

# TFI Report 480277-01

## Sound Absorption Impact Sound Insulation

### Customer

egetaeppe a/s  
Industrivej Nord 25  
7400 Herning  
DENMARK

### Product

textile floor covering  
highline 80/20 1400 AB.

This report includes 2 pages and 2 annex(es)

### Responsible at TFI

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### Aachen, 12.03.2018

Dr. Alexander Siebel

- Head of the testing laboratory -

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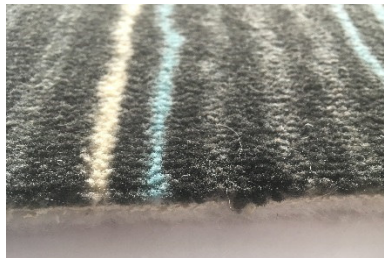
This report only applies to the tested samples and has been established to the best of our knowledge. Only the entire report shall be reproduced. Under no circumstances, extracts shall be used. Furthermore, we apply the "General Terms and Conditions for the Execution of Contracts" of the TFI Aachen GmbH, also with regard to the order execution.

## 1 Transaction

Test order	sound absorption according to EN ISO 354 sound insulation according to EN ISO 10140
Order date	13.02.2018
Your reference	L. Mauritzen
Product designation	highline 80/20 1400 AB
TFI sample number	18-02-0083

## 2 Product Specification

Type of manufacture	tufted
Type of surface	cut pile
Backing	textile fleece backing
Pattern	multicoloured, patterned
Colour	black, grey, light blue, light beige
View	



Thickness [mm]	11*
Area density [g/m <sup>2</sup> ]	3100*
Type of delivery	broadloom
	*customer information

## 3 Results

Sound absorption	$\alpha_w = 0,35$ (H)
Impact sound insulation	$\Delta L_w = 38$ dB

## 4 Annexes

Sound absorption	SA 480277-01 <sup>a</sup>
Impact sound insulation	TS 480277-01 <sup>a</sup>

The annexes marked <sup>a</sup> are based on tests accredited in accordance with EN ISO/IEC 17025.

# Annex SA - Sound Absorption Coefficient

## 1 Transaction

Product designation	highline 80/20 1400 AB
TFI sample number	18-02-0083
Testing period	21.02.2018

## 2 Test Method / Requirements

EN ISO 354:2003	Measurement of sound absorption in a reverberation room
EN ISO 11654:1997	Sound absorbers for use in buildings – Rating of sound absorption
Deviation from the standard	None

## 3 Remarks

None

## 4 Measuring Operation

Test noise:	broadband pink noise
Receive filter:	third octave band filter
Measurement:	2 loudspeaker positions 6 microphone positions

## 5 Laboratories

Test rooms:	laboratory of the TFI Aachen GmbH, Hauptstr. 133, 52477 Alsdorf, Germany
Test method:	reverberation room method
Volume:	211 m <sup>3</sup>
Total surface:	213 m <sup>2</sup>
Floor plan:	trapezoidal
Reflectors:	6 aluminium plates 1.0 m x 2.0 m 7 plywood boards 1.5 m x 1.3 m 1 aluminium plate 1.8 m x 0.9 m

## 6 Measuring Devices

Real time analyser:	Norsonic Nor140, SN: 1406926
Microphone:	Norsonic Type 1209/21134
Loudspeaker:	2 dodecahedrons

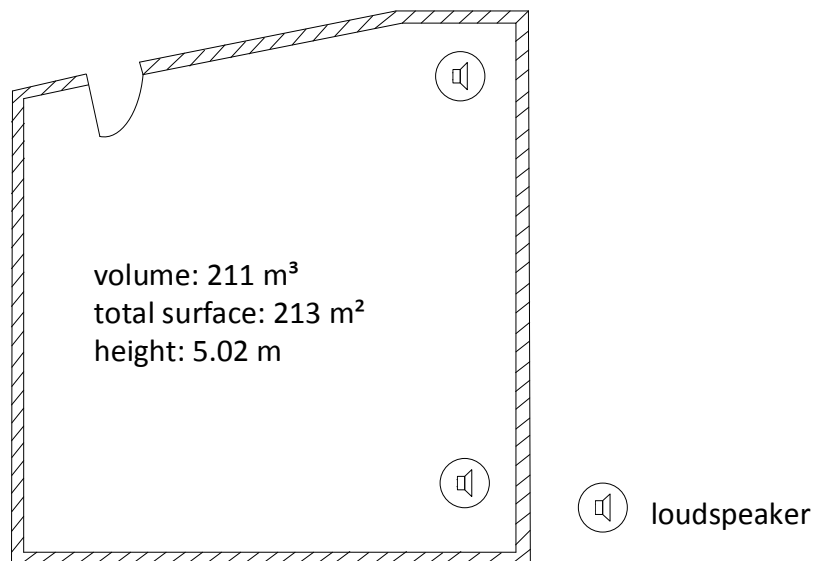
## 7 Evaluation

The decay curves are determined using the interrupted noise method. Several decay curves measured at one microphone and/or loudspeaker position are averaged in order to reach a sufficient reproducibility. The reverberation time of the room is expressed by the arithmetic mean derived from the total number of all reverberation time measurements in each frequency band.

The equivalent sound absorption area of the test specimen  $A_T$  is calculated as the difference between the equivalent sound absorption area of the reverberation room with test specimen  $A_2$  and the equivalent sound absorption area of the empty reverberation room  $A_1$  without test specimen.

The equivalent sound absorption coefficient  $\alpha_s$  describes the ratio of the equivalent sound absorption area  $A_T$  of a test specimen divided by the area of the test specimen.

The evaluated sound absorption coefficient  $\alpha_w$  is a single-number frequency-independent value which equals the value of the reference curve at 500 Hz after shifting it.



*Drawing reverberation room*

Measurement of sound absorption coefficient in a reverberation room

Annex SA – Sound absorption

Page 1 of 2

TFI sample no.: 18-02-0083

Testing period: 21.02.2018

Construction: -  
(from top to bottom)

Product name: highline 80/20 1400 AB

Reverberation room / without

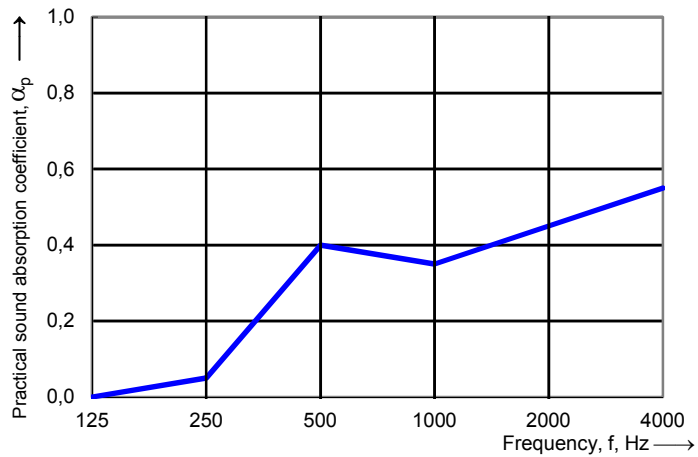
Relative humidity: 34,5 %  
Temperature: 19,6 °C  
Barometric pressure: 100,6 kPa

Reverberation room / with sample

Relative humidity: 34,5 %  
Temperature: 19,6 °C  
Barometric pressure: 100,6 kPa

Surface area: 12,04 m<sup>2</sup>  
Room volume: 211,0 m<sup>3</sup>  
Total room area St: 213 m<sup>2</sup>

Frequency f [Hz]	$\alpha_p$ Oktave
100 125 160	0,00
200 250 315	0,05
400 500 630	0,40
800 1000 1250	0,35
1600 2000 2500	0,45
3150 4000 5000	0,55



Weighted sound absorption coefficient according to ISO 11654

$$\alpha_w = 0,35 \text{ (H)}$$



# Sound absorption according ISO 354

SA 480277-01

Measurement of sound absorption coefficient in a reverberation room

Annex SA – Sound absorption

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Weighted sound absorption coefficient according to ISO 11654

$$\alpha_w = 0,35 \text{ (H)}$$

Surface area: 12,04 m<sup>2</sup>  
Room volume: 211,0 m<sup>3</sup>  
Total room area St: 213,0 m<sup>2</sup>

Frequency [Hz]	$\alpha_p$	$\alpha_s$	A [m <sup>2</sup> ]	T1 [s]	T2 [s]
50		0,01	0,1	6,97	6,79
63	0,00	0,01	0,1	7,40	7,21
80		0,02	0,3	10,27	9,54
100		0,01	0,1	10,91	10,70
125	0,00	0,01	0,1	6,78	6,60
160		-0,01	-0,1	6,09	6,24
200		0,02	0,3	6,65	6,33
250	0,05	0,05	0,6	6,49	5,79
315		0,13	1,5	5,98	4,72
400		0,18	2,1	5,81	4,26
500	0,40	0,40	4,8	5,91	3,21
630		0,62	7,5	5,89	2,57
800		0,40	4,8	5,65	3,14
1000	0,35	0,34	4,1	5,36	3,27
1250		0,38	4,5	5,28	3,10
1600		0,44	5,3	4,85	2,76
2000	0,45	0,48	5,8	4,25	2,47
2500		0,49	5,9	3,52	2,18
3150		0,49	5,9	2,73	1,85
4000	0,55	0,54	6,5	2,12	1,51
5000		0,60	7,2	1,51	1,14

Reverberation room / without sample:  
Relative humidity: 34,5 %  
Temperature: 19,6 °C  
Barometric pressure: 100,6 kPa

Reverberation room / with sample:  
Relative humidity: 34,5 %  
Temperature: 19,6 °C  
Barometric pressure: 100,6 kPa

TFI sample number: 18-02-0083



# Annex TS - Impact Sound Insulation

## 1 Transaction

Product designation	highline 80/20 1400 AB
TFI sample number	18-02-0083
Testing period	22.02.2018

## 2 Test Method / Requirements

EN ISO 10140-1:2014	Acoustics - Laboratory measurement of sound insulation of building elements - Part 1: Application rules for certain products
EN ISO 10140-2:2010	Acoustics - Laboratory measurement of sound insulation of building elements - Part 2: Measurement of airborne sound insulation
EN ISO 10140-3:2015	Acoustics - Laboratory measurement of sound insulation of building elements - Part 3: Measurement of impact sound reduction
EN ISO 10140-4:2010	Acoustics - Laboratory measurement of sound insulation of building elements - Part 4: Measurement procedures and requirements
EN ISO 10140-5:2014	Acoustics - Laboratory measurement of sound insulation of building elements - Part 5: Requirements for test facilities and equipment
EN ISO 717-1:2013	Acoustics - Rating of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation
EN ISO 717-2:2013	Acoustics - Rating of sound insulation in buildings and of building elements - Part 2: Impact sound reduction

## 3 Remarks

None

## 4 Measuring Operation

Measurement of the impact sound pressure level:	Using with 4 tapping machine position. (The single results of the one-third-octave-bands were averaged on an energy basis)
Test surface:	~ 1m <sup>2</sup>
Category:	I
Connection with the floor:	loose laid
Damage to the sample:	None

## 5 Laboratories

Test rooms:	Laboratories of the TFI Aachen GmbH, Hauptstrasse 133, 52477 Alsdorf, Germany
Sending room (1.04):	$V = 52.1 \text{ m}^3$ (with diffusers)
Receiving room (0.01):	$4.05 \text{ m} \times 3.95 \text{ m} \times 3.33 \text{ m} + 2.00 \text{ m} \times 0.98 \text{ m} \times 0.18 \text{ m}$ ; $V = 53.6 \text{ m}^3$ (cuboid room, with diffusers)
Reference floor:	$4.27 \text{ m} \times 4.46 \text{ m}$ ; $S = 19.04 \text{ m}^2$ 14 cm concrete slab floor with an area-related mass of $m' \sim 322 \text{ kg/m}^2$
Flanking walls:	Lime sand brick walls with light wall facings (facing shell $d = 12 \text{ cm}$ ) with an average area-related mass of $m' \sim 330 \text{ kg/m}^2$

## 6 Measuring Devices

Real time analyser:	Norsonic Nor140, SN: 1406927 Norsonic Nor140, SN: 1406926
Microphone:	Norsonic Type 1209/21135 Norsonic Type 1209/21134
Tapping machine:	NORSONIC, Type 211, SN: 502 (standard tapping machine with 3 feet and 5 hammers according to ISO 10140)

## 7 Evaluation

The impact sound pressure level generated by the standard tapping machine is measured in the receiving room under a bare heavy floor with and without a floor covering. The impact sound reduction is determined on the basis of the measured values as follows:

$$\Delta L = L_{n,0} - L_n \text{ (dB)}$$

$L_{n,0}$  Impact sound pressure level without a floor covering (dB)

$L_n$  Impact sound pressure level with a floor covering (dB)

For the evaluation of the weighted reduction in impact sound pressure level  $\Delta L_w$ , the relevant reference curve is shifted in increments of 1 dB towards the measured curve until the sum of unfavourable deviations is as large as possible, but not more than 32 dB.

The linear impact sound level  $\Delta L_{lin}$  is determined according to the following equation:

$$\Delta L_{lin} = L_{n,r,0,w} + C_{l,r,0} - (L_{n,r,w} + C_{l,r}) = \Delta L_w + C_{l,\Delta}$$



$L_{n,r,w}$	is the calculated weighted normalized impact sound pressure level of the reference floor with the floor covering under test
$L_{n,r,0,w}$	78 dB, calculated from $L_{n,r,0}$ according to Section 4.3.1 of DIN EN ISO 717-2: 2013
$C_{l,r}$	Spectrum adaptation term for the reference floor with the floor covering to be tested
$C_{l,r,0}$	-11 dB, spectrum adaptation term for the reference floor with $L_{n,r,0}$ determined according to Annex A, Section A.2.1 of DIN EN ISO 717-2:2013

## 8 Note

The results are based on measurements performed under laboratory conditions with artificial excitation (standard procedure). The test results are applicable in due consideration of the national provisions and the local circumstances and/or constructions.

# Impact sound insulation according ISO 10140-1

TS 480277-01

Laboratory measurements of the reduction of transmitted impact noise by floor coverings on a heavyweight reference floor

Annex TS – Impact sound insulation

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TFI sample number: 18-02-0083 Testing period: 22.02.2018

Product name: highline 80/20 1400 AB

Installed by: TFI

Construction: -  
(from top to bottom)

Receiving room:

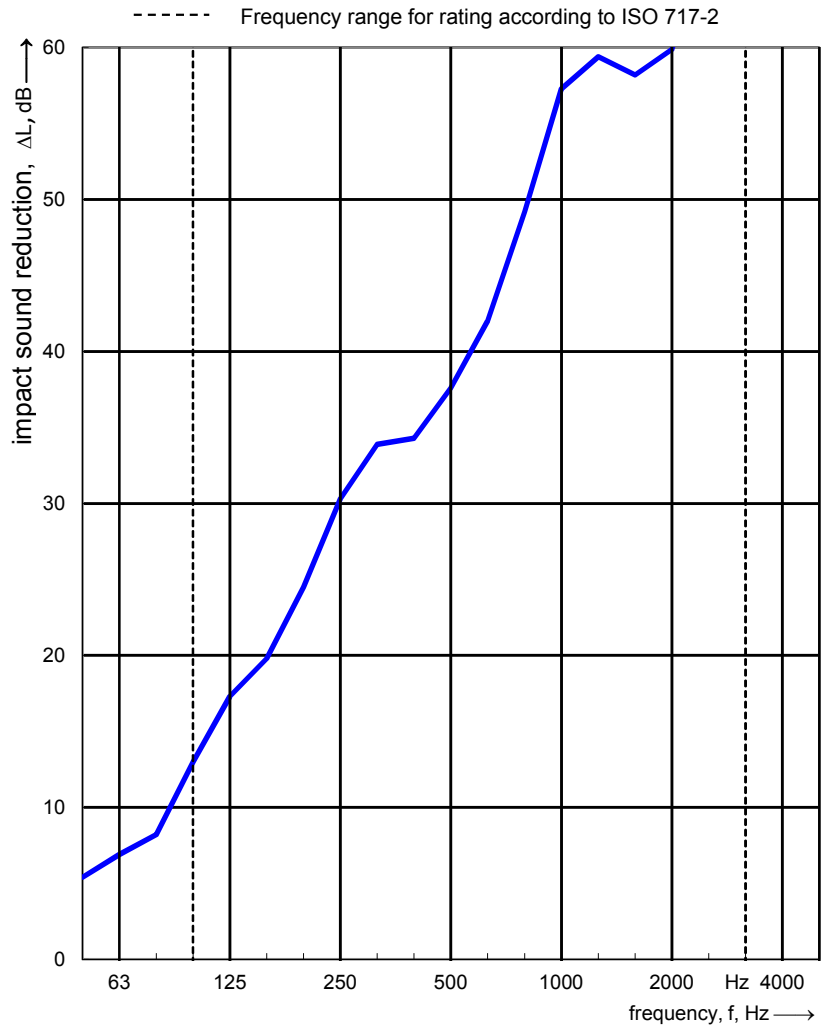
Volume: 53,6 m<sup>3</sup>  
Air temperature: 19,2 °C  
Relative air humidity: 69,4 %  
Static pressure: 100,5 kPa

Source room:

Volume: 52,1 m<sup>3</sup>  
Air temperature: 19,7 °C  
Relative air humidity: 34,2 %  
Type of reference floor: Heavyweight

Frequency f [Hz]	L <sub>n,0</sub> 1/3 oct. [dB]	ΔL 1/3 oct. [dB]
50	61,6	5,4 <sup>1</sup>
63	60,6	6,9
80	58,9	8,2
100	59,4	13,0
125	66,5	17,3
160	60,4	19,8
200	62,8	24,5
250	67,3	30,3
315	63,9	33,9
400	64,1	34,3
500	64,3	37,6
630	65,4	42,0
800	65,9	49,2
1000	67,4	57,3 <sup>1</sup>
1250	67,6	59,4 <sup>1</sup>
1600	67,8	58,2
2000	68,2	59,9
2500	67,9	67,3 <sup>1</sup>
3150	68,5	66,9 <sup>1</sup>
4000	67,6	65,4 <sup>1</sup>
5000	64,5	61,6 <sup>1</sup>

<sup>1</sup> to high



Evaluation according to ISO 717-2

ΔL<sub>w</sub> = 38 dB

C<sub>L,Δ</sub> = -13 dB

C<sub>L,r</sub> = 2 dB

The results are based on measurements, which were performed under laboratory conditions with artificial excitation (standard procedure).



# Impact sound insulation according ISO 10140-1

TS 480277-01

Laboratory measurements of the reduction of transmitted impact noise by floor coverings on a heavyweight reference floor

Annex TS – Impact sound insulation

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Evaluation according to ISO 717-2

$\Delta L_w = 38$  dB

$C_{i,\Delta} = -13$  dB

$C_{i,r} = 2$  dB

The results are based on measurements, which were performed under laboratory conditions with artificial excitation (standard procedure).

Weighted normalized impact sound pressure level  $L_{n,0,w} = 74$  dB

Weighted normalized impact sound pressure level  $L_{n,w} = 34$  dB

Weighted normalized impact sound pressure level  $L_{n,r,w} = 40$  dB

Frequency [Hz]	$\Delta L$ [dB]	$L_{n,0}$ [dB]	$L_n$ [dB]	$L_{n,r}$ [dB]
50	5,4	61,6	56,2	
63	6,9	60,6	53,7	
80	8,2	58,9	50,7	
100	13,0	59,4	46,4	54,0
125	17,3	66,5	49,2	50,2
160	19,8	60,4	40,6	48,2
200	24,5	62,8	38,3	44,0
250	30,3	67,3	37,0	38,7
315	33,9	63,9	30,0	35,6
400	34,3	64,1	29,8	35,7
500	37,6	64,3	26,7	32,9
630	42,0	65,4	23,4	29,0
800	49,2	65,9	16,7	22,3
1000	57,3	67,4	10,1	14,7
1250	59,4	67,6	8,2	12,6
1600	58,2	67,8	9,6	13,8
2000	59,9	68,2	8,3	12,1
2500	67,3	67,9	0,6	4,7
3150	66,9	68,5	1,6	5,1
4000	65,4	67,6	2,2	
5000	61,6	64,5	2,9	

Receiving room:

Volumen: 53,6 m<sup>3</sup>

Air temperature: 19,2 °C

Relative air humidity: 69,40 %

Static pressure: 100,5 kPa

Source room:

Volumen: 52,1 m<sup>3</sup>

Air temperature: 19,7 °C

Relative air humidity: 34,2 %

Type of reference floor: Heavyweight



TFI sample number:

18-02-0083