Acoustic performance Bell

Axolight

From noise to acoustic comfort, how to do it?

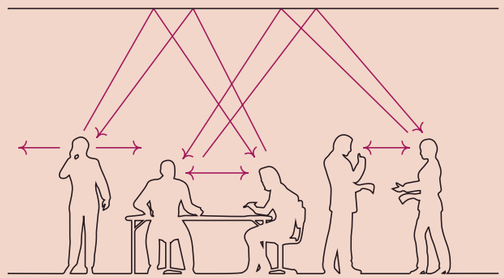
Noise is commonly identified as an unwanted and disturbing sound, for example buzzing (an incomprehensible and continuous hum) from a moving car, a drill, etc.

Acoustic comfort is the psychophysical condition of wellbeing a person finds themselves in when they are in an environment where noise is limited.

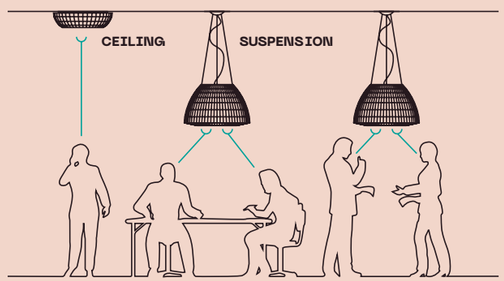
The measurement of **Reverberation Time (RT60)**, or the time required for sound to become imperceptible, allows the acoustic comfort to be measured in any given environment: the higher the reverberation time, the greater the perception of sound.

A setting with reflective materials (such as marble, cement, glass etc) and/or irregular geometric shapes will have high Reverberation Time and therefore tend to be noisy.

Noise



Acoustic comfort



Introducing sound-absorbing objects into an environment (objects which can reduce the Reverberation Time), is the way in which acoustic comfort can be reached without making any structural changes to the space itself.

How can the efficiency of an object's sound absorbency be measured?

By measuring the Reverberation Time (RT60) of an enclosed environment both with and without sound-absorbing objects, then taking into account the difference, it is possible to calculate their efficiency.

In order to calculate the Reverberation Time (RT60), the Volume of the enclosed space (V) and the cumulative **Equivalent Sound Absorbing Area (A)** of all the surfaces and objects present in the environment must be known:

$$RT60 = 0{,}161 \times (V/A)$$

The Equivalent Sound Absorbing Area (A) of each single object (i.e. lamp) takes into account the overall sound-absorbing properties of the materials the object is made of, as well as its size and shape.


Lida Chaulet / Ronald Tilleman

To identify the sound-absorbing properties of a single material (not the object in its entirety) it is possible to use the **Sound Absorption Coefficient (α)** whose value can vary from 0, where all incident sound is reflected, to 1, where all incident sound is absorbed. Therefore, if the value of α equals 0,5, 50% of the incident sound on the material's surface is absorbed.

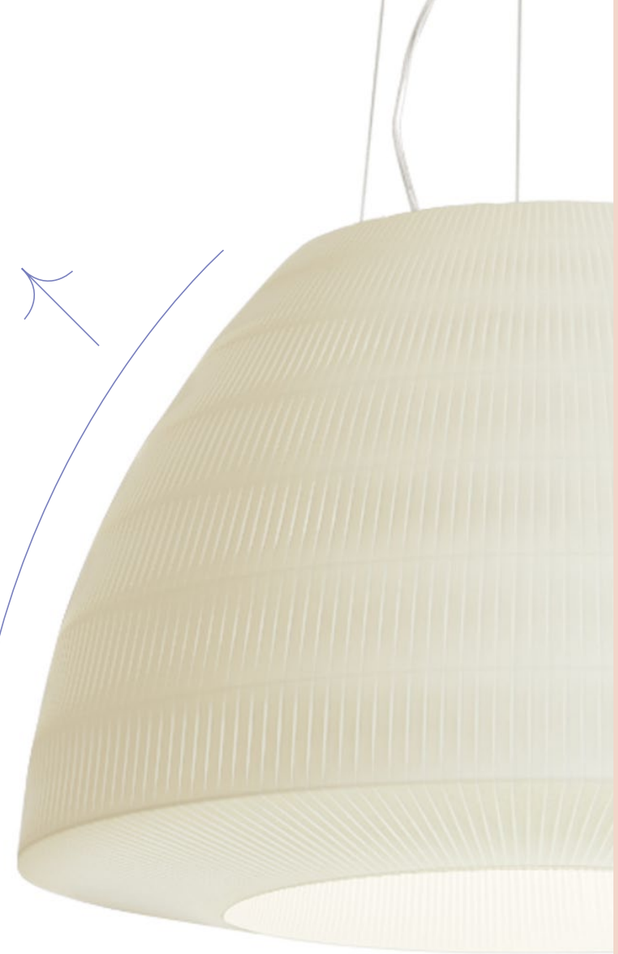
Bell

Manuel Vivian

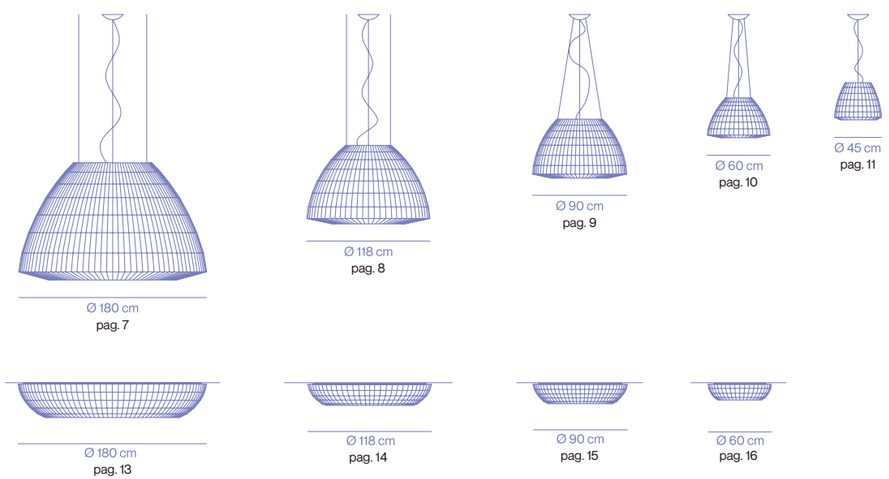
from 0,32
to 4,63
Equivalent Sound Absorbing Area (A)

from –3,3%
to –59,7%
Reduction of noise

Average 500÷2.000 Hz

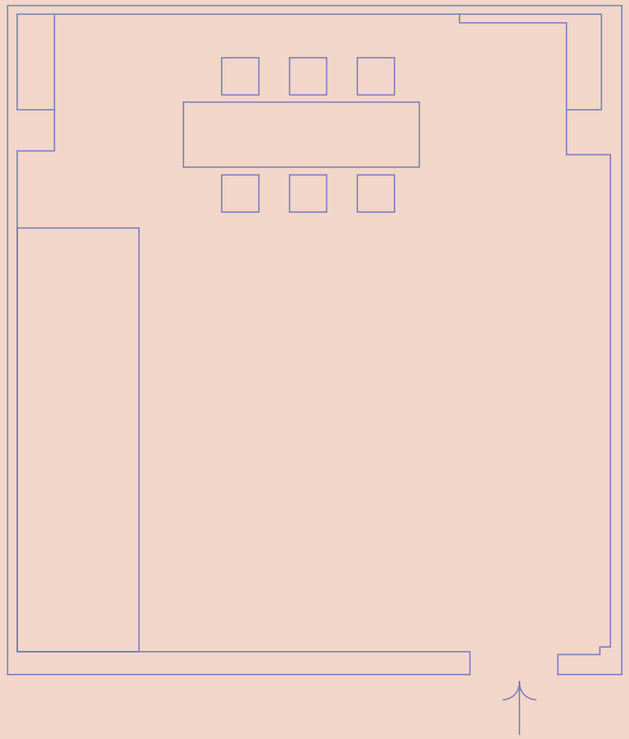


Index



Where we tested our products?

The environment used to measure the sound-absorbing properties the Axolight lamps is shown below:



Room data

L → 8 m
W → 6 m
H → 3,1 m

→ 150 m³

The Reverberation Times of the room, with sounds of varying frequencies emitted from an audio source, were measured, first without acoustic lamps, then with 1, 2 or 3 lamps added at a time.

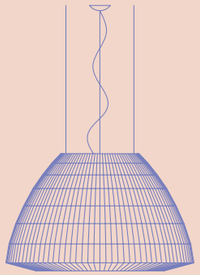
This is how the reduction of sound in the room was calculated.

Studio Polio

SPBEL180

Lighting performance per lamp

98 W / 10719 lm → per lamp



Ø 180 cm

Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

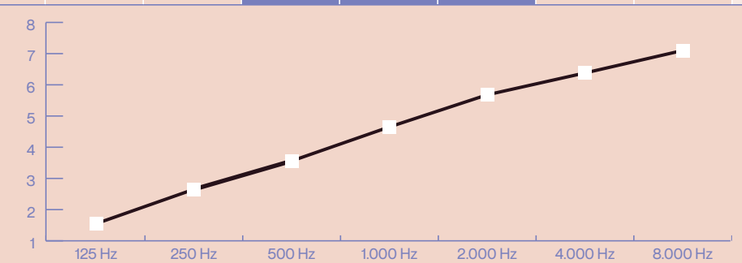
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–33,2%**									
	-9,8%	-18,4%	**-27,5%**	**-34,8%**	**-37,5%**	-37,7%	-32,8%	-28,3%	-33,2%
2 lamps **–49,7%**									
	-17,9%	-31,1%	**-43,1%**	**-51,6%**	**-54,5%**	-54,7%	-49,4%	-43,2%	-49,7%
3 lamps **–59,7%**									
	-24,7%	-40,4%	**-53,2%**	**-61,5%**	**-64,3%**	-64,4%	-59,4%	-52,6%	-59,7%

Equivalent Sound Absorption Area (A) in m² per lamp

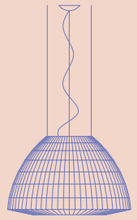
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	1,55	2,65	**3,56**	**4,65**	**5,68**	6,38	7,10	4,51	4,63



SPBEL118

Lighting performance per lamp

98 W / 10719 lm → per lamp



Ø 118 cm

Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

After

Reduction of Reverberation Time (RT60) in %

1 lamp **–16,7%**

	-4,0%	-8,1%	**-12,7%**	**-17,4%**	**-19,8%**	-20,2%	-18,5%	-14,4%	-16,7%

2 lamps **–28,4%**

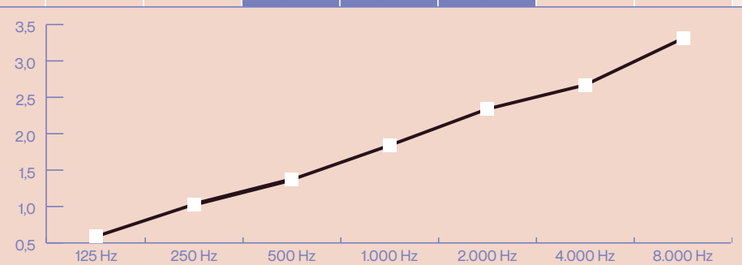
	-7,7%	-14,9%	**-22,6%**	**-29,7%**	**-33,1%**	-33,6%	-31,2%	-24,7%	-28,4%

3 lamps **–37,3%**

	-11,1%	-20,9%	**-30,4%**	**-38,8%**	**-42,6%**	-43,1%	-40,5%	-32,5%	-37,3%

Equivalent Sound Absorption Area (A) in m² per lamp

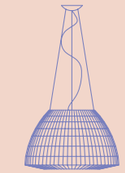
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,59	1,03	**1,37**	**1,84**	**2,34**	2,67	3,31	1,88	1,85



SPBEL090

Lighting performance per lamp

88 W / 9610 lm → per lamp



Ø 90 cm

Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

After

Reduction of Reverberation Time (RT60) in %

1 lamp **–7,0%**

	-1,0%	-2,7%	**-4,9%**	**-7,2%**	**-8,8%**	-10,3%	-8,8%	-6,3%	-7,0%

2 lamps **–13,0%**

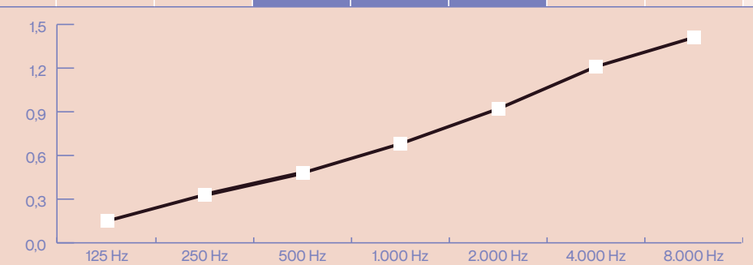
	-2,1%	-5,3%	**-9,3%**	**-13,5%**	**-16,3%**	-18,6%	-16,2%	-11,6%	-13,0%

3 lamps **–18,3%**

	-3,1%	-7,8%	**-13,3%**	**-19,0%**	**-22,6%**	-25,6%	-22,5%	-16,2%	-18,3%

Equivalent Sound Absorption Area (A) in m² per lamp

FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,15	0,33	**0,48**	**0,68**	**0,92**	1,21	1,41	0,74	0,69



SPBEL060

Lighting performance per lamp

20 W / 2452 lm → per lamp

Ø 60 cm

Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

After

Reduction of Reverberation Time (RT60) in %

1 lamp **–3,5%**

	-0,4%	-1,3%	**-2,6%**	**-3,6%**	**-4,1%**	-4,3%	-3,4%	-2,8%	-3,5%

2 lamps **–6,7%**

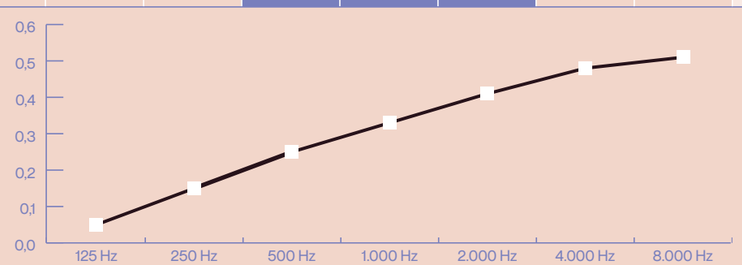
	-0,7%	-2,5%	**-5,1%**	**-7,0%**	**-8,0%**	-8,3%	-6,5%	-5,4%	-6,7%

3 lamps **–9,7%**

	-1,0%	-3,7%	**-7,4%**	**-10,2%**	**-11,5%**	-12,0%	-9,5%	-7,9%	-9,7%

Equivalent Sound Absorption Area (A) in m² per lamp

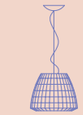
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,05	0,15	**0,25**	**0,33**	**0,41**	0,48	0,51	0,31	0,33



SPBEL045

Lighting performance per lamp

20 W / 2452 lm → per lamp



Ø 45 cm

Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

After

Reduction of Reverberation Time (RT60) in %

1 lamp **–3,4%**

	-0,4%	-1,3%	**-2,6%**	**-3,6%**	**-3,9%**	-4,1%	-3,4%	-2,7%	-3,4%

2 lamps **–6,5%**

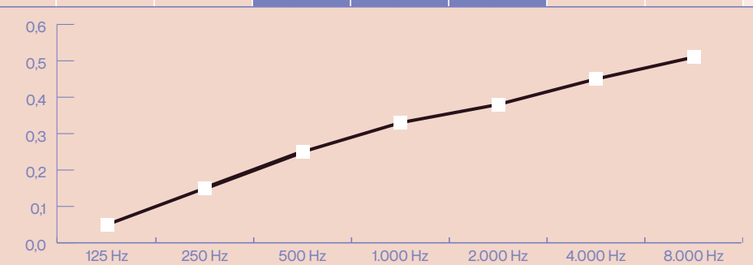
	-0,7%	-2,5%	**-5,1%**	**-7,0%**	**-7,4%**	-7,9%	-6,5%	-5,3%	-6,5%

3 lamps **–9,4%**

	-1,0%	-3,7%	**-7,4%**	**-10,2%**	**-10,7%**	-11,3%	-9,5%	-7,7%	-9,4%

Equivalent Sound Absorption Area (A) in m² per lamp

FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,05	0,15	**0,25**	**0,33**	**0,38**	0,45	0,51	0,30	0,32



Horizon Photoworks

PLBEL180

Lighting performance per lamp

80 W / 9605 lm → per lamp

Ø 180 cm

Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

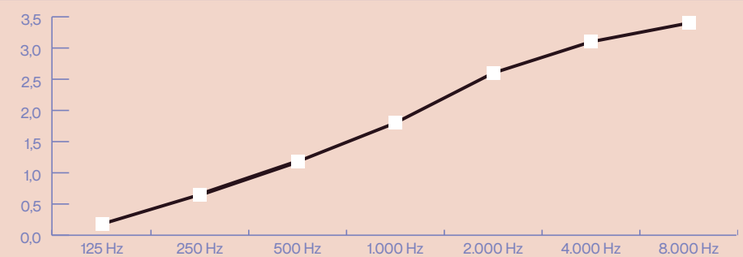
After

Reduction of Reverberation Time (RT60) in %

1 lamp **-16,6%**	-1,3%	-5,3%	**-11,2%**	**-17,1%**	**-21,5%**	-22,7%	-18,9%	-14,0%	-16,6%
2 lamps **-28,2%**	-2,5%	-10,0%	**-20,1%**	**-29,2%**	**-35,4%**	-37,0%	-31,8%	-23,7%	-28,2%
3 lamps **-36,9%**	-3,7%	-14,3%	**-27,4%**	**-38,2%**	**-45,1%**	-46,8%	-41,2%	-31,0%	-36,9%

Equivalent Sound Absorption Area (A) in m^2 per lamp

FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,18	0,65	**1,18**	**1,80**	**2,60**	3,10	3,40	1,84	1,86



PLBEL118

Lighting performance per lamp

64 W / 7684 lm → per lamp

Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

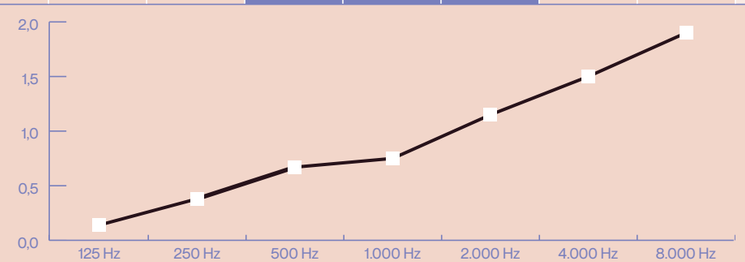
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–8,5%**	-1,0%	-3,1%	**-6,7%**	**-7,9%**	**-10,8%**	-12,4%	-11,5%	-7,6%	-8,5%
2 lamps **–15,6%**	-1,9%	-6,1%	**-12,5%**	**-14,7%**	**-19,5%**	-22,1%	-20,7%	-13,9%	-15,6%
3 lamps **–21,6%**	-2,9%	-8,9%	**-17,6%**	**-20,5%**	**-26,7%**	-29,9%	-28,1%	-19,2%	-21,6%

Equivalent Sound Absorption Area (A) in m² per lamp

FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,14	0,38	**0,67**	**0,75**	**1,15**	1,50	1,90	0,93	0,86



PLBEL090

Lighting performance per lamp

48 W / 5763 lm → per lamp

Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

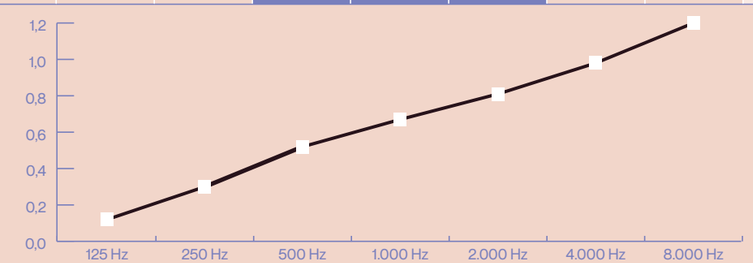
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–6,8%**	-0,8%	-2,5%	**-5,2%**	**-7,1%**	**-7,9%**	-8,5%	-7,6%	-5,7%	-6,8%
2 lamps **–12,6%**	-1,7%	-4,9%	**-10,0%**	**-13,3%**	**-14,6%**	-15,7%	-14,1%	-10,6%	-12,6%
3 lamps **–17,8%**	-2,5%	-7,1%	**-14,2%**	**-18,7%**	**-20,4%**	-21,8%	-19,8%	-14,9%	-17,8%

Equivalent Sound Absorption Area (A) in m² per lamp

FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,12	0,30	**0,52**	**0,67**	**0,81**	0,98	1,20	0,66	0,67



PLBEL060

Lighting performance per lamp

32 W / 3842 lm → per lamp

Ø 60 cm

Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

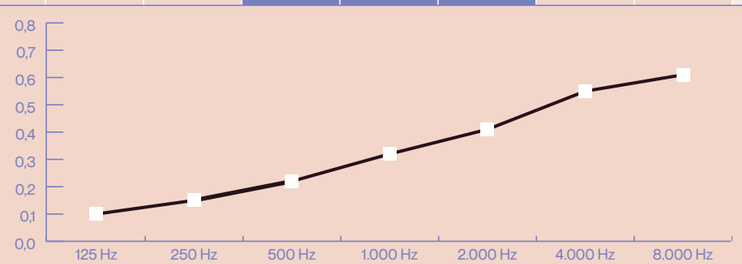
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–3,3%**	-0,7%	-1,3%	**-2,3%**	**-3,5%**	**-4,1%**	-4,9%	-4,0%	-3,0%	-3,3%
2 lamps **–6,4%**	-1,4%	-2,5%	**-4,5%**	**-6,8%**	**-8,0%**	-9,4%	-7,7%	-5,8%	-6,4%
3 lamps **–9,3%**	-2,1%	-3,7%	**-6,6%**	**-9,9%**	**-11,5%**	-13,5%	-11,2%	-8,3%	-9,3%

Equivalent Sound Absorption Area (A) in m² per lamp

FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,10	0,15	**0,22**	**0,32**	**0,41**	0,55	0,61	0,34	0,32



Note

Acoustic performance Layers

Axolight

From noise to acoustic comfort, how to do it?

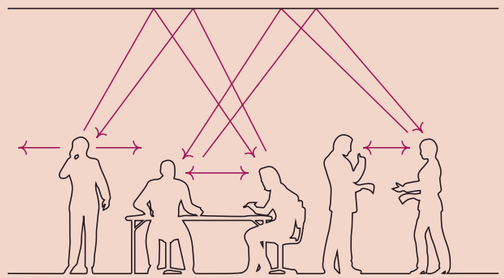
Noise is commonly identified as an unwanted and disturbing sound, for example buzzing (an incomprehensible and continuous hum) from a moving car, a drill, etc.

Acoustic comfort is the psychophysical condition of wellbeing a person finds themselves in when they are in an environment where noise is limited.

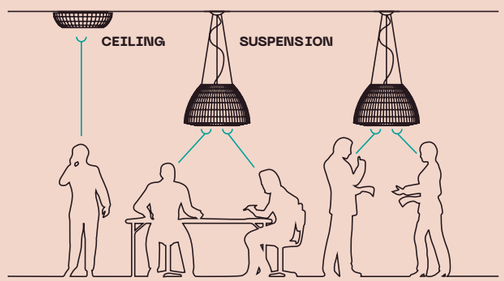
The measurement of **Reverberation Time (RT60)**, or the time required for sound to become imperceptible, allows the acoustic comfort to be measured in any given environment: the higher the reverberation time, the greater the perception of sound.

A setting with reflective materials (such as marble, cement, glass etc) and/or irregular geometric shapes will have high Reverberation Time and therefore tend to be noisy.

Noise



Acoustic comfort



Introducing sound-absorbing objects into an environment (objects which can reduce the Reverberation Time), is the way in which acoustic comfort can be reached without making any structural changes to the space itself.

How can the efficiency of an object's sound absorbency be measured?

By measuring the Reverberation Time (RT60) of an enclosed environment both with and without sound-absorbing objects, then taking into account the difference, it is possible to calculate their efficiency.

In order to calculate the Reverberation Time (RT60), the Volume of the enclosed space (V) and the cumulative **Equivalent Sound Absorbing Area (A)** of all the surfaces and objects present in the environment must be known:

$$RT60 = 0{,}161 \times (V/A)$$

The Equivalent Sound Absorbing Area (A) of each single object (i.e. lamp) takes into account the overall sound-absorbing properties of the materials the object is made of, as well as its size and shape.


Lida Chaulet / Ronald Tilleman

To identify the sound-absorbing properties of a single material (not the object in its entirety) it is possible to use the **Sound Absorption Coefficient (α)** whose value can vary from 0, where all incident sound is reflected, to 1, where all incident sound is absorbed. Therefore, if the value of α equals 0,5, 50% of the incident sound on the material's surface is absorbed.

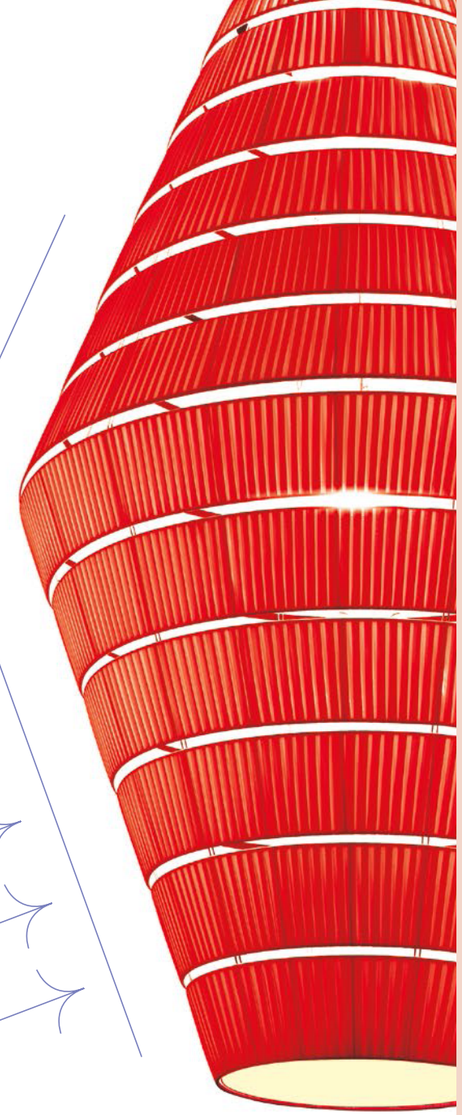
Layers

Vanessa Vivian

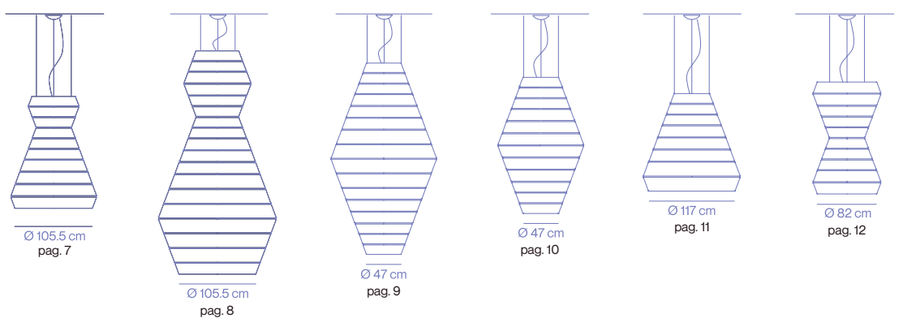
from 2,30
to 5,78
Equivalent Sound Absorbing Area (A)

from −10,8%
to −47,1%
Reduction of noise

Average 500÷2.000 Hz

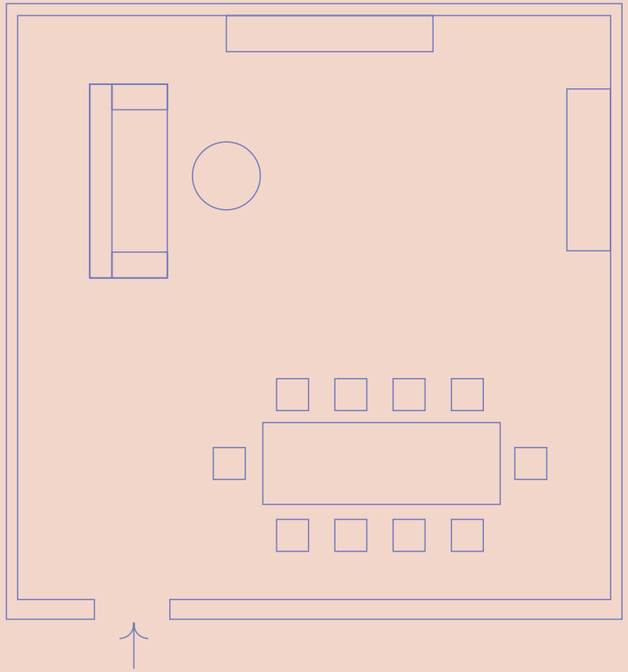


Index



Where we tested our products?

The environment used to measure the sound-absorbing properties the Axolight lamps is shown below:



Room data

L → 7 m
W → 7 m
H → 6,1 m

→ 300 m³

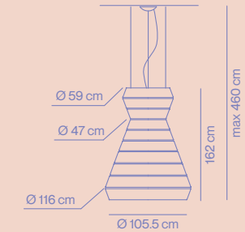
The Reverberation Times of the room, with sounds of varying frequencies emitted from an audio source, were measured, first without acoustic lamps, then with 1, 2 or 3 lamps added at a time.

This is how the reduction of sound in the room was calculated.

SPLAYA

Lighting performance per lamp

144 W / 17289 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,64	1,99	**2,49**	**2,68**	**2,47**	2,21	1,60	1,17	1,38

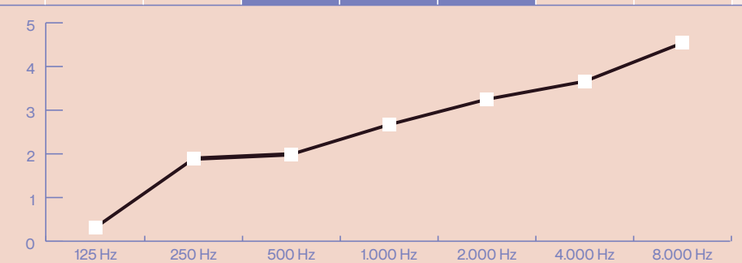
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–12,2%**	-1,1%	-7,3%	**-9,4%**	**-13,0%**	**-14,3%**	-14,4%	-13,2%	-10,4%	-12,2%
2 lamps **–21,7%**	-2,1%	-13,6%	**-17,1%**	**-23,0%**	**-25,0%**	-25,2%	-23,3%	-18,5%	-21,7%
3 lamps **–29,3%**	-3,2%	-19,1%	**-23,6%**	**-30,9%**	**-33,4%**	-33,6%	-31,3%	-25,0%	-29,3%

Equivalent Sound Absorption Area (A) in m^2 per lamp

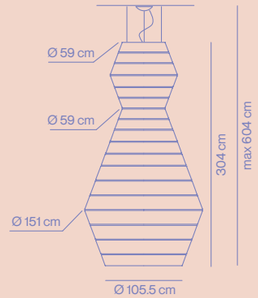
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,32	1,89	**1,99**	**2,67**	**3,25**	3,66	4,54	2,62	2,64



SPLAYB

Lighting performance per lamp

240 W / 28815 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,64	1,99	**2,49**	**2,68**	**2,47**	2,21	1,60	1,17	1,38

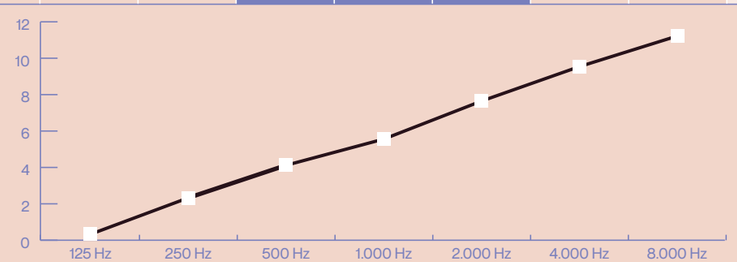
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–23,2%**	-1,1%	-8,8%	**-17,6%**	**-23,7%**	**-28,2%**	-30,5%	-27,3%	-19,6%	-23,2%
2 lamps **–37,4%**	-2,2%	-16,2%	**-29,9%**	**-38,3%**	**-44,0%**	-46,8%	-42,9%	-31,5%	-37,4%
3 lamps **–47,1%**	-3,3%	-22,5%	**-39,1%**	**-48,2%**	**-54,1%**	-56,9%	-52,9%	-39,6%	-47,1%

Equivalent Sound Absorption Area (A) in m² per lamp

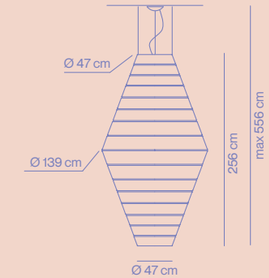
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,33	2,33	**4,12**	**5,56**	**7,65**	9,54	11,22	5,82	5,78



SPLAYC

Lighting performance per lamp

240 W / 28815 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,64	1,99	**2,49**	**2,68**	**2,47**	2,21	1,60	1,17	1,38

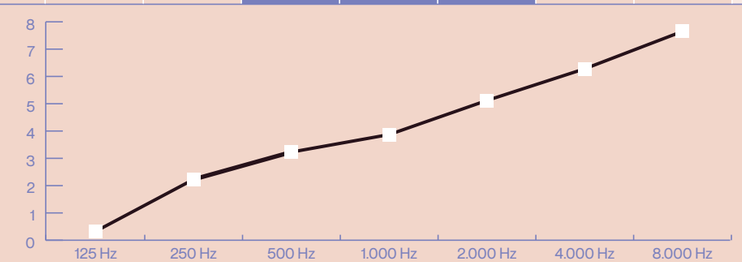
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–17,6%**	-1,1%	-8,5%	**-14,3%**	**-17,8%**	**-20,8%**	-22,4%	-20,4%	-15,0%	-17,6%
2 lamps **–29,9%**	-2,2%	-15,6%	**-25,1%**	**-30,2%**	**-34,5%**	-36,7%	-33,8%	-25,4%	-29,9%
3 lamps **–39,0%**	-3,3%	-21,7%	**-33,4%**	**-39,3%**	**-44,1%**	-46,5%	-43,4%	-33,1%	-39,0%

Equivalent Sound Absorption Area (A) in m² per lamp

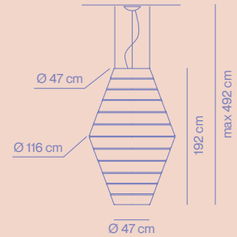
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,33	2,23	**3,23**	**3,87**	**5,12**	6,28	7,65	4,10	4,07



SPLAYD

Lighting performance per lamp

144 W / 17289 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,64	1,99	**2,49**	**2,68**	**2,47**	2,21	1,60	1,17	1,38

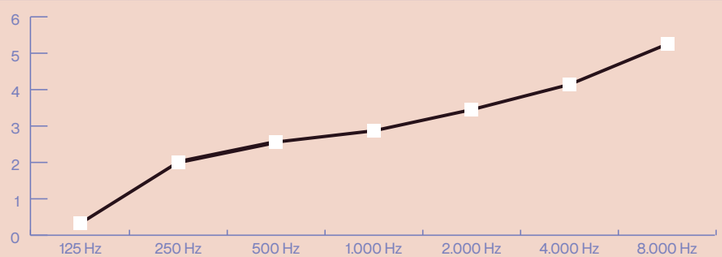
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–13,5%**	-1,1%	-7,7%	**-11,7%**	**-13,8%**	**-15,1%**	-16,0%	-14,9%	-11,5%	-13,5%
2 lamps **–23,8%**	-2,2%	-14,3%	**-21,0%**	**-24,3%**	**-26,2%**	-27,6%	-26,0%	-20,2%	-23,8%
3 lamps **–31,9%**	-3,3%	-20,0%	**-28,5%**	**-32,5%**	**-34,7%**	-36,4%	-34,5%	-27,1%	-31,9%

Equivalent Sound Absorption Area (A) in m² per lamp

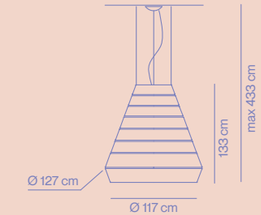
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,33	2,01	**2,56**	**2,87**	**3,45**	4,14	5,25	2,94	2,96



SPLAYE

Lighting performance per lamp

144 W / 17289 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
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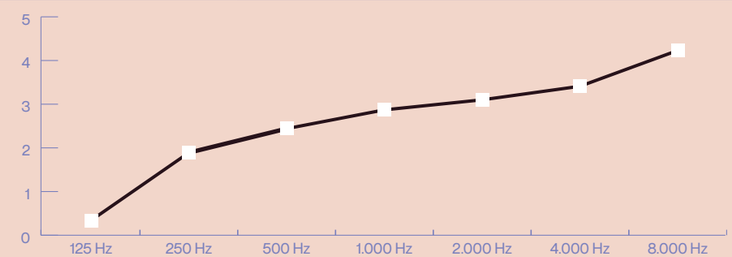
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–12,9%**	-1,2%	-7,3%	**-11,2%**	**-13,8%**	**-13,7%**	-13,6%	-12,4%	-10,5%	-12,9%
2 lamps **–22,9%**	-2,3%	-13,6%	**-20,2%**	**-24,3%**	**-24,2%**	-23,9%	-22,0%	-18,6%	-22,9%
3 lamps **–30,8%**	-3,4%	-19,1%	**-27,5%**	**-32,5%**	**-32,3%**	-32,0%	-29,8%	-25,2%	-30,8%

Equivalent Sound Absorption Area (A) in m² per lamp

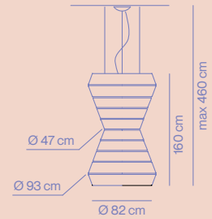
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,34	1,89	**2,44**	**2,87**	**3,10**	3,41	4,23	2,61	2,80



SPLAYF

Lighting performance per lamp

144 W / 17289 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
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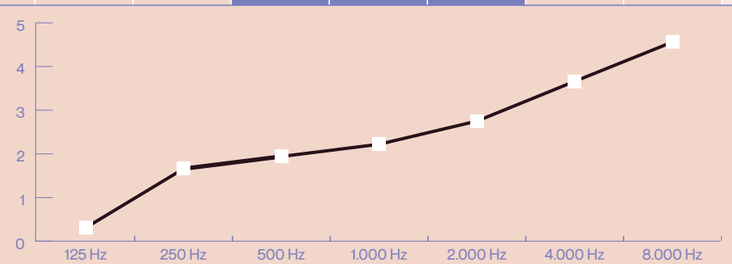
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–10,8%**	-1,1%	-6,4%	**-9,1%**	**-11,0%**	**-12,4%**	-14,4%	-13,2%	-9,7%	-10,8%
2 lamps **–19,5%**	-2,1%	-12,1%	**-16,7%**	**-19,9%**	**-22,0%**	-25,2%	-23,4%	-17,3%	-19,5%
3 lamps **–26,7%**	-3,1%	-17,1%	**-23,2%**	**-27,1%**	**-29,8%**	-33,6%	-31,4%	-23,6%	-26,7%

Equivalent Sound Absorption Area (A) in m^2 per lamp

FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,31	1,66	**1,94**	**2,22**	**2,75**	3,66	4,56	2,44	2,30



Note

Acoustic performance Plumage

Axolight

From noise to acoustic comfort, how to do it?

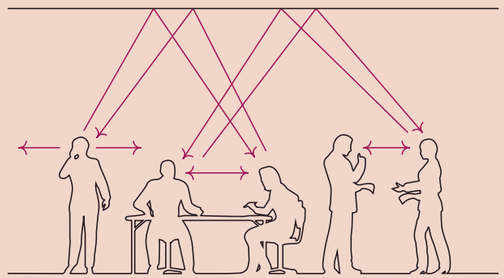
Noise is commonly identified as an unwanted and disturbing sound, for example buzzing (an incomprehensible and continuous hum) from a moving car, a drill, etc.

Acoustic comfort is the psychophysical condition of wellbeing a person finds themselves in when they are in an environment where noise is limited.

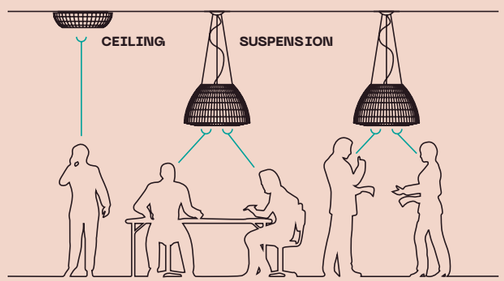
The measurement of **Reverberation Time (RT60)**, or the time required for sound to become imperceptible, allows the acoustic comfort to be measured in any given environment: the higher the reverberation time, the greater the perception of sound.

A setting with reflective materials (such as marble, cement, glass etc) and/or irregular geometric shapes will have high Reverberation Time and therefore tend to be noisy.

Noise



Acoustic comfort



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In order to calculate the Reverberation Time (RT60), the Volume of the enclosed space (V) and the cumulative **Equivalent Sound Absorbing Area (A)** of all the surfaces and objects present in the environment must be known:

$$RT60 = 0{,}161 \times (V/A)$$

The Equivalent Sound Absorbing Area (A) of each single object (i.e. lamp) takes into account the overall sound-absorbing properties of the materials the object is made of, as well as its size and shape.


Lida Chaulet / Ronald Tilleman

To identify the sound-absorbing properties of a single material (not the object in its entirety) it is possible to use the **Sound Absorption Coefficient (α)** whose value can vary from 0, where all incident sound is reflected, to 1, where all incident sound is absorbed. Therefore, if the value of α equals 0,5, 50% of the incident sound on the material's surface is absorbed.

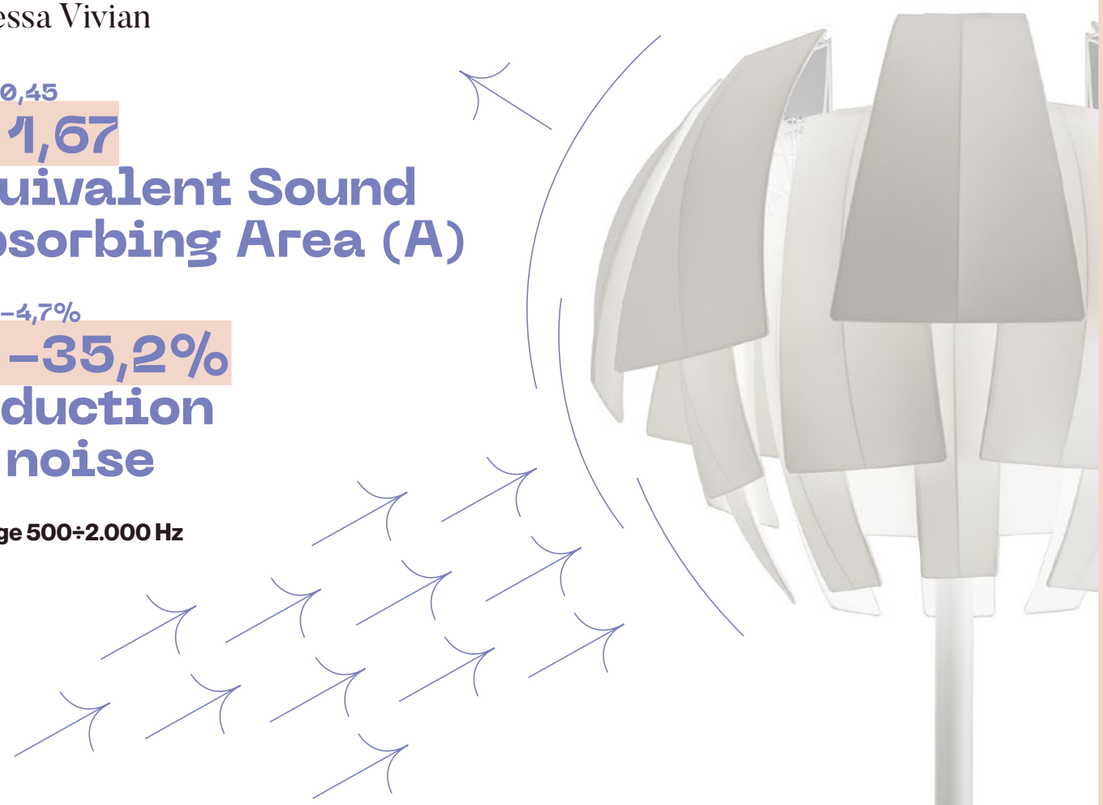
Plumage

Vanessa Vivian

from 0,45
to 1,67
Equivalent Sound Absorbing Area (A)

from –4,7%
to –35,2%
Reduction of noise

Average 500÷2.000 Hz



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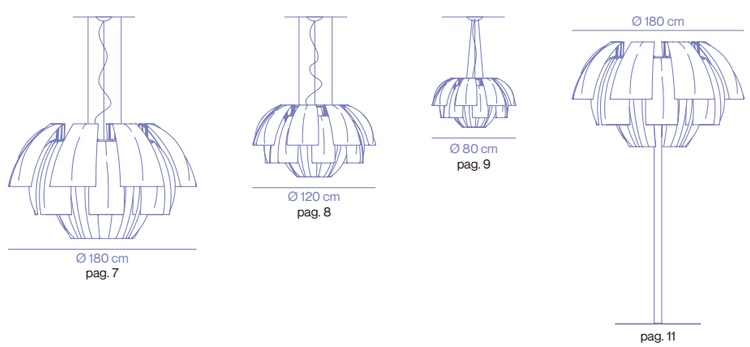
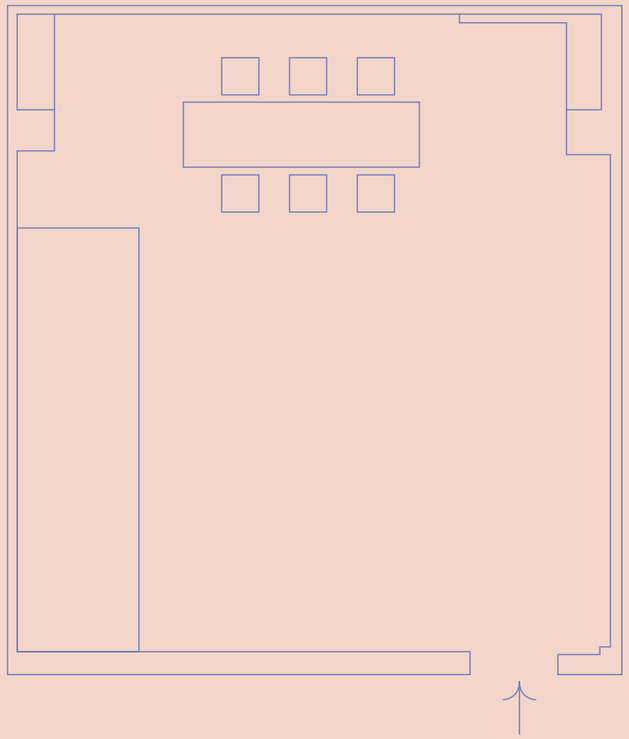


Where we tested our products?

The environment used to measure the sound-absorbing properties the Axolight lamps is shown below:



Room data

L → 8 m
W → 6 m
H → 3,1 m

→ 150 m³

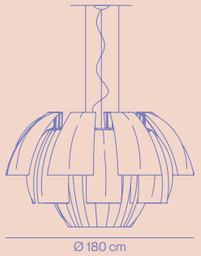
The Reverberation Times of the room, with sounds of varying frequencies emitted from an audio source, were measured, first without acoustic lamps, then with 1, 2 or 3 lamps added at a time.

This is how the reduction of sound in the room was calculated.

SPPLU180

Lighting performance per lamp

96 W / 11526 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

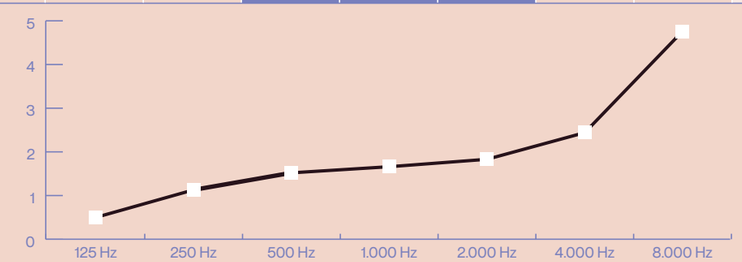
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–15,4%**	-3,4%	-8,8%	**-13,9%**	**-16,0%**	**-16,2%**	-18,8%	-24,6%	-14,5%	-15,4%
2 lamps **–26,6%**	-6,6%	-16,2%	**-24,5%**	**-27,6%**	**-27,9%**	-31,6%	-39,5%	-24,8%	-26,6%
3 lamps **–35,2%**	-9,5%	-22,4%	**-32,7%**	**-36,3%**	**-36,7%**	-40,9%	-49,5%	-32,6%	-35,2%

Equivalent Sound Absorption Area (A) in m^2 per lamp

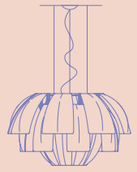
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,50	1,13	**1,52**	**1,66**	**1,83**	2,44	4,76	1,98	1,67



SPPLU120

Lighting performance per lamp

96 W / 11526 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

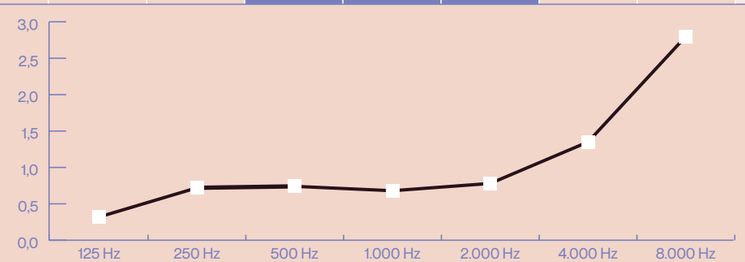
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–7,4%**	-2,2%	-5,8%	**-7,3%**	**-7,2%**	**-7,6%**	-11,3%	-16,1%	-8,2%	-7,4%
2 lamps **–13,7%**	-4,3%	-10,9%	**-13,6%**	**-13,5%**	**-14,1%**	-20,4%	-27,8%	-14,9%	-13,7%
3 lamps **–19,3%**	-6,3%	-15,6%	**-19,1%**	**-19,0%**	**-19,8%**	-27,7%	-36,6%	-20,6%	-19,3%

Equivalent Sound Absorption Area (A) in m² per lamp

FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,32	0,72	**0,74**	**0,68**	**0,78**	1,35	2,80	1,06	0,73



SPPLU080

Lighting performance per lamp

48 W / 5763 lm → per lamp

Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

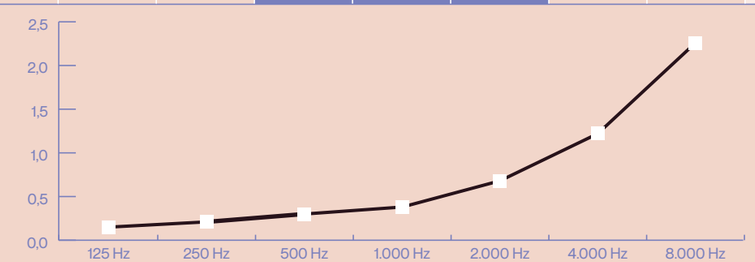
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–4,7%**	-1,0%	-1,8%	**-3,1%**	**-4,2%**	**-6,7%**	-10,4%	-13,4%	-5,8%	-4,7%
2 lamps **–8,9%**	-2,1%	-3,5%	**-6,0%**	**-8,0%**	**-12,6%**	-18,8%	-23,7%	-10,6%	-8,9%
3 lamps **–12,7%**	-3,1%	-5,1%	**-8,7%**	**-11,6%**	**-17,7%**	-25,7%	-31,8%	-14,8%	-12,7%

Equivalent Sound Absorption Area (A) in m² per lamp

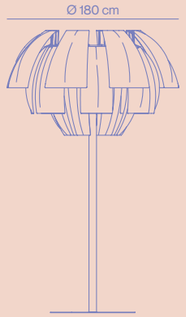
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,15	0,21	**0,30**	**0,38**	**0,68**	1,22	2,26	0,74	0,45



PTPLU180

Lighting performance per lamp

96 W / 11526 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

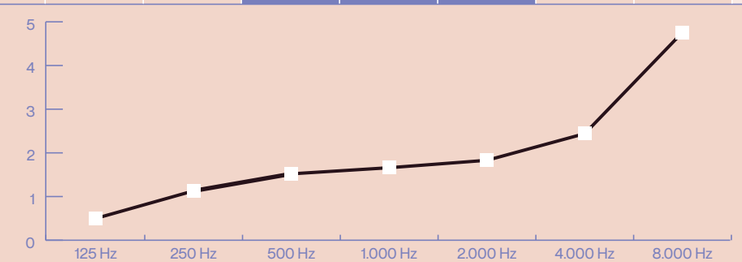
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–12,9%**	-3,4%	-8,8%	**-6,7%**	**-16,0%**	**-16,2%**	-18,8%	-24,6%	-13,5%	-12,9%
2 lamps **–26,6%**	-6,6%	-16,2%	**-24,5%**	**-27,6%**	**-27,9%**	-31,6%	-39,5%	-24,8%	-26,6%
3 lamps **–35,2%**	-9,5%	-22,4%	**-32,7%**	**-36,3%**	**-36,7%**	-40,9%	-49,5%	-32,6%	-35,2%

Equivalent Sound Absorption Area (A) in m^2 per lamp

FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,50	1,13	**1,52**	**1,66**	**1,83**	2,44	4,76	1,98	1,67



Acoustic performance Skirt

Axolight

From noise to acoustic comfort, how to do it?

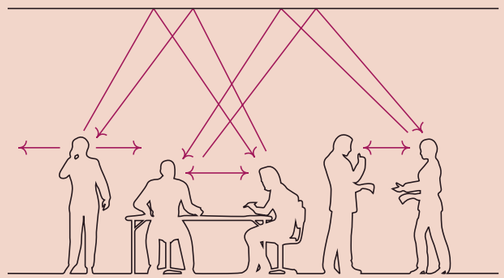
Noise is commonly identified as an unwanted and disturbing sound, for example buzzing (an incomprehensible and continuous hum) from a moving car, a drill, etc.

Acoustic comfort is the psychophysical condition of wellbeing a person finds themselves in when they are in an environment where noise is limited.

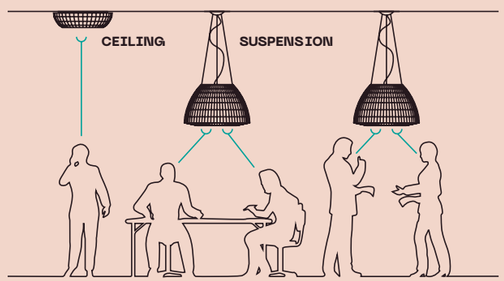
The measurement of **Reverberation Time (RT60)**, or the time required for sound to become imperceptible, allows the acoustic comfort to be measured in any given environment: the higher the reverberation time, the greater the perception of sound.

A setting with reflective materials (such as marble, cement, glass etc) and/or irregular geometric shapes will have high Reverberation Time and therefore tend to be noisy.

Noise



Acoustic comfort



Introducing sound-absorbing objects into an environment (objects which can reduce the Reverberation Time), is the way in which acoustic comfort can be reached without making any structural changes to the space itself.

How can the efficiency of an object's sound absorbency be measured?

By measuring the Reverberation Time (RT60) of an enclosed environment both with and without sound-absorbing objects, then taking into account the difference, it is possible to calculate their efficiency.

In order to calculate the Reverberation Time (RT60), the Volume of the enclosed space (V) and the cumulative **Equivalent Sound Absorbing Area (A)** of all the surfaces and objects present in the environment must be known:

$$RT60 = 0{,}161 \times (V/A)$$

The Equivalent Sound Absorbing Area (A) of each single object (i.e. lamp) takes into account the overall sound-absorbing properties of the materials the object is made of, as well as its size and shape.


Lida Chaulet / Ronald Tilleman

To identify the sound-absorbing properties of a single material (not the object in its entirety) it is possible to use the **Sound Absorption Coefficient (α)** whose value can vary from 0, where all incident sound is reflected, to 1, where all incident sound is absorbed. Therefore, if the value of α equals 0,5, 50% of the incident sound on the material's surface is absorbed.

Skirt

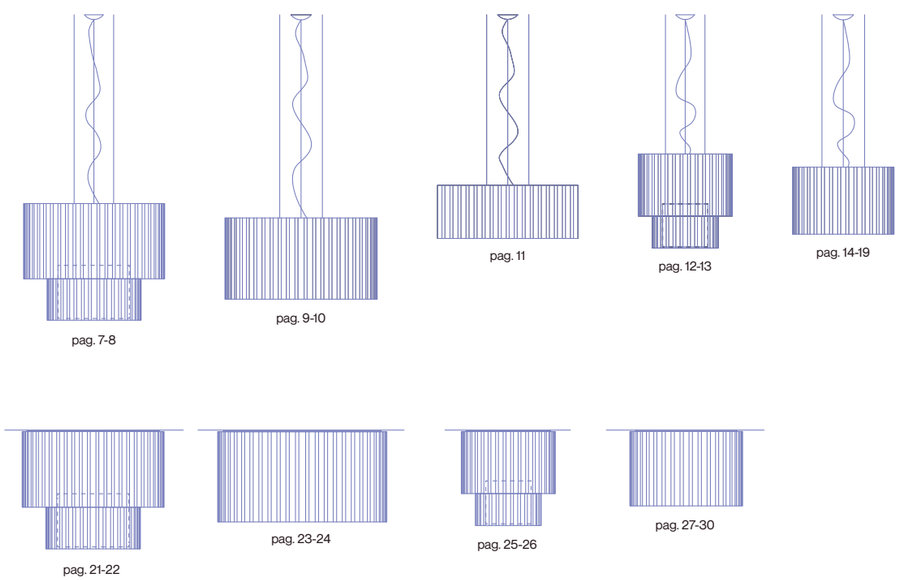
Vanessa Vivian

from 0,36
to 3,55
Equivalent Sound Absorbing Area (A)

from –3,8%
to –53,6%
Reduction of noise

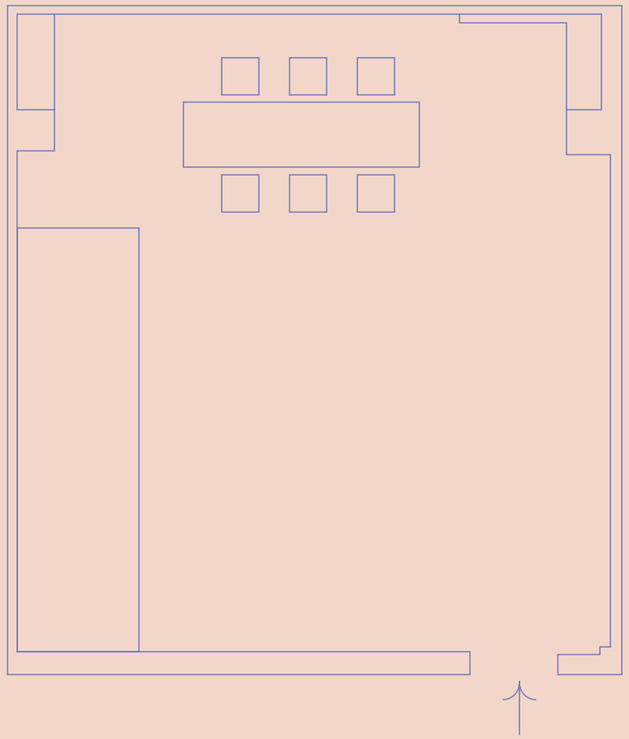
Average 500÷2.000 Hz

Index



Where we tested our products?

The environment used to measure the sound-absorbing properties the Axolight lamps is shown below:



Room data

L → 8 m
W → 6 m
H → 3,1 m

→ 150 m^3

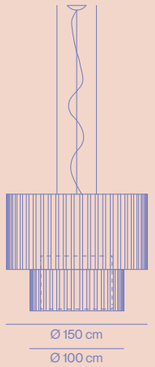
The Reverberation Times of the room, with sounds of varying frequencies emitted from an audio source, were measured, first without acoustic lamps, then with 1, 2 or 3 lamps added at a time.

This is how the reduction of sound in the room was calculated.

SPSK1502NE

Lighting performance per lamp

98 W / 10719 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

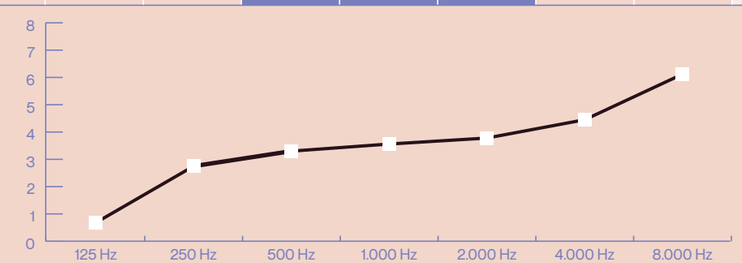
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–27,8%**	-4,6%	-19,0%	**-26,0%**	**-29,0%**	**-28,5%**	-29,6%	-29,6%	-23,8%	-27,8%
2 lamps **–43,5%**	-8,7%	-31,9%	**-41,3%**	**-44,9%**	**-44,4%**	-45,7%	-45,7%	-37,5%	-43,5%
3 lamps **–53,6%**	-12,6%	-41,3%	**-51,3%**	**-55,0%**	**-54,5%**	-55,8%	-55,8%	-46,6%	-53,6%

Equivalent Sound Absorption Area (A) in m^2 per lamp

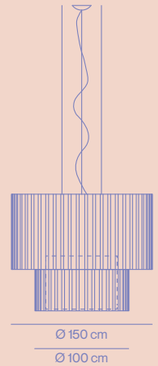
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,68	2,75	**3,30**	**3,56**	**3,78**	4,45	6,12	3,52	3,55



SPSK1502

Lighting performance per lamp

98 W / 10719 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

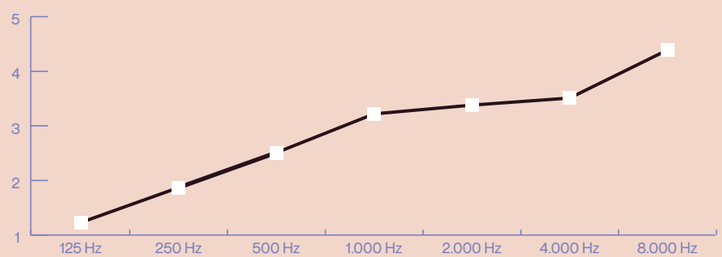
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–27,0%**	-4,4%	-18,5%	**-24,0%**	**-28,9%**	**-28,2%**	-28,6%	-25,9%	-22,6%	-27,0%
2 lamps **–42,5%**	-8,5%	-31,3%	**-38,7%**	**-44,8%**	**-44,0%**	-44,5%	-41,1%	-36,1%	-42,5%
3 lamps **–52,5%**	-12,2%	-40,6%	**-48,6%**	**-54,9%**	**-54,1%**	-54,6%	-51,1%	-45,2%	-52,5%

Equivalent Sound Absorption Area (A) in m² per lamp

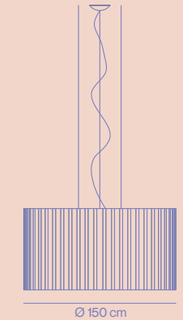
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,66	2,67	**2,96**	**3,54**	**3,73**	4,23	5,08	3,27	3,41



SPSKR150NE

Lighting performance per lamp

98 W / 10719 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

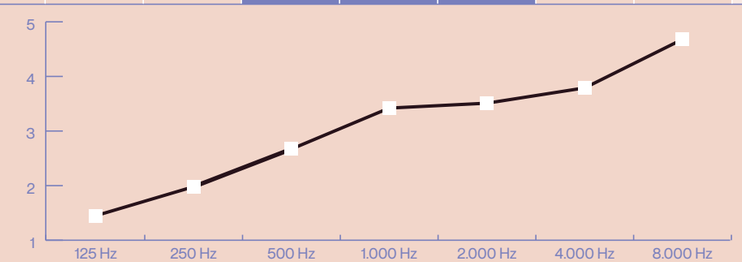
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–27,8%**	-9,3%	-14,4%	**-22,1%**	**-28,2%**	**-27,0%**	-26,4%	-24,3%	-21,7%	-25,8%
2 lamps **–43,5%**	-17,0%	-25,2%	**-36,2%**	**-43,9%**	**-42,6%**	-41,8%	-39,1%	-35,1%	-40,9%
3 lamps **–53,6%**	-23,4%	-33,6%	**-46,0%**	**-54,0%**	**-52,6%**	-51,8%	-49,1%	-44,4%	-50,9%

Equivalent Sound Absorption Area (A) in m² per lamp

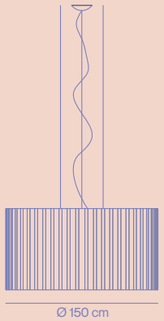
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	1,45	1,98	**2,67**	**3,42**	**3,51**	3,79	4,68	3,07	3,20



SPSKR150

Lighting performance per lamp

98 W / 10719 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

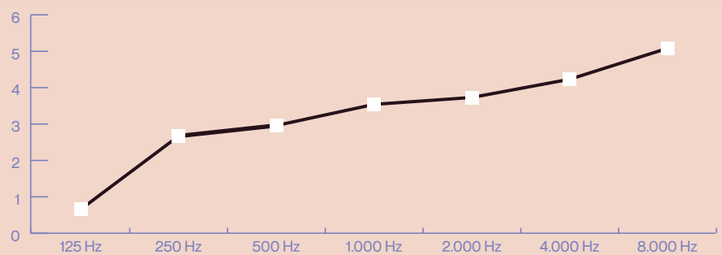
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–24,8%**	-8,0%	-13,8%	**-21,1%**	**-27,0%**	**-26,3%**	-24,9%	-23,2%	-20,6%	-24,8%
2 lamps **–39,6%**	-14,8%	-24,2%	**-34,8%**	**-42,5%**	**-41,6%**	-39,9%	-37,6%	-33,6%	-39,6%
3 lamps **–49,6%**	-20,6%	-32,4%	**-44,5%**	**-52,5%**	**-51,7%**	-49,9%	-47,5%	-42,7%	-49,6%

Equivalent Sound Absorption Area (A) in m² per lamp

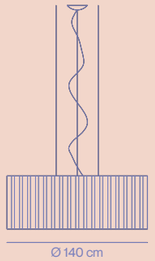
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	1,23	1,87	**2,51**	**3,22**	**3,38**	3,51	4,39	2,87	3,04



SPSKR140

Lighting performance per lamp

98 W / 10719 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

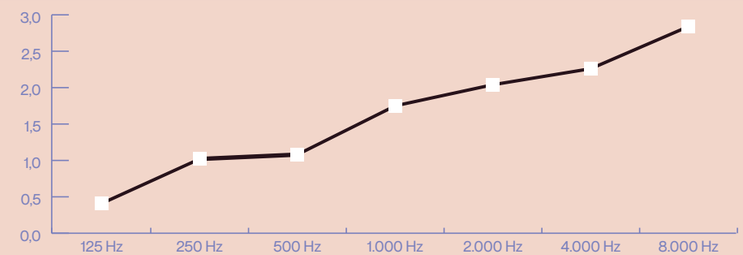
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–14,9%**	-2,8%	-8,0%	**-10,3%**	**-16,7%**	**-17,7%**	-17,6%	-16,3%	-12,8%	-14,9%
2 lamps **–25,8%**	-5,4%	-14,8%	**-18,7%**	**-28,6%**	**-30,1%**	-30,0%	-28,1%	-22,2%	-25,8%
3 lamps **–34,2%**	-7,9%	-20,6%	**-25,7%**	**-37,6%**	**-39,2%**	-39,1%	-36,9%	-29,6%	-34,2%

Equivalent Sound Absorption Area (A) in m² per lamp

FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,41	1,02	**1,08**	**1,75**	**2,04**	2,26	2,84	1,63	1,62



SPSK1002NE

Lighting performance per lamp

98 W / 10719 lm → per lamp

Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

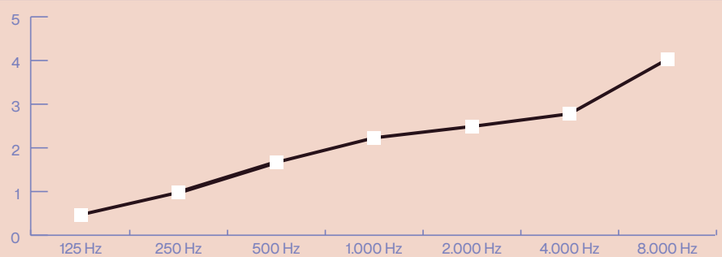
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–18,8%**	-3,2%	-7,7%	**-15,1%**	**-20,4%**	**-20,8%**	-20,8%	-21,7%	-15,7%	-18,8%
2 lamps **–31,5%**	-6,2%	-14,3%	**-26,2%**	**-33,8%**	**-34,4%**	-34,5%	-35,6%	-26,4%	-31,5%
3 lamps **–40,8%**	-9,0%	-20,0%	**-34,8%**	**-43,4%**	**-44,1%**	-44,1%	-45,4%	-34,4%	-40,8%

Equivalent Sound Absorption Area (A) in m² per lamp

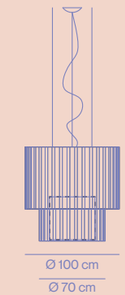
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,47	0,98	**1,67**	**2,23**	**2,49**	2,78	4,03	2,09	2,13



SPSK1002

Lighting performance per lamp

98 W / 10719 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

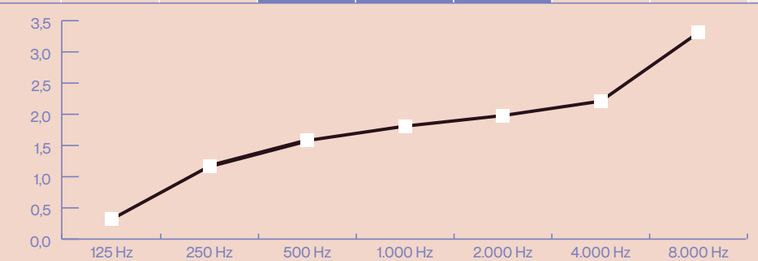
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–16,3%**	-2,2%	-9,1%	**-14,4%**	**-17,2%**	**-17,3%**	-17,3%	-18,5%	-13,7%	-16,3%
2 lamps **–28,0%**	-4,3%	-16,6%	**-25,2%**	**-29,3%**	**-29,5%**	-29,5%	-31,2%	-23,7%	-28,0%
3 lamps **–36,8%**	-6,3%	-23,0%	**-33,5%**	**-38,4%**	**-38,5%**	-38,6%	-40,5%	-31,3%	-36,8%

Equivalent Sound Absorption Area (A) in m² per lamp

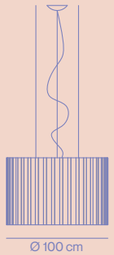
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,32	1,17	**1,58**	**1,81**	**1,98**	2,21	3,31	1,77	1,79



SPSKR100NE

Lighting performance per lamp

98 W / 10719 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

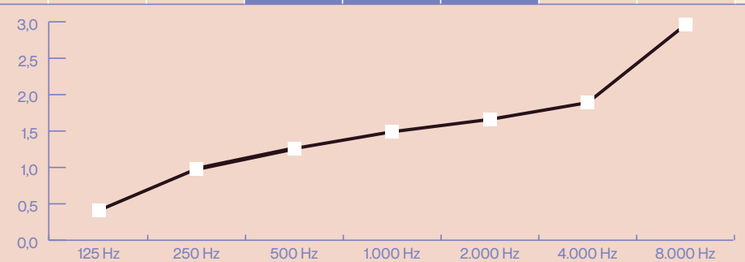
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–13,8%**	-2,8%	-7,7%	**-11,8%**	**-14,6%**	**-14,9%**	-15,2%	-16,9%	-12,0%	-13,8%
2 lamps **–24,2%**	-5,5%	-14,3%	**-21,2%**	**-25,5%**	**-25,9%**	-26,4%	-28,9%	-21,1%	-24,2%
3 lamps **–32,3%**	-8,0%	-20,0%	**-28,7%**	**-33,9%**	**-34,4%**	-34,9%	-37,9%	-28,3%	-32,3%

Equivalent Sound Absorption Area (A) in m² per lamp

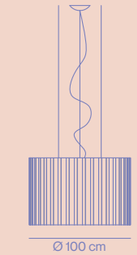
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,41	0,98	**1,26**	**1,49**	**1,66**	1,89	2,96	1,52	1,47



SPSKR100

Lighting performance per lamp

98 W / 10719 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

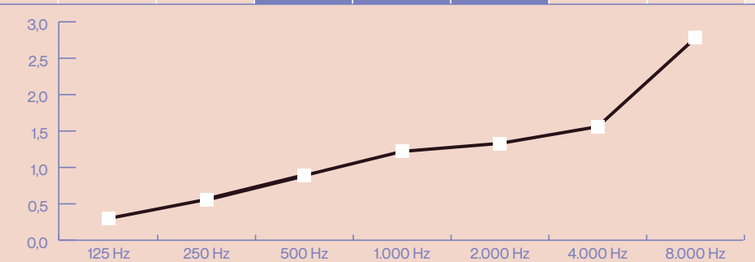
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–11,1%**	-2,1%	-4,6%	**-8,7%**	**-12,3%**	**-12,3%**	-12,9%	-16,0%	-9,8%	-11,1%
2 lamps **–19,9%**	-4,1%	-8,7%	**-15,9%**	**-21,9%**	**-21,9%**	-22,8%	-27,6%	-17,6%	-19,9%
3 lamps **–27,1%**	-6,0%	-12,5%	**-22,1%**	**-29,6%**	**-29,6%**	-30,7%	-36,4%	-23,8%	-27,1%

Equivalent Sound Absorption Area (A) in m² per lamp

FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,30	0,56	**0,89**	**1,22**	**1,33**	1,56	2,78	1,23	1,15



SPSKR070NE

Lighting performance per lamp

20 W / 2452 lm → per lamp

Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

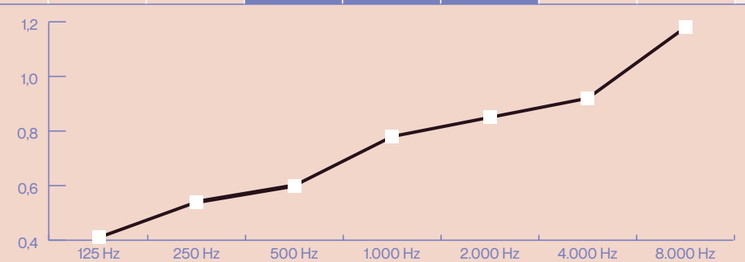
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–7,5%**	-2,8%	-4,4%	**-6,0%**	**-8,2%**	**-8,2%**	-8,0%	-7,5%	-6,5%	-7,5%
2 lamps **–13,9%**	-5,5%	-8,4%	**-11,3%**	**-15,2%**	**-15,2%**	-14,8%	-13,9%	-12,1%	-13,9%
3 lamps **–19,5%**	-8,0%	-12,1%	**-16,1%**	**-21,2%**	**-21,2%**	-20,7%	-19,5%	-17,0%	-19,5%

Equivalent Sound Absorption Area (A) in m² per lamp

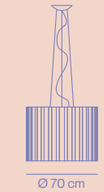
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,41	0,54	**0,60**	**0,78**	**0,85**	0,92	1,18	0,75	0,74



SPSKR070

Lighting performance per lamp

20 W / 2452 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

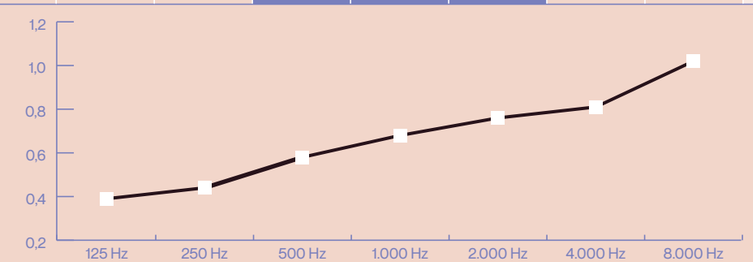
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–6,8%**	-2,7%	-3,6%	**-5,8%**	**-7,2%**	**-7,4%**	-7,1%	-6,5%	-5,8%	-6,8%
2 lamps **–12,8%**	-5,2%	-7,0%	**-11,0%**	**-13,5%**	**-13,8%**	-13,3%	-12,3%	-10,9%	-12,8%
3 lamps **–18,0%**	-7,6%	-10,1%	**-15,6%**	**-19,0%**	**-19,4%**	-18,7%	-17,4%	-15,4%	-18,0%

Equivalent Sound Absorption Area (A) in m² per lamp

FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,39	0,44	**0,58**	**0,68**	**0,76**	0,81	1,02	0,67	0,67



SPSKR050NE

Lighting performance per lamp

20 W / 2452 lm → per lamp

Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

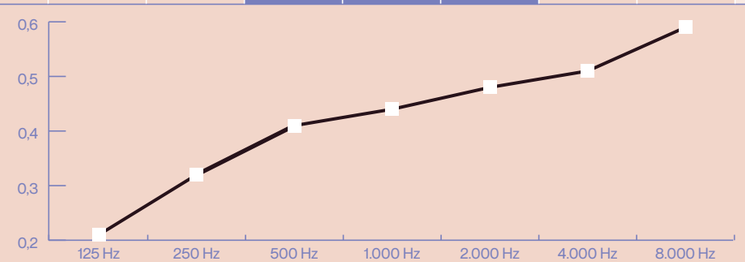
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–4,6%**	-1,5%	-2,7%	**-4,2%**	**-4,8%**	**-4,8%**	-4,6%	-3,9%	-3,8%	-4,6%
2 lamps **–8,8%**	-2,9%	-5,2%	**-8,0%**	**-9,2%**	**-9,2%**	-8,8%	-7,5%	-7,2%	-8,8%
3 lamps **–12,6%**	-4,2%	-7,6%	**-11,6%**	**-13,1%**	**-13,2%**	-12,7%	-10,8%	-10,5%	-12,6%

Equivalent Sound Absorption Area (A) in m² per lamp

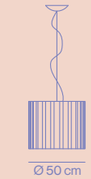
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,21	0,32	**0,41**	**0,44**	**0,48**	0,51	0,59	0,42	0,44



SPSKR050

Lighting performance per lamp

20 W / 2452 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

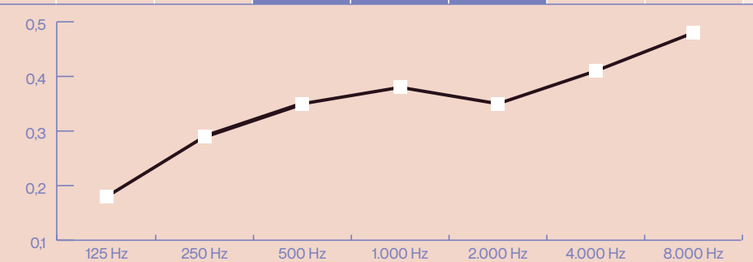
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–3,8%**	-1,3%	-2,4%	**-3,6%**	**-4,2%**	**-3,6%**	-3,7%	-3,2%	-3,1%	-3,8%
2 lamps **–7,3%**	-2,5%	-4,7%	**-6,9%**	**-8,0%**	**-6,9%**	-7,2%	-6,2%	-6,1%	-7,3%
3 lamps **–10,5%**	-3,7%	-6,9%	**-10,1%**	**-11,6%**	**-10,0%**	-10,4%	-9,0%	-8,8%	-10,5%

Equivalent Sound Absorption Area (A) in m² per lamp

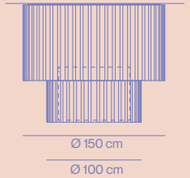
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,18	0,29	**0,35**	**0,38**	**0,35**	0,41	0,48	0,35	0,36



PLSK1502NE

Lighting performance per lamp

64 W / 7684 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

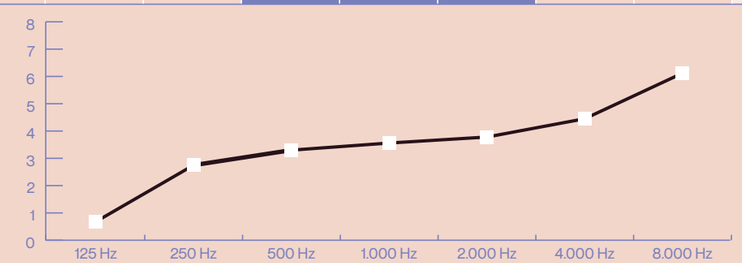
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–27,8%**	-4,6%	-19,0%	**-26,0%**	**-29,0%**	**-28,5%**	-29,6%	-29,6%	-23,8%	-27,8%
2 lamps **–43,5%**	-8,7%	-31,9%	**-41,3%**	**-44,9%**	**-44,4%**	-45,7%	-45,7%	-37,5%	-43,5%
3 lamps **–53,6%**	-12,6%	-41,3%	**-51,3%**	**-55,0%**	**-54,5%**	-55,8%	-55,8%	-46,6%	-53,6%

Equivalent Sound Absorption Area (A) in m² per lamp

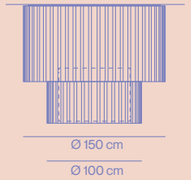
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,68	2,75	**3,30**	**3,56**	**3,78**	4,45	6,12	3,52	3,55



PLSK1502

Lighting performance per lamp

64 W / 7684 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

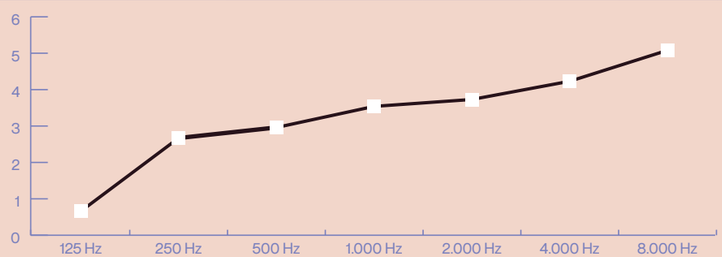
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–27,0%**	-4,4%	-18,5%	**-24,0%**	**-28,9%**	**-28,2%**	-28,6%	-25,9%	-22,6%	-27,0%
2 lamps **–42,5%**	-8,5%	-31,3%	**-38,7%**	**-44,8%**	**-44,0%**	-44,5%	-41,1%	-36,1%	-42,5%
3 lamps **–52,5%**	-12,2%	-40,6%	**-48,6%**	**-54,9%**	**-54,1%**	-54,6%	-51,1%	-45,2%	-52,5%

Equivalent Sound Absorption Area (A) in m² per lamp

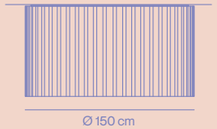
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,66	2,67	**2,96**	**3,54**	**3,73**	4,23	5,08	3,27	3,41



PLSKR150NE

Lighting performance per lamp

64 W / 7684 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

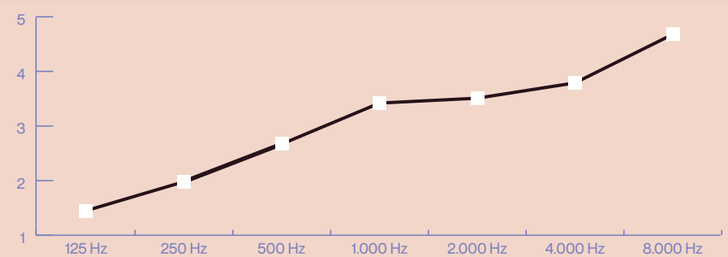
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–25,8%**	-9,3%	-14,4%	**-22,1%**	**-28,2%**	**-27,0%**	-26,4%	-24,3%	-21,7%	-25,8%
2 lamps **–40,9%**	-17,0%	-25,2%	**-36,2%**	**-43,9%**	**-42,6%**	-41,8%	-39,1%	-35,1%	-40,9%
3 lamps **–50,9%**	-23,4%	-33,6%	**-46,0%**	**-54,0%**	**-52,6%**	-51,8%	-49,1%	-44,4%	-50,9%

Equivalent Sound Absorption Area (A) in m² per lamp

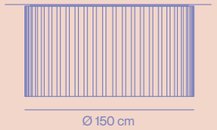
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	1,45	1,98	**2,67**	**3,42**	**3,51**	3,79	4,68	3,07	3,20



PLSKR150

Lighting performance per lamp

64 W / 7684 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

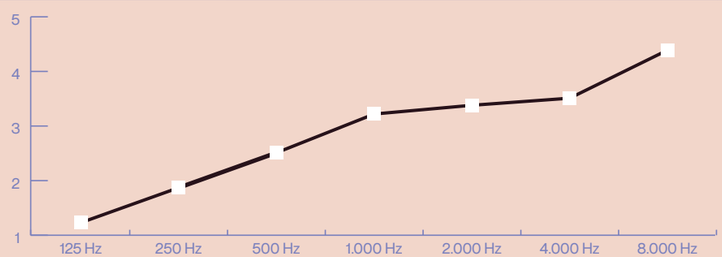
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–24,8%**	-8,0%	-13,8%	**-21,1%**	**-27,0%**	**-26,3%**	-24,9%	-23,2%	-20,6%	-24,8%
2 lamps **–39,6%**	-14,8%	-24,2%	**-34,8%**	**-42,5%**	**-41,6%**	-39,9%	-37,6%	-33,6%	-39,6%
3 lamps **–49,6%**	-20,6%	-32,4%	**-44,5%**	**-52,5%**	**-51,7%**	-49,9%	-47,5%	-42,7%	-49,6%

Equivalent Sound Absorption Area (A) in m² per lamp

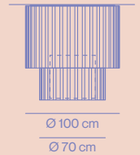
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	1,23	1,87	**2,51**	**3,22**	**3,38**	3,51	4,39	2,87	3,04



PLSK1002NE

Lighting performance per lamp

48 W / 5763 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

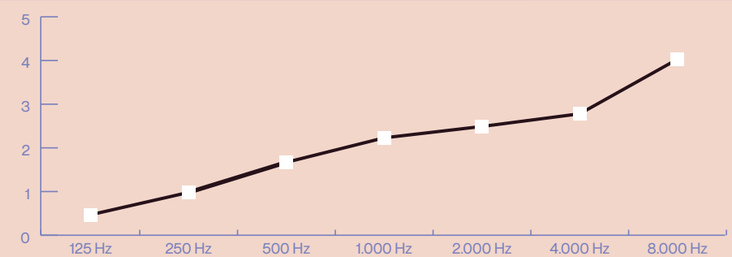
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–18,8%**	-3,2%	-7,7%	**-15,1%**	**-20,4%**	**-20,8%**	-20,8%	-21,7%	-15,7%	-18,8%
2 lamps **–31,5%**	-6,2%	-14,3%	**-26,2%**	**-33,8%**	**-34,4%**	-34,5%	-35,6%	-26,4%	-31,5%
3 lamps **–40,8%**	-9,0%	-20,0%	**-34,8%**	**-43,4%**	**-44,1%**	-44,1%	-45,4%	-34,4%	-40,8%

Equivalent Sound Absorption Area (A) in m² per lamp

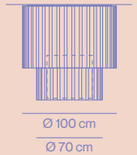
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,47	0,98	**1,67**	**2,23**	**2,49**	2,78	4,03	2,09	2,13



PLSK1002

Lighting performance per lamp

64 W / 7684 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

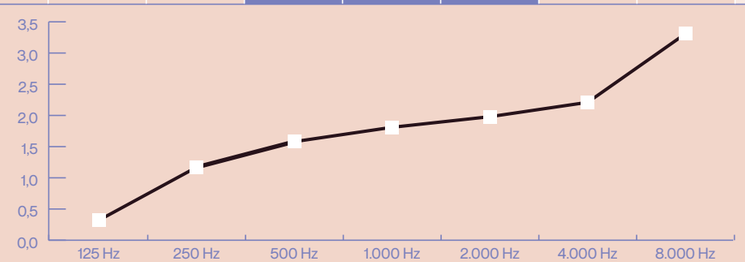
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–16,3%**	-2,2%	-9,1%	**-14,4%**	**-17,2%**	**-17,3%**	-17,3%	-18,5%	-13,7%	-16,3%
2 lamps **–28,0%**	-4,3%	-16,6%	**-25,2%**	**-29,3%**	**-29,5%**	-29,5%	-31,2%	-23,7%	-28,0%
3 lamps **–36,8%**	-6,3%	-23,0%	**-33,5%**	**-38,4%**	**-38,5%**	-38,6%	-40,5%	-31,3%	-36,8%

Equivalent Sound Absorption Area (A) in m² per lamp

FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,32	1,17	**1,58**	**1,81**	**1,98**	2,21	3,31	1,77	1,79



PLSKR100NE

Lighting performance per lamp

48 W / 5763 lm → per lamp

Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

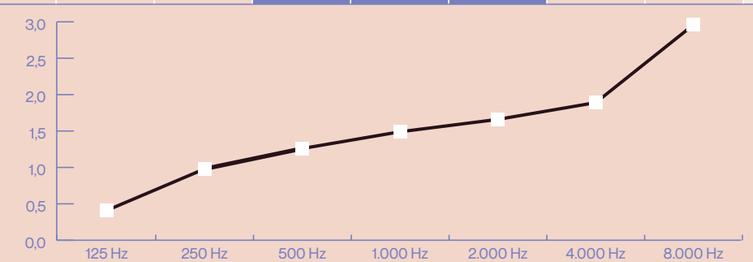
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–13,8%**	-2,8%	-7,7%	**-11,8%**	**-14,6%**	**-14,9%**	-15,2%	-16,9%	-12,0%	-13,8%
2 lamps **–24,2%**	-5,5%	-14,3%	**-21,2%**	**-25,5%**	**-25,9%**	-26,4%	-28,9%	-21,1%	-24,2%
3 lamps **–32,3%**	-8,0%	-20,0%	**-28,7%**	**-33,9%**	**-34,4%**	-34,9%	-37,9%	-28,3%	-32,3%

Equivalent Sound Absorption Area (A) in m² per lamp

FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,41	0,98	**1,26**	**1,49**	**1,66**	1,89	2,96	1,52	1,47



PLSKR100

Lighting performance per lamp

64 W / 7684 lm → per lamp

Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

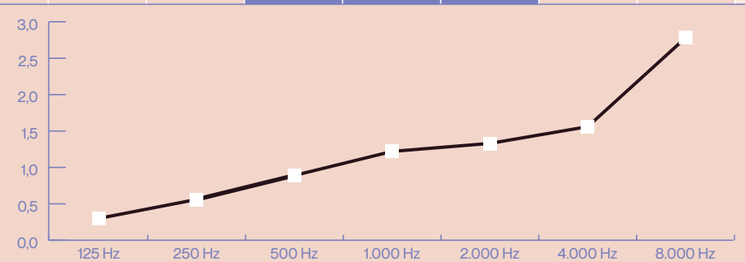
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–11,1%**	-2,1%	-4,6%	**-8,7%**	**-12,3%**	**-12,3%**	-12,9%	-16,0%	-9,8%	-11,1%
2 lamps **–19,9%**	-4,1%	-8,7%	**-15,9%**	**-21,9%**	**-21,9%**	-22,8%	-27,6%	-17,6%	-19,9%
3 lamps **–27,1%**	-6,0%	-12,5%	**-22,1%**	**-29,6%**	**-29,6%**	-30,7%	-36,4%	-23,8%	-27,1%

Equivalent Sound Absorption Area (A) in m² per lamp

FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,30	0,56	**0,89**	**1,22**	**1,33**	1,56	2,78	1,23	1,15



PLSKR070NE

Lighting performance per lamp

16 W / 1921 lm → per lamp

Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

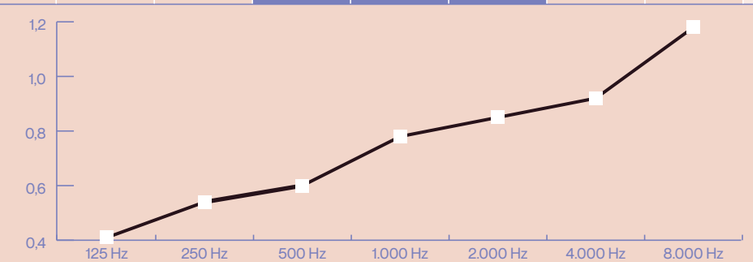
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–7,5%**	-2,8%	-4,4%	**-6,0%**	**-8,2%**	**-8,2%**	-8,0%	-7,5%	-6,5%	-7,5%
2 lamps **–13,9%**	-5,5%	-8,4%	**-11,3%**	**-15,2%**	**-15,2%**	-14,8%	-13,9%	-12,1%	-13,9%
3 lamps **–19,5%**	-8,0%	-12,1%	**-16,1%**	**-21,2%**	**-21,2%**	-20,7%	-19,5%	-17,0%	-19,5%

Equivalent Sound Absorption Area (A) in m² per lamp

FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,41	0,54	**0,60**	**0,78**	**0,85**	0,92	1,18	0,75	0,74



PLSKR070

Lighting performance per lamp

16 W / 1921 lm → per lamp

Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

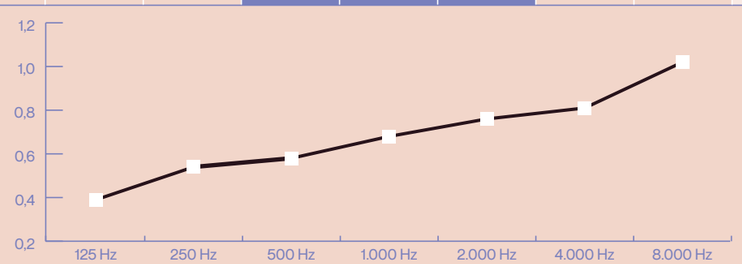
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–6,8%**	-2,7%	-3,6%	**-5,8%**	**-7,2%**	**-7,4%**	-7,1%	-6,5%	-5,8%	-6,8%
2 lamps **–12,8%**	-5,2%	-7,0%	**-11,0%**	**-13,5%**	**-13,8%**	-13,3%	-12,3%	-10,9%	-12,8%
3 lamps **–18,0%**	-7,6%	-10,1%	**-15,6%**	**-19,0%**	**-19,4%**	-18,7%	-17,4%	-15,4%	-18,0%

Equivalent Sound Absorption Area (A) in m^2 per lamp

FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,39	0,44	**0,58**	**0,68**	**0,76**	0,81	1,02	0,67	0,67



Note

Acoustic performance Ukiyo

Axolight

From noise to acoustic comfort, how to do it?

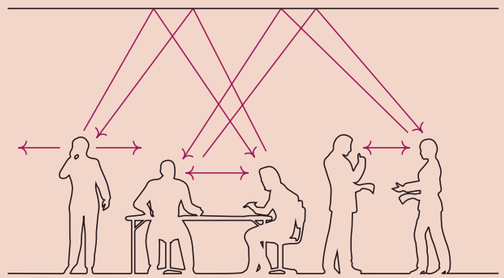
Noise is commonly identified as an unwanted and disturbing sound, for example buzzing (an incomprehensible and continuous hum) from a moving car, a drill, etc.

Acoustic comfort is the psychophysical condition of wellbeing a person finds themselves in when they are in an environment where noise is limited.

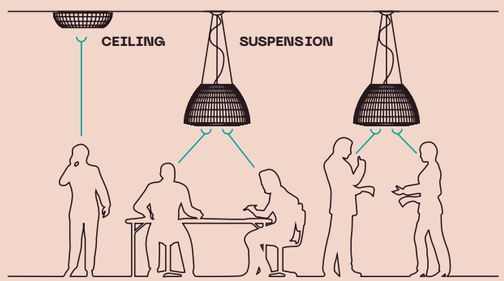
The measurement of **Reverberation Time (RT60)**, or the time required for sound to become imperceptible, allows the acoustic comfort to be measured in any given environment: the higher the reverberation time, the greater the perception of sound.

A setting with reflective materials (such as marble, cement, glass etc) and/or irregular geometric shapes will have high Reverberation Time and therefore tend to be noisy.

Noise



Acoustic comfort



Introducing sound-absorbing objects into an environment (objects which can reduce the Reverberation Time), is the way in which acoustic comfort can be reached without making any structural changes to the space itself.

How can the efficiency of an object's sound absorbency be measured?

By measuring the Reverberation Time (RT60) of an enclosed environment both with and without sound-absorbing objects, then taking into account the difference, it is possible to calculate their efficiency.

In order to calculate the Reverberation Time (RT60), the Volume of the enclosed space (V) and the cumulative **Equivalent Sound Absorbing Area (A)** of all the surfaces and objects present in the environment must be known:

$$RT60 = 0{,}161 \times (V/A)$$

The Equivalent Sound Absorbing Area (A) of each single object (i.e. lamp) takes into account the overall sound-absorbing properties of the materials the object is made of, as well as its size and shape.


Lida Chaulet / Ronald Tilleman

To identify the sound-absorbing properties of a single material (not the object in its entirety) it is possible to use the **Sound Absorption Coefficient (α)** whose value can vary from 0, where all incident sound is reflected, to 1, where all incident sound is absorbed. Therefore, if the value of α equals 0,5, 50% of the incident sound on the material's surface is absorbed.

Ukiyo

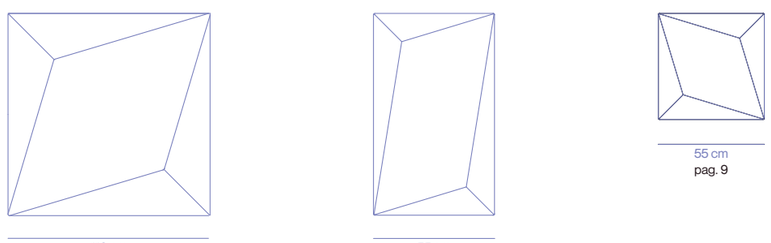
Manuel Vivian

from 0,17
to 0,77
Equivalent Sound Absorbing Area (A)

from –1,8%
to –20,1%
Reduction of noise

Average 500÷2.000 Hz

Index



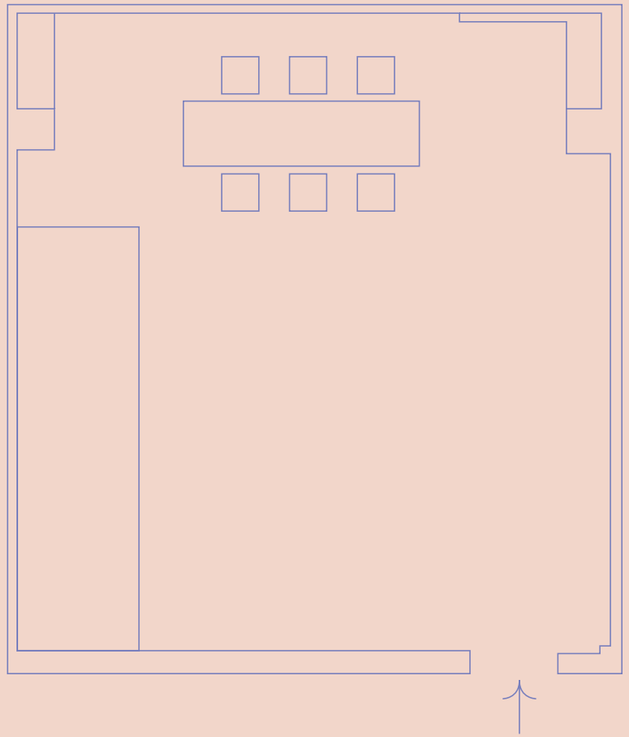
110 cm
pag. 7

55 cm
pag. 7

55 cm
pag. 9

Where we tested our products?

The environment used to measure the sound-absorbing properties the Axolight lamps is shown below:



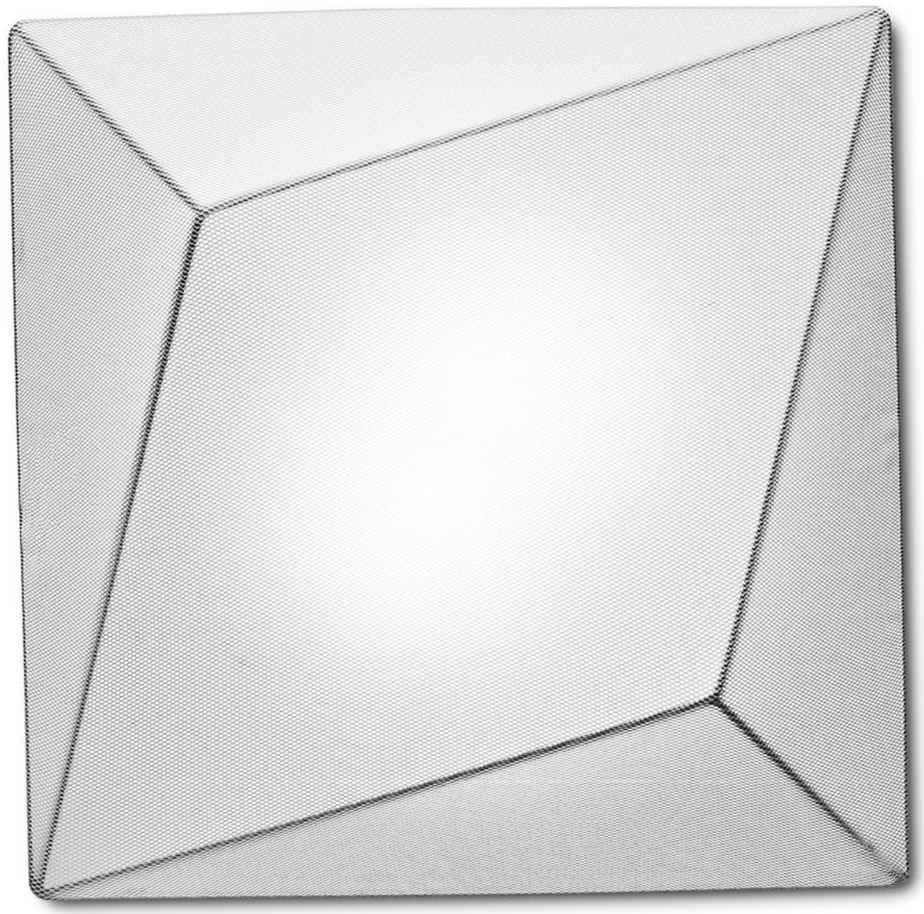
Room data

L → 8 m
W → 6 m
H → 3,1 m

→150 m³

The Reverberation Times of the room, with sounds of varying frequencies emitted from an audio source, were measured, first without acoustic lamps, then with 1, 2 or 3 lamps added at a time.

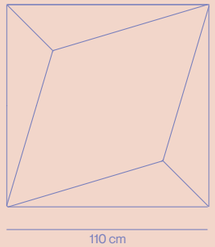
This is how the reduction of sound in the room was calculated.



PLUKIYOG

Lighting performance per lamp

48 W / 5763 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

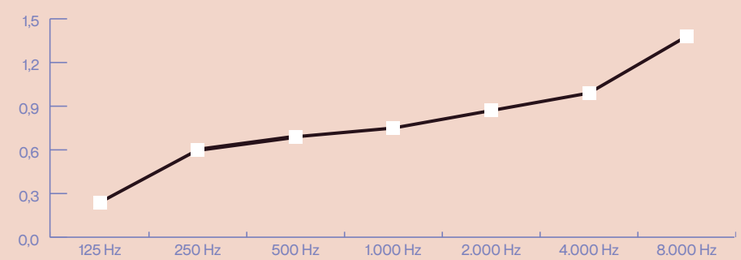
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–7,7%**	-1,7%	-4,9%	**-6,8%**	**-7,9%**	**-8,4%**	-8,6%	-8,7%	-6,7%	-7,7%
2 lamps **–14,3%**	-3,3%	-9,3%	**-12,8%**	**-14,7%**	**-15,5%**	-15,8%	-15,9%	-12,5%	-14,3%
3 lamps **–20,1%**	-4,8%	-13,3%	**-18,1%**	**-20,5%**	**-21,6%**	-21,9%	-22,1%	-17,5%	-20,1%

Equivalent Sound Absorption Area (A) in m² per lamp

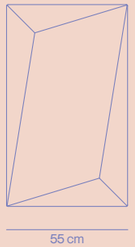
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,24	0,60	**0,69**	**0,75**	**0,87**	0,99	1,38	0,79	0,77



PLUKI110

Lighting performance per lamp

48 W / 5763 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

After

Reduction of Reverberation Time (RT60) in %

1 lamp **–5,0%**

	-1,3%	-3,0%	**-4,3%**	**-5,2%**	**-5,4%**	-5,2%	-4,5%	-4,1%	-5,0%

2 lamps **–9,5%**

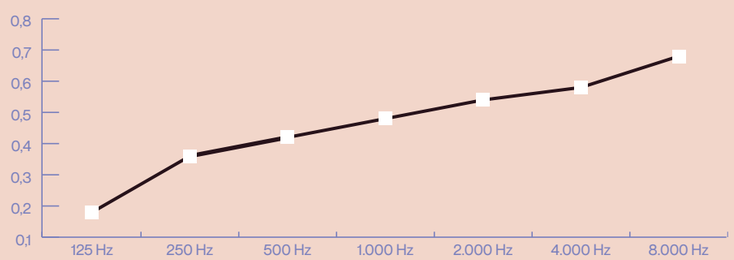
	-2,5%	-5,8%	**-8,2%**	**-9,9%**	**-10,2%**	-9,9%	-8,5%	-7,9%	-9,5%

3 lamps **–13,5%**

	-3,7%	-8,4%	**-11,8%**	**-14,2%**	**-14,6%**	-14,1%	-12,3%	-11,3%	-13,5%

Equivalent Sound Absorption Area (A) in m² per lamp

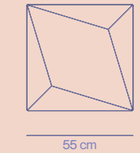
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,18	0,36	**0,42**	**0,48**	**0,54**	0,58	0,68	0,46	0,48



PLUKIYOP

Lighting performance per lamp

19,5 W / 2418 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
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After

Reduction of Reverberation Time (RT60) in %

1 lamp **–1,8%**

	-0,6%	-1,0%	**-1,5%**	**-1,8%**	**-2,1%**	-2,9%	-3,6%	-1,9%	-1,8%

2 lamps **–3,5%**

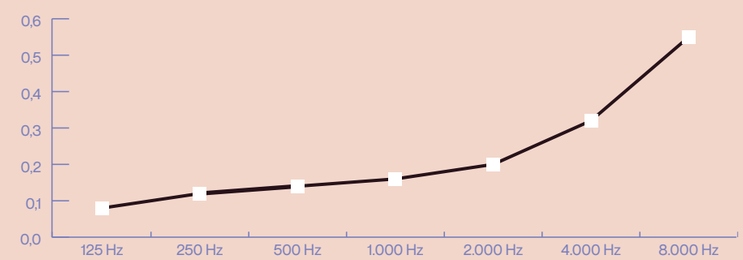
	-1,1%	-2,0%	**-2,9%**	**-3,5%**	**-4,1%**	-5,7%	-7,0%	-3,8%	-3,5%

3 lamps **–5,2%**

	-1,7%	-3,0%	**-4,3%**	**-5,2%**	**-6,0%**	-8,3%	-10,2%	-5,5%	-5,2%

Equivalent Sound Absorption Area (A) in m² per lamp

FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,08	0,12	**0,14**	**0,16**	**0,20**	0,32	0,55	0,22	0,17



Acoustic performance U-Light

Axolight

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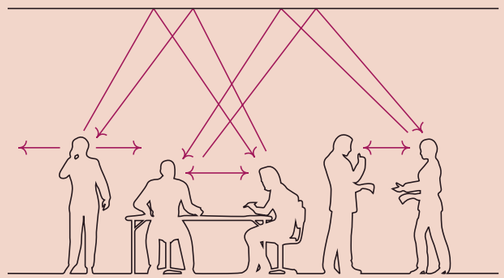
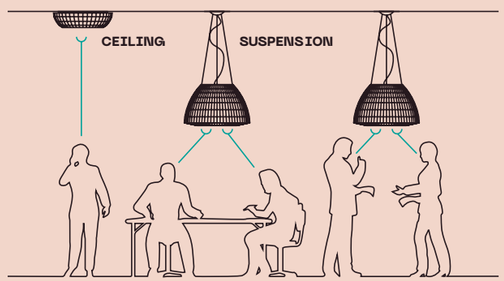
Noise



Acoustic comfort



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U-Light

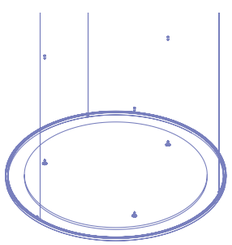
Timo Ripatti

from 0,54
to 3,11
Equivalent Sound Absorbing Area (A)

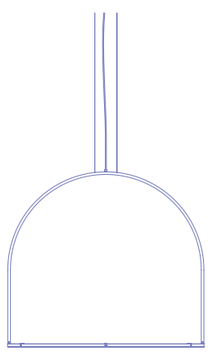
from -5,6%
to -49,6%
Reduction of noise

Average 500÷2.000 Hz

Index



pag. 7-10



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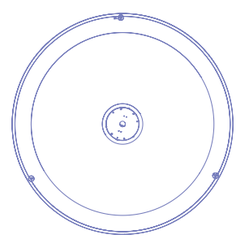

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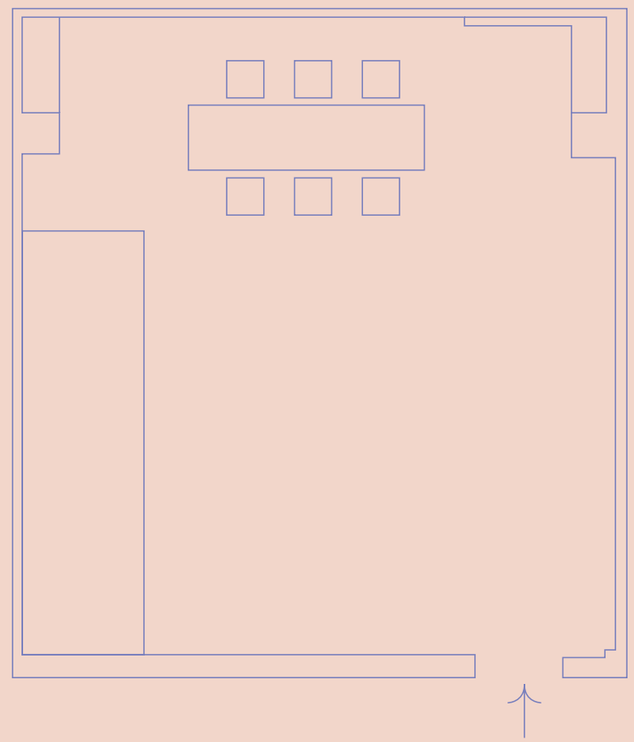
Where we tested our products?

The environment used to measure the sound-absorbing properties the Axolight lamps is shown below:



Room data

L → 8 m
W → 6 m
H → 3,1 m

→ 150 m^3

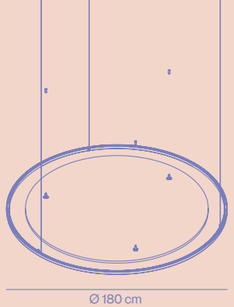
The Reverberation Times of the room, with sounds of varying frequencies emitted from an audio source, were measured, first without acoustic lamps, then with 1, 2 or 3 lamps added at a time.

This is how the reduction of sound in the room was calculated.

SPULA180

Lighting performance per lamp

153 W / 9800 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

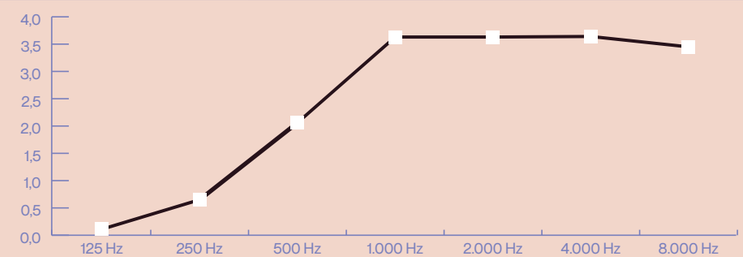
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–25,0%**	-0,8%	-5,3%	**-18,0%**	**-29,4%**	**-27,7%**	-25,6%	-19,2%	-18,0%	-25,0%
2 lamps **–39,8%**	-1,5%	-10,0%	**-30,5%**	**-45,4%**	**-43,4%**	-40,8%	-32,2%	-29,1%	-39,8%
3 lamps **–49,6%**	-2,3%	-14,3%	**-39,7%**	**-55,5%**	**-53,5%**	-50,8%	-41,6%	-36,8%	-49,6%

Equivalent Sound Absorption Area (A) in m^2 per lamp

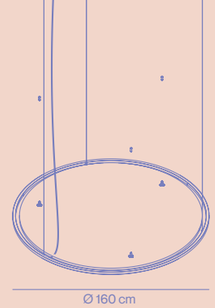
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,11	0,65	**2,06**	**3,63**	**3,63**	3,64	3,45	2,45	3,11



SPULA160

Lighting performance per lamp

125 W / 8575 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

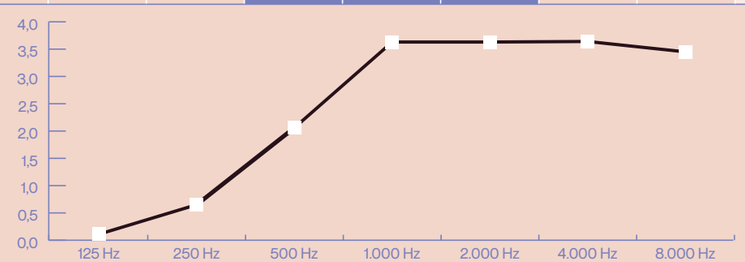
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–25,0%**	-0,8%	-5,3%	**-18,0%**	**-29,4%**	**-27,7%**	-25,6%	-19,2%	-18,0%	-25,0%
2 lamps **–39,8%**	-1,5%	-10,0%	**-30,5%**	**-45,4%**	**-43,4%**	-40,8%	-32,2%	-29,1%	-39,8%
3 lamps **–49,6%**	-2,3%	-14,3%	**-39,7%**	**-55,5%**	**-53,5%**	-50,8%	-41,6%	-36,8%	-49,6%

Equivalent Sound Absorption Area (A) in m² per lamp

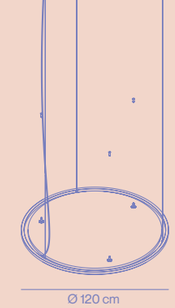
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,11	0,65	**2,06**	**3,63**	**3,63**	3,64	3,45	2,45	3,11



SPULA120

Lighting performance per lamp

86 W / 7354 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

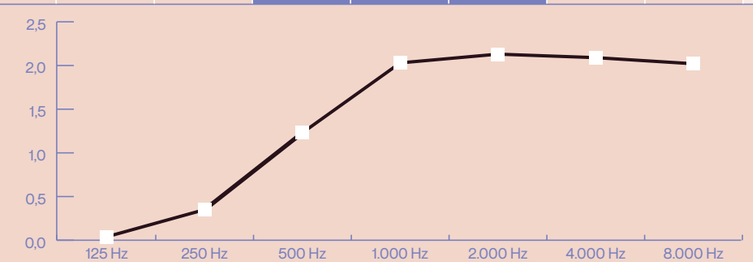
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–16,3%**	-0,3%	-2,9%	**-11,6%**	**-18,9%**	**-18,3%**	-16,5%	-12,2%	-11,5%	-16,3%
2 lamps **–27,8%**	-0,6%	-5,6%	**-20,8%**	**-31,7%**	**-31,0%**	-28,3%	-21,7%	-20,0%	-27,8%
3 lamps **–36,5%**	-0,9%	-8,2%	**-28,2%**	**-41,1%**	**-40,3%**	-37,2%	-29,3%	-26,5%	-36,5%

Equivalent Sound Absorption Area (A) in m² per lamp

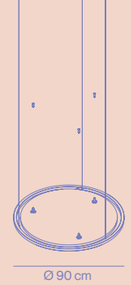
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,04	0,35	**1,23**	**2,03**	**2,13**	2,09	2,02	1,41	1,80



SPULA090

Lighting performance per lamp

63 W / 4904 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

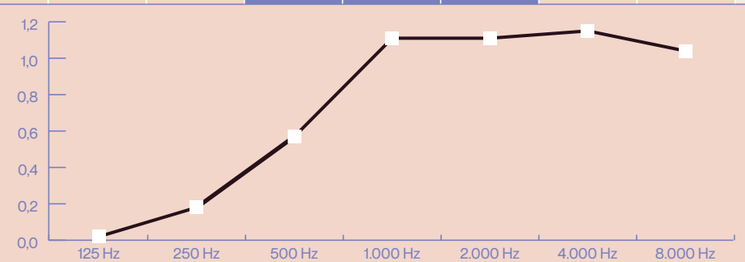
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–9,2%**	-0,1%	-1,5%	**-5,7%**	**-11,3%**	**-10,5%**	-9,8%	-6,6%	-6,5%	-9,2%
2 lamps **–16,8%**	-0,2%	-3,0%	**-10,9%**	**-20,3%**	**-19,0%**	-17,8%	-12,5%	-12,0%	-16,8%
3 lamps **–23,1%**	-0,4%	-4,4%	**-15,5%**	**-27,7%**	**-26,1%**	-24,6%	-17,6%	-16,6%	-23,1%

Equivalent Sound Absorption Area (A) in m² per lamp

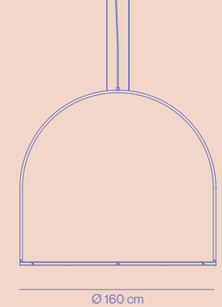
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,02	0,18	**0,57**	**1,11**	**1,11**	1,15	1,04	0,74	0,93



SPULI160

Lighting performance per lamp

125 W / 8575 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

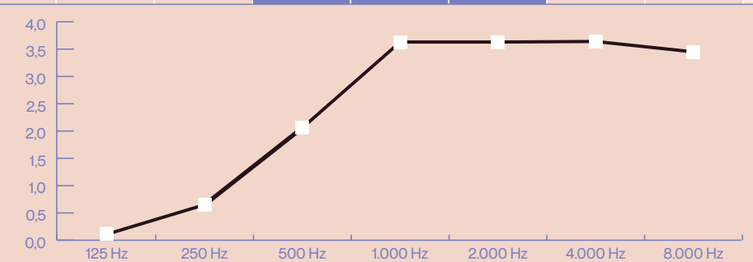
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–25,0%**	-0,8%	-5,3%	**-18,0%**	**-29,4%**	**-27,7%**	-25,6%	-19,2%	-18,0%	-25,0%
2 lamps **–39,8%**	-1,5%	-10,0%	**-30,5%**	**-45,4%**	**-43,4%**	-40,8%	-32,2%	-29,1%	-39,8%
3 lamps **–49,6%**	-2,3%	-14,3%	**-39,7%**	**-55,5%**	**-53,5%**	-50,8%	-41,6%	-36,8%	-49,6%

Equivalent Sound Absorption Area (A) in m² per lamp

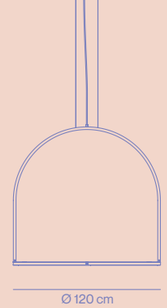
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,11	0,65	**2,06**	**3,63**	**3,63**	3,64	3,45	2,45	3,11



SPULI120

Lighting performance per lamp

86 W / 7354 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

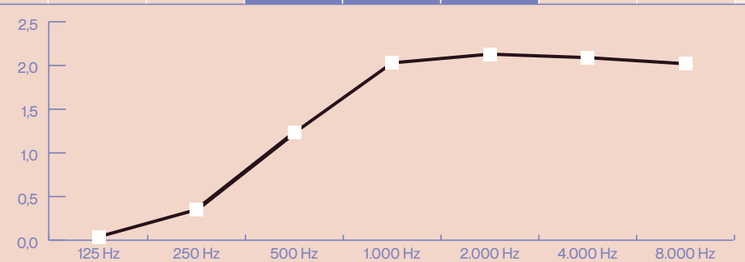
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–16,3%**	-0,3%	-2,9%	**-11,6%**	**-18,9%**	**-18,3%**	-16,5%	-12,2%	-11,5%	-16,3%
2 lamps **–27,8%**	-0,6%	-5,6%	**-20,8%**	**-31,7%**	**-31,0%**	-28,3%	-21,7%	-20,0%	-27,8%
3 lamps **–36,5%**	-0,9%	-8,2%	**-28,2%**	**-41,1%**	**-40,3%**	-37,2%	-29,3%	-26,5%	-36,5%

Equivalent Sound Absorption Area (A) in m² per lamp

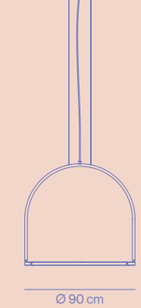
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,04	0,35	**1,23**	**2,03**	**2,13**	2,09	2,02	1,41	1,80



SPULI090

Lighting performance per lamp

63 W / 4904 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

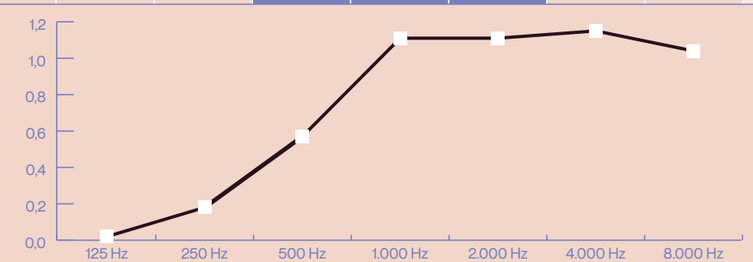
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–9,2%**	-0,1%	-1,5%	**-5,7%**	**-11,3%**	**-10,5%**	-9,8%	-6,6%	-6,5%	-9,2%
2 lamps **–16,8%**	-0,2%	-3,0%	**-10,9%**	**-20,3%**	**-19,0%**	-17,8%	-12,5%	-12,0%	-16,8%
3 lamps **–23,1%**	-0,4%	-4,4%	**-15,5%**	**-27,7%**	**-26,1%**	-24,6%	-17,6%	-16,6%	-23,1%

Equivalent Sound Absorption Area (A) in m² per lamp

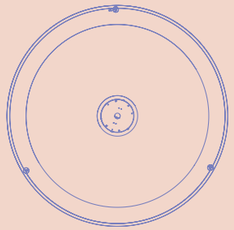
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,02	0,18	**0,57**	**1,11**	**1,11**	1,15	1,04	0,74	0,93



PLUL2180

Lighting performance per lamp

153 W / 9800 lm → per lamp



Ø 180cm

Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

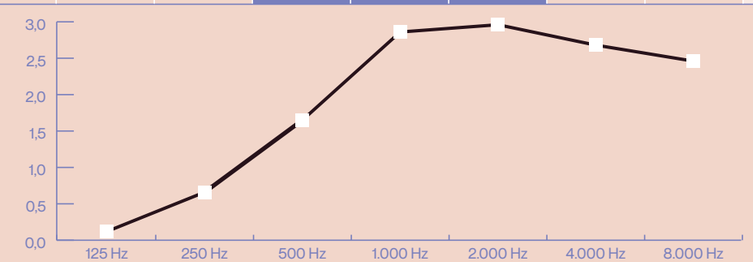
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–21,1%**	-0,9%	-5,3%	**-14,9%**	**-24,7%**	**-23,8%**	-20,2%	-14,4%	-14,9%	-21,1%
2 lamps **–34,7%**	-1,7%	-10,1%	**-26,0%**	**-39,6%**	**-38,4%**	-33,7%	-25,2%	-25,0%	-34,7%
3 lamps **–44,1%**	-2,6%	-14,4%	**-34,5%**	**-49,6%**	**-48,3%**	-43,2%	-33,6%	-32,3%	-44,1%

Equivalent Sound Absorption Area (A) in m² per lamp

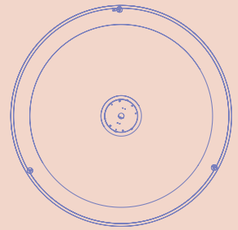
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,12	0,66	**1,65**	**2,86**	**2,96**	2,68	2,46	1,91	2,49



PLUL1180

Lighting performance per lamp

153 W / 9800 lm → per lamp



Ø 180cm

Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

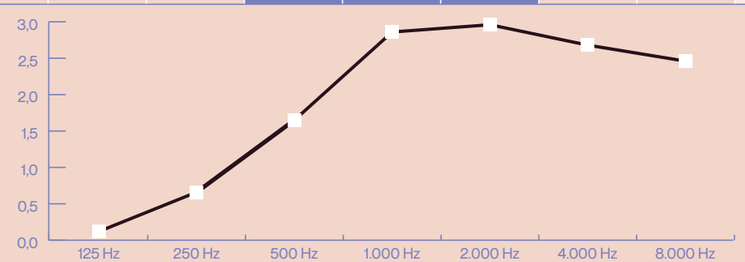
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–21,1%**	-0,9%	-5,3%	**-14,9%**	**-24,7%**	**-23,8%**	-20,2%	-14,4%	-14,9%	-21,1%
2 lamps **–34,7%**	-1,7%	-10,1%	**-26,0%**	**-39,6%**	**-38,4%**	-33,7%	-25,2%	-25,0%	-34,7%
3 lamps **–44,1%**	-2,6%	-14,4%	**-34,5%**	**-49,6%**	**-48,3%**	-43,2%	-33,6%	-32,3%	-44,1%

Equivalent Sound Absorption Area (A) in m² per lamp

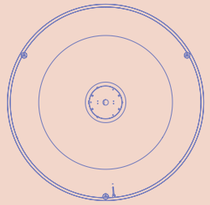
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,12	0,66	**1,65**	**2,86**	**2,96**	2,68	2,46	1,91	2,49



PLUL2160

Lighting performance per lamp

125 W / 8575 lm → per lamp



Ø 160 cm

Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

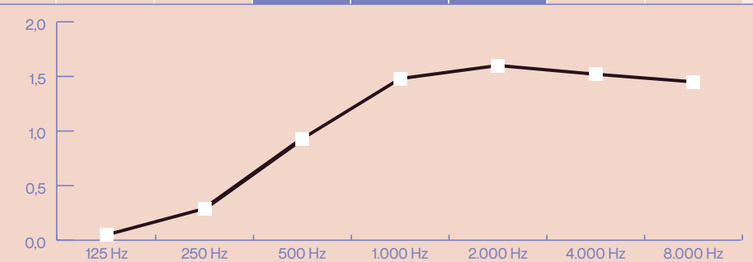
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–12,7%**	-0,3%	-2,4%	**-9,0%**	**-14,5%**	**-14,5%**	-12,6%	-9,0%	-8,9%	-12,7%
2 lamps **–22,4%**	-0,7%	-4,7%	**-16,5%**	**-25,4%**	**-25,3%**	-22,3%	-16,6%	-15,9%	-22,4%
3 lamps **–30,1%**	-1,0%	-6,9%	**-22,8%**	**-33,8%**	**-33,6%**	-30,1%	-23,0%	-21,6%	-30,1%

Equivalent Sound Absorption Area (A) in m² per lamp

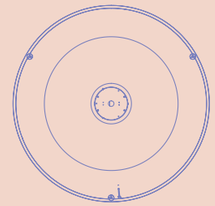
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,05	0,29	**0,93**	**1,48**	**1,60**	1,52	1,45	1,04	1,34



PLUL1160

Lighting performance per lamp

125 W / 8575 lm → per lamp



Ø 160 cm

Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

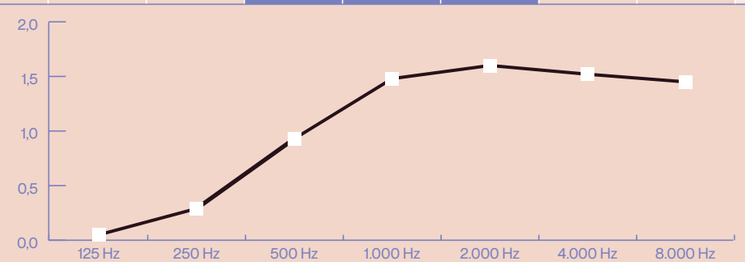
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–12,7%**	-0,3%	-2,4%	**-9,0%**	**-14,5%**	**-14,5%**	-12,6%	-9,0%	-8,9%	-12,7%
2 lamps **–22,4%**	-0,7%	-4,7%	**-16,5%**	**-25,4%**	**-25,3%**	-22,3%	-16,6%	-15,9%	-22,4%
3 lamps **–30,1%**	-1,0%	-6,9%	**-22,8%**	**-33,8%**	**-33,6%**	-30,1%	-23,0%	-21,6%	-30,1%

Equivalent Sound Absorption Area (A) in m² per lamp

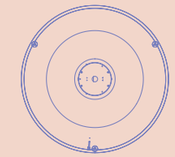
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,05	0,29	**0,93**	**1,48**	**1,60**	1,52	1,45	1,04	1,34



PLUL2120

Lighting performance per lamp

86 W / 7354 lm → per lamp



Ø 120cm

Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

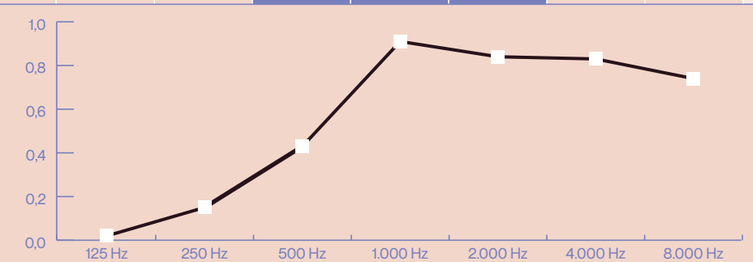
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–7,3%**	-0,1%	-1,3%	**-4,4%**	**-9,4%**	**-8,1%**	-7,3%	-4,9%	-5,1%	-7,3%
2 lamps **–13,6%**	-0,3%	-2,5%	**-8,4%**	**-17,2%**	**-15,0%**	-13,6%	-9,3%	-9,5%	-13,6%
3 lamps **–19,0%**	-0,4%	-3,7%	**-12,1%**	**-23,8%**	**-21,0%**	-19,2%	-13,3%	-13,3%	-19,0%

Equivalent Sound Absorption Area (A) in m² per lamp

FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,02	0,15	**0,43**	**0,91**	**0,84**	0,83	0,74	0,56	0,73



PLUL1120

Lighting performance per lamp

86 W / 7354 lm → per lamp

Ø 120cm

Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

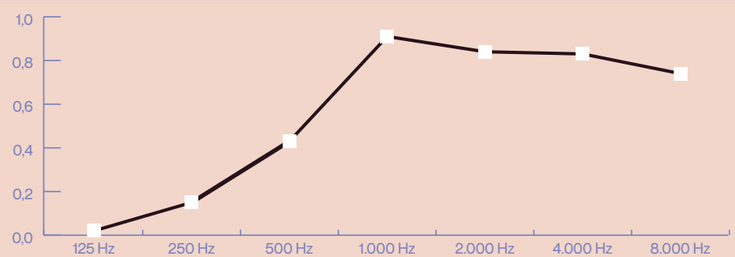
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–7,3%**	-0,1%	-1,3%	**-4,4%**	**-9,4%**	**-8,1%**	-7,3%	-4,9%	-5,1%	-7,3%
2 lamps **–13,6%**	-0,3%	-2,5%	**-8,4%**	**-17,2%**	**-15,0%**	-13,6%	-9,3%	-9,5%	-13,6%
3 lamps **–19,0%**	-0,4%	-3,7%	**-12,1%**	**-23,8%**	**-21,0%**	-19,2%	-13,3%	-13,3%	-19,0%

Equivalent Sound Absorption Area (A) in m² per lamp

FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,02	0,15	**0,43**	**0,91**	**0,84**	0,83	0,74	0,56	0,73



PLUL2090

Lighting performance per lamp

63 W / 4904 lm → per lamp

Ø 90cm

Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

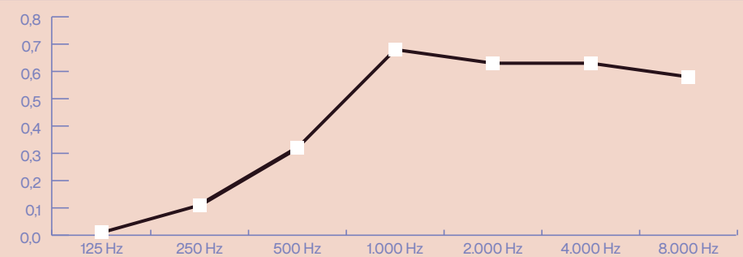
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–5,6%**	-0,1%	-0,9%	**-3,3%**	**-7,2%**	**-6,2%**	-5,6%	-3,8%	-3,9%	-5,6%
2 lamps **–10,5%**	-0,1%	-1,8%	**-6,4%**	**-13,5%**	**-11,7%**	-10,6%	-7,4%	-7,4%	-10,5%
3 lamps **–15,0%**	-0,2%	-2,7%	**-9,3%**	**-19,0%**	**-16,6%**	-15,1%	-10,7%	-10,5%	-15,0%

Equivalent Sound Absorption Area (A) in m² per lamp

FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,01	0,11	**0,32**	**0,68**	**0,63**	0,63	0,58	0,42	0,54



PLUL1090

Lighting performance per lamp

63 W / 4904 lm → per lamp

Ø 90cm

Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

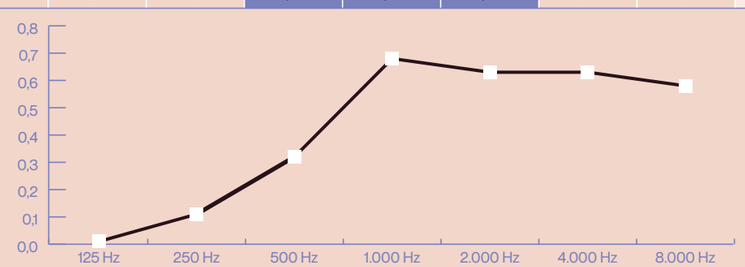
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–5,6%**	-0,1%	-0,9%	**-3,3%**	**-7,2%**	**-6,2%**	-5,6%	-3,8%	-3,9%	-5,6%
2 lamps **–10,5%**	-0,1%	-1,8%	**-6,4%**	**-13,5%**	**-11,7%**	-10,6%	-7,4%	-7,4%	-10,5%
3 lamps **–15,0%**	-0,2%	-2,7%	**-9,3%**	**-19,0%**	**-16,6%**	-15,1%	-10,7%	-10,5%	-15,0%

Equivalent Sound Absorption Area (A) in m^2 per lamp

FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,01	0,11	**0,32**	**0,68**	**0,63**	0,63	0,58	0,42	0,54



Note

Acoustic performance Velvet

Axolight

From noise to acoustic comfort, how to do it?

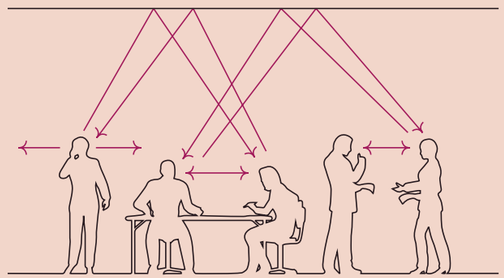
Noise is commonly identified as an unwanted and disturbing sound, for example buzzing (an incomprehensible and continuous hum) from a moving car, a drill, etc.

Acoustic comfort is the psychophysical condition of wellbeing a person finds themselves in when they are in an environment where noise is limited.

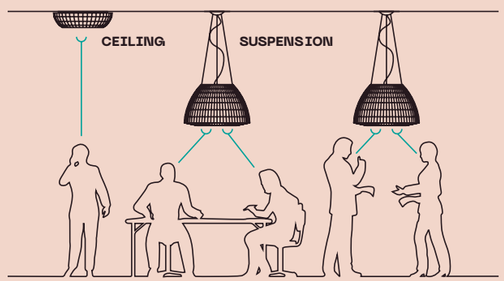
The measurement of **Reverberation Time (RT60)**, or the time required for sound to become imperceptible, allows the acoustic comfort to be measured in any given environment: the higher the reverberation time, the greater the perception of sound.

A setting with reflective materials (such as marble, cement, glass etc) and/or irregular geometric shapes will have high Reverberation Time and therefore tend to be noisy.

Noise



Acoustic comfort



Introducing sound-absorbing objects into an environment (objects which can reduce the Reverberation Time), is the way in which acoustic comfort can be reached without making any structural changes to the space itself.

How can the efficiency of an object's sound absorbency be measured?

By measuring the Reverberation Time (RT60) of an enclosed environment both with and without sound-absorbing objects, then taking into account the difference, it is possible to calculate their efficiency.

In order to calculate the Reverberation Time (RT60), the Volume of the enclosed space (V) and the cumulative **Equivalent Sound Absorbing Area (A)** of all the surfaces and objects present in the environment must be known:

$$RT60 = 0{,}161 \times (V/A)$$

The Equivalent Sound Absorbing Area (A) of each single object (i.e. lamp) takes into account the overall sound-absorbing properties of the materials the object is made of, as well as its size and shape.


Lida Chaulet / Ronald Tilleman

To identify the sound-absorbing properties of a single material (not the object in its entirety) it is possible to use the **Sound Absorption Coefficient (α)** whose value can vary from 0, where all incident sound is reflected, to 1, where all incident sound is absorbed. Therefore, if the value of α equals 0,5, 50% of the incident sound on the material's surface is absorbed.

Velvet

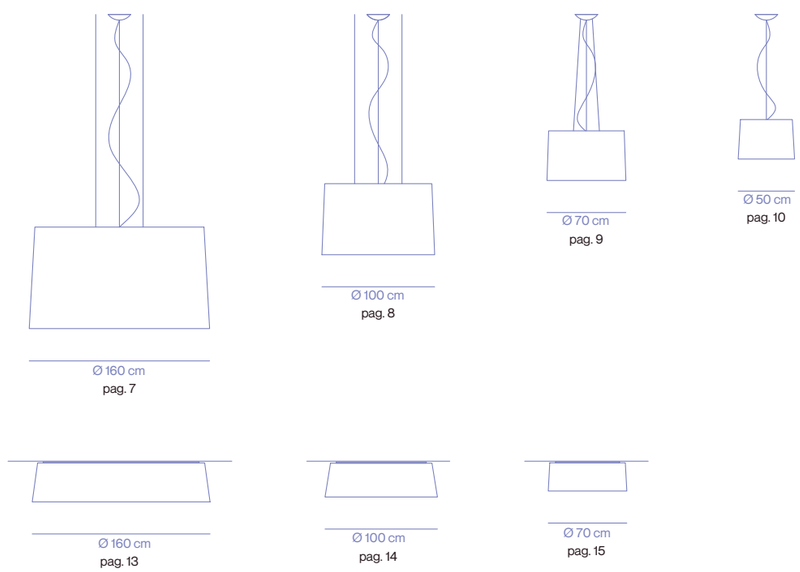
Manuel Vivian

from 0,23
to 2,05
Equivalent Sound Absorbing Area (A)

from −2,5%
to −40,0%
Reduction of noise

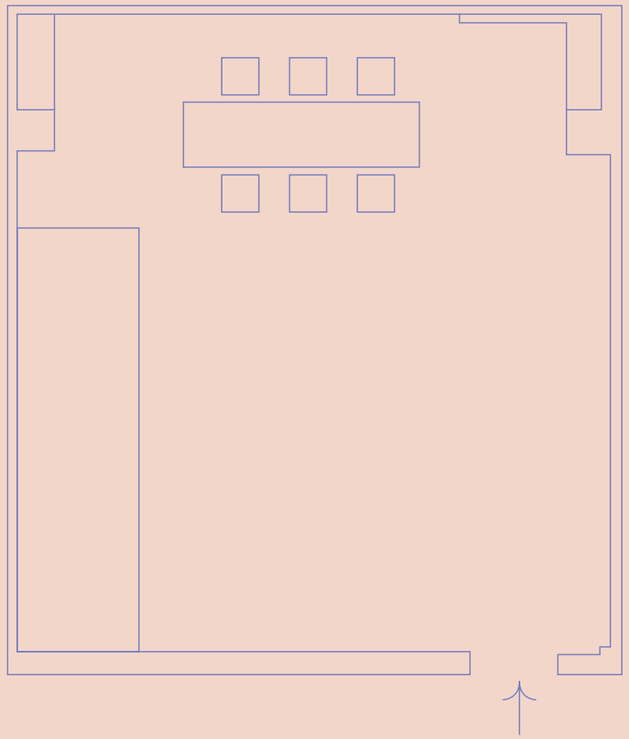
Average 500÷2.000 Hz

Index



Where we tested our products?

The environment used to measure the sound-absorbing properties the Axolight lamps is shown below:



Room data

L → 8 m
W → 6 m
H → 3,1 m

→ 150 m³

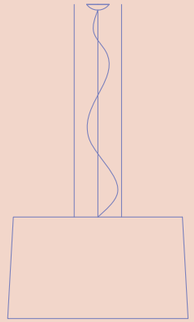
The Reverberation Times of the room, with sounds of varying frequencies emitted from an audio source, were measured, first without acoustic lamps, then with 1, 2 or 3 lamps added at a time.

This is how the reduction of sound in the room was calculated.

SPVEL160

Lighting performance per lamp

98 W / 10719 lm → per lamp



Ø 160 cm

Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

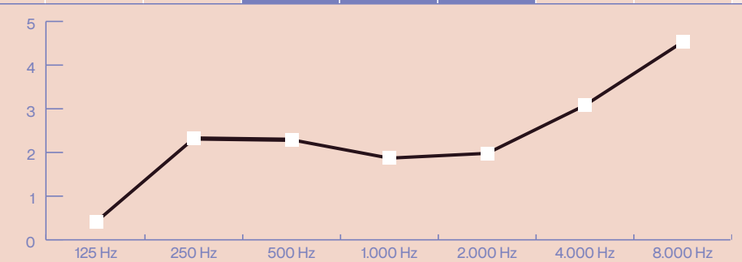
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–18,2%**	-9,0%	-16,5%	**-19,6%**	**-17,7%**	**-17,3%**	-22,6%	-23,7%	-18,1%	-18,2%
2 lamps **–30,8%**	-16,6%	-28,3%	**-32,8%**	**-30,0%**	**-29,5%**	-36,8%	-38,3%	-30,3%	-30,8%
3 lamps **–40,0%**	-22,9%	-37,2%	**-42,2%**	**-39,1%**	**-38,5%**	-46,7%	-48,3%	-39,3%	-40,0%

Equivalent Sound Absorption Area (A) in m² per lamp

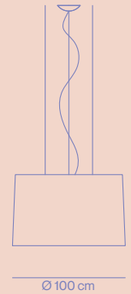
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	1,41	2,32	**2,29**	**1,87**	**1,98**	3,08	4,53	2,50	2,05



SPVEL100

Lighting performance per lamp

98 W / 10719 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

After

Reduction of Reverberation Time (RT60) in %

1 lamp **–8,8%**

	-3,9%	-7,1%	**-9,2%**	**-8,9%**	**-8,4%**	-10,7%	-11,4%	-8,5%	-8,8%

2 lamps **–16,2%**

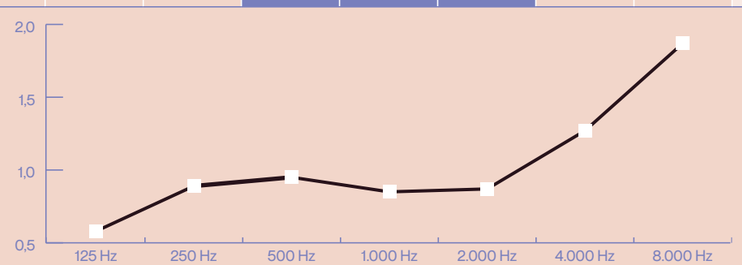
	-7,5%	-13,2%	**-16,8%**	**-16,3%**	**-15,5%**	-19,4%	-20,4%	-15,6%	-16,2%

3 lamps **–22,5%**

	-10,9%	-18,5%	**-23,3%**	**-22,6%**	**-21,6%**	-26,5%	-27,8%	-21,6%	-22,5%

Equivalent Sound Absorption Area (A) in m² per lamp

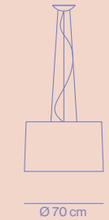
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,58	0,89	**0,95**	**0,85**	**0,87**	1,27	1,87	1,04	0,89



SPVEL070

Lighting performance per lamp

20 W / 2452 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

After

Reduction of Reverberation Time (RT60) in %

1 lamp **–6,4%**

	-1,0%	-3,6%	**-5,2%**	**-7,0%**	**-7,2%**	-6,6%	-6,5%	-5,3%	-6,4%

2 lamps **–12,1%**

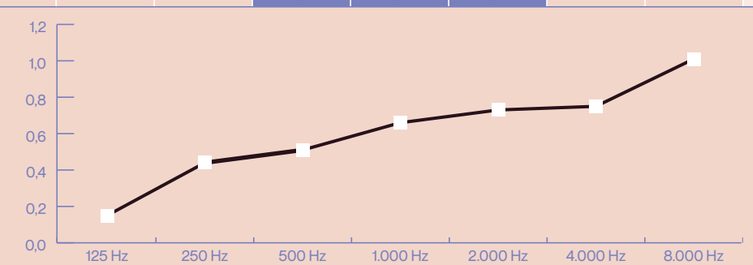
	-2,1%	-7,0%	**-9,8%**	**-13,1%**	**-13,4%**	-12,4%	-12,2%	-10,0%	-12,1%

3 lamps **–17,1%**

	-3,1%	-10,1%	**-14,0%**	**-18,5%**	**-18,8%**	-17,6%	-17,2%	-14,2%	-17,1%

Equivalent Sound Absorption Area (A) in m² per lamp

FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,15	0,44	**0,51**	**0,66**	**0,73**	0,75	1,01	0,61	0,63



SPVEL050

Lighting performance per lamp

16 W / 1921 lm → per lamp

Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

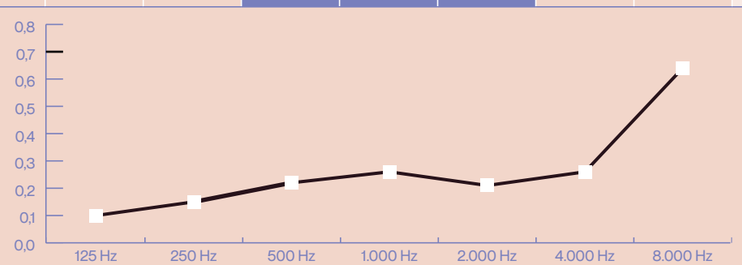
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–2,5%**	-0,7%	-1,3%	**-2,3%**	**-2,9%**	**-2,2%**	-2,4%	-4,2%	-2,3%	-2,5%
2 lamps **–4,8%**	-1,4%	-2,5%	**-4,5%**	**-5,6%**	**-4,2%**	-4,7%	-8,1%	-4,4%	-4,8%
3 lamps **–7,0%**	-2,1%	-3,7%	**-6,6%**	**-8,2%**	**-6,2%**	-6,9%	-11,6%	-6,5%	-7,0%

Equivalent Sound Absorption Area (A) in m² per lamp

FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,10	0,15	**0,22**	**0,26**	**0,21**	0,26	0,64	0,26	0,23

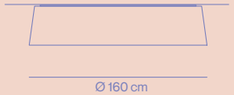


Note

PLVEL160

Lighting performance per lamp

80 W / 9605 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

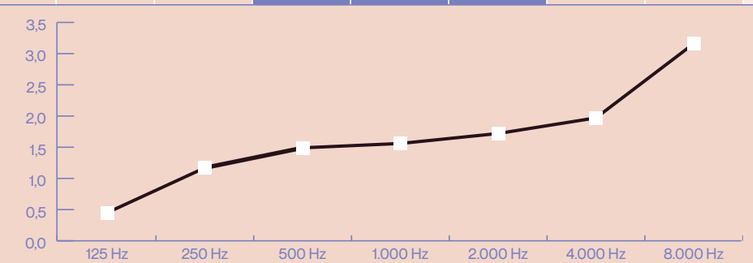
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–14,7%**	-3,1%	-9,1%	**-13,7%**	**-15,2%**	**-15,4%**	-15,7%	-17,8%	-12,8%	-14,7%
2 lamps **–25,7%**	-6,0%	-16,6%	**-24,1%**	**-26,3%**	**-26,6%**	-27,2%	-30,3%	-22,4%	-25,7%
3 lamps **–34,1%**	-8,7%	-23,0%	**-32,2%**	**-34,9%**	**-35,3%**	-35,9%	-39,4%	-29,9%	-34,1%

Equivalent Sound Absorption Area (A) in m² per lamp

FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,45	1,17	**1,49**	**1,56**	**1,72**	1,97	3,16	1,65	1,59



PLVEL100

Lighting performance per lamp

48 W / 5763 lm → per lamp

Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

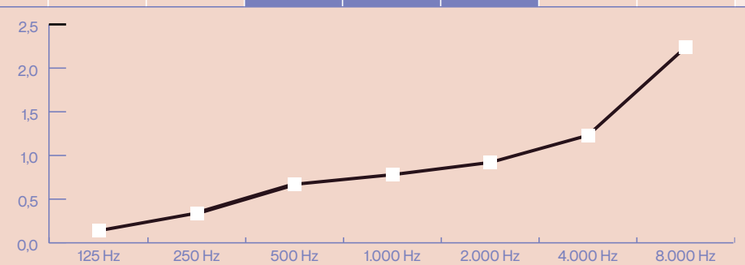
After

Reduction of Reverberation Time (RT60) in %

1 lamp **–7,9%**	-1,0%	-2,8%	**-6,7%**	**-8,2%**	**-8,8%**	-10,4%	-13,3%	-7,3%	-7,9%
2 lamps **–14,6%**	-1,9%	-5,5%	**-12,5%**	**-15,2%**	**-16,3%**	-18,9%	-23,5%	-13,4%	-14,6%
3 lamps **–20,4%**	-2,9%	-8,0%	**-17,6%**	**-21,2%**	**-22,6%**	-25,9%	-31,6%	-18,5%	-20,4%

Equivalent Sound Absorption Area (A) in m² per lamp

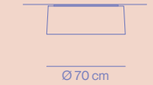
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,14	0,34	**0,67**	**0,78**	**0,92**	1,23	2,24	0,90	0,79



PLVEL070

Lighting performance per lamp

32 W / 3842 lm → per lamp



Acoustic performance

Before

Initial Reverberation Time (RT60) in s

	LOW		MEDIUM			HIGH		AVERAGE	
FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
RT60	1,69	2,05	**2,56**	**2,75**	**2,53**	2,27	1,65	2,21	2,61

After

Reduction of Reverberation Time (RT60) in %

1 lamp **–6,4%**	-0,8%	-1,8%	**-2,8%**	**-3,5%**	**-3,8%**	-4,5%	-7,3%	-3,5%	-3,4%
2 lamps **–12,1%**	-1,7%	-3,6%	**-5,4%**	**-6,8%**	**-7,2%**	-8,6%	-13,6%	-6,7%	-6,5%
3 lamps **–17,1%**	-2,5%	-5,3%	**-7,9%**	**-9,9%**	**-10,5%**	-12,4%	-19,1%	-9,7%	-9,4%

Equivalent Sound Absorption Area (A) in m² per lamp

FREQUENCY	125 HZ	250 HZ	**500 HZ**	**1000 HZ**	**2000 HZ**	4000 HZ	8000 HZ	125-8000 HZ	500-2000 HZ
A	0,12	0,22	**0,27**	**0,32**	**0,37**	0,50	1,15	0,42	0,32