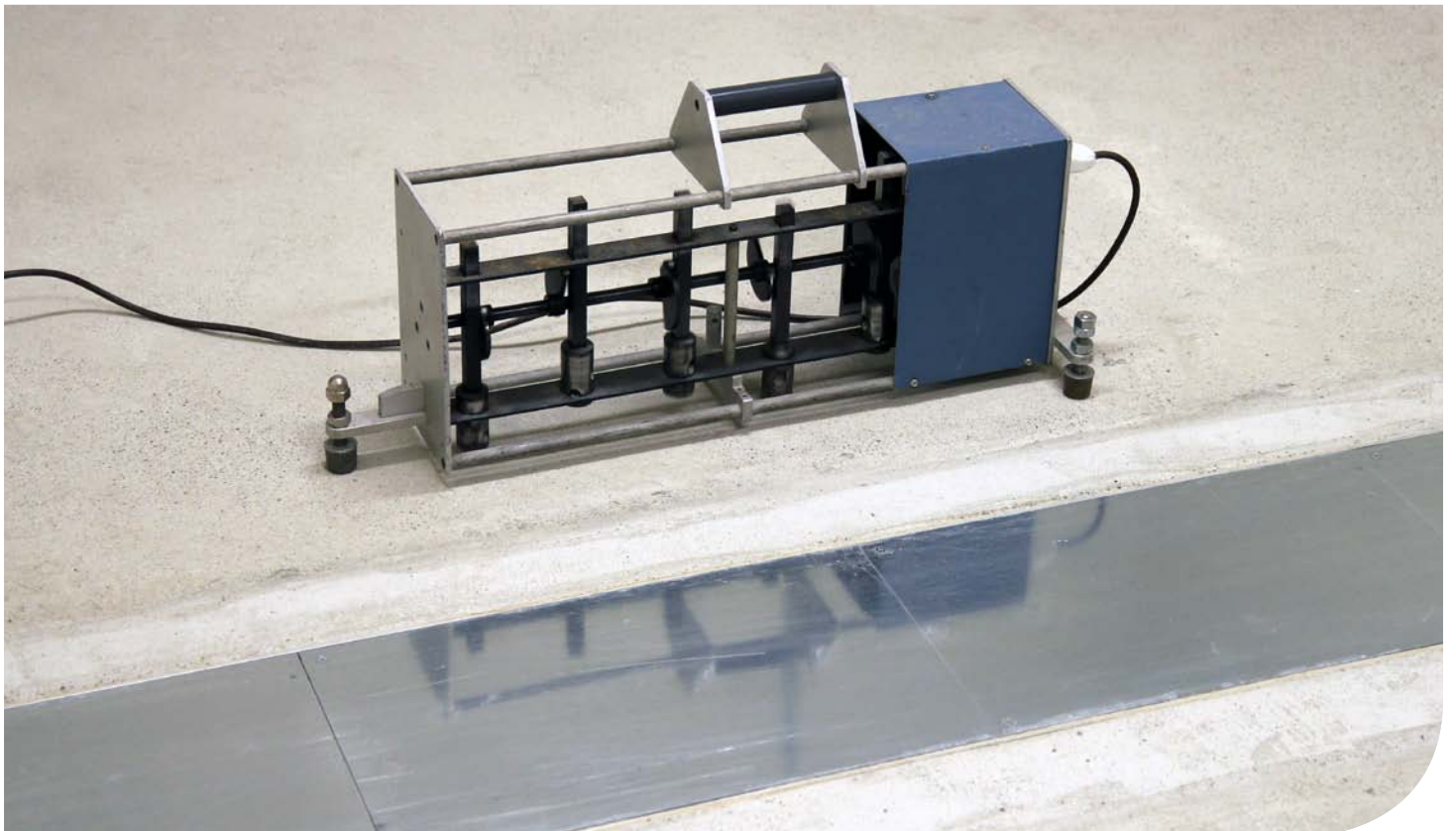




Impact noise behaviour

Technical informations



Sound insulation using underfloor duct systems

The sound insulation requirements in buildings are standardised by DIN 4109. The key objective is to keep the noise disturbance on the lowest possible level. Acoustic decoupling between concrete slab, duct system and screed by means of insulation layers should always be the basic requirement, resulting in the formation of floatingscreed. Otherwise the excitation of structure borne noise is transmitted directly to the concrete slab and a reduction of the impact noise pressure level only be only achieved by using soft resilient floor coverings.

Measurement method underfloor duct systems

The impact noise behaviour measurements of the screed-flush and screed-covered systems take place between rooms located above one another in an impact noise test station with structural flanking transmissions in accordance with DIN 52210-2 and DIN EN ISO 10140, while the tests themselves are carried out according to DIN EN ISO 140-7 and DIN EN ISO 16283-2.

A standard hammer mill is used for initiation in the source room. Initiation takes place on the screed as well as directly on the duct or the installation unit.

The tests are exclusively carried out together with test laboratories according to DIN EN ISO/IEC 17025.

The reception levels were determined using a real-time analyser and a swivel microphone as measuring instruments. The standard impact noise $L'_{n,w}$ is calculated as a parameter of the construction part to be evaluated while taking into account the volume and the reverberation period.

The reduction of subsonic noise ΔL_w equals the difference between the standard impact noise of a floor with and without floor covering. However, the reduction of impact noise must be at least effective enough to ensure that the required standard impact noise in office buildings is not exceeded. The required standard subsonic noise values in office buildings are specified:

Normal requirements standardised impact noise pressure level

$$L'_{n,w} \leq 53 \text{ dB (DIN 4109 table 3)}$$

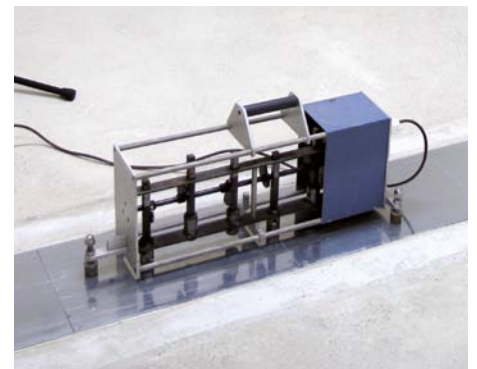
Raised requirements (suggestions) impact noise pressure level

$$L'_{n,w} \leq 46 \text{ dB (DIN 4109 supplement 2 table 3)}$$

Receiving room



Broadcasting studio

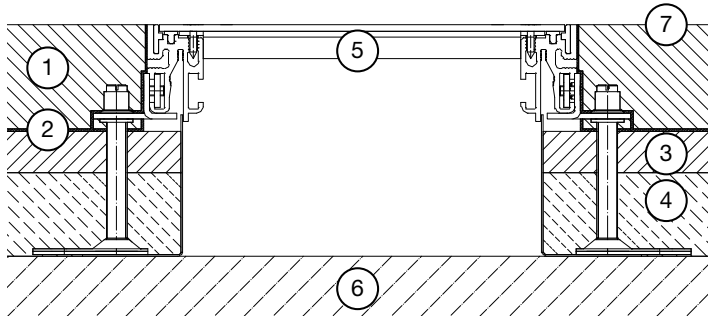


Impact noise behaviour | Screed-flush underfloor duct system

Technical informations

Test

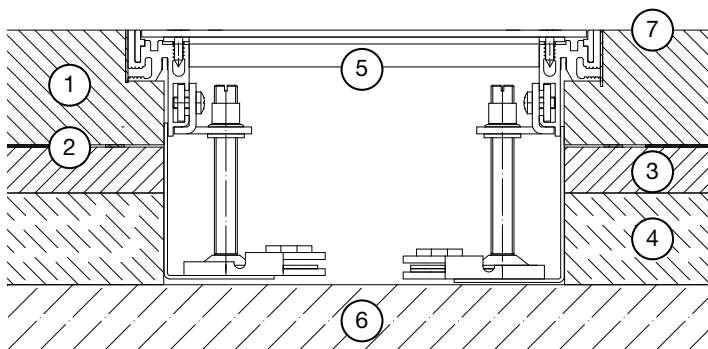
Duct UEBS with an external levelling device



Experimental setup	ΔL_w (dB)	$L'_{n,w}$ (dB)
Duct system installed in floating screed, stimulation on screed and duct	28	53
Duct system installed in floating screed, stimulation on screed and duct with linoleum	33	48
Duct system installed in floating screed, stimulation on screed and duct with textile floor covering	40	41

Results according to test report 13-840 from March 2014

Duct UEBS with an internal levelling device



Experimental setup	ΔL_w (dB)	$L'_{n,w}$ (dB)
Duct system installed in floating screed, stimulation on screed and duct without decoupling	28	53
Duct system installed in floating screed, stimulation on screed and duct, decoupling by using a rubber sleeve	29	52
Duct system installed in floating screed, stimulation on screed and duct, decoupling, self-supporting without levelling device	30	51

Results according to test report 13-840 from March 2014

Setup:

1. 50 mm cement screed
2. 1 mm foil
3. 20 mm impact noise insulation plate
4. 40 mm heat insulation plate
5. screed-flush duct UEBS
6. 160 mm concrete slab
7. floor covering (carpet 8.0 mm, linoleum 2.8 mm)

$L'_{n,w} = 81$ dB sound excitation on concrete slab

$L'_{n,w} = 50$ dB sound excitation on screed without installations

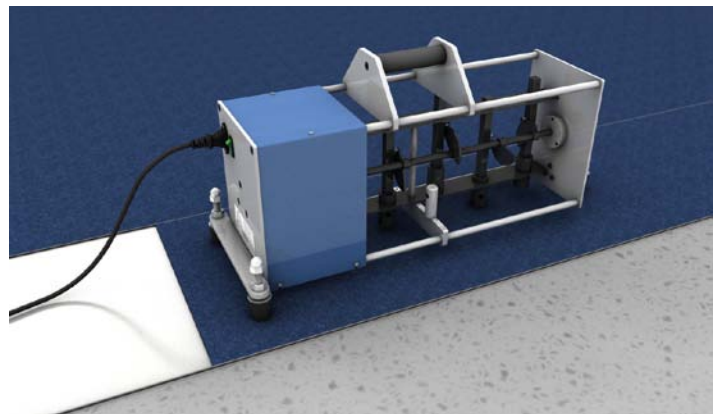
Results

The results show that the screed-flush underfloor system fulfils the standard sound insulation requirement of 53 dB for floors in office buildings. The installation of the underfloor systems into the floating screed of a floor is completely unproblematic according to the impact noise behaviour.

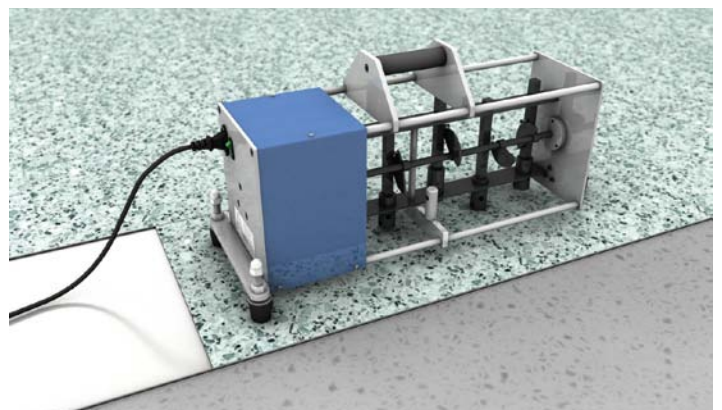
The impact noise excitation can occur on screed or directly on the duct without any attention to linoleum or carpet floor coverings. Furthermore, the standard sound insulation can even be maintained without a floor covering.

The impact noise can be reduce up to 1 dB by decoupling the duct system by using a rubber sleeve. After the hardening of the screed, an impact noise reduction up to 2 dB can be done by a complete decoupling of the duct system with a subsequent removal of the levelling device.

Broadcasting studio with carpet flooring



Broadcasting studio with linoleum flooring

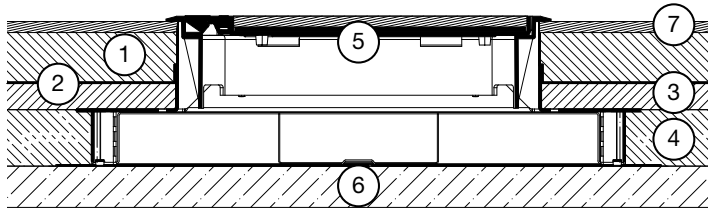


Impact noise behaviour | Screed-covered underfloor duct system

Technical informations

Test

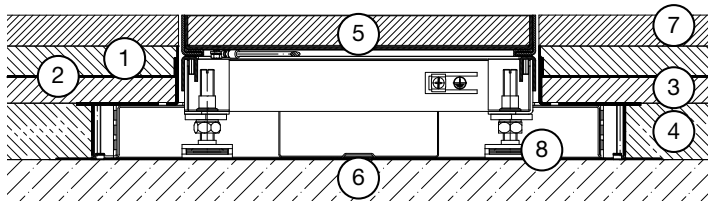
Duct UKL, hollow space floor box UBDHB350 V and plastic installation unit UEKD3 V, quadrangular



Experimental setup	ΔL_w (dB)	$L'_{n,w}$ (dB)
Duct system installed in floating screed, stimulation on screed	29	52
Duct system installed in floating screed, stimulation on screed with textile floor covering	40	41
Duct system installed in floating screed, stimulation on installation unit with textile floor covering	46	35

Results according to test report 13-840 from March 2014

Duct UKL, hollow space floor box UBDHB350 V and stainless steel installation unit UEKD V E, mounted quadrangular on levelling unit UNE



Experimental setup	ΔL_w (dB)	$L'_{n,w}$ (dB)
Duct system installed in floating screed, stimulation on stainless steel installation unit with parquet floor covering	28	53
Duct system installed in floating screed, stimulation on stainless steel installation unit with parquet floor covering, decoupling by using a rubber sleeve	31	50

Results according to test report 13-840 from March 2014

Setup:

1. 50 mm cement screed
2. 1 mm foil
3. 20 mm impact noise insulation plate
4. 40 mm heat insulation plate
5. installation unit
6. 160 mm concrete slab
7. floor covering (carpet 8.0 mm, parquet 12.0 mm)
8. rubber sleeve UGM

$L'_{n,w} = 81$ dB sound excitation on concrete slab

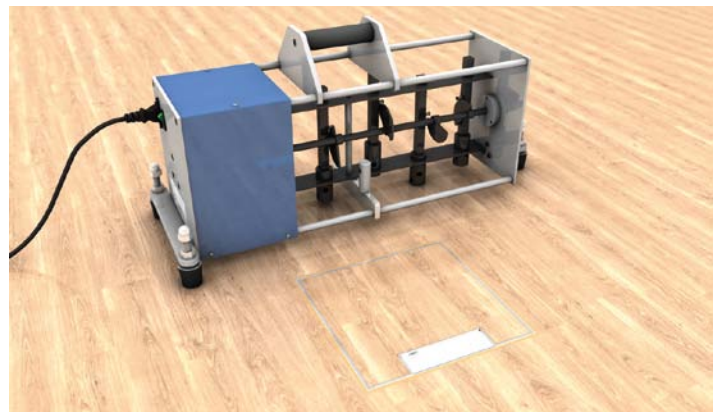
$L'_{n,w} = 50$ dB sound excitation on screed without installation

Results

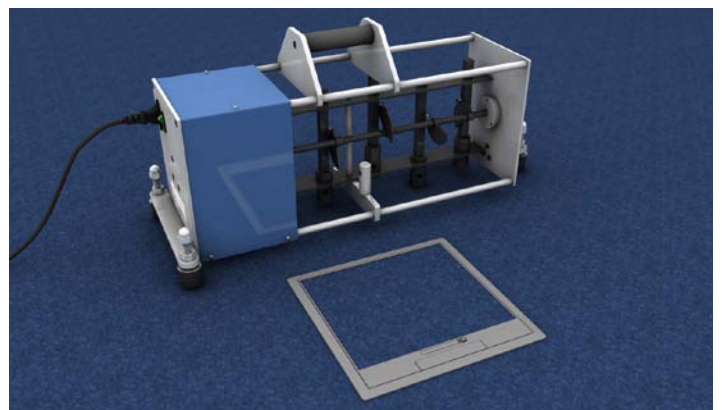
The results show that the screed-covered underfloor system fulfils the standard sound insulation requirement of 53 dB for floors in office buildings. The installation of the underfloor systems into the floating screed is completely unproblematic according to the impact noise behaviour.

Whether the noise stimulation occurs on screed or directly on the installation unit is irrelevant for laying carpet or parquet floor coverings. An additional decoupling of the levelling systems from the concrete slab with a rubber sleeve improves the impact noise behaviour around 3 dB as opposed to the direct mounting of the levelling system onto the concrete slab. The advantage of the new hollow space floor box is its complete mechanical decoupling from the duct system and becomes especially obvious with the use of parquet, stone, cast-asphalt or exposed concrete floor coverings.

Broadcasting studio with parquet flooring



Broadcasting studio with carpet flooring

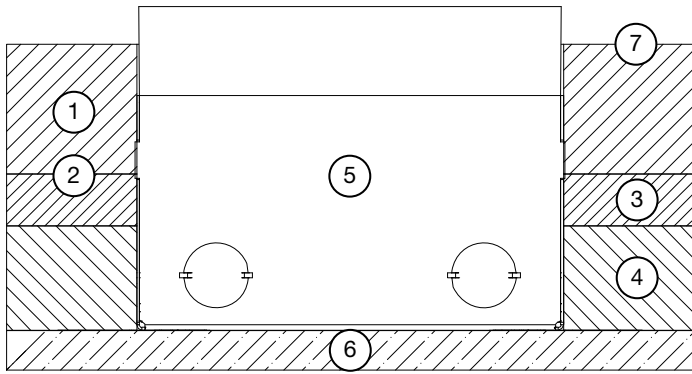


Impact noise behaviour | Compact single outlets

Technical informations

Test

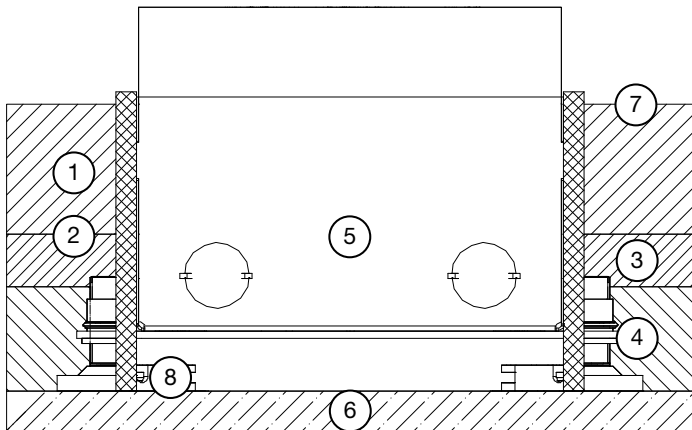
Duct UKL, compact single outlet UKE 160, quadrangular



Experimental setup	ΔL_w (dB)	$L'_{n,w}$ (dB)
Compact single outlet installed in floating screed, initiated on screed without decoupling	21	56
Compact single outlet installed in floating screed, initiated on screed with textile floor covering/laminate	26	51

Measurements from test report 17-106-1 from May 2017

Duct UKL, compact single outlet UKE 160, quadrangular, mounted on levelling unit UNENP 160



Experimental setup	ΔL_w (dB)	$L'_{n,w}$ (dB)
Compact single outlet installed in floating screed, completely decoupled by using a rubber sleeve, initiated on screed with textile floor covering/laminate	30	47

Measurements from test report 17-106-1 from May 2017

Setup:

1. 50 mm cement screed
2. 1 mm foil
3. 20 mm impact noise insulation plate
4. 40 mm heat insulation board
5. Compact single outlet
6. 140 mm bare floor
7. floor covering (carpet 6.0 mm, laminate 8.0 mm)
8. rubber sleeve UGM SLF

$L'_{n,w} = 77$ dB sound excitation on bare floor

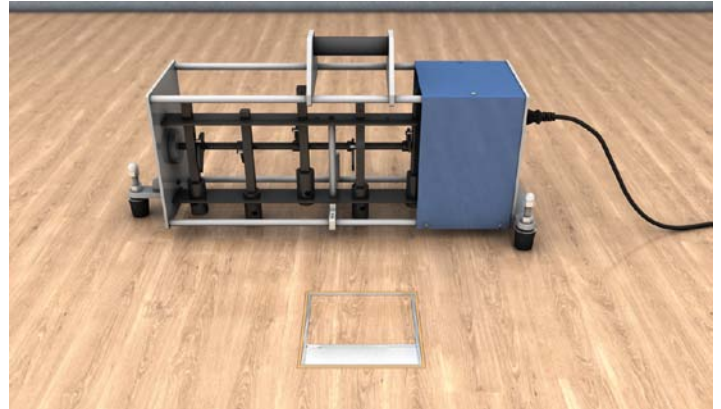
$L'_{n,w} = 51$ dB sound excitation on screed without compact single outlet

Results

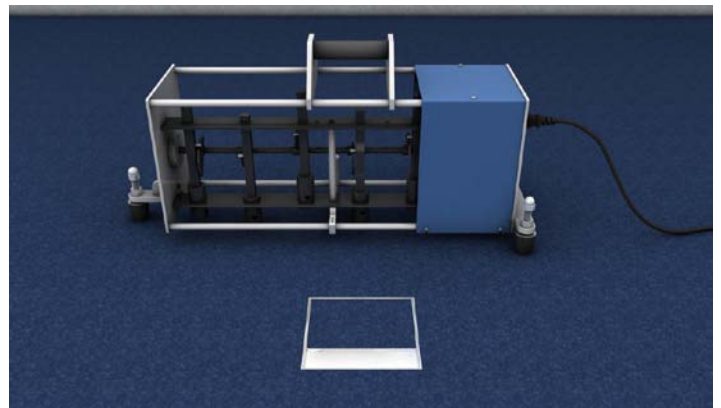
Verified by the tests, the compact single outlets meet the requirements for the standard sound insulation of 53 dB for floors in office buildings. Therefore the underfloor system can be installed in floating screed without any regard to the impact noise behaviour.

It is not significant to the impact noise initiation, if it is directly applied on the compact single outlet or on the screed.

Broadcasting studio with parquet flooring



Broadcasting studio with carpet flooring





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