

# Evidence of performance

## Joint sound reduction of filling material

### Test report

no. 16-002732-PR01  
(PB 01-K05-04-en-01)



Client **tremco illbruck Productie B.V.**  
Vlietskade 1032  
4241 WC Arkel  
Netherlands

#### Basis

EN ISO 10140-1: 2016  
EN ISO 10140-2 : 2010  
EN ISO 717-1 : 2013  
16-002732-PR01 (PB 01-K05-04-de-01) dated 20.01.2017

#### Representation



Product	Waterbased polymer foam
Designation	Waterbased foam JF100 – LP113876
Density	36.9 g/l for 10 mm width of joint
	39.8 g/l for 20 mm width of joint
	39.3 g/l for 30 mm width of joint
Special features	-/-

#### 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.

Weighted joint sound reduction index  $R_{S,w}$   
Spectrum adaptation terms  $C$  and  $C_{tr}$   
test 1 (width of joint 10 mm)



$$R_{S,w}(C; C_{tr}) \geq 62 \text{ (-2; -6) dB}$$

test 2 (width of joint 20 mm)

$$R_{S,w}(C; C_{tr}) \geq 62 \text{ (-2; -6) dB}$$

test 3 (width of joint 30 mm)

$$R_{S,w}(C; C_{tr}) \geq 61 \text{ (-1; -5) dB}$$

ift Rosenheim  
24.01.2017

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

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

#### 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 12 pages:

- 1 Object
  - 2 Procedure
  - 3 Detailed results
  - 4 Instructions for use
- Data sheet (3 pages)

**Joint sound reduction of filling material**

Test report 16-002732-PR01 (PB 01-K05-04-en-01) dated 24.01.2017

Client tremco illbruck Productie B.V., 4241 WC Arkel (Netherlands)

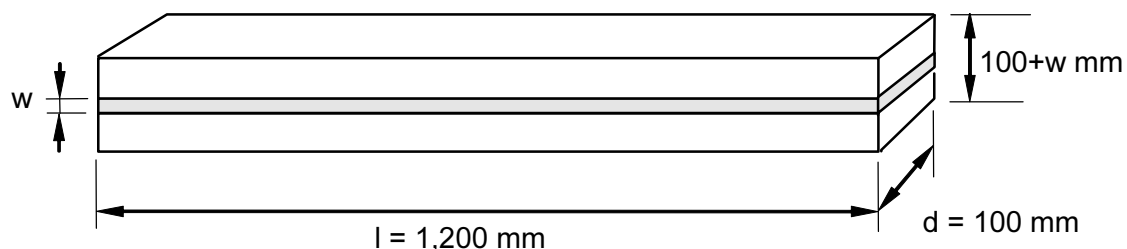
**1 Object****1.1 Description of test specimen**

<b>Product</b>	Waterbased polymer foam
Date of manufacturing of test specimen	By employees of the client
Product designation	Waterbased foam JF100 – LP113876
Dimension	
Length of joint $l$	1,200 mm
Depth of joint $d$	100 mm
Width of joint $w$	10 mm, 20 mm and 30 mm
Joint cover	Without cover, cut foam
Curing time	22 days
Density	36.9 g/l for 10 mm width of joint 39.8 g/l for 20 mm width of joint 39.3 g/l for 30 mm width of joint

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 client. Additional data provided by the manufacturer are marked with \*.

**1.2 Mounting to test rig**

The sound reduction index  $R_S$  of the joint was measured in a mobile joint measuring apparatus as per EN ISO 10140-1:2016, Annex J, (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 filled 22 days before the test by employees of the client with the filling material acc. to the guideline of 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.

**Joint sound reduction of filling material**

Test report 16-002732-PR01 (PB 01-K05-04-en-01) dated 24.01.2017

Client tremco illbruck Productie B.V., 4241 WC Arkel (Netherlands)

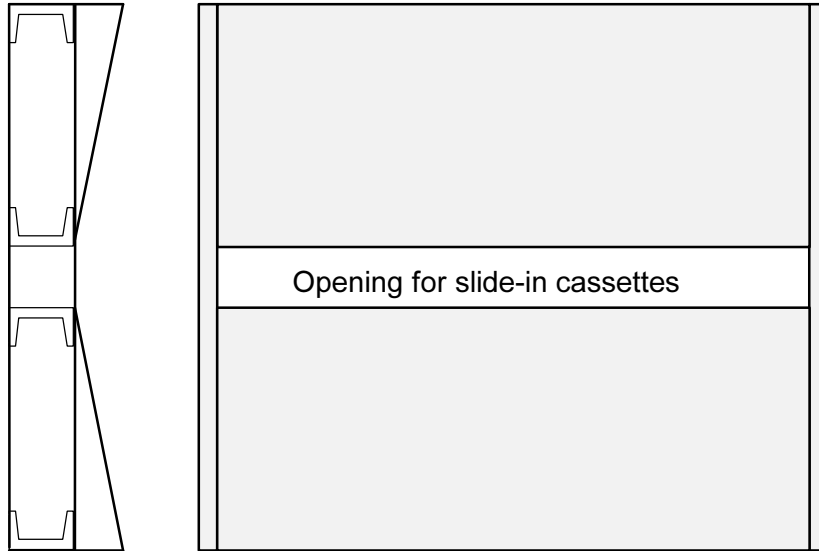


fig 2 Set-up of joint testing apparatus (high performance sound insulating element)



fig 3 Photo of the mounted element, taken by ift Laboratory for Building Acoustics



## Joint sound reduction of filling material

Test report 16-002732-PR01 (PB 01-K05-04-en-01) dated 24.01.2017

Client tremco illbruck Productie B.V., 4241 WC Arkel (Netherlands)

## 2 Procedure

### 2.1 Sampling

Sampling	The samples were selected by the client. The slide-in cassettes were filled by employees of the client with the filler to be tested.
Quantity	1
Manufacturer	tremco illbruck Productie B.V.
Manufacturing plant	Vlietskade 1032 4241 WC Arkel (Netherlands)
Date of manufacture / Date of sampling	There was no sampling report by client.
Production line	-
Responsible for sampling	Mr. Siebe Schootstra
Delivery at ift	01. December 2016 by the client.
ift registration number	-

### 2.2 Process

#### Basis

EN ISO 10140-1:2016	Acoustics; Laboratory measurement of sound insulation of building elements - Part 1: Application rules for specific products (ISO 10140-1: 2016); German version EN ISO 10140-1:2016
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 10140-1:2016-12, 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

**Joint sound reduction of filling material**

Test report 16-002732-PR01 (PB 01-K05-04-en-01) dated 24.01.2017

Client tremco illbruck Productie B.V., 4241 WC Arkel (Netherlands)

	$L_2$ 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	$A = 0,16 \cdot \frac{V}{T} \text{ m}^2$
Measurement of sound level difference	Minimum of 2 loudspeaker positions and rotating microphones.
Measurement equation	$R_S = L_1 - L_2 + 10 \log \frac{S_N \cdot l}{A \cdot l_N} \text{ dB}$

**KEY**

$R_{ST}$	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 m <sup>2</sup> )
$l_N$	Reference length (1 m)
$A$	Equivalent absorption area in m <sup>2</sup>
$V$	Volume of receiving room in m <sup>3</sup>
$T$	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 2013. The sound level meter used, Series No. 31423, was DKD calibrated by the company Norsonic Tippkemper (DKD - Deutscher Kalibrierdienst "German Calibration Service") on 22nd of June 2015.

**Joint sound reduction of filling material**

Test report 16-002732-PR01 (PB 01-K05-04-en-01) dated 24.01.2017

Client tremco illbruck Productie B.V., 4241 WC Arkel (Netherlands)

**2.4 Testing**Date 22<sup>nd</sup> of December 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  $R_{S,w \max}(C; C_{tr}) = 61 (-2; -6)$  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 10140-1:2016, Annex J. Table 1 lists the weighted sound reduction indices of the different joint designs.

**Table 1** Test results, joint depth  $d = 100$  mm

Weighted joint sound reduction index $R_{S,w}(C; C_{tr})$ in dB	Measures taken, comments
61 (-2; -6)	Maximum sound insulation
$\geq 62$ (-2; -6)	Width of joint 10 mm, filled with Waterbased foam JF100 – LP113876
$\geq 62$ (-2; -6)	Width of joint 20 mm, filled with Waterbased foam JF100 – LP113876
$\geq 61$ (-1; -5)	Width of joint 30 mm, filled with Waterbased foam JF100 – LP113876

### Joint sound reduction of filling material

Test report 16-002732-PR01 (PB 01-K05-04-en-01) dated 24.01.2017

Client tremco illbruck Productie B.V., 4241 WC Arkel (Netherlands)

## 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 joint sound reduction index 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<sup>2</sup> 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 weighted sound reduction index R) and assuming the building component's area S<sub>1</sub> >> than the area of the joint (w · l, w = joint width), for the associated joint length l and a reference length l<sub>0</sub> = 1 m the resulting sound reduction index R<sub>i,w</sub> of the i-th-window with installation joint 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'<sub>w,ges</sub> in accordance with DIN 4109-2 Clause 4, the input data obtained from laboratory measurements must be stated in <sup>1</sup>/<sub>10</sub> dB. For the implementation of sound transmission via installation joint the resulting weighted joint sound reduction index can then be applied directly to the joint sound insulation. This gives:

$$R_{S,w} = 62,1 \text{ dB (width of joint 10 mm)}$$

$$R_{S,w} = 62,2 \text{ dB (width of joint 20 mm)}$$

$$R_{S,w} = 61,5 \text{ dB (width of joint 30 mm)}$$

### 4.2 Uncertainty of measurement, single number ratings in <sup>1</sup>/<sub>10</sub> 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)
----------------------	---

**Joint sound reduction of filling material**

Test report 16-002732-PR01 (PB 01-K05-04-en-01) dated 24.01.2017

Client tremco illbruck Productie B.V., 4241 WC Arkel (Netherlands)

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:

$$R_{S,w} = 62,1 \text{ dB} \pm 1,2 \text{ dB (width of joint 10 mm)}$$

$$R_{S,w} = 62,2 \text{ dB} \pm 1,2 \text{ dB (width of joint 20 mm)}$$

$$R_{S,w} = 61,5 \text{ dB} \pm 1,2 \text{ dB (width of joint 30 mm)}$$

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 joint sound reduction index and the spectrum adaptation terms as given in Section 3

$$R_{S,w} (C;C_{tr}) = 62 (-2; -6) \text{ dB (width of joint 10 mm)}$$

$$R_{S,w} (C;C_{tr}) = 62 (-2; -6) \text{ dB (width of joint 20 mm)}$$

$$R_{S,w} (C;C_{tr}) = 61 (-1; -5) \text{ dB (width of joint 30 mm)}$$

**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 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



**Joint sound reduction of filling material**

Test report 16-002732-PR01 (PB 01-K05-04-en-01) dated 24.01.2017

Client tremco illbruck Productie B.V., 4241 WC Arkel (Netherlands)



- 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<sup>2</sup> 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:

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

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  
24.01.2017

# Joint sound reduction index according to ISO 10140-1

Determination of sound reduction index of joints

Client: **tremco illbruck Productie B.V.**, 4241 WC Arkel (Netherlands)

Product designation Waterbased foam JF100 – LP113876



## Design of test specimen

Waterbased polymer foam

Joint size

Length  $l$  1,200 mm

Depth  $d$  100 mm

width  $w$  10 mm

Density 36.9 g/l

Test date 22<sup>nd</sup> of December 2016

Test length  $l$  1.2 m

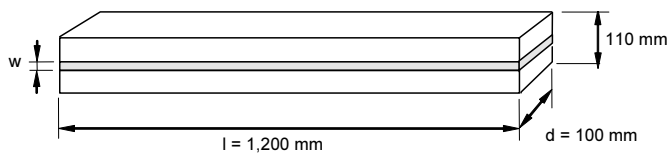
Test rig as per EN ISO 10140-5

Partition wall Double-leaf concrete wall, insert frame

Test noise pink noise

Volumes of test rooms  $V_S = 104 \text{ m}^3$   
 $V_R = 67.5 \text{ m}^3$

## Drawing of the test arrangement



Maximum joint sound reduction index  
 $R_{S,w,max} = 61 \text{ dB}$  (related to test length)

Mounting conditions

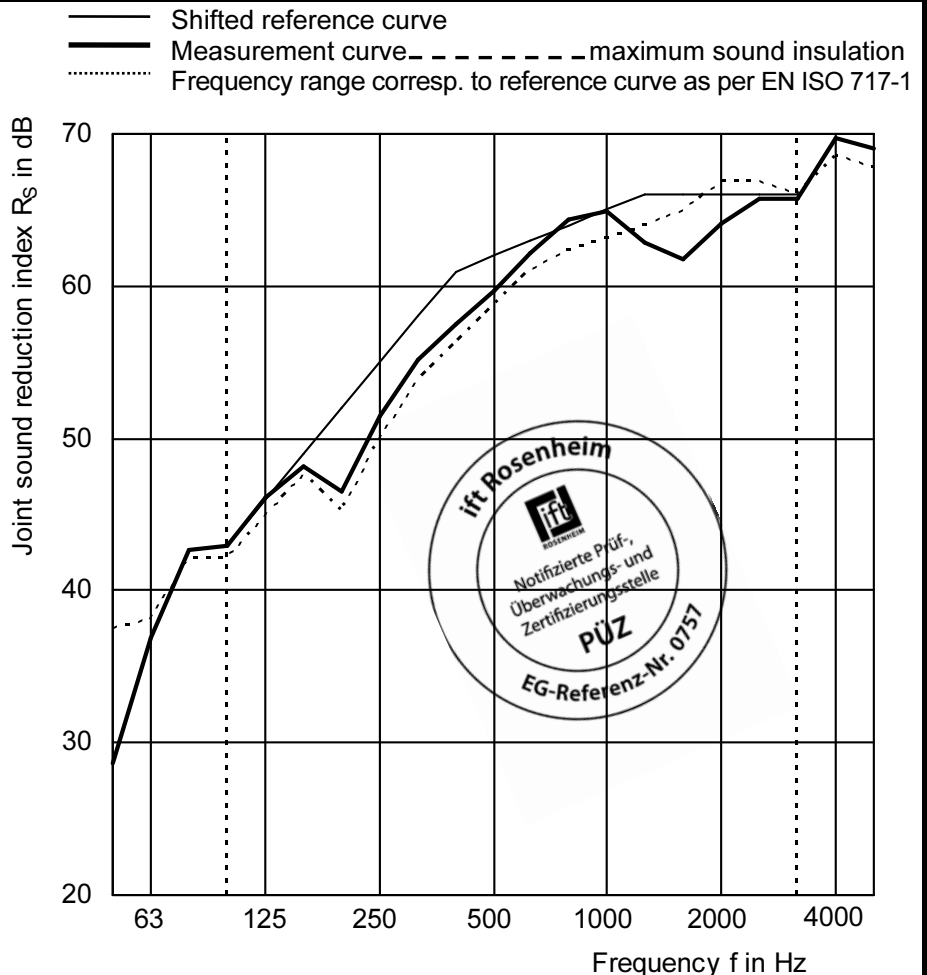
Mounting of the cassette in high performance sound insulating element.

Climate in test rooms 20°C / 35 % RH

Static air pressure 973 Pa

f in Hz	$R_S$ in dB
50	28.7
63	( $\geq 36.9$ )
80	( $\geq 42.6$ )
100	( $\geq 43.0$ )
125	( $\geq 46.1$ )
160	( $\geq 48.2$ )
200	( $\geq 46.5$ )
250	( $\geq 51.4$ )
315	( $\geq 55.1$ )
400	( $\geq 57.5$ )
500	( $\geq 59.7$ )
630	( $\geq 62.2$ )
800	( $\geq 64.3$ )
1,000	( $\geq 64.9$ )
1,250	( $\geq 62.9$ )
1,600	( $\geq 61.7$ )
2,000	( $\geq 64.1$ )
2,500	( $\geq 65.8$ )
3,150	( $\geq 65.8$ )
4,000	( $\geq 69.7$ )
5,000	( $\geq 69.1$ )

( $\geq$  = minimum value)



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

**$[R_{S,w} (C; C_{tr}) \geq 62 (-2; -6) \text{ dB}]$**   $C_{50-3,150} = -3 \text{ dB}$ ;  $C_{100-5,000} = -1 \text{ dB}$ ;  $C_{50-5,000} = -2 \text{ dB}$   
 $C_{tr,50-3,150} = -11 \text{ dB}$ ;  $C_{tr,100-5,000} = -6 \text{ dB}$ ;  $C_{tr,50-5,000} = -11 \text{ dB}$

Test report no.: 16-002732-PR01 (PB 01-K05-04-en-01)

Page 10 of 12, record no Z01, Data sheet no 1

ift Rosenheim

Laboratory for Building Acoustics

24. January 2017

*F. Brechleier*  
Dipl. Ing. (FH) Mr. Florian Brechleier  
Operating Testing Officer

# Joint sound reduction index according to ISO 10140-1

Determination of sound reduction index of joints



Client: **tremco illbruck Productie B.V.**, 4241 WC Arkel (Netherlands)

Product designation Waterbased foam JF100 – LP113876

## Design of test specimen

Waterbased polymer foam

Joint size

Length l 1,200 mm

Depth d 100 mm

Width w 20 mm

Density 39.8 g/l

Test date 22<sup>nd</sup> of December 2016

Test length l 1.2 m

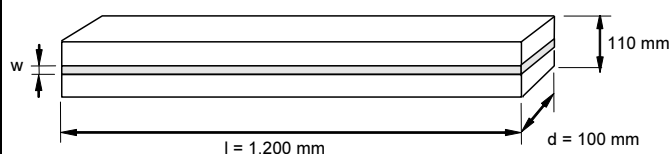
Test rig as per EN ISO 10140-5

Partition wall Double-leaf concrete wall, insert frame

Test noise pink noise

Volumes of test rooms  $V_S = 104 \text{ m}^3$   
 $V_R = 67.5 \text{ m}^3$

## Drawing of the test arrangement



Maximum joint sound reduction index  
 $R_{S,w,max} = 61 \text{ dB}$  (related to test length)

Mounting conditions

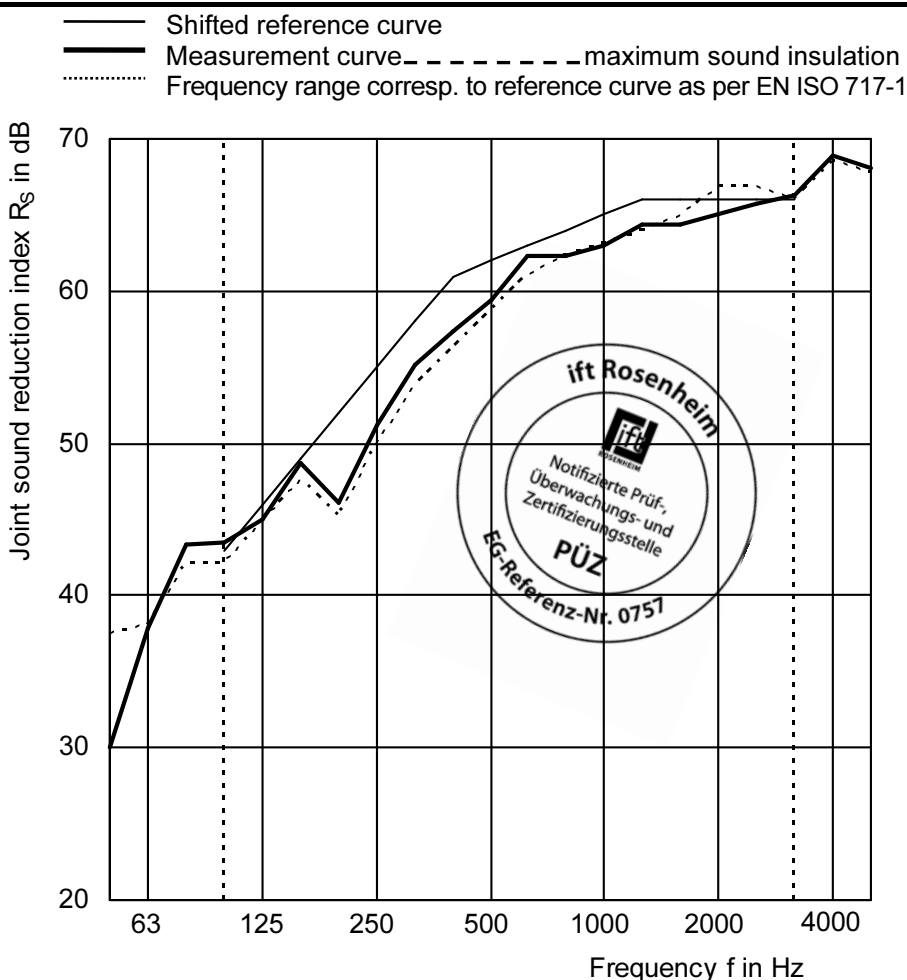
Mounting of the cassette in high performance sound insulating element.

Climate in test rooms 20°C / 35 % RH

Static air pressure 973 Pa

f in Hz	$R_S$ in dB
50	30.0
63	(≥ 37.9)
80	(≥ 43.3)
100	(≥ 43.5)
125	(≥ 45.0)
160	(≥ 48.7)
200	(≥ 46.1)
250	(≥ 51.2)
315	(≥ 55.1)
400	(≥ 57.4)
500	(≥ 59.4)
630	(≥ 62.3)
800	(≥ 62.3)
1,000	(≥ 63.0)
1,250	(≥ 64.3)
1,600	(≥ 64.4)
2,000	(≥ 65.1)
2,500	(≥ 65.8)
3,150	(≥ 66.3)
4,000	(≥ 68.9)
5,000	(≥ 68.1)

(≥ = Minimum value)



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

$[R_{S,w} (C; C_{tr}) \geq 62 (-2; -6) \text{ dB}]$   $C_{50-3,150} = -3 \text{ dB}; C_{100-5,000} = -1 \text{ dB}; C_{50-5,000} = -2 \text{ dB}$   
 $C_{tr,50-3,150} = -10 \text{ dB}; C_{tr,100-5,000} = -6 \text{ dB}; C_{tr,50-5,000} = -10 \text{ dB}$

Test report no.: 16-002732-PR01 (PB 01-K05-04-en-01)

Page 11 of 12, record no Z02, Data sheet no 2

ift Rosenheim

Laboratory for Building Acoustics

24. January 2017

*F. Brechleier*  
 Dipl. Ing. (FH) Mr. Florian Brechleier  
 Operating Testing Officer

# Joint sound reduction index according to ISO 10140-1

Determination of sound reduction index of joints



Client: **tremco illbruck Productie B.V.**, 4241 WC Arkel (Netherlands)

Product designation Waterbased foam JF100 – LP113876

## Design of test specimen

Waterbased polymer foam

Joint size

Length l 1,200 mm

Depth d 100 mm

Width w 30 mm

Density 39.3 g/l

Test date 22<sup>nd</sup> of December 2016

Test length l 1.2 m

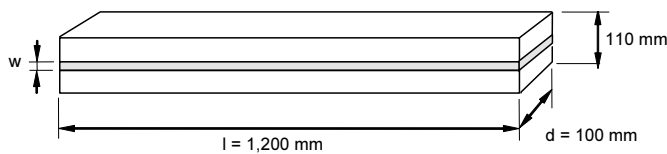
Test rig as per EN ISO 10140-5

Partition wall Double-leaf concrete wall, insert frame

Test noise pink noise

Volumes of test rooms  $V_S = 104 \text{ m}^3$   
 $V_R = 67.5 \text{ m}^3$

## Drawing of the test arrangement



Maximum joint sound reduction index  
 $R_{S,w,max} = 61 \text{ dB}$  (related to test length)

Mounting conditions

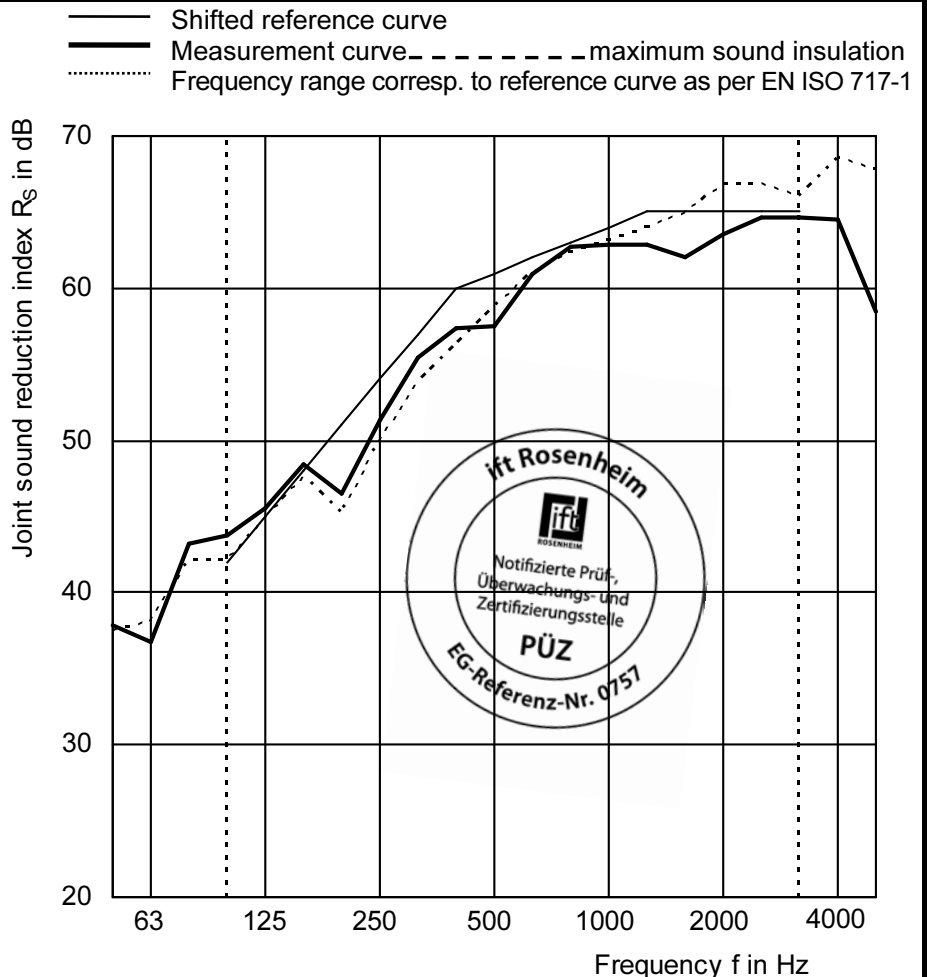
Mounting of the cassette in high performance sound insulating element.

Climate in test rooms 20°C / 35 % RH

Static air pressure 973 Pa

f in Hz	$R_S$ in dB
50	(≥ 37.8)
63	(≥ 36.7)
80	(≥ 43.2)
100	(≥ 43.7)
125	(≥ 45.6)
160	(≥ 48.4)
200	(≥ 46.5)
250	(≥ 51.3)
315	(≥ 55.4)
400	(≥ 57.4)
500	(≥ 57.5)
630	(≥ 60.9)
800	(≥ 62.7)
1,000	(≥ 62.8)
1,250	(≥ 62.9)
1,600	(≥ 62.0)
2,000	(≥ 63.5)
2,500	(≥ 64.7)
3,150	(≥ 64.7)
4,000	(≥ 64.5)
5,000	58.5

(≥ = Minimum value)



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

**$[R_{S,w} (C; C_{tr}) \geq 61 (-1; -5) \text{ dB}]$**   $C_{50-3,150} = -2 \text{ dB}$ ;  $C_{100-5,000} = -1 \text{ dB}$ ;  $C_{50-5,000} = -2 \text{ dB}$   
 $C_{tr,50-3,150} = -7 \text{ dB}$ ;  $C_{tr,100-5,000} = -5 \text{ dB}$ ;  $C_{tr,50-5,000} = -7 \text{ dB}$

Test report no.: 16-002732-PR01 (PB 01-K05-04-en-01)

Page 12 of 12, record no Z03, Data sheet no 3

ift Rosenheim

Laboratory for Building Acoustics

24. January 2017

*F. Brechleier*  
 Dipl. Ing. (FH) Mr. Florian Brechleier  
 Operating Testing Officer