Evidence of Performance

Joint sound reduction of filling material

Test Report
No. 13-002455-PR01
(PB Z5-K02-04-en-01)

Client **Soudal N. V.**
Everdongenlaan 18 - 20
2300 Turnhout
Belgium

Product	Gunned acrylic-sealant
Designation	Firecryl FR
Thickness of sealant	10 mm, backer rod Ø 30 mm
Density	340 g/m sealant
Special features	20 mm joint, on both sides filled with sealant

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

$$[R_{s,w}\ (C;\ C_{tr}) \geq 62\ (-1;-4)\ \text{dB}]$$

Determined for 20 mm joint width

ift Rosenheim
10.09.2013

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

Bernd Saß, Dipl.-Ing. (FH)
Operating Testing Officer
Building Acoustics

Basis

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

Test report no. 13-002455-PR01 (PB Z5-K02-04-de-01) dated 09.09.2013.

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 τ_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 present construction 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 abstract.

Contents

The test report contains a total of 8 pages

ift Rosenheim GmbH
Geschäftsführer:
Dr. Jochen Peichl
Prof. Ulrich Sieberath
Dr. Martin H. Spitzner

Theodor-Gietl-Str. 7 - 9
D-83026 Rosenheim
Tel.: +49 (0)8031/261-0
Fax: +49 (0)8031/261-290
www.ift-rosenheim.de

Sitz: 83026 Rosenheim
AG Traunstein, HRB 14763
Sparkasse Rosenheim
Kto. 3822
BLZ 711 500 00

Notified Body Nr.: 0757
Anerkannte PÜZ-Stelle: BAY 18
DAP-ZE-2288.00
DGA-IS-4285-00
DAkkS Deutsche Akkreditierungsstelle D-PL-11349-01-00 D-ZM-11349-01-00

1 Object

1.1 Description of test specimen

Product	Gunned acrylic-sealant
Date of manufacturing of test specimen	22 August 2013
Product designation	Firecryl FR
Size	
Length of joint l	1,200 mm
Depth of joint d	100 mm
Width of joint w	20 mm
Sealant thickness	10 mm, backer rod Ø 30 mm
Joint cover	Joint sealed on both sides with backer rod, without cover
Curing time	7 days
Length related mass incl. backer rod	340 g/m sealant (total mass 0,82 kg)

The description is based on inspection of the test specimen at **ift** Laboratory for Building Acoustics. Article designations / numbers as well as material specifications were given by the client. (Additional data provided by the client 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 10140-1:2010 + 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. One side of the profiles of the slide-in cassettes is made of concrete whereas the other side is made of aluminium profiles 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 7 days before the date of test using the filling material to be tested as specified by the manufacturer. After curing the cassette was 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.

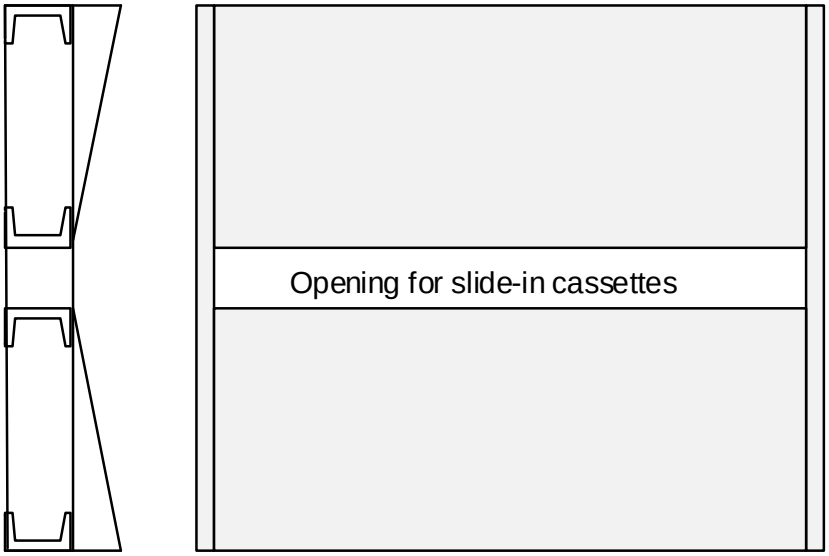


Fig. 2 Set-up of joint testing apparatus (high performance sound insulating element)

Fig. 3 Photo of the mounted element (taken by **ift** Laboratory for Building Acoustics)

2 Procedure

2.1 Sampling

Sampling	The samples were selected by the 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	1
Manufacturer	Soudal N.V.
Manufacturing plant	B-2300 Turnhout
Date of manufacture / date of sampling	02/08/2013
Charge	200978201 WIT WHITE Weiss Blanc 08/14
Responsible for sampling	Mr. Franssen
Delivery at **ift**	6 August 2013 by the client
ift registration number	35306

2.2 Method/s

Basis

EN ISO 10140-1:2010 + A1 : 2012	Acoustics; Laboratory measurement of sound insulation of building elements - Part 1: Application rules for specific products
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 10140-1:2012-05, DIN EN ISO 10140-2:2010-12 und 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 were 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 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 (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

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

$$R_{res} = -10\log\left(10^{-\frac{R}{10}} + \frac{l}{S}\cdot 10^{-\frac{R_S}{10}}\right) \text{ dB}$$

2.3 Test equipment

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 production	-
Amplifier	Type E120	FG Elektronik
Rotating microphone boom	Own production / 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 3 July 2013.

2.4 Testing

Date	29 August 2013
Operating testing officer	Bernd Saß

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;-4) 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/prA1:2012. 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
62 (-1;-4)	Maximum sound insulation
≥ 62 (-2;-5)	Joint width 20 mm, on both sides filled with Firecryl FR

4 Instructions for use

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 τ_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.

ift Rosenheim
Laboratory for Building Acoustics
10.09.2013

Joint sound reduction index according to ISO 10140-1

Determination of sound reduction index of joints

Client: **Soudal N. V.**, 2300 Turnhout (Belgium)

Product designation Firecryl FR

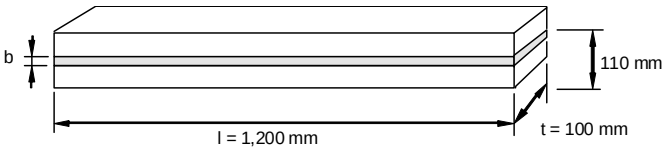
Construction of test specimen

Gunned acrylic-sealant

Joint size

Length l	1,200 mm
Depth d	100 mm
Width w	20 mm
Density	340 g/m sealant

Drawing of test arrangement



Test date	29 August 2013
Test length	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 V_E = 67.5 m³

Maximum joint sound reduction index
$R_{S,w,max}$ = 62 dB (related to test length)

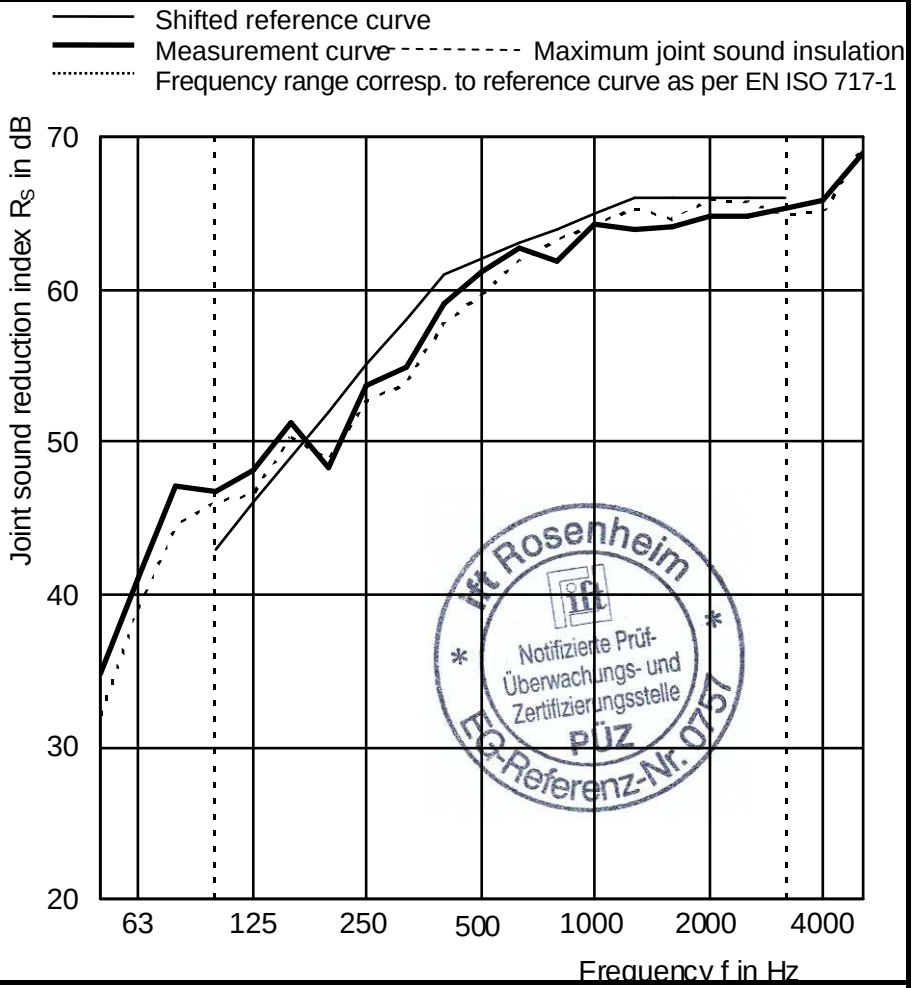
Mounting conditions
Mounting of the cassette in high performance sound insulating element.

Climate in test rooms 21 °C / 55 % RF

Static air pressure 965 hPa

f in Hz	R_S in dB
50	(≥ 34.8)
63	(≥ 41.0)
80	(≥ 47.1)
100	(≥ 46.8)
125	(≥ 48.1)
160	(≥ 51.2)
200	(≥ 48.3)
250	(≥ 53.7)
315	(≥ 54.9)
400	(≥ 59.0)
500	(≥ 61.1)
630	(≥ 62.7)
800	(≥ 61.8)
1000	(≥ 64.2)
1250	(≥ 64.0)
1600	(≥ 64.1)
2000	(≥ 64.7)
2500	(≥ 64.8)
3150	(≥ 65.3)
4000	(≥ 65.9)
5000	(≥ 68.9)

(≥ = minimum value)



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

[$R_{S,w}$ (C;C_{tr}) ≥ 62 (-1;-4) dB] $C_{50\text{-}3150}$ = -1 dB; $C_{100\text{-}5000}$ = 0 dB; $C_{50\text{-}5000}$ = 0 dB

$C_{tr,50\text{-}3150}$ = -7 dB; $C_{tr,100\text{-}5000}$ = -4 dB; $C_{tr,50\text{-}5000}$ = -7 dB

ift Rosenheim
Laboratory for Building Acoustics
10. September 2013

Dipl. Ing. (FH) Bernd Saß
Operating testing officer