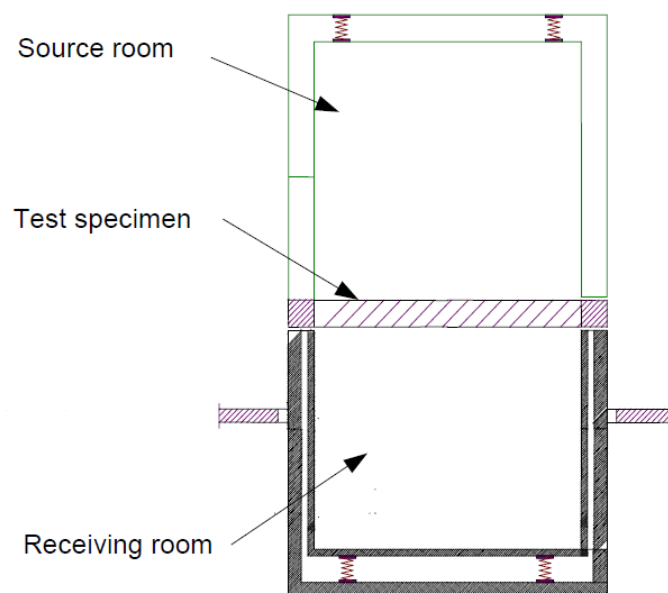


RECENT TESTS CARRIED OUT IN AUDIOTEC PROVE THE SUPERIOR IMPACT NOISE ISOLATION OF SYLOMER® UNDER THE IMPACT OF A DUMBBELL THROWN FROM A CONSIDERABLE HEIGHT.

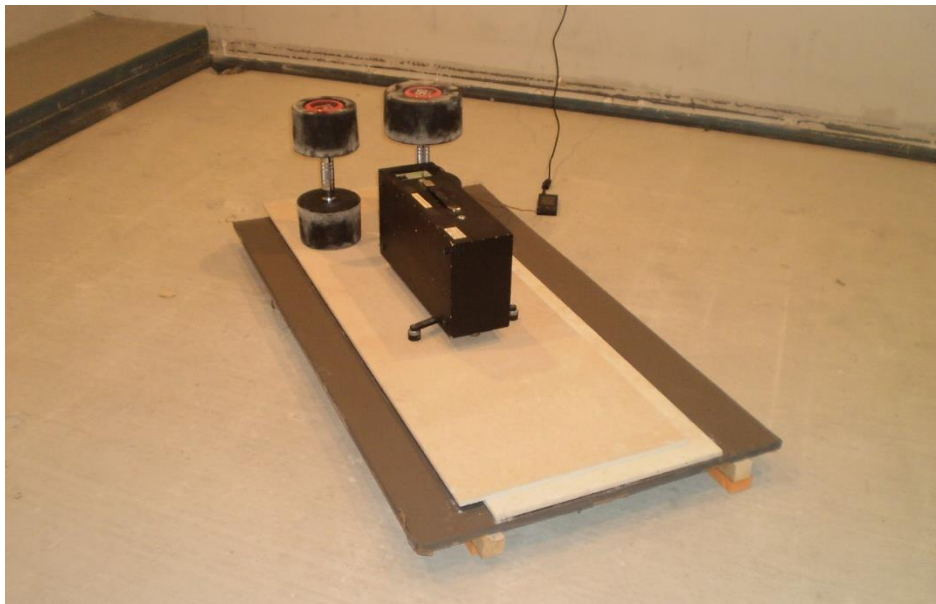
The investigation project is carried out to compare different floor systems regarding the noise insulation due to the impact of a 50kg dumbbell thrown from 0,5m height.

Since there is not a standard procedure to carry out this type of test, the next methodology was followed:

- In standardized chambers, a dumbbell fall support system was installed at a height of about 50 cm.
- The source room and the receiving room were adjacent to each other and there were completely decoupled. The transmission was only through the floor, with no indirect transmission via wall or ceiling flanks. The system between the two chambers was a standardized reinforced concrete floor slab 14 cm thick.

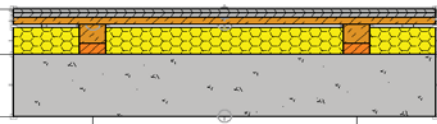
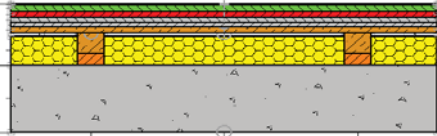
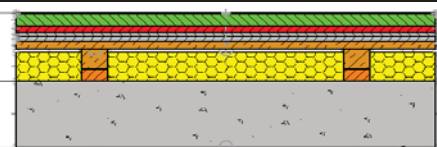
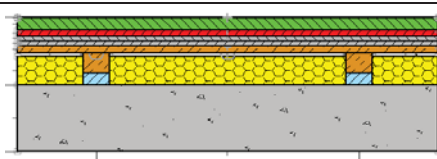
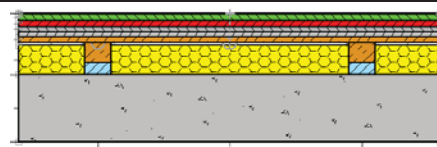
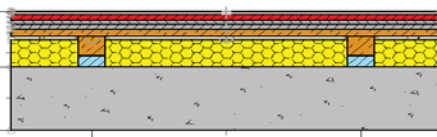
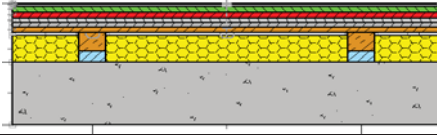
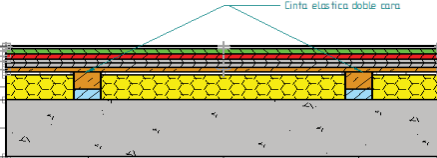
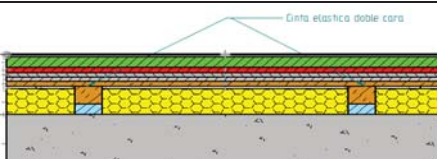
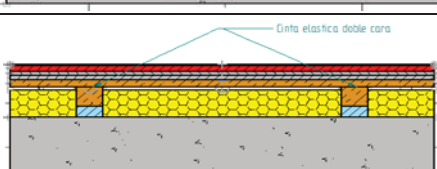


- The acoustic system or sample was placed in an upper chamber, directly on the floor (on the 14 cm thick concrete slab) and the measurements were made in the lower chamber.
- For the test, a 50 kg dumbbell was dropped on the sample from a height of 50 cm
- The system was large enough to receive the full impact of the dumbbell in each case (between 1 and 2 m²).
- The equivalent sound level was measured for 5 seconds in the lower chamber, collecting during this period the moment of impact of the dumbbell on the sample in the upper chamber.
- Three measurements were made for each sample, averaging the results to obtain a value for each sample.
- Each measurement was made in frequency bands between 16 and 12,500 Hz, thus gathering a very wide spectrum of frequencies (the whole audible range).
- It was also obtained a global value of impact noise level generated with frequency weighting A, LAeq (which is the most common value taken as a reference in noise immission regulations and associates the level with the perception of the human ear), and C, LCEq (which barely attenuates the low frequency).



Below it is presented a summary of the different floor systems tested and the results obtained.

Comparison between different floor systems regarding the noise insulation due to the impact of a 50 Kg. dumbbell thrown from 0,5 m height.

Floor system	Description	Drawing	Measurement Leq(A) [dB]	Improvement ΔLeq(A) [dB]
Floor System 1	<ol style="list-style-type: none"> Reference 140 mm thickness concrete slab. SYLOMER SR18, 25 mm thickness bearing. Wooden strip, 42 mm thickness. (gap between wooden strip 50 cm) Rock wool, thickness 60 mm. wooden board, thickness 16 mm with sonex coating of 3 Kg/m². Two RIGIDUR plates, thickness 10 mm each plate. 		53,8 dB	43,4 dB
Floor System 2	<ol style="list-style-type: none"> Reference 140 mm thickness concrete slab. SYLOMER SR18, 25 mm thickness bearing. Wooden strip, 42 mm thickness. (gap between wooden strip 50 cm) Rock wool, thickness 60 mm. wooden board, thickness 16 mm with sonex coating of 3 Kg/m². Two RIGIDUR plates, thickness 10 mm each plate. RIGIDUR plate, thickness 13 mm with sonex coating of 2 Kg/m². SYLOMER HD 30, thickness 13 mm. Synthetic blanket, thickness 2 mm (top coat). 		50,2 dB	47 dB
Floor System 3	<ol style="list-style-type: none"> Reference 140 mm thickness concrete slab. SYLOMER SR18, 25 mm thickness bearing. Wooden strip, 42 mm thickness. (gap between wooden strip 50 cm) Rock wool, thickness 60 mm. wooden board, thickness 16 mm with sonex coating of 3 Kg/m². Two RIGIDUR plates, thickness 10 mm each plate. RIGIDUR plate, thickness 13 mm with sonex coating of 2 Kg/m². SYLOMER HD 30, thickness 25 mm. Synthetic blanket, thickness 2 mm (top coat). 		47,8 dB	49,4 dB
Floor System 4	<ol style="list-style-type: none"> Reference 140 mm thickness concrete slab. SYLOMER SR28, 25 mm thickness bearing. Wooden strip, 42 mm thickness. (gap between wooden strip 50 cm) Rock wool, thickness 60 mm. wooden board, thickness 16 mm with sonex coating of 3 Kg/m². Two RIGIDUR plates, thickness 10 mm each plate. RIGIDUR plate, thickness 13 mm with sonex coating of 2 Kg/m². SYLOMER HD 30, thickness 25 mm. Synthetic blanket, thickness 2 mm (top coat). 		47,8 dB	49,4 dB
Floor System 5	<ol style="list-style-type: none"> Reference 140 mm thickness concrete slab. SYLOMER SR28, 25 mm thickness bearing. Wooden strip, 42 mm thickness. (gap between wooden strip 50 cm) Rock wool, thickness 60 mm. wooden board, thickness 16 mm with sonex coating of 3 Kg/m². Two RIGIDUR plates, thickness 10 mm each plate. RIGIDUR plate, thickness 13 mm with sonex coating of 2 Kg/m². SYLOMER HD 30, thickness 13 mm. Synthetic blanket, thickness 2 mm (top coat). 		49,6 dB	47,6 dB
Floor System 6	<ol style="list-style-type: none"> Reference 140 mm thickness concrete slab. SYLOMER SR28, 25 mm thickness bearing. Wooden strip, 42 mm thickness. (gap between wooden strip 50 cm) Rock wool, thickness 60 mm. wooden board, thickness 16 mm with sonex coating of 3 Kg/m². Two RIGIDUR plates, thickness 10 mm each plate. RIGIDUR plate, thickness 13 mm with sonex coating of 2 Kg/m². Rubber pad, thickness 5 mm. Synthetic blanket, thickness 2 mm (top coat). 		55,5 dB	41,7 dB
Floor System 7	<ol style="list-style-type: none"> Reference 140 mm thickness concrete slab. SYLOMER SR28, 25 mm thickness bearing. Wooden strip, 42 mm thickness. (gap between wooden strip 50 cm) Rock wool, thickness 60 mm. wooden board, thickness 16 mm with sonex coating of 3 Kg/m². Two RIGIDUR plates, thickness 10 mm each plate. RIGIDUR plate, thickness 13 mm with sonex coating of 2 Kg/m². Rubber pad, thickness 5 mm + Sylomer HD 30, thickness 13 mm. Synthetic blanket, thickness 2 mm (top coat). 		50,3 dB	46,9 dB
Floor System 8	<ol style="list-style-type: none"> Reference 140 mm thickness concrete slab. SYLOMER SR28, 25 mm thickness bearing. Wooden strip, 42 mm thickness. (gap between wooden strip 50 cm) Rock wool, thickness 60 mm. wooden board, thickness 16 mm with sonex coating of 3 Kg/m². Two RIGIDUR plates, thickness 10 mm each plate. RIGIDUR plate, thickness 13 mm with sonex coating of 2 Kg/m². Rubber pad, thickness 5 mm + Sylomer HD 30, thickness 13 mm. Synthetic blanket, thickness 2 mm (top coat). <p>Note: Elastic double-face adhesive tape between wooden strip and board.</p>		48,5 dB	48,7 dB
Floor System 9	<ol style="list-style-type: none"> Reference 140 mm thickness concrete slab. SYLOMER SR28, 25 mm thickness bearing. Wooden strip, 42 mm thickness. (gap between wooden strip 50 cm) Rock wool, thickness 60 mm. wooden board, thickness 16 mm with sonex coating of 3 Kg/m². Two RIGIDUR plates, thickness 10 mm each plate. RIGIDUR plate, thickness 13 mm with sonex coating of 2 Kg/m². Rubber pad, thickness 5 mm + Sylomer HD 30, thickness 25 mm. Synthetic blanket, thickness 2 mm (top coat). <p>Note: Elastic double-face adhesive tape between wooden strip and board.</p>		47,1 dB	50,1 dB
Floor System 10	<ol style="list-style-type: none"> Reference 140 mm thickness concrete slab. SYLOMER SR28, 25 mm thickness bearing. Wooden strip, 42 mm thickness. (gap between wooden strip 50 cm) Rock wool, thickness 60 mm. wooden board, thickness 16 mm with sonex coating of 3 Kg/m². Two RIGIDUR plates, thickness 10 mm each plate. RIGIDUR plate, thickness 13 mm with sonex coating of 2 Kg/m². Synthetic blanket, thickness 2 mm (top coat). <p>Note: Elastic double-face adhesive tape between wooden strip and board.</p>		52,9 dB	44,3 dB

Results comparison to the thrown of the dumbbell

Frecuencia	System 1	System 2	System 3	System 4	System 5	System 6	System 7	System 8	System 9	System 10	System 11
	Leq (dB)	Leq (dB)	Leq (dB)	Leq (dB)	Leq (dB)	Leq (dB)	Leq (dB)	Leq (dB)	Leq (dB)	Leq (dB)	Leq (dB)
16 Hz	76,3	79,3	78,6	78,6	78,0	79,7	74,6	79,0	75,5	76,1	97,9
20 Hz	73,9	71,8	75,4	75,4	73,9	71,5	77,7	73,5	77,4	76,1	95,1
25 Hz	61,1	59,2	58,2	58,2	58,2	59,3	58,7	58,3	58,7	58,3	85,0
31,5 Hz	61,2	62,4	60,4	60,4	62,1	61,9	60,6	61,3	59,4	60,9	80,2
40 Hz	57,5	53,4	53,1	53,1	55,2	54,4	59,1	52,6	56,3	58,5	82,9
50 Hz	59,0	59,7	61,6	61,6	59,4	60,8	57,9	61,0	59,7	59,8	91,2
63 Hz	55,8	57,1	56,7	56,7	57,5	56,7	56,9	56,9	56,1	56,1	73,8
80 Hz	54,7	53,8	54,7	54,7	53,5	54,9	54,1	53,9	54,2	55,6	82,9
100 Hz	52,6	52,9	54,3	54,3	54,4	53,3	52,3	54,2	53,6	54,1	92,3
125 Hz	52,0	51,6	52,4	52,4	51,6	52,4	51,2	51,8	50,8	52,0	92,9
160 Hz	50,4	49,9	50,8	50,8	50,5	49,9	49,2	50,0	49,5	51,2	93,4
200 Hz	48,6	47,9	48,9	48,9	48,8	48,1	47,3	48,2	47,1	49,1	92,9
250 Hz	47,4	46,3	46,8	46,8	46,8	46,5	45,2	45,6	45,1	47,7	94,1
315 Hz	45,2	44,5	44,0	44,0	44,9	45,1	43,7	43,5	42,4	45,8	95,2
400 Hz	43,8	42,1	41,0	41,0	42,0	43,7	41,4	40,4	39,6	43,1	92,4
500 Hz	41,1	39,6	37,6	37,6	39,1	41,7	38,6	37,0	36,4	40,2	93,7
630 Hz	38,6	36,5	34,5	34,5	36,2	39,6	35,1	33,2	32,2	36,6	90,4
800 Hz	35,9	33,1	30,2	30,2	33,0	36,9	30,6	29,0	27,4	31,9	89,2
1000 Hz	32,3	28,9	26,2	26,2	29,3	33,4	25,2	25,7	25,6	28,8	85,3
1250 Hz	27,0	25,5	24,2	24,2	25,1	28,6	23,1	24,0	22,7	27,0	80,0
1600 Hz	22,4	22,4	22,6	22,6	22,1	22,8	22,0	20,8	20,5	24,3	72,4
2000 Hz	22,3	22,2	18,2	18,2	20,6	22,5	19,4	17,7	17,1	21,7	67,9
2500 Hz	20,3	21,2	16,9	16,9	17,6	21,2	15,3	15,2	14,9	19,0	63,8
3150 Hz	16,9	19,1	14,1	14,1	14,2	18,7	13,9	12,9	12,1	17,4	60,0
4000 Hz	15,8	17,5	12,8	12,8	12,7	16,8	12,1	10,9	10,6	15,6	55,6
5000 Hz	12,9	13,8	11,8	11,8	10,7	15,2	10,2	9,8	9,4	12,9	53,2
6300 Hz	11,8	12,3	10,8	10,8	10,4	13,1	10,1	9,6	9,5	11,9	50,7
8000 Hz	11,6	13,0	11,3	11,3	10,6	13,0	10,3	10,1	10,1	11,9	48,2
10000 Hz	11,5	12,4	11,3	11,3	10,9	12,7	10,7	10,6	10,6	11,3	46,7
12500 Hz	11,7	12,2	11,4	11,4	11,3	12,0	11,2	11,1	11,1	11,4	45,9
Leq (A)	53,8	50,2	47,8	47,8	49,6	55,5	50,3	48,5	47,1	52,9	97,2
Leq (C)	71,7	72,7	73,3	73,3	72,5	73,0	72,8	72,9	72,8	72,5	103,6
	System 1	System 2	System 3	System 4	System 5	System 6	System 7	System 8	System 9	System 10	System 11

RESULTS

Systems description:

- System 1 (dumbbell of 50 Kg):

1. Reference 140 mm thickness concrete slab.
2. SYLOMER SR18, 25 mm thickness bearing.
3. Wooden strip, 42 mm thickness.
4. Rock wool, thickness 60 mm.
5. wooden board, thickness 16 mm with sonec coating of 3 Kg/m².
6. Two RIGIDUR plates, thickness 10 mm each plate.

- System 2 (dumbbell of 50 Kg):

1. Reference 140 mm thickness concrete slab.
2. SYLOMER SR18, 25 mm thickness bearing.
3. Wooden strip, 42 mm thickness.
4. Rock wool, thickness 60 mm.
5. wooden board, thickness 16 mm with sonec coating of 3 Kg/m².
6. Two RIGIDUR plates, thickness 10 mm each plate.
7. RIGIDUR plate, thickness 13 mm with sonec coating of 2 Kg/m².
8. SYLOMER HD 30, thickness 13 mm.
9. Synthetic blanket, thickness 2 mm (top coat).

- System 3 (dumbbell of 50 Kg):

1. Reference 140 mm thickness concrete slab.
2. SYLOMER SR18, 25 mm thickness bearing.
3. Wooden strip, 42 mm thickness.
4. Rock wool, thickness 60 mm.
5. wooden board, thickness 16 mm with sonec coating of 3 Kg/m².
6. Two RIGIDUR plates, thickness 10 mm each plate.
7. RIGIDUR plate, thickness 13 mm with sonec coating of 2 Kg/m².
8. SYLOMER HD 30, thickness 25 mm.
9. Synthetic blanket, thickness 2 mm (top coat).

- System 4 (dumbbell of 50 Kg):

1. Reference 140 mm thickness concrete slab.
2. SYLOMER SR28, 25 mm thickness bearing.
3. Wooden strip, 42 mm thickness.
4. Rock wool, thickness 60 mm.
5. wooden board, thickness 16 mm with sonec coating of 3 Kg/m².
6. Two RIGIDUR plates, thickness 10 mm each plate.
7. RIGIDUR plate, thickness 13 mm with sonec coating of 2 Kg/m².
8. SYLOMER HD 30, thickness 25 mm.
9. Synthetic blanket, thickness 2 mm (top coat).

- System 5 (dumbbell of 50 Kg):

1. Reference 140 mm thickness concrete slab.
2. SYLOMER SR28, 25 mm thickness bearing.
3. Wooden strip, 42 mm thickness.
4. Rock wool, thickness 60 mm.
5. wooden board, thickness 16 mm with sonec coating of 3 Kg/m².
6. Two RIGIDUR plates, thickness 10 mm each plate.
7. RIGIDUR plate, thickness 13 mm with sonec coating of 2 Kg/m².
8. SYLOMER HD 30, thickness 13 mm.

- System 9 (dumbbell of 50 Kg):

1. Reference 140 mm thickness concrete slab.
2. SYLOMER SR28, 25 mm thickness bearing.
3. Wooden strip, 42 mm thickness.
4. Rock wool, thickness 60 mm.
5. wooden board, thickness 16 mm with sonec coating of 3 Kg/m².
6. Two RIGIDUR plates, thickness 10 mm each plate.
7. RIGIDUR plate, thickness 13 mm with sonec coating of 2 Kg/m².
8. Rubber pad, thickness 5 mm + Sylomer HD 30, thickness 25 mm.
9. Synthetic blanket, thickness 2 mm (top coat).

Note: Elastic double-face adhesive tape between wooden strip and board.

- System 10 (dumbbell of 50 Kg):

1. Reference 140 mm thickness concrete slab.
2. SYLOMER SR28, 25 mm thickness bearing.
3. Wooden strip, 42 mm thickness.
4. Rock wool, thickness 60 mm.
5. wooden board, thickness 16 mm with sonec coating of 3 Kg/m².
6. Two RIGIDUR plates, thickness 10 mm each plate.
7. RIGIDUR plate, thickness 13 mm with sonec coating of 2 Kg/m².
8. Synthetic blanket, thickness 2 mm (top coat).

Note: Elastic double-face adhesive tape between wooden strip and board.

- System 11 (dumbbell of 50 Kg):

1. Reference 140 mm thickness concrete slab.

- System 6 (dumbbell of 50 Kg):

1. Reference 140 mm thickness concrete slab.
2. SYLOMER SR28, 25 mm thickness bearing.
3. Wooden strip, 42 mm thickness.
4. Rock wool, thickness 60 mm.
5. wooden board, thickness 16 mm with sonec coating of 3 Kg/m².
6. Two RIGIDUR plates, thickness 10 mm each plate.
7. RIGIDUR plate, thickness 13 mm with sonec coating of 2 Kg/m².
8. Rubber pad, thickness 5 mm.
9. Synthetic blanket, thickness 2 mm (top coat).

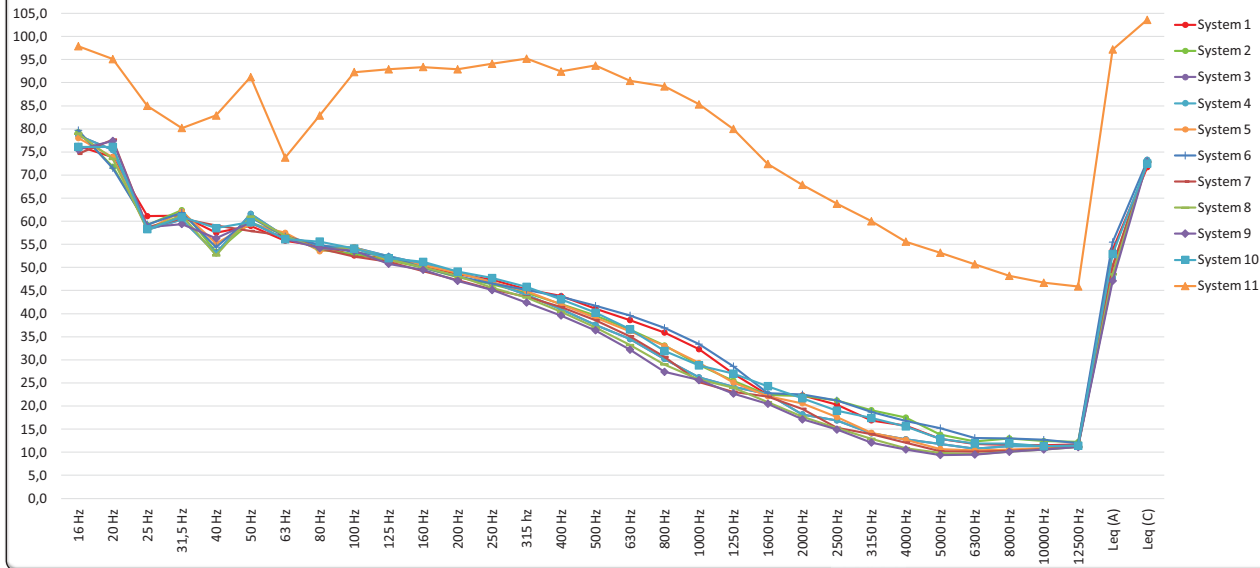
- System 7 (dumbbell of 50 Kg):

1. Reference 140 mm thickness concrete slab.
2. SYLOMER SR28, 25 mm thickness bearing.
3. Wooden strip, 42 mm thickness.
4. Rock wool, thickness 60 mm.
5. wooden board, thickness 16 mm with sonec coating of 3 Kg/m².
6. Two RIGIDUR plates, thickness 10 mm each plate.
7. RIGIDUR plate, thickness 13 mm with sonec coating of 2 Kg/m².
8. Rubber pad, thickness 5 mm + Sylomer HD 30, thickness 13 mm.
9. Synthetic blanket, thickness 2 mm (top coat).

- System 8 (dumbbell of 50 Kg):

1. Reference 140 mm thickness concrete slab.
2. SYLOMER SR28, 25 mm thickness bearing.
3. Wooden strip, 42 mm thickness.
4. Rock wool, thickness 60 mm.
5. wooden board, thickness 16 mm with sonec coating of 3 Kg/m².
6. Two RIGIDUR plates, thickness 10 mm each plate.
7. RIGIDUR plate, thickness 13 mm with sonec coating of 2 Kg/m².
8. Rubber pad, thickness 5 mm + Sylomer HD 30, thickness 13 mm.
9. Synthetic blanket, thickness 2 mm (top coat).

Niveles de inmisión sonora en bandas y globales, Leq (dB)



These results should not be interpreted as results of real situations considering the values obtained as attributable to a real situation, but should be considered as a comparison between them, taking into account the improvement or attenuation of the sound level collected with respect to the bare floor slab (without interposing any system or sample). In other words, they give us an idea of the improvement they can bring to a system without any acoustic or impact treatment and also serve to compare the different variants of systems or samples.

After testing the different floor systems, the main conclusions are the next ones:

- The main conclusion is that the elastic bearing Sylomer® in combination with other materials reduces the noise level around the 50% of the reference noise level, this means an improvement up to 40 dBs in every studied system.
- The element which provides the second better improvement in the noise insulation is the Sylomer® HD 30 coating, due to the high damping. Part of the impact energy is dissipated, and the transmitted noise is decreased. In the test carried out the Sylomer® HD 30 in 12,5 mm thickness provides around a 3 dBs improvement in the noise level and the 25 mm thickness provides around 6 dBs improvement.
- The rubber pad provides little improvement and it is almost invaluable in the global noise value.
- The elastic double-face adhesive tape between wooden strip and board provides an improvement of around 0,5 dBs.

Moreover, it is studied the theoretical natural frequency of each system. It is made an approximation considering the different properties of the materials which are presented. In the next table, it is summarized the results divided into two scenarios: the system without load and the system with a 100kg/m² weight.

	Floor System 1	Floor System 2	Floor System 3	Floor System 4	Floor System 5	Floor System 6	Floor System 7	Floor System 8	Floor System 9	Floor System 10
Natural Frequency (Hz) - 0kg	38,9	24,4	20,3	27,4	32,6	39,8	31,3	31,3	26,3	41,6
Natural Frequency (Hz) - 100kg	17,3	10,8	8,8	16	18,9	23,4	18,6	18,6	15,8	23,8

