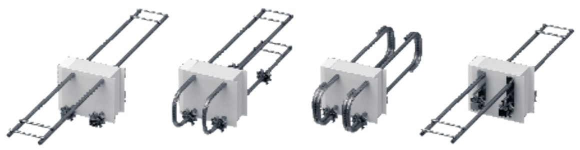

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Balcony connections with optimal thermal insulation for thermally isolated concrete slabs.

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