# Evidence of Performance
## Joint sound reduction of filling material

**Test Report**
**no. 17-001469-PR01**
**(PB 01-K05-04-en-01)**

ift ROSENHEIM

Client **fischerwerke GmbH & Co. KG**
Klaus-Fischer-Str. 1
72178 Waldachtal
Germany

Product 1K-gun foam

Designations fischer PUP B1 750

Density 10 mm joint : 31 g/l
20 mm joint: 26 g/l

Special features -/-

Weighted sound reduction index of joints $R_{s,w}$
Spectrum adaptation terms C and $C_{tr}$

10 mm joint
$R_{s,w}\ (C;\ C_{tr})$ = 63 (-1; -5) dB
20 mm joint
$R_{s,w}\ (C;\ C_{tr})$ = 62 (-1; -4) dB

Determined for 10 and 20 mm width of joint

**ift** Rosenheim
09.05.2017

Dr. Joachim Hessinger, Dipl.-Phys.
Head of Testing Department
Building Acoustics

Florian Brechleiter, MSc, Dipl.-Ing. (FH)
Operating Testing Officer
Building Acoustics

**Basis**

EN ISO 10140-1: 2010
+A1: 2012 + A2:2014
EN ISO 10140-2 : 2010
EN ISO 717-1 : 2013

Transfer of test report 16-003744-PR01 (PB 01-K05-04-en-01) dated 18.11.2016 to new owner and his product designation.

**Representation**

**Instructions for use**

This procedure is suitable for the comparison of construction products designed for sealing (e.g. gaskets/seals, fillers for joints). The results can be used to evaluate the sound power ratio $\tau_e$ according to EN 12354-3 Annex B.
Using the calculated sound reduction of the joint for the calculation of the overall sound reduction is not a substitute for the sound reduction verification of the overall construction.

**Validity**

The data and results given relate solely to the tested and described specimen.

Testing the sound insulation does not allow any statement to be made on any further characteristics of the construction submitted regarding performance and quality.

**Notes on publication**

The **ift** Guidance Sheet "Conditions and Guidance for the Use of **ift** Test Documents" applies.

The cover sheet can be used as an abstract.

**Contents**

The test report contains a total of 11 pages:






**ift** Rosenheim GmbH
Theodor-Gietl-Str. 7-9
D-83026 Rosenheim

Kontakt
Tel. +49.8031.261-0
Fax +49.8031.261-290
www.ift-rosenheim.de

# 1 Object

## 1.1 Description of test specimen

| | |
|---|---|
| **Product** | 1K-gun foam |
| Date of manufacturing of test specimen | 04.11.2016 |
| Product designation* | fischer PUP B1 750 |
| Batch number* | 800094681D03/16 |
| Dimension | |
| Length of joint l | 1,200 mm |
| Depth of joint d | 100 mm |
| Width of joint w | 10 mm and 20 mm |
| Joint cover | Without cover, foam cutted |
| Curing time | 3 days |
| Density of sealant | 10 mm joint: 31 g/l |
| | 20 mm joint: 26 g/l |
| | Values determined on tested sealant |

The description is based on inspection of the test specimen at the **ift** Laboratory for Building Acoustics. Item designations / numbers as well as material specifications were provided by the original client. Additional data provided by the manufacturer are marked with *.

## 1.2 Mounting of test rig

The sound reduction index $R_S$ of the joint was measured in a mobile joint measuring apparatus as per EN ISO 10140-1:2010 + A1:2012 (see Figs. 1 and 2). This mobile measuring apparatus consists of a high-performance sound insulating element made of metal profiles and Bondal sheet with slide-in cassettes; the profiles of the slide-in cassettes are filled with sand. Using these cassettes, a great variety of joints with varying joint widths w can be created (Fig. 1).

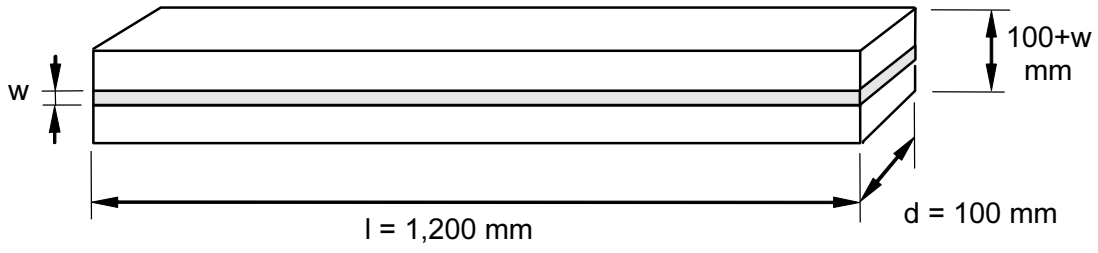



**fig 1** Slide-in cassettes

These slide-in cassettes were produced by the **ift** Laboratory for Building Acoustics 3 days before the date of test using the filling material to be tested as specified by the manufacturer. After curing the filling material was cut off and the cassettes were mounted to the high-performance sound insulating frame (Fig. 2). The frame was then mounted to the test opening in the separating wall of the window test rig (Z-wall) as per EN ISO 10 140-5.

The test opening connecting joints were filled with foamed material and sealed on both sides with plastic sealant.

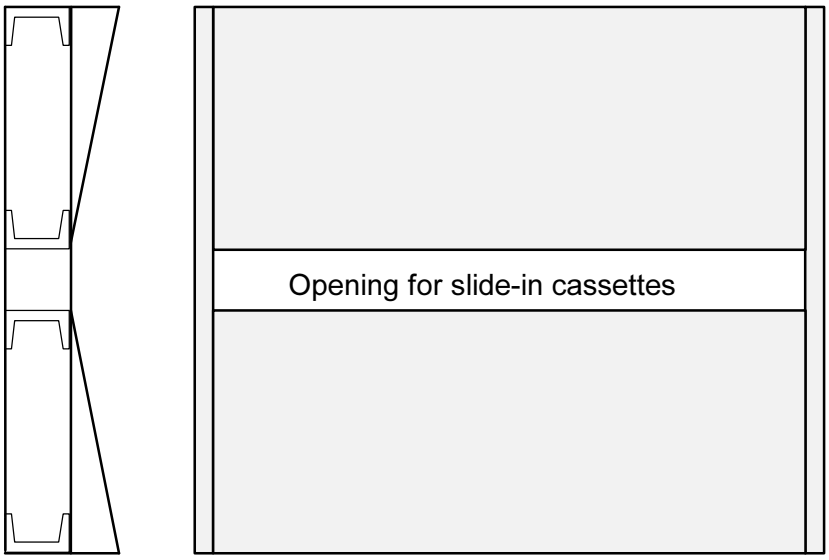



fig 2 Set-up of joint testing apparatus (high performance sound insulating element)

**fig 3** Photo(s) of the mounted element, taken by **ift** Laboratory for Building Acoustics

# 2 Procedure

## 2.1 Sampling

| | |
|---|---|
| Sampling | The samples were selected by the original client. The slide-in cassettes were filled by the **ift** Laboratory for Building Acoustics with the filler to be tested according to the instructions of the manufacturer. |
| Quantity | 2 |
| Manufacturer | The manufacturer is known to the ift Rosenheim. It is not published in this test report. |
| Manufacturing plant | The manufacturing plant is known to the ift Rosenheim. It is not published in this test report. |
| Date of manufacture / Date of sampling | 20.01.2016 / 02.11.2016 |
| Responsible for sampling | The person who was responsible for sampling is known to the ift Rosenheim. It is not published in this test report. |
| Delivery at **ift** | 04. November 2016 by the client via forwarding agency |
| **ift** registration number | 42434/01 |

## 2.2 Process

Basis

| | |
|---|---|
| EN ISO 10140-1:2010 + A1 : 2012 + A2 : 2014 | Acoustics; Laboratory measurement of sound insulation of building elements - Part 1: Application rules for specific products (ISO 10140-1: 2010 + Amd. 1 : 2012 + Amd. 2: 2014) |
| EN ISO 10140-2:2010 | Acoustics; Laboratory measurement of sound insulation of building elements - Part 2: Measurement of airborne sound insulation (ISO 10140-2:2010) |
| EN ISO 717-1: 2013 | Acoustics; Rating of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation |

Corresponds to the national German standard/s:
DIN EN ISO 10140-1:2014-09, DIN EN ISO 10140-2:2010-12 and DIN EN ISO 717-1 : 2013-06

| | |
|---|---|
| Boundary conditions | As specified by the standard |
| Deviation | There are no deviations from the test method/s and/or test conditions. |
| Test noise | Pink noise |
| Measuring filter | One-third-octave band filter |
| Measurement limits | |
| Low frequencies | The dimensions of the receiving room are smaller than recommended for testing in the frequency range from 50 Hz to |

| | |
|---|---|
| | 80 Hz as per EN ISO 10140-4:2010 Annex A (informative). A moving loudspeaker was used. |
| Background noise level | The background noise level in the receiving room was determined during measurement and the receiving room level $L_2$ corrected by calculation as per EN ISO 10140-4: 2010 Clause 4.3. |
| Maximum insulation | The maximum insulation of the test rig is partly within the range of the test results. Therefore the tested values are minimum values. A correction by calculation was performed for maximum sound insulation. |
| Measurement of reverberation time | Arithmetical mean: two measurements each of 2 loudspeaker and 3 microphone positions (a total of 12 independent measurements). |
| Measurement equation A | $A = 0{,}16 \cdot \frac{V}{T}$ m² |
| Measurement of sound level difference | Minimum of 2 loudspeaker positions and rotating microphones. |
| Measurement equation | $R_S = L_1 - L_2 + 10\log\frac{S_N \cdot l}{A \cdot l_N}$ dB |

KEY

| | |
|---|---|
| $R_S$ | Joint sound reduction index in dB |
| $L_1$ | Sound pressure level source room in dB |
| $L_2$ | Sound pressure level receiving room in dB |
| l | Length of joint in m |
| $S_N$ | Reference area (1 m²) |
| $l_N$ | Reference length (1 m) |
| A | Equivalent absorption area in m² |
| V | Volume of receiving room in m³ |
| T | Reverberation time in s |

## 2.3 Test apparatus

| Device | Type | Manufacturer |
|---|---|---|
| Integrating sound meter | Type Nortronic 121 | Norsonic-Tippkemper |
| Microphone preamplifiers | Type 1201 | Norsonic-Tippkemper |
| Microphone unit | Type 1220 | Norsonic-Tippkemper |
| Calibrator | Type 1251 | Norsonic-Tippkemper |
| Dodecahedron loudspeakers | Own design | - |
| Amplifier | Type E120 | FG Elektronik |
| Rotating microphone boom | Own design / Type 231-N-360 | Norsonic-Tippkemper |

The **ift** Laboratory for Building Acoustics participates in comparative measurements at the Physikalisch-Technische Bundesanstalt (PTB) in Braunschweig every three years, the last one was in April 2016. The sound level meter used, Series No. 31423, was DKD calibrat-

ed by the company Norsonic Tippkemper (DKD - Deutscher Kalibrierdienst “German Calibration Service”) on 22nd of June 2015.

### 2.4 Testing

| | |
|---|---|
| Date | 7th of November 2016 |
| Operating testing officer | Mr. Florian Brechleiter |

## 3 Detailed results

The values of the measured sound reduction index $R_S$ of the joint for the tested filler are plotted against frequency in the data sheets (Annex). Based on EN ISO 717 - 1, this is used to calculate the weighted sound reduction index $R_{S,\,w}$ of the joint and the spectrum adaptation terms C and $C_{tr}$, related to joint length l = 1.20 m, for the frequency range 100 Hz to 3,150 Hz.

The diagram includes the maximum sound reduction of the test set-up (related to l = 1.20 m), plotted with a maximum weighted sound reduction index $R_{S,w\ max}$ ($C;C_{tr}$) = 62 (-1;-5) dB.

The resulting sound reduction indices for joints are within the range for maximum sound insulation; in these cases the values obtained are minimum values. For maximum insulation, it has been corrected by calculation as per EN ISO 10140-1:2010 + A1:2012+A2:2014. Table 1 lists the weighted sound reduction indices of the different joint designs.

**table 1** test results

| Weighted joint sound reduction index $R_{S,w}$ (C; $C_{tr}$) in dB | Measures taken, comments |
|---|---|
| 62 (-1;-5) | Maximum sound insulation |
| 63 (-1; -5) | Joint width 10 mm,<br>filled with fischer PUP B1 750 |
| 62 (-1; -4) | Joint width 20 mm,<br>filled with fischer PUP B1 750 |

# 4 Instructions for use

## 4.1 Application for DIN 4109: 2016-07

Basis

| | |
|---|---|
| DIN 4109-1: 2016-07 | Sound insulation in buildings - Part 1: Minimum requirements |
| DIN 4109-2: 2016-07 | Sound insulation in buildings - Part 2: Verification of compliance with the requirements by calculation |

The weighted sound reduction index of joints determined in accordance with Section 3, can be directly used for verification of sound insulation by calculation in accordance with DIN 4109-2.

This sound reduction index of joints is comparable to the linear sound reduction index of a building component with 1 m joint length for each $m^2$ area and where the sound is transmitted only through the joint.

If the joint is combined with a building component (e.g. window with area S and sound reduction index R) and assuming the building component's area $S_1$ >> than the opening area of the joint (w · l, w = joint width), for the associated joint length l the resulting sound reduction index $R_{res}$ is calculated as follows:

$$R_{i,w} = -10 \cdot \log\left( 10^{-\frac{R_w}{10}} + \frac{l \cdot l_0}{S} \cdot 10^{-\frac{R_{s,w}}{10}} \right) \text{dB}$$

For calculation of the total weighted apparent sound reduction index $R'_{w,ges}$ in accordance with DIN 4109-2 Clause 4, the input data obtained from laboratory measurements must be stated in $^1/_{10}$ dB. The resulting weighted sound reduction index can then be applied directly to the sound insulation of the i-th-component of the building envelope if there is no influence by installation joints. This gives:

$R_{S,w}$ = 63,9 dB
$R_{S,w}$ = 62,9 dB

## 4.2 Uncertainty of measurement, single number ratings in $^1/_{10}$ dB

Basis

| | |
|---|---|
| EN ISO 12999-1: 2014 | Acoustics; Determination and application of measurement uncertainties in building acoustics, part 1: sound insulation (ISO 12999-1: 2014) |

The resulting weighted sound reduction index of joints (in $^1/_{10}$ dB with measurement uncertainty), determined on the basis of EN ISO 717-1:2013-06 is:

$R_{S,w}$ = 63,9 dB ± 1.2 dB (width of joint 10 mm)

$R_{S,w}$ = 62,9 dB ± 1.2 dB (width of joint 20 mm)

The specified measurement uncertainty is the average standard deviation of laboratory measurements (standard measurement uncertainty $\sigma_R$ for measurement situation A: Characterisation of a building component by laboratory measurements as per EN ISO 12999-1:2014, Table 3 $\sigma_R$ = 1.2 dB).

The product declaration must use the integral value of the sound reduction index and the spectrum adaptation terms as given in Section 3

$R_{S,w}$ (C;$C_{tr}$) = 63 (-1; -5) dB (width of joint 10 mm)

$R_{S,w}$ (C;$C_{tr}$) = 62 (-1; -4) dB (width of joint 20 mm)

### 4.3 General remarks:

The method is suitable for comparing construction products designed for sealing purposes (e.g. seals/gaskets, fillers to seal joints). The results can be used to evaluate the sound power ratio $\tau_e$ as per EN 12354-3 Annex B. Using the calculated sound reduction of the joint for the calculation of the overall sound reduction is not a substitute for the verification of the overall construction

In practice, e.g. when combining the sound insulation of a window with that of a joint in an existing opening, the following must be taken into account:

a) for physical reasons, the sound reduction index of joints must be corrected by approx. –3 dB in the area of corners and edges;
b) the existing thickness of the window frame profile (joint depth d) must be adapted with a correction between –1 dB and –2 dB.

c) experience shows that the filling of window niches in edges and difficult reachable areas as are weak points by handling

From these results, that in practice the measured sound reduction index of joint has to be

a) either corrected by –4 dB or
b) increased by additional sealing with backfilling tape with or without bar or elastic sealant with filling band.

## Remark on transfer of the test results

According to the experience of **ift** the following correction reduction has to be applied for a window with an area of 1.82 $m^2$ and a surrounding joint length of 5.5 m (conditions in laboratory) with the sound reduction index of a window of $R_w \geq 40$ dB:

$R_{w,res} = R_{w,Fe} - 2$ dB

The corrective factor of –2 dB is inapplicable if a sealing is carried out on both sides additionally to the foaming. For windows with $R_w \geq 48$ dB higher reductions may apply.

**ift** Rosenheim
Laboratory for Building Acoustics
09.05.2017

# Joint sound reduction index according to ISO 10140-1

Determination of sound reduction index of joints

Client: **fischerwerke GmbH & Co. KG**, 72178 Waldachtal (Germany)

Product designation fischer PUP B1 750

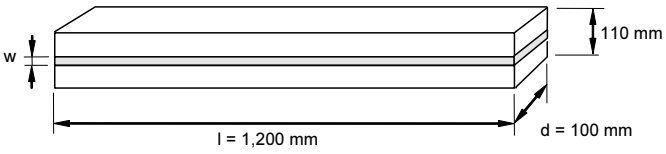
**Design of test specimen**

1K-gun foam

Joint size

| | |
|---|---|
| Length l | 1,200 mm |
| Depth d | 100 mm |
| Width w | 10 mm |
| Density | 31 g/l |

**Drawing of the test arrangement**




| | |
|---|---|
| Test date | 7th of November 2016 |
| Length of joint l | 1,2 m |
| Test rig | as per EN ISO 10140-5 |
| Partition wall | Double-leaf concrete wall, insert frame |
| Test noise | Pink noise |
| Volumes of test rooms | $V_S$ = 104 m³<br>$V_R$ = 67.5 m³ |

Maximum sound reduction index of joints

$R_{S,w,max}$ = 62 dB (related to test length)

Mounting conditions

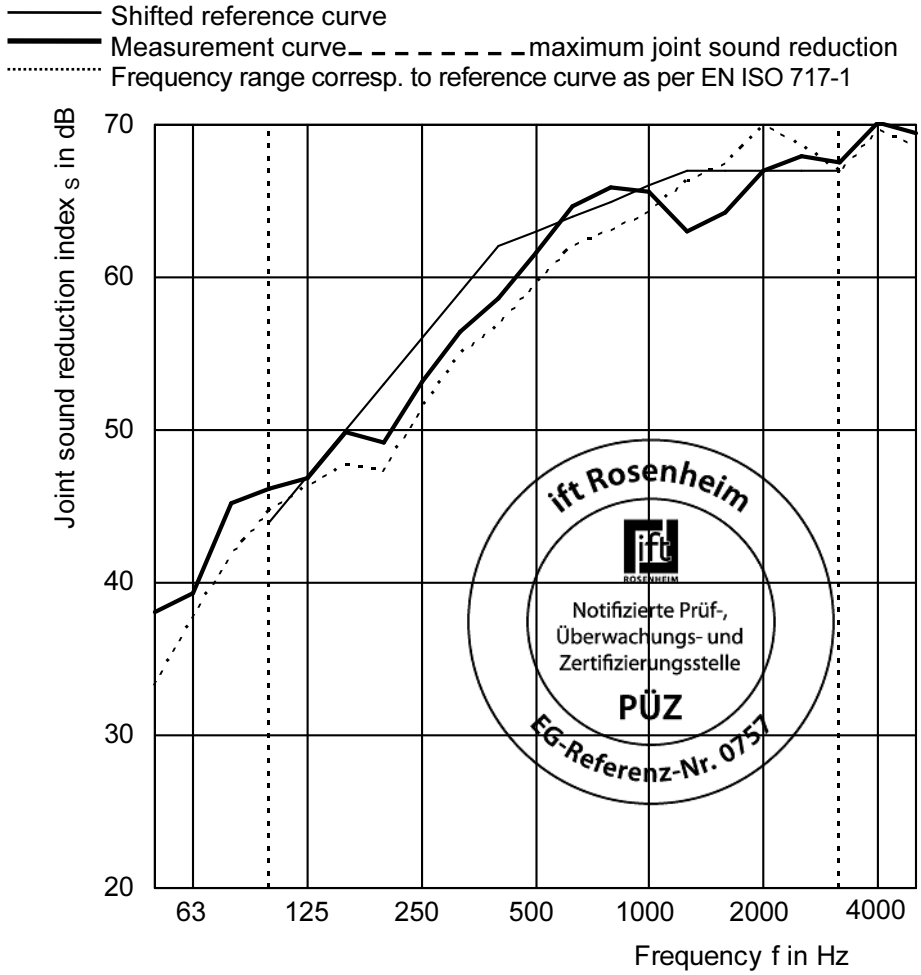
Mounting of the cassette in high performance sound insulating element.

Climate of test rooms 21°C / 40 % RH

Static air pressure 952 hPa

| f in Hz | $R_S$ in dB |
|---|---|
| 50 | (≥ 38.1) |
| 63 | (≥ 39.3) |
| 80 | (≥ 45.2) |
| 100 | (≥ 46.1) |
| 125 | (≥ 46.9) |
| 160 | (≥ 49.9) |
| 200 | (≥ 49.2) |
| 250 | (≥ 53.1) |
| 315 | (≥ 56.5) |
| 400 | (≥ 58.6) |
| 500 | (≥ 61.6) |
| 630 | (≥ 64.6) |
| 800 | (≥ 65.9) |
| 1,000 | (≥ 65.6) |
| 1,250 | (≥ 63.0) |
| 1,600 | (≥ 64.2) |
| 2,000 | (≥ 67.0) |
| 2,500 | (≥ 67.9) |
| 3,150 | (≥ 67.5) |
| 4,000 | (≥ 70.2) |
| 5,000 | (≥ 69.4) |

(≥ = minimum value)




Rating according to EN ISO 717-1 (in third octave bands)

**$R_{S,w}$ (C; $C_{tr}$) = 63 (-1; -5) dB** $C_{50\text{-}3,150}$ = -2 dB; $C_{100\text{-}5,000}$ = 0 dB; $C_{50\text{-}5,000}$ = -1 dB

$C_{tr,50\text{-}3,150}$ = -8 dB; $C_{tr,100\text{-}5,000}$ = -5 dB; $C_{tr,50\text{-}5,000}$ = -8 dB



**ift** Rosenheim
Laboratory for Building Acoustics
9. May 2017

Dipl. Ing. (FH) Mr. Florian Brechleiter
Operating testing officer

# Joint sound reduction index according to ISO 10140-1

Determination of sound reduction index of joints

Client: **fischerwerke GmbH & Co. KG**, 72178 Waldachtal (Germany)

Product designation fischer PUP B1 750

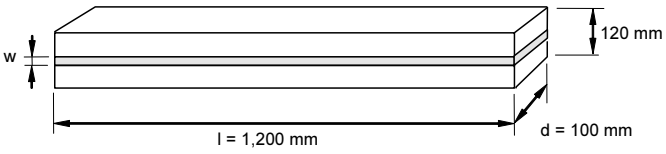
**Design of test specimen**

1K-gun foam

Joint size

| | |
|---|---|
| Length l | 1,200 mm |
| Depth d | 100 mm |
| Width w | 20 mm |
| Density | 26 g/l |

**Drawing of the test arrangement**




| | |
|---|---|
| Test date | 7th of November 2016 |
| Length of joint l | 1,2 m |
| Test rig | as per EN ISO 10140-5 |
| Partition wall | Double-leaf concrete wall, insert frame |
| Test noise | Pink noise |
| Volumes of test rooms | $V_S$ = 104 m³<br>$V_R$ = 67.5 m³ |

Maximum sound reduction index of joints

$R_{S,w,max}$ = 62 dB (related to test length)

Mounting conditions

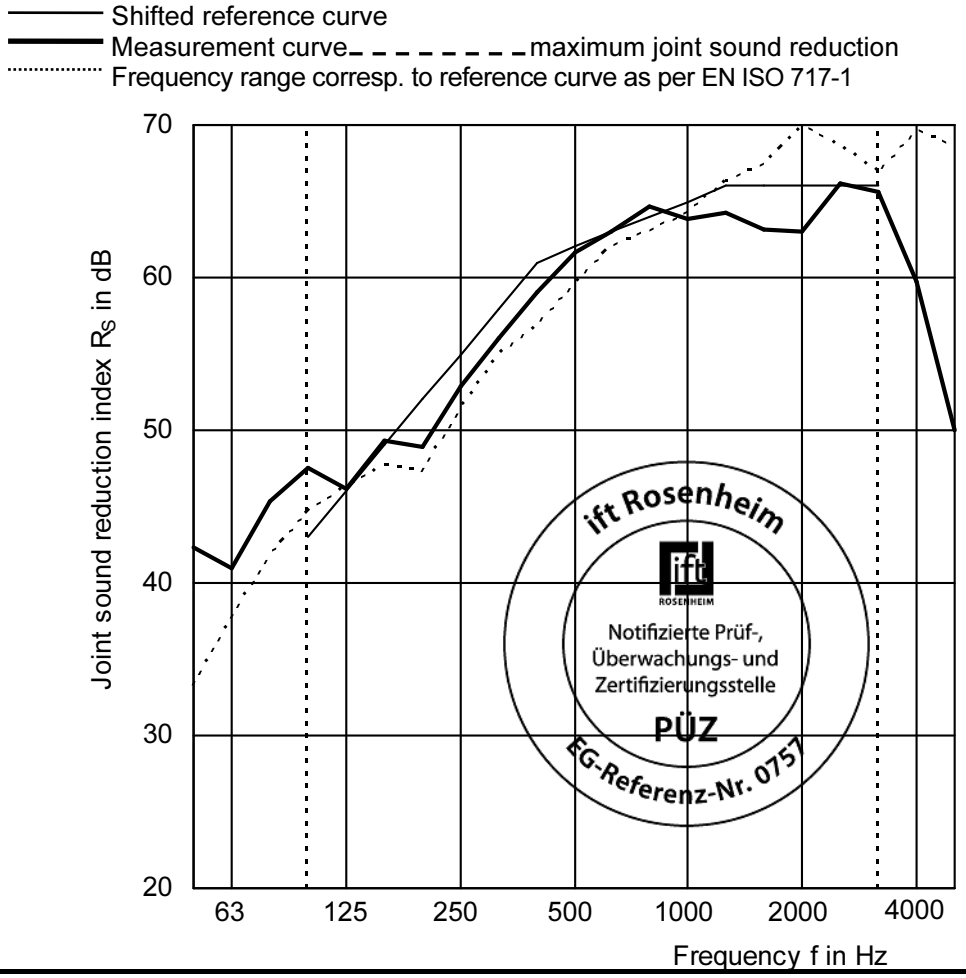
Mounting of the cassette in high performance sound insulating element.

Climate of test rooms 21°C / 40 % RH

Static air pressure 952 hPa

| f in Hz | $R_S$ in dB |
|---|---|
| 50 | (≥ 42.3) |
| 63 | (≥ 41.0) |
| 80 | (≥ 45.3) |
| 100 | (≥ 47.5) |
| 125 | (≥ 46.1) |
| 160 | (≥ 49.3) |
| 200 | (≥ 48.9) |
| 250 | (≥ 52.9) |
| 315 | (≥ 56.0) |
| 400 | (≥ 59.0) |
| 500 | (≥ 61.6) |
| 630 | (≥ 63.0) |
| 800 | (≥ 64.6) |
| 1,000 | (≥ 63.9) |
| 1,250 | (≥ 64.3) |
| 1,600 | (≥ 63.2) |
| 2,000 | 63.0 |
| 2,500 | (≥ 66.1) |
| 3,150 | (≥ 65.6) |
| 4,000 | 59.7 |
| 5,000 | 50.0 |

(≥ = minimum value)




Rating according to EN ISO 717-1 (in third octave bands)

**$R_{S,w}$ (C; $C_{tr}$) = 62 (-1; -4) dB** $C_{50\text{-}3,150}$ = -1 dB; $C_{100\text{-}5,000}$ = -4 dB; $C_{50\text{-}5,000}$ = -4 dB

$C_{tr,50\text{-}3,150}$ = -6 dB; $C_{tr,100\text{-}5,000}$ = -5 dB; $C_{tr,50\text{-}5,000}$ = -6 dB



**ift** Rosenheim
Laboratory for Building Acoustics
9. May 2017

Dipl. Ing. (FH) Mr. Florian Brechleiter
Operating testing officer