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Bellaterra: 25th of April, 2019

File number: 19/19154-549

Test petitioner: **BEKA SPORT Zeminleri Ins. Mad. Koz. San. ve Dis Tic. LTD. STI.**
Altunizade Mahallesi, Kisikli Cad.
Tekinak is Merkezi No:3 D:8, 34662
Uskudar – Instanbul (Turkey)

# TEST REPORT

The present document is a translated copy of the Spanish test report 19/19154-549. This report is issued on the 3rd of May, 2019. In case of dispute, the valid document is the original Spanish version.

**Requested test:** Laboratory measurement of the improvement of airborne sound insulation, in accordance with the standards UNE-EN ISO 10140-2:2011 and UNE-EN ISO 10140-1:2016 (Annex G), by a floor covering composed of rubber tiles referenced ***BEKA rubber tiles***.

**Dates of test:** 19th and 20th of March, 2019

**Tests carried out by:** Xavier Roviralta – Acoustics Laboratory (22nd of September, 2017)

Firmado digitalmente
por Xavier Roviralta

Xavier Roviralta
Technical Manager of Acoustics
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## 1.- SCOPE OF THE TEST

Laboratory measurement of the improvement of airborne sound insulation, in accordance with the standards UNE-EN ISO 10140-2:2011 and UNE-EN ISO 10140-1:2016 (Annex G), by a floor covering composed of rubber tiles referenced ***BEKA rubber tiles***.

## 2.- MEASUREMENT EQUIPMENT

The equipment used in the test is the following:

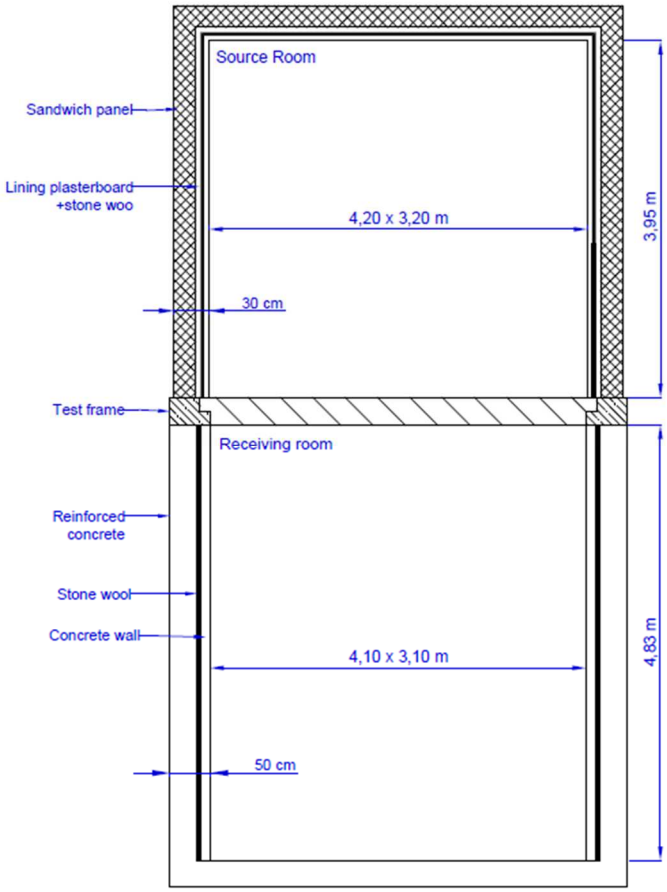
- Spectrum analyser id. number: 170701 (Bruel&Kjaer mod. Pulse LAN-XI)
- Microphone calibrator id. number: 103032 (Bruel&Kjaer mod. 4231)
- Diffuse field microphones id. numbers: 103128 and 103131 (Bruel&Kjaer mod. 4943)
- Rotating microphone booms id. numbers: 170691 and 170692 (Ntek mod. MB-01)
- Sound sources id. numbers: 103098 (AVM mod. DO12) and 170260 and 170261 (CESVA BP012)
- Noise generator with power amplifier id. number: 103125 (CESVA mod. AP600)
- Equalizer id. number: 170092 (INTER mod. EQ-9231)
- Thermo-hygrometer and barometer id. number: 170680 (PCE mod. THB-40)
- Tape measurer id. number: 103095 (Stanley mod. Powerlock)
- Distance meter id. number: 170136 (Stanley mod. TLM130)

## 3.- TEST PROCEDURE AND EVALUATION

### 3.1. TEST METHOD

Test carried out in accordance with the standard UNE-EN ISO 10140-2:2011, "Measurement of airborne sound insulation", which is part 2 of the set of standards UNE-EN ISO 10140 "Laboratory measurement of sound insulation of building elements".

Two horizontally or vertically adjacent rooms are used, one being designated the source room and the other the receiving room. The test element is mounted in an opening in the partition between those rooms. In the source room, a diffuse sound field is generated with a level enough to measure, in the receiving room, a sound pressure level at least 6 dB higher (preferably more than 15 dB) than the background noise level, at any frequency band. If this is not fulfilled, corrections specified in the standard UNE-EN ISO 10140-4:2011 shall be applied.




**Schematic drawing of the test rooms**

The average sound pressure levels in the source room and in the receiving room are measured, according to the procedure specified in the standard UNE-EN ISO 10140-4:2011.

**Sound reduction index**, ***R***, is calculated using:

$$R = L_1 - L_2 + 10\ lg\ (\frac{S}{A})\ \text{[dB]}$$

where:

- $L_1$ is the energy average sound pressure level in the source room (dB)
- $L_2$ is the energy average sound pressure level in the receiving room (dB)
- S is the area of the free test opening in which the test element is installed ($m^2$)
- A is the equivalent sound absorption area in the receiving room ($m^2$)

The equivalent absorption area, *A*, in square meters, from the reverberation time using Sabine's formula is calculated by the following equation:

$$A = \left(\frac{0{,}16 \cdot V}{T}\right) \quad [m^2]$$

where:

- V is the receiving room volume ($m^3$)
- T is the receiving room reverberation time (s)

## 3.2. WEIGHTED SOUND REDUCTION INDEX $R_w$

The **weighted sound reduction index**, **$R_w$**, is defined in the standard ISO 717-1 as the value, in decibels, of the reference curve (see table 3.1) at the frequency of 500 Hz, after shifting it according to the method laid down in this document.

To evaluate the results of a measurement of R (airborne sound insulation in one-third octave bands), the reference curve is shifted in steps of 1 dB (positive or negative) towards the measured curve until the sum of the unfavourable deviations is as large as possible but no more than 32 dB. Only frequencies within the range of 100 to 3150 Hz are taken into account. An unfavourable deviation at a particular frequency occurs when the result of measurement is less than the reference curve.

| Freq. (Hz) | 100 | 125 | 160 | 200 | 250 | 315 |
|---|---|---|---|---|---|---|
| Ref. | 33 | 36 | 39 | 42 | 45 | 48 |
| Freq. (Hz) | 400 | 500 | 630 | 800 | 1000 | 1250 |
| Ref. | 51 | 52 | 53 | 54 | 55 | 56 |
| Freq. (Hz) | 1600 | 2000 | 2500 | 3150 | 4000 | 5000 |
| Ref. | 56 | 56 | 56 | 56 | - | - |

**Table 3.1: Values of the reference curve**

## 3.3. ADAPTATION TERMS (C; $C_{tr}$)

As defined in the standard ISO 717-1, the adaptation term is the value, in decibels, that can be added to the global rating ($R_w$,...) to take into account the features of peculiar spectrums.

These terms are introduced by the standard to take into account the different spectrums of noise sources (such as pink noise and traffic noise) and to evaluate sound insulation curves with excessive low values in a single frequency band.

In the next informative table, several cases are presented and which adaptation terms can be used:

| Suitable Adaptation Term | Type of noise source |
|---|---|
| C (Adaptation term for pink noise) | Human Activities (conversations, music, radio, TV)<br>Kinder games<br>High and middle velocity trains<br>Motorway (> 80 Km/h)<br>Jet aircraft, (short distances)<br>Factory emitting middle and high frequency noise |
| $C_{tr}$ (Adaptation term for traffic noise) | Urban traffic<br>Low speed trains<br>Jet aircraft<br>Music from discotheque<br>Factory emitting low frequency noise |

**Table 3.2: Adaptation terms and its suitable use**

## 3.4. A-WEIGHTED SOUND REDUCTION INDEX CALCULATION, $R_A$

The **A-weighted sound reduction index**, **$R_A$**, of a building element is the global rating, in dBA, of the sound reduction index, R, for an incident A-weighted normalized pink noise. In the Annex A of the *Documento Básico "DB-HR Protección frente al ruido" del Código Técnico de la Edificación*, $R_A$ is defined by the following formula from the values of sound reduction index R obtained by laboratory testing:

$$R_A = -10\ Log \sum_{i=1}^{n} 10^{(L_{Ar,i} - R_i)/10} \text{ [dBA]}$$

where:

- $R_i$ is the sound reduction index in the i frequency band, in dB.
- $L_{Ar,i}$ is the value of A-weighted pink noise spectrum in the i frequency band, in dBA.
- i covers all the one-third octave frequency bands from 100 Hz to 5 kHz.

| Freq. (Hz) | 100 | 125 | 160 | 200 | 250 | 315 |
|---|---|---|---|---|---|---|
| $L_{Ar,i}$ | -30,1 | -27,1 | -24,4 | -21,9 | -19,6 | -17,6 |
| Freq. (Hz) | 400 | 500 | 630 | 800 | 1000 | 1250 |
| $L_{Ar,i}$ | -15,8 | -14,2 | -12,9 | -11,8 | -11,0 | -10,4 |
| Freq. (Hz) | 1600 | 2000 | 2500 | 3150 | 4000 | 5000 |
| $L_{Ar,i}$ | -10,0 | -9,8 | -9,7 | -9,8 | -10,0 | -10,5 |

**Table 3.3: A-weighted normalized pink noise spectrum**

## 3.5. IMPROVEMENT OF AIRBORNE SOUND INSULATION

The Annex G of standard UNE-EN ISO 10140-1:2011 "Application rules for specific products", which is part 1 of the set of standards UNE-EN ISO 10140:2011 "Laboratory measurement of sound insulation of building elements", specifies the procedure for determining the improvement of airborne sound insulation of acoustical linings on walls and floors.

The quantity determined is the **sound reduction improvement index ΔR**, in decibels, which is defined as the difference between the sound reduction indices of the basic element with and without the lining for each one-third octave band:

$$\Delta R = R_{with} - R_{without} \quad [dB]$$

The constructions specified in UNE EN-ISO 10140-5:2011, Annex B, shall be used as standard basic elements. In case of floor coverings, the lining shall be applied to the standard floor with low critical frequency ("heavy floor") in accordance with UNE EN-ISO 10140-5:2011, Annex C. This standard heavyweight reference floor consists of a reinforced concrete slab of thickness $120^{+40}_{-20}$ mm, preferably 140 mm for the construction of new laboratories.

### 3.5.1 SINGLE-NUMBER RATING

#### 3.5.1.1 IN ACCORDANCE WITH UNE-EN ISO 10140-1:2011 Annex G

To evaluate the single-number rating $\Delta R_w$, **weighted sound reduction improvement index**, from the one-third octave band ΔR values given to one decimal place, the measured values of the sound reduction improvement are used in conjunction with standard reference curves for the standard basic elements (specified in UNE-EN ISO 10140-5:2011, Annex B) by calculation.

The one-third octave band sound reduction improvement index ΔR values, are taken as measured and added to the reference values of the sound insulation index, $R_{ref,without}$, of the matching standard basic element:

$$R_{ref,with} = R_{ref,without} + \Delta R \quad [dB]$$

In case of using the standard floor with low critical frequency ("heavy floor") as standard basic element, the standard reference curve shall be the following:

| Freq. (Hz) | 100 | 125 | 160 | 200 | 250 | 315 |
|---|---|---|---|---|---|---|
| R | 40,0 | 40,0 | 40,0 | 40,0 | 40,0 | 41,8 |
| Freq. (Hz) | 400 | 500 | 630 | 800 | 1000 | 1250 |
| R | 44,4 | 46,8 | 49,3 | 51,9 | 54,4 | 56,8 |
| Freq. (Hz) | 1600 | 2000 | 2500 | 3150 | 4000 | 5000 |
| R | 59,5 | 61,9 | 64,3 | 65,0 | 65,0 | 65,0 |

| **$R_w$ (C;$C_{tr}$)** (dB) | **52 (-1;-5)** | **$R_A$** (dBA) | **51,5** |
|---|---|---|---|

**Table 3.4: Reference values of the sound insulation index of heavyweight reference floor, in accordance with UNE-EN ISO 10140-5:2011, Annex B ($R_A$ according DB-HR Annex E)**

Weighted sound reduction indices, $R_{w,ref,with}$ and $R_{w,ref,without}$, and the corresponding spectrum adaptation terms are determined in accordance with ISO 717-1. The weighted improvement of sound reduction index, $\Delta R_w$, is then given by the next equation:

$$\Delta R_w = R_{w,ref,with} - R_{w,ref,without} \quad [dB]$$

The A-weighted improvement of sound reduction indices $\Delta(R_w+C)$, respectively $\Delta(R_w+C_{tr})$, are calculated in an equivalent way.

An additional index indicates the reference basic element used: "heavy" for the heavyweight reference floor in accordance with UNE-EN ISO 10140-5:2011, Annexes B and C.

3.5.1.2 IN ACCORDANCE WITH DB-HR

In the Annex A of the document *Documento Básico "DB-HR Protección frente al ruido" del Código Técnico de la Edificación*, the **A-weighted sound reduction improvement index**, $\Delta R_A$, is defined as the increase of the A-weighted sound reduction index of a building element by an additional lining applied to the basic building element. The improvement is determined by calculating the difference between the A-weighted sound reduction index, $R_A$, of the basic building element with and without the additional lining.

The Annex E of the document *Documento Básico "DB-HR Protección frente al ruido" del Código Técnico de la Edificación* specifies the measurement and rating procedure for the $\Delta R_A$ improvement.

The $\Delta R_A$ index is obtained by the following equation:

$$\Delta R_A = (R_0 + \Delta R)_A - R_{0,A} \quad \text{[dBA]}$$

where:

- $(R_0+\Delta R)_A$ is the A-weighted sound reduction index of the basic building element with the lining
- $R_{0,A}$ is the A-weighted sound reduction index of the basic building element.

To determinate the $(R_0+\Delta R)_A$ value, the third-octave values of the sound reduction improvement index $\Delta R$ are added to the reference values of sound reduction index, $R_0$, of the corresponding standard basic element. In case the test is carried out using the standard floor with low critical frequency ("heavy floor") in accordance with UNE EN-ISO 10140-5:2011 Annex C as standard basic element, the sound reduction index values of the corresponding reference curve (see table 3.4) should be taken as $R_0$ values.

The A-weighted sound reduction index of this "heavy floor" (see table 3.4) should be taken as $R_{0,A}$.

Each reference curve leads to a different value of $\Delta R$ improvement, being $\Delta R_{A,I}$ the A-weighted sound reduction improvement index for the reference curve with low critical frequency.

## 3.6. UNCERTAINTY OF RESULTS

The uncertainty associated to the test has been calculated and is available to the petitioner. The expanded uncertainty has been calculated as the typical measurement uncertainty multiplied by a coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

## 4.- TEST ELEMENT DESCRIPTION

The main characteristics of the test element are listed below (commercial references are provided by the client). LGAI Technological Center, S.A. is not responsible for the documentation and/or information provided for the petitioner.

| | |
|---|---|
| **Type of test element** | Floor covering |
| **Manufacturer** | BEKA SPORT Zeminleri Ins. Mad. Koz. San. ve Dis Tic. LTD. STI. |
| **Model / Reference** | ***BEKA rubber tiles*** |
| **Foam supplied by** | BEKA SPORT Zeminleri Ins. Mad. Koz. San. ve Dis Tic. LTD. STI. |
| **Date received** | 7th of March, 2019 |
| **Area, *S*, of test element (test opening)** | 12,71 $m^2$ – 4,10 x 3,10 m |
| **Test element thickness** | 160 mm (reference floor: 140 mm; floor covering: 20 mm) |
| **Mass per unit area, *m* (estimated)** | ≈368 $kg/m^2$ (reference floor: ≈350 $kg/m^2$; floor covering: 18 $kg/m^2$) |
| **Type of mounting** | In the opening of a concrete frame (test frame) |
| **Composition** | - Reference floor: Standard reference floor with low critical frequency ("heavy floor"). Reinforced concrete slab of thickness 140 mm, in accordance with Annexes B and C of the standard EN ISO 10140-5.<br>- Floor covering 4,4x3,4 m composed of (from inside to outside):<br>  - Tiles made of EPDM and recycled SBR Rubber with MDI polyurethane adhesive of nominal dimensions 1000x1000 mm and 20 mm of thickness. Nominal density material of 970 $kg/m^3$ (provided by the test petitioner) and 18 $kg/m^2$ of mass per unit area. |
| **Perimeter sealing** | High density mastic |
| **Test arrangement** | In accordance with the specifications in Section 6 of UNE-EN ISO 10140-2:2011 and Annex G of the UNE-EN-ISO 10140-1:2011 |
| **Test element assembling (carried out by/date)** | Applus Laboratories - LGAI Technological Center /18th of March, 2019 |
| **Mounting type** | See figures 1 and 2 |

The technical information of the test element, provided by the test petitioner, is attached in the Annex.

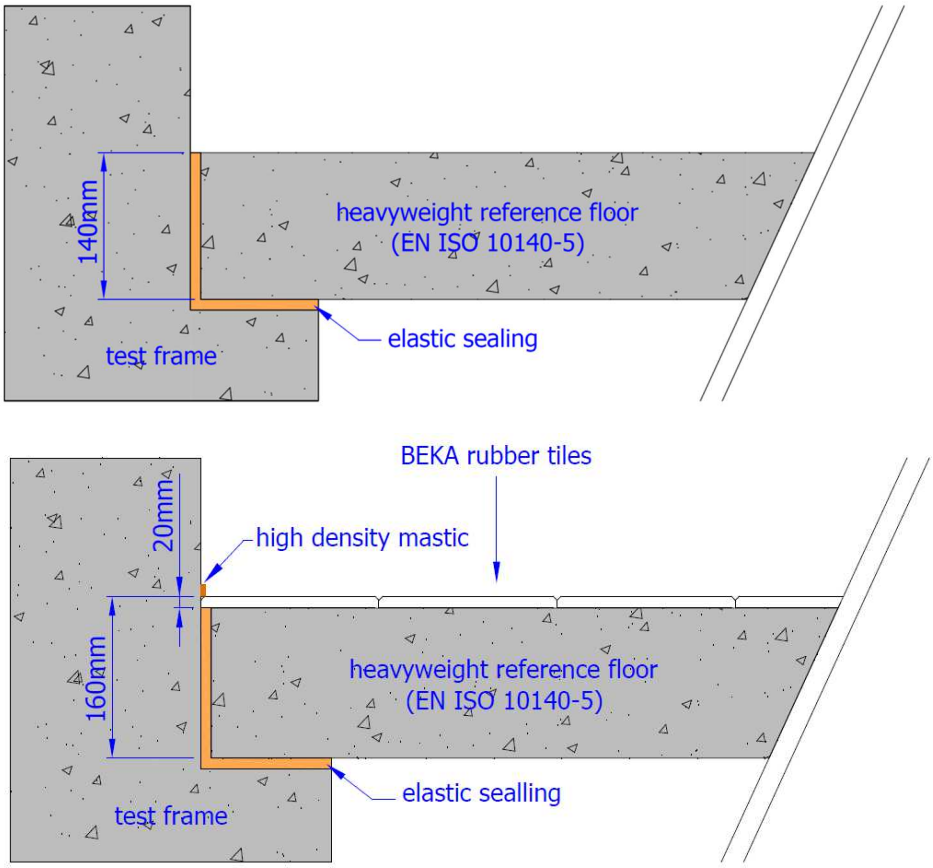
In order to determinate the improvement of airborne sound insulation provided by the floor covering two measurements are carried out: the measurement of the reference floor without the floor covering (22/02/2019) and the measurement of the reference floor with the floor covering (19/03/2019).

**Images 1 to 4 Details of a *BEKA rubber tiles***

**Images 5 to 12 Installation and sealing of the floor covering on the reference floor**

**Images 13 and 14 Test specimen installed and ready for the test**

The following figures show the sections of the tested constructions.




**Figures 1 and 2 Reference floor and reference floor with the floor covering**

## 5.- TEST ENVIRONMENT

5.1. STANDARD REFERENCE FLOOR (heavyweight reference floor in accordance with UNE-EN ISO 10140-5:2011 Annexes B and C)

| | Source Room | Receiving Room |
|---|---|---|
| **Room volumes** | 52,9 $m^3$ | 62,9 $m^3$ |
| **Climatic conditions** | Temperature: 20,5 ±0,6 ºC | Temperature: 20,8 ±0,6 ºC |
| | Humidity: 56,3 ±4,7 % | Humidity: 58,4 ±4,7 % |
| | Static pressure: 1012,6 ±1,3 hPa | |

5.2. STANDARD REFERENCE FLOOR + FLOOR COVERING

| | Source Room (Note 1) | Receiving Room |
|---|---|---|
| **Room volumes** | 52,6 $m^3$ | 62,9 $m^3$ |
| **Climatic conditions** | Temperature: 20,4 ±0,6 ºC | Temperature: 19,9 ±0,6 ºC |
| | Humidity: 60,8 ±4,7 % | Humidity: 60,2 ±4,7 % |
| | Static pressure: 1006,8 ±1,3 hPa | |

Note 1: The floor covering (test element) is located into the source room.

## 6.- RESULTS

The obtained results for the basic floor (reference floor) test (section 6.1), the basic floor with the floor covering (section 6.2), and the improvement of airborne sound insulation due to the application of the floor covering on the basic floor (section 6.3) are showed below.

**NOTE:**

At the frequency bands indicated with the '≥' symbol the value of sound reduction index, R, shall be understood as a minimum value (it may be slightly higher) due to the flanking transmission. In these frequency bands the R' value is bigger than $R'_{max}$ - 15 dB (where $R'_{max}$ is the maximum measurable R in the test facility). It has been verified that a slight increase in the values of R in these frequency bands might not suppose any change in the weighted sound reduction indexes $R_w$ and $R_A$.

At the frequency bands indicated with '*', the difference between the background noise level and the level of signal and background noise combined is less than 6 dB, so that the correction of 1,3 dB is applied.

## 6.1. STANDARD REFERENCE FLOOR

### Sound reduction index, *R*, in accordance with ISO 10140-2

**Client: BEKA SPORT Zeminleri Ins. Mad. Koz. San. ve Dis Tic. LTD. STI.**

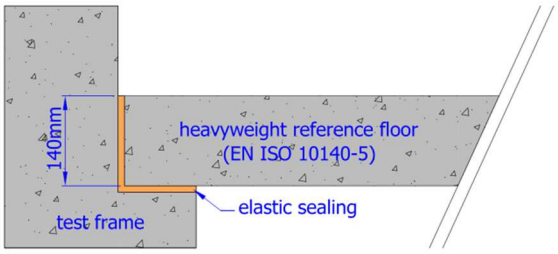
**Test element :**

Standard reference floor with low critical frequency ("heavy floor") in accordance with UNE-EN ISO 10140-5:2011 Annexes B and C: reinforced concrete slab of 140 mm thickness.

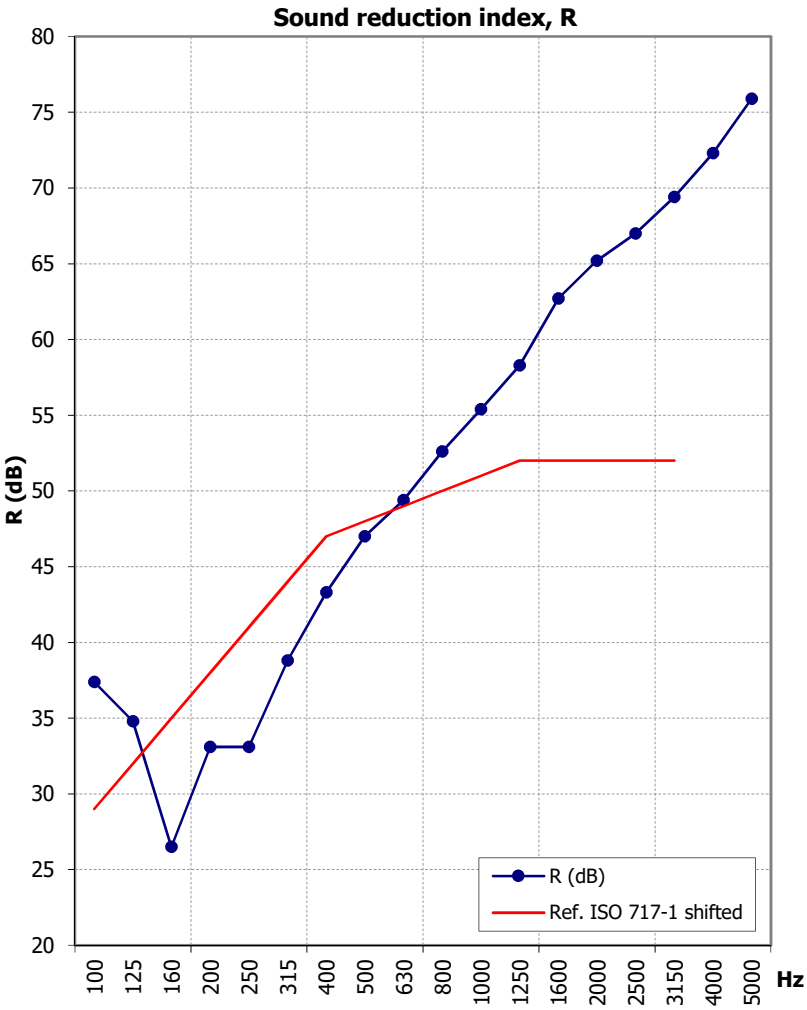
**Mass per unit area, *m*** (estimated ): 350 kg/m$^2$

**Area, *S*, of test element :** 12,71 m$^2$ (4,10 x 3,10 m)

**Date of test:** 22nd of March, 2019




| Frequency (Hz) | R (dB) |
|---|---|
| 100 | 37,4 |
| 125 | 34,8 |
| 160 | 26,5 |
| 200 | 33,1 |
| 250 | 33,1 |
| 315 | 38,8 |
| 400 | 43,3 |
| 500 | 47,0 |
| 630 | 49,4 |
| 800 | 52,6 |
| 1000 | 55,4 |
| 1250 | 58,3 |
| 1600 | 62,7 |
| 2000 | 65,2 |
| 2500 | 67,0 |
| 3150 | 69,4 |
| 4000 | 72,3 |
| 5000 | 75,9 |




| | | |
|---|---|---|
| *ISO 717-1* | Weighted sound reduction index, **$R_w$** ($C$; $C_{tr}$): | **48 (-3; -7) dB** |
| *CTE DB-HR* | A-weighted sound reduction index, **$R_A$**: | **46,3 dBA** |

## 6.2. STANDARD REFERENCE FLOOR + FLOOR COVERING

### Sound reduction index, *R*, in accordance with ISO 10140-2

**Client: BEKA SPORT Zeminleri Ins. Mad. Koz. San. ve Dis Tic. LTD. STI.**

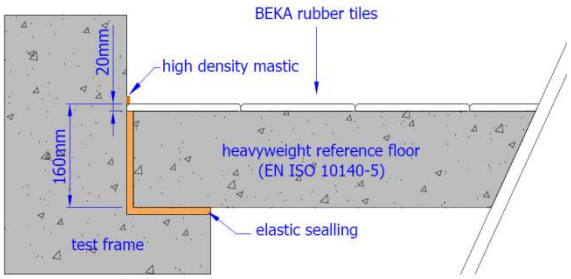
**Test element :**

Floor covering composed of rubber tiles referenced ***BEKA rubber tiles*** installed on a heavyweight reference floor (in accordance with UNE-EN ISO 10140-5:2011 Annexes B and C)

**Mass per unit area, *m*** (estimated ): 368 kg/m$^2$
(18 kg/m$^2$ of the floor covering)

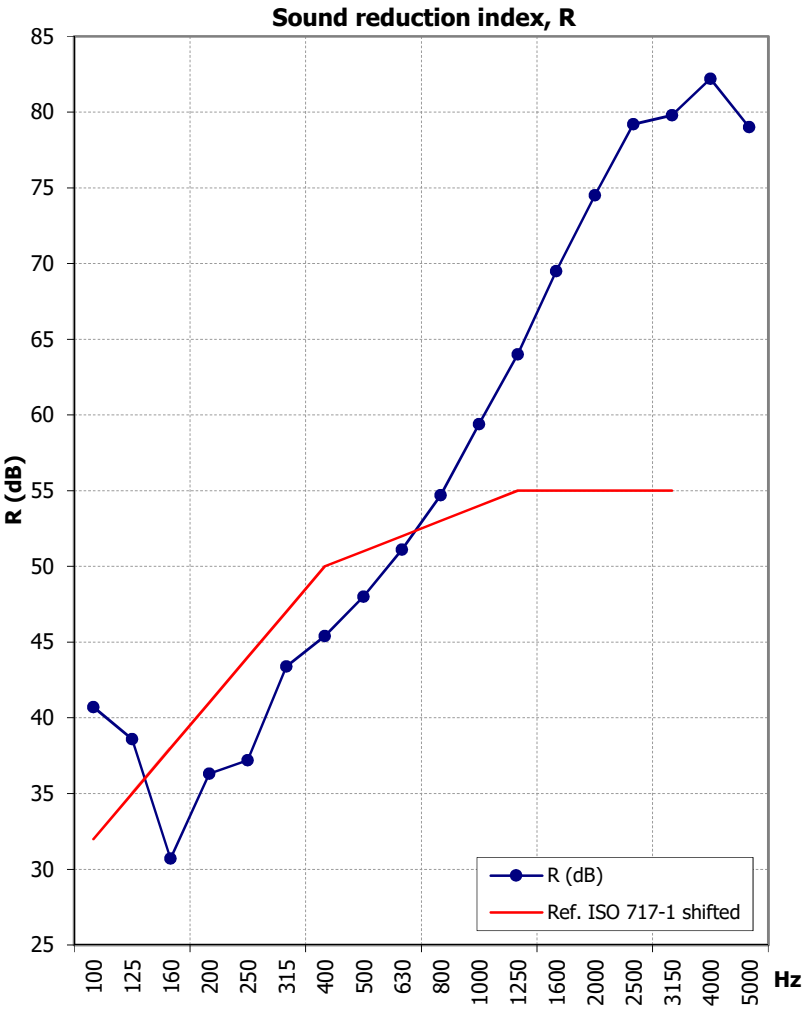
**Area, *S*, of test element :** 12,71 m$^2$ (4,10 x 3,10 m)

**Date of test:** 19th of March, 2019




| Frequency (Hz) | R (dB) |
|---|---|
| 100 | 40,7 |
| 125 | 38,6 |
| 160 | 30,7 |
| 200 | 36,3 |
| 250 | 37,2 |
| 315 | 43,4 |
| 400 | 45,4 |
| 500 | 48,0 |
| 630 | 51,1 |
| 800 | 54,7 |
| 1000 | 59,4 |
| 1250 | 64,0 |
| 1600 | 69,5 |
| 2000 | 74,5 |
| 2500 | ≥ 79,2 |
| 3150 | ≥ 79,8 |
| 4000 | ≥ 82,2 * |
| 5000 | ≥ 79,0 * |

*Frequency bands with '≥' and '*' symbols see **NOTE** in Page 15.*




| | | |
|---|---|---|
| *ISO 717-1* | Weighted sound reduction index , $R_w$ ($C$; $C_{tr}$): | **51 (-2; -6) dB** |
| *CTE DB-HR* | A-weighted sound reduction index , $R_A$: | **50,0 dBA** |

## 6.3. IMPROVEMENT OF AIRBORNE SOUND INSULATION

**Improvement of airborne sound insulation in accordance with Standard ISO 10140 (all parts)**

**Client: BEKA SPORT Zeminleri Ins. Mad. Koz. San. ve Dis Tic. LTD. STI.**

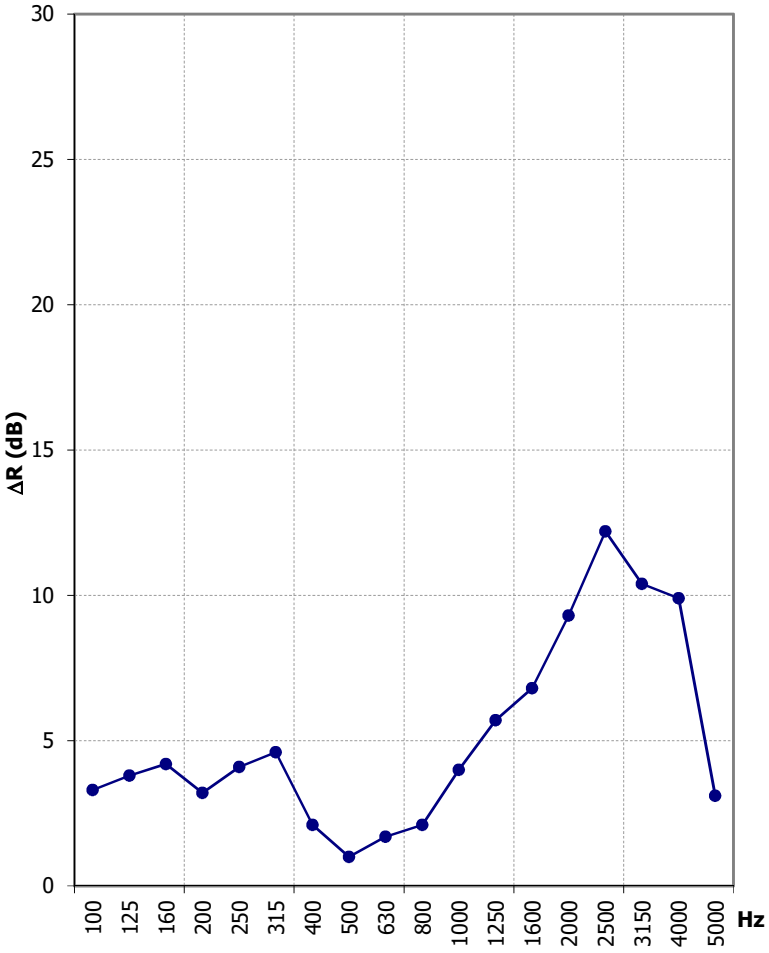
**Date of test:** 19th and 20th of March, 2019

**Test element**: Floor covering composed of rubber tiles referenced ***BEKA rubber tiles*** installed on a heavyweight reference floor (standard reference floor in accordance with EN ISO 10140-5 Annexes B and C)

| Reference floor | Reference floor + floor covering |
|---|---|
| $R_w$ (C; $C_{tr}$)= 48 (-3; -7) dB | $R_w$ (C; $C_{tr}$)= 51 (-2; -6) dB |
| $R_A$ = 46,3 dBA | $R_A$ = 50,0 dBA |

| Frequency (Hz) | ΔR (dB) |
|---|---|
| 100 | 3,3 |
| 125 | 3,8 |
| 160 | 4,2 |
| 200 | 3,2 |
| 250 | 4,1 |
| 315 | 4,6 |
| 400 | 2,1 |
| 500 | 1,0 |
| 630 | 1,7 |
| 800 | 2,1 |
| 1000 | 4,0 |
| 1250 | 5,7 |
| 1600 | 6,8 |
| 2000 | 9,3 |
| 2500 | 12,2 |
| 3150 | 10,4 |
| 4000 | 9,9 |
| 5000 | 3,1 |

**Sound reduction improvement index, ΔR**




| | | |
|---|---|---|
| *ISO 10140-1* | Weighted sound reduction improvement index, $\Delta R_{w,heavy}$: | **2 dB** |
| | $\Delta(R_w+C)_{heavy}$; $\Delta(R_w+C_{tr})_{heavy}$: | **3; 4 dB** |
| *CTE DB-HR* | A-weighted sound reduction improvement index, $\Delta R_{A,I}$ : | **3,0 dBA** |

## ANNEX. TECHNICAL INFORMATION PROVIDED BY THE TEST PETIOTIONER

BEKA RUBBER

Technical Specifications | **Rubber Tile**

**EXPLANATIONS**

**MATERIALS:**
Original EPDM and recycled SBR Rubber. Color pigments. MDI poliurethan adhesive.

**SPECIFICATIONS:**
2 or 3 layer according to demanded Sbr Rubber Tile. On top base EPDM rubber wear layer, SBR shock absorption layer and SBR rubber base layer. The wear layer provides maximum safety and slip resistance along with an aesthetic surface. This layer would be produced only by Sbr if it is requested. SBR layers give you a comfortable feeling of pushing and walking / jogging and provides shock absorption and cushioning.

**APPLICATION AREAS**

Indoor and outdoor climbing wall areas, indoor and outdoor playgrounds, recreation areas, playing rooms, child care centers and fitness facilities.

**WARRANTY**

Beka Rubber guarantees that there will not be a problem due to production defects under standart use conditions for a period of 2 years from the original installation date, when the product installed using the recommended procedures and adhesives of Beka Rubber.

**TECHNICAL SPECIFICATIONS**

**COLORS:** Red (terra cota), Green, Black (sligth color differents or fades are possible).

**TOP SURFACE:** Open-pored, smooth.

**BOTTOM SURFACE:** Dimpled pattern, flat, grooved and / or different type (for drainage).

**DIMENSIONS:**

| Thikcness [mm] | Fall Height [m] | Weight [kg]/max. |
|---|---|---|
| 20 mm | 0.70 m | 4,5 kg |
| 25 mm | 0.89 m | 5,75 kg |
| 30 mm | 1.00 m | 6,75 kg |
| 35 mm | 1.10 m | 7,5 kg |
| 40 mm | 1.20 m | 8,25 kg |
| | | |

**SIZES:**
40x40 cm - 50x50 cm - 100x100 cm

**TEST RESULTS**

**Permitted Fall Heigth:**
DIN EN 1177: 2018, EN 1177: 2018 according

**HIC 1000:**
DIN EN 1176-1: 2017, EN 1176-1: 2017

**Fire Resistance:**
Class E (DIN EN 13501-1, 2010)

**Chemical Resistance:**
Conditionally resistant to acids and bases

**UV Resistance:**
According DIN EN 1297, DIN EN, ISO 3386-2

**Chlorine Resistance:**
According DIN EN ISO 175, DIN EN, ISO 3386-2

**Cold Fracture Resistance:**
24 hours / -20 ° C, no fracture

**Cold Cracking Resistance:**
5 hours / -15 ° C, no crack

**Slip Resistance:**
Wet: 50,75,
Dry: 50 ASTM E 303 according

**Water Resistance:**
40 mm panel: 0,011 gpm / $in^3$
70 mm panel: 0,015 gpm / $in^3$