DATASHEETS

HOW IS THE EQUIPMENT MEASURED ?

ARE WE CERTAIN THAT WE KNOW HOW TO INTERPRET IT AND FIND WHAT WE REALLY NEED IN IT?

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DATASHEETS

The term datasheet indicates the documentation that summarizes the characteristics of a component (for example an electronic or mechanical component), an apparatus (such as a power supply), a software or also a chemical compound. Usually the information can be found at the manufacturer's or on specialized sites.

The datasheet is generally composed of:
Name of manufacturer
Name of the component
Brief description of the component highlighting the main features and any approvals
Indications on the index revision datasheet or last updated. For new components we often will read “Preliminary” and it should be noted that the component information may be incomplete (in some parameters sometimes appears the initials TBD "to be determined", referring to information or details not yet defined) and that are subject to variations.
If information about the structure of the component using function blocks with figures or details for the various functions.
Instructions for use of the component. Often this information is provided in a separate document to the complexity or for sharing with multiple components (user manual).

Technical features:
Nominal.
Absolute maximum ratings (or Limiting values). Is information which, if exceeded, may cause permanent damage to the component. This does not conclusively show that the conditions mentioned component functions correctly: why we need to stay within closer ties indicated in the remainder of the datasheet.

Ordering information (purchase information): Instructions (precise code) to order the component (which may vary depending on the type of container, the temperature range of operation chosen, the quantity of components in the package, to a particular selection, etc.).

Mechanical data weights and dimensions with or without package

Revision history: indication of revisions datasheet (not always present and only for complex components) with indication of changes
Errata corrige: any errors in previous editions of the datasheet
Disclaimer (disclaimer) on any errors or changes to the data illustrated without notice
Copyright information

DATASHEETS

But today we are at Audioforum @ ISE and we will discuss the technical features of some audio equipment, as can be found in datasheets, as should be read, as should be used and where we need to be careful.

While not nominally commercial documents (brochures) those can affect the purchase from system integrators: YES THEY ARE ALSO COMMERCIAL DOCUMENTS (we'll see)

We will see some “copy-paste” original datasheets, good and bad examples.

Our questions are:

WHAT DO WE NEED TO FIND IN A DATASHEET ?

HOW SUITABLE IS IT ?

Our goal is to understand if the equipment fulfils our needs.

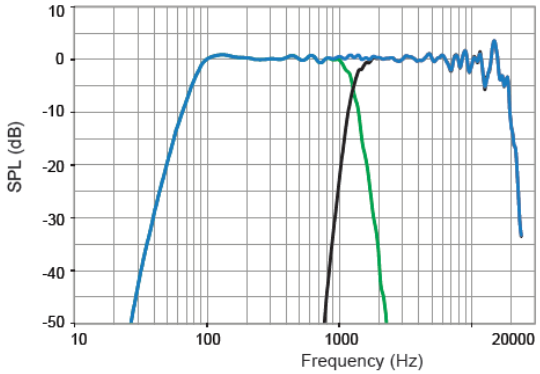
DATASHEETS

Frequency response - bandwidth + response curve

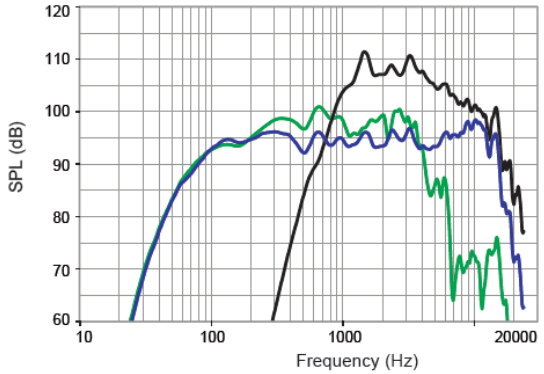
EXAMPLE 1: 2 way loudspeaker passive or bi-amped 12” woofer, 3” driver

Operating Range: 65 Hz to 19 kHz

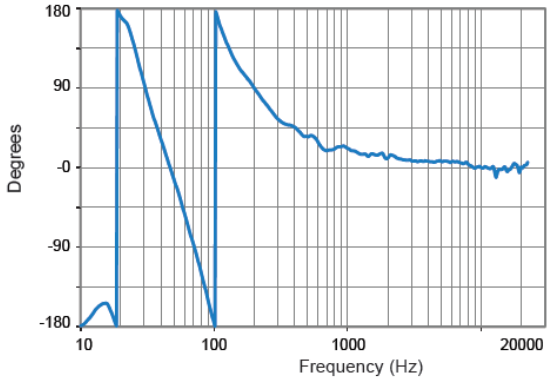
Frequency Response: Processed
LF = green, HF = black, Complete = blue



Frequency Response: Unprocessed
LF = green, HF = black, Complete = blue



Phase Linearity
Complete = blue



Note at the end of the sheet

Operating Range: Range where the processed Frequency Response stays within -10 dB SPL of the power averaged SPL within this range; measured on the geometric axis. Narrow band dips are excepted.

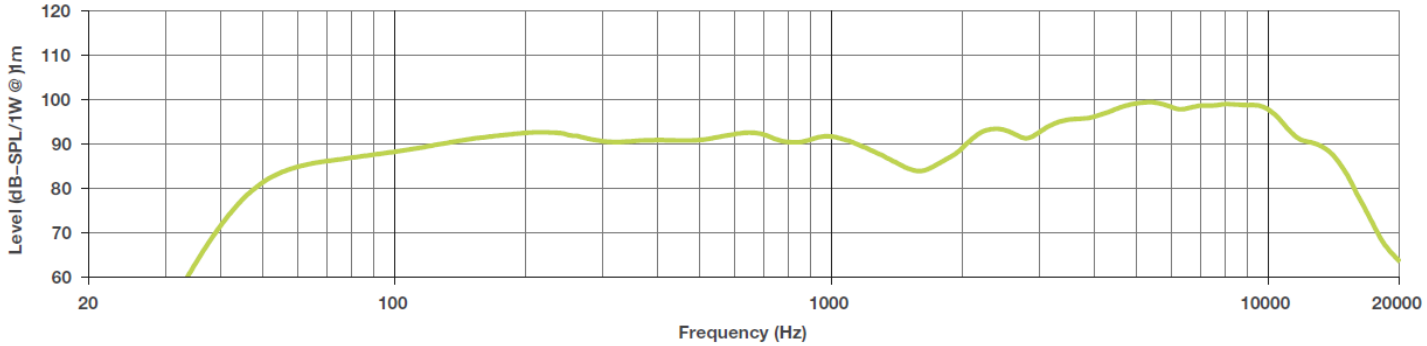
DATASHEETS

Frequency response - bandwidth + response curve

EXAMPLE 2 : 8 x 4,5” loudspeaker

Frequency Range (–10 dB)[1]	52 Hz - 15 kHz

On-Axis Response



Note at the end of the sheet

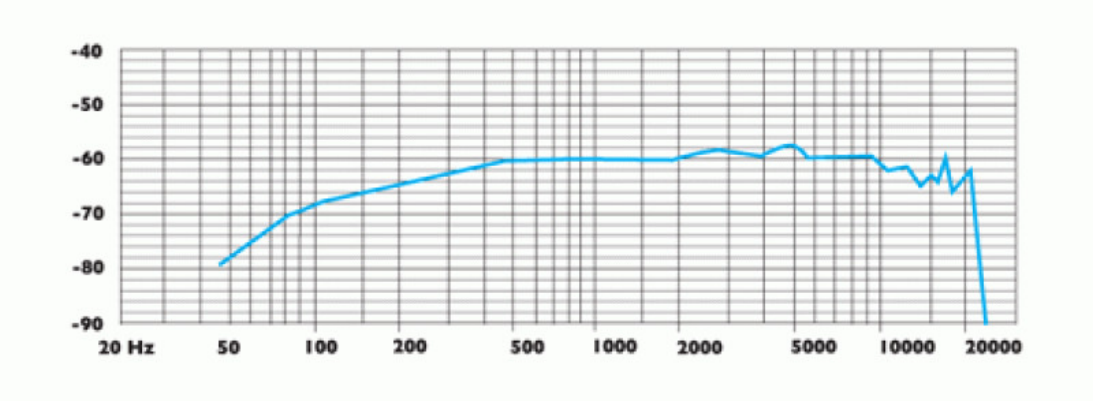
1. Frequency range measured on-axis with recommended EQ in an anechoic environment.

DATASHEETS

Frequency response - bandwidth + response curve

EXAMPLE 3 : gooseneck microphone

Frequency Response	50Hz - 18KHz



When measured at -10 dB, the frequency response starts from 90 Hz !!

DATASHEETS

Frequency response - bandwidth + response curve

BE CAREFUL TO THD !!!

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A_1 AMPLIFIER – SINGLE TUBE

PLATE VOLTAGE	250	300	350	VOLTS
GRID #2 VOLTAGE	250	200	250	VOLTS
GRID #1 VOLTAGE	−14	−12.5	−18	VOLTS
PEAK AF SIGNAL VOLTAGE	14	12.5	18	VOLTS
TRANSCONDUCTANCE	6 100	5 300	5 200	µMHOS
PLATE RESISTANCE	30 000	35 000	48 000	OHMS
ZERO-SIGNAL PLATE CURRENT	75	48	53	MA.
ZERO-SIGNAL GRID #2 CURRENT	4.3	2.5	2.5	MA.
MAXIMUM SIGNAL PLATE CURRENT	80	55	65	MA.
MAXIMUM SIGNAL GRID #2 CURRENT	7.6	4.7	8.5	MA.
LOAD RESISTANCE	2 500	4 500	4 200	OHMS
POWER OUTPUT	6.7	6.5	11.3	WATTS
TOTAL HARMONIC DISTORTION	10	11	13	PERCENT

A tube amplifier is not linear: we can talk about bandwidth in a generic way but there is NOT a frequency response curve because each frequency “generates other"

DATASHEETS

Efficiency : dB @1W/1m on axis

EXAMPLES 1 & 2 – point source loudspeaker

Axial Sensitivity *(whole space SPL):*

LF/HF	95 dB	65 Hz to 19 kHz
LF	97 dB	65 Hz to 1400 Hz
HF	106 dB	1200 Hz to 19 kHz

1

Axial Sensitivity: Power averaged SPL over the Operating Range with an input voltage that would produce 1 W at the nominal impedance; measured with *no external processing* on the geometric axis, referenced to 1 m.

Sound pressure level at 20 W / 1 W (1kHz, 1 m)	99 dB / 86 dB (SPL)

2

Octave band sensitivity*

	Octave SPL 1W/1m	Total octave SPL 1W/1m	Total octave SPL Pmax/1m
125 Hz	84.1	-	-
250 Hz	84.7	-	-
500 Hz	84.3	-	-
1000 Hz	85.3	-	-
2000 Hz	88.3	-	-
4000 Hz	90.7	-	-
8000 Hz	90.7	-	-
A-weighted	-	87.4	99.3
Lin-weighted	-	89.4	101.0

DATASHEETS

Efficiency : dB @1W/1m on axis

EXAMPLES 3 & 4 :<u>line</u> sources

SPL 1W/1mt	98 dB [2]
Measured @4 mt then scaled @1 mt	

Not all the data sheets report this note, but it's very important because being at 1m away from the line array, sound does not come from all the components of the array

DATASHEETS

Impedance

it is important to know the impedance of a speaker for several reasons

1. Knowledge about how many speakers can be connected in parallel without damaging the amplifier
2. Best identification of the proper amplifier (POWER)
3. Verify the need to protect loudspeaker (for example with HPF)

It is important to know the rated impedance but is very useful to know its frequency behavior

DATASHEETS

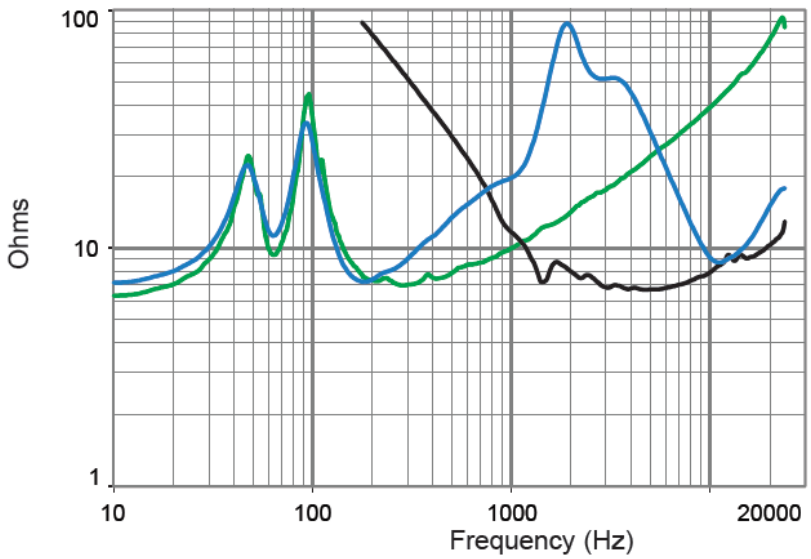
Impedance

Input Impedance *(ohms):*

	Nominal	*Minimum*
LF/HF	8	7.2 @ 180 Hz
LF	8	6.9 @ 290 Hz
HF	8	6.7 @ 4700 Hz

Impedance

LF = green, HF = black, Complete = blue



Nominal Impedance:
Selected 4, 8, or 16 ohm resistance such that the minimum impedance point is no more than 20% below this resistance over the Operating Range.

Impedance:
Variation in impedance magnitude, in ohms, with frequency without regard to voltage/current phase. This means the impedance values may not be used to calculate True Watts (see 9 above).

Watts:
Per audio industry practice, "loudspeaker watts" are calculated as voltage squared divided by rated nominal impedance. Thus, these are not True Watt units of energy as defined by International Standard.

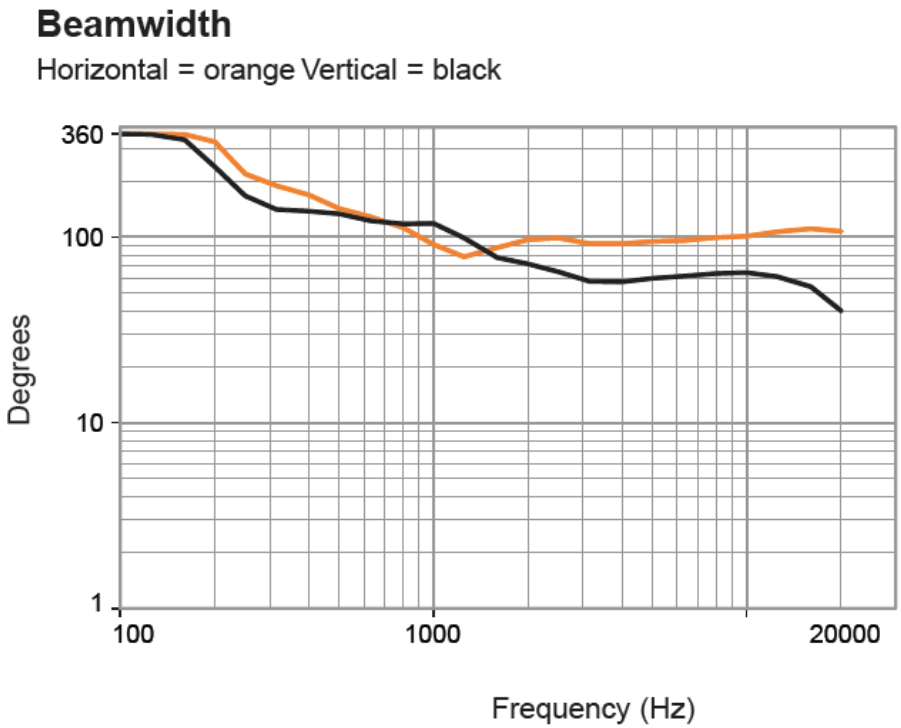
DATASHEETS

Opening angle/Polar diagram

Nominal Beamwidth: *(rotatable)*

Horz 90°

Vert 45°

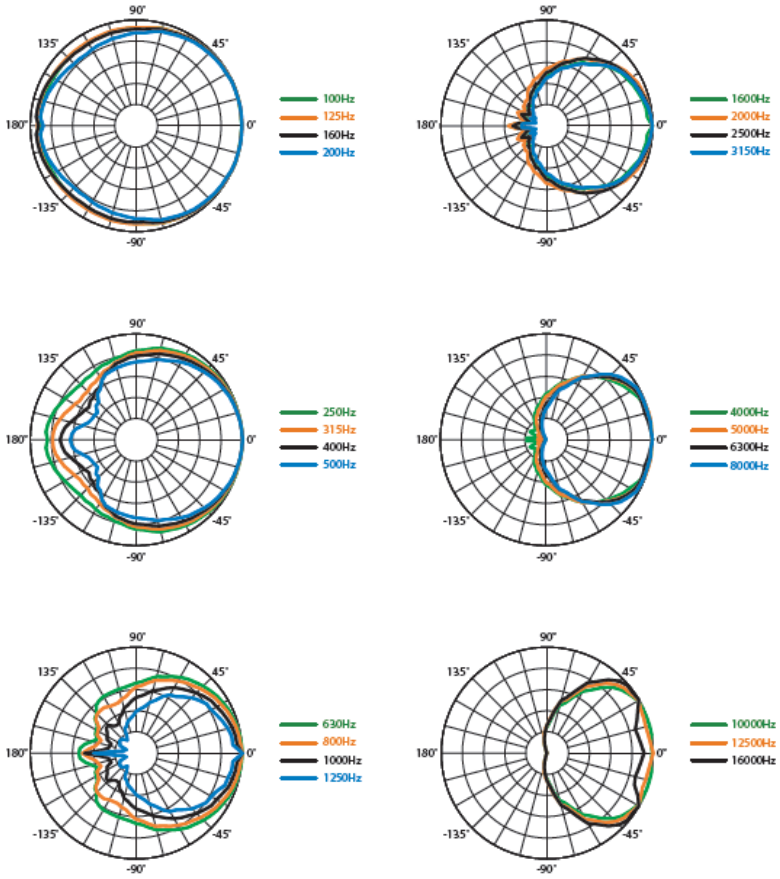


Nominal Beamwidth: Design angle for the -6 dB SPL points, referenced to 0 dB SPL as the highest level.

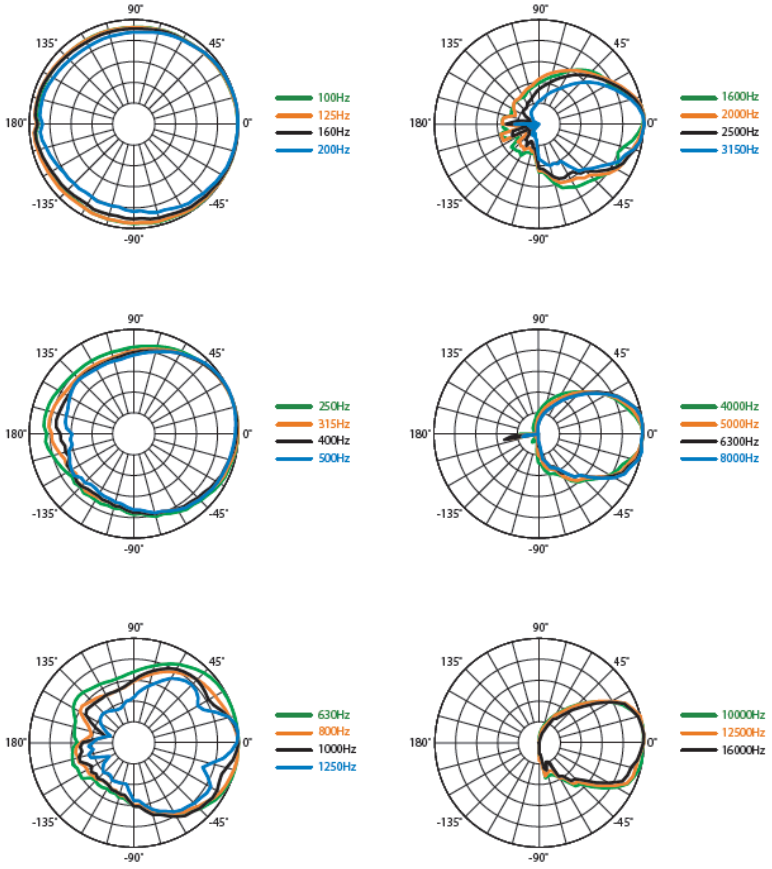
DATASHEETS

Opening angle/Polar diagram

HORIZONTAL POLAR DATA
See *NOTES GRAPHIC DATA* for details



VERTICAL POLAR DATA
See *NOTES GRAPHIC DATA* for details

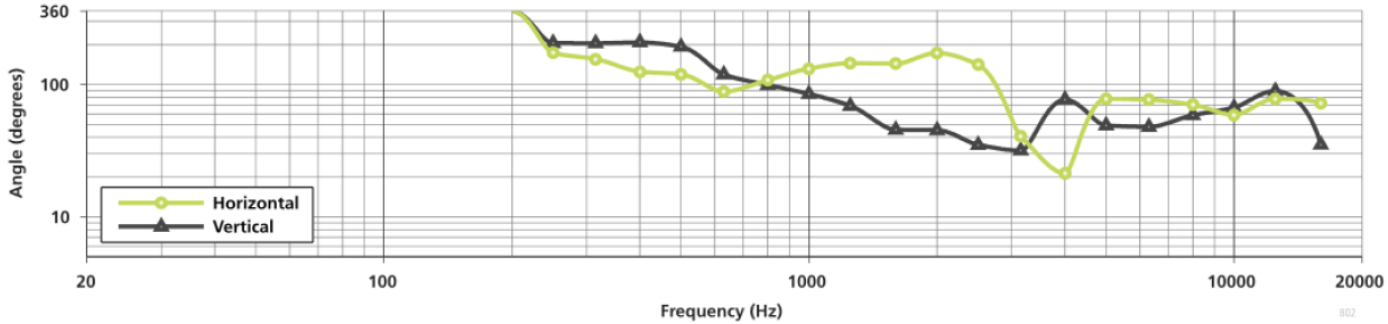


DATASHEETS

Opening angle/Polar diagram

Nominal Coverage Pattern	120° H x 100° V

Beamwidth



But….

"120° x 100° design covers a very wide area, which can reduce the number of loudspeakers required" *…. excusatio non petita……?*

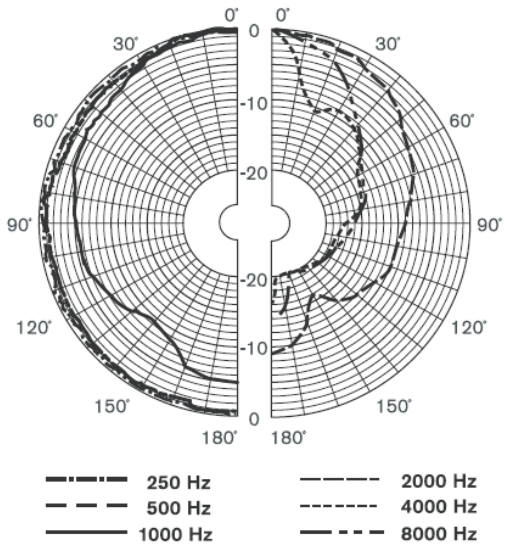
DATASHEETS

Opening angle/Polar diagram – Pendant sphere loudspeaker

Opening angle at 1 kHz / 4 kHz (-6 dB)	220° / 65°

Octave band opening angles

	Horizontal	Vertical	
125 Hz	360	360	
250 Hz	360	360	
500 Hz	360	360	
1000 Hz	220	220	
2000 Hz	122	122	
4000 Hz	67	67	
8000 Hz	37	37	



Polar diagram (measured with pink noise)

*Acoustical performance specified per octave * (all* measurements are done with a pink noise signal; the values are in dBSPL).

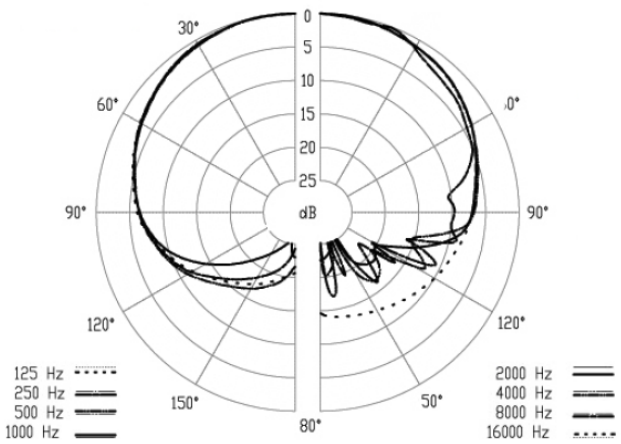
DATASHEETS

Opening angle/Polar diagram – Pendant sphere loudspeaker

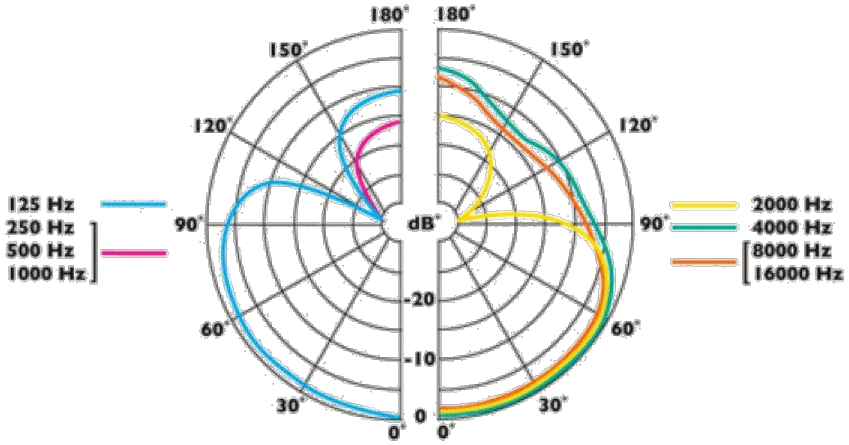
Abstrahlwinkel / *Radiation angle* 1.000 Hz (-10dB):	180°

DATASHEETS

Opening angle/Polar diagram – **cardioid** mics



1



2

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DATASHEETS

EN54-24 Certification – NOT ONLY COMPLIANCE

Zertifizierung / *Certification* - *Nr.* EN 54-24:2008 - 1438/CPD/0198

JEDNOSTKA CERTYFIKUJĄCA
The Certification Body

CENTRUM NAUKOWO-BADAWCZE OCHRONY PRZECIWPOŻAROWEJ
im. Józefa Tuliszkowskiego
SCIENTIFIC AND RESEARCH CENTRE FOR FIRE PROTECTION

CNBOP

CERTYFIKAT ZGODNOŚCI EC
EC-CERTIFICATE OF CONFORMITY
1438 / CPD / 0198

wprowadzony na rynek przez:
placed on market by:

PARTNER Sp. z o.o.
ul. Kopernika 1
46-340 Gluchołazy

produkowany w:
and produced in the factory:

PARTNER Sp. z o.o.
ul. Kopernika 1
46-340 Gluchołazy

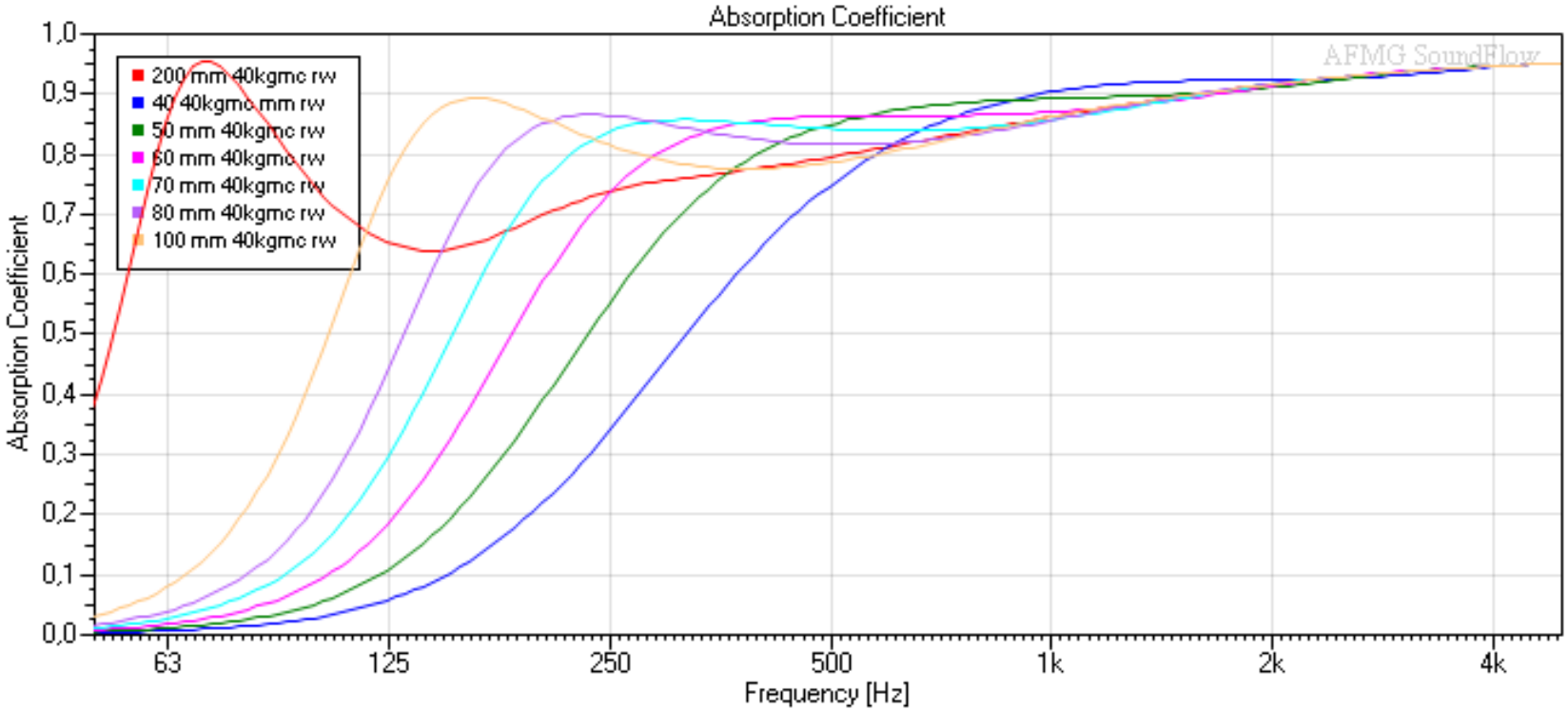
EN 54-24:2008 Fire detection and fire alarm systems.
Components of voice alarm systems. Loudspeakers

CE
1438

DATASHEETS

Acoustic absorption coefficient (alpha):

same material (rockwool 40 kg/m^3)**, different thickness**.



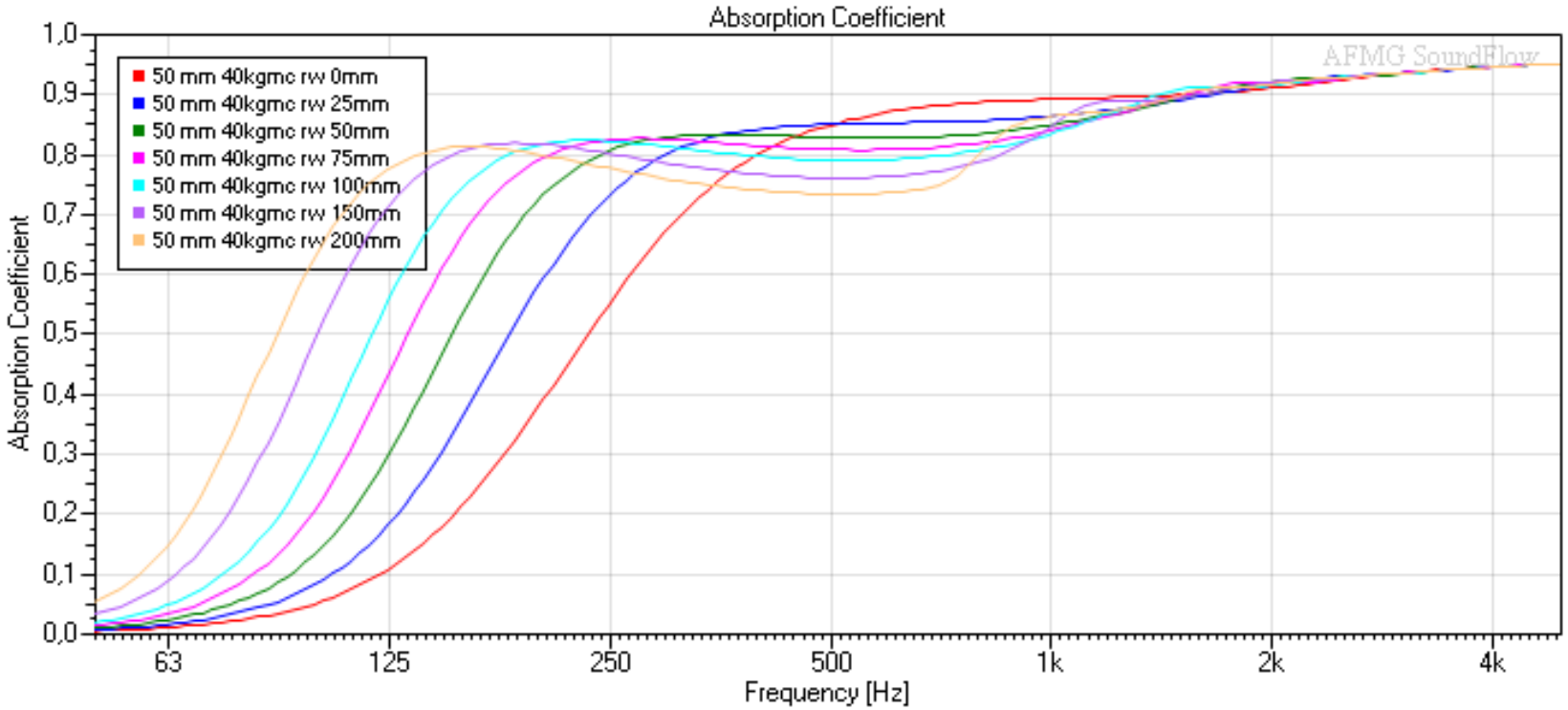
Pay attention because 5 cm of porous materials does not absorb under 100 HZ!!!

The more is the thickness the lowest is the frequency absorbed.

DATASHEETS

Acoustic absorption coefficient (alpha):

same material (rockwool 40 kg/m^3)**, different mounting** (air gap behind).

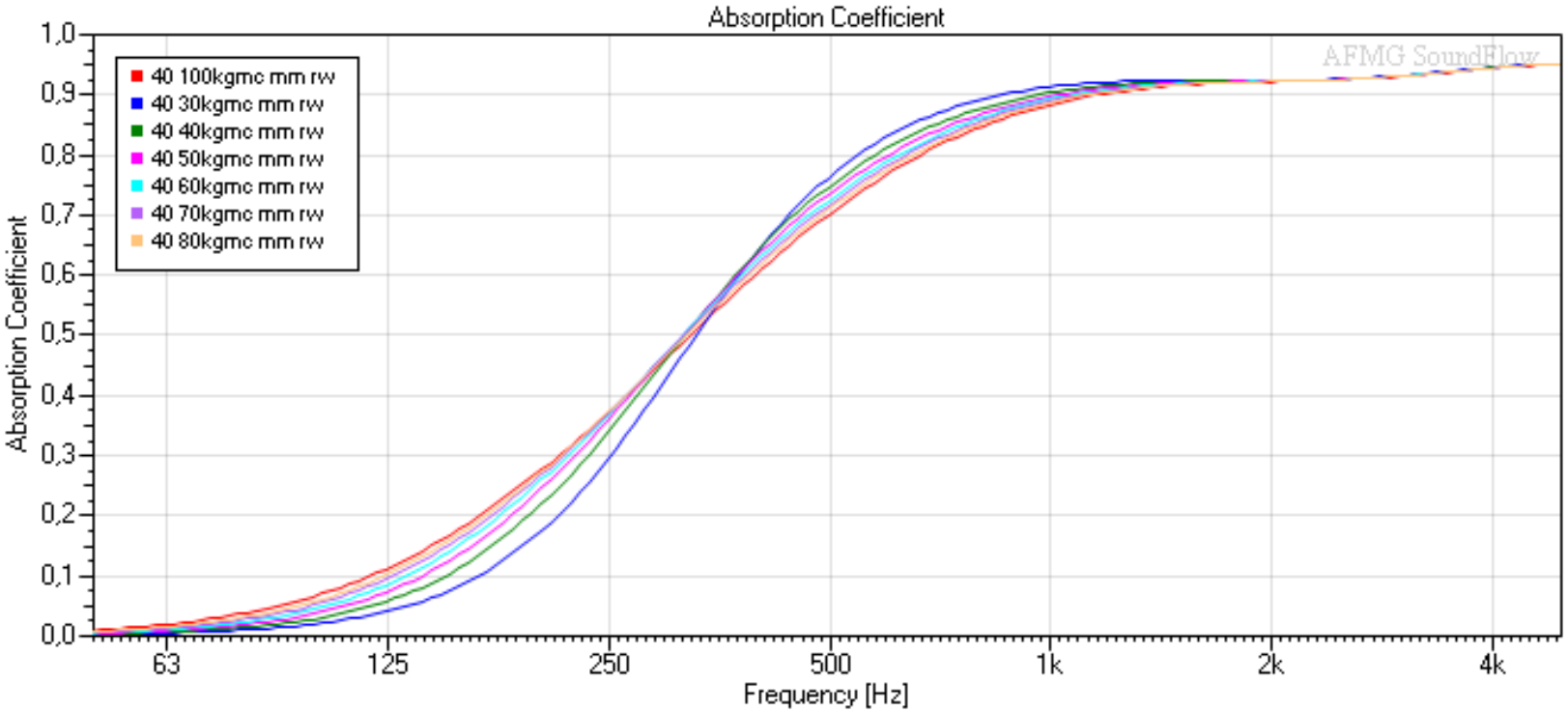


The air between the porous material and the rigid back increases the absorption performances at low frequencies too (but less than the absorber's thickness…).

DATASHEETS

Acoustic absorption coefficient (alpha):

same material, different density (rockwool 30 ÷ 100 kg/m^3)**, same mounting**.



Usually the density has a little effect in the absorption: using lightweight materials (min 40 kg/m^3) thicker or mounted on the air chamber is better than using heavier ones for LF absorption.

DATASHEETS

Perforated panels acoustic properties changes:

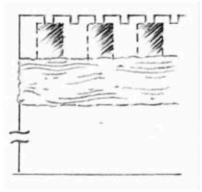
- If there is porous material or not
- If they are mounted far from the rigid back

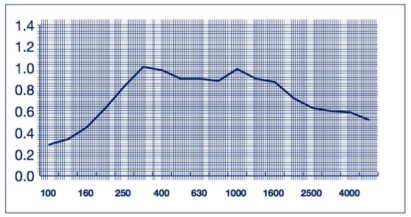
TOP)A)K)U)S)T)I)K)®

VALORI MEDI DI FONOASSORBENZA / SOUND ABSORPTION AVERAGE VALUES

a)

Freq. (Hz)	Risultato / Result
100	0.29
125	0.34
160	0.45
200	0.63
250	0.83
315	1,01
400	0.98
500	0.90
630	0.90
800	0.88
1000	0.99
1250	0.90
1600	0.87
2000	0.72
2500	0.63
3150	0,60
4000	0.59
5000	0.52



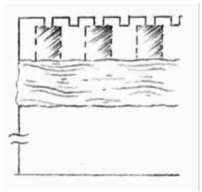


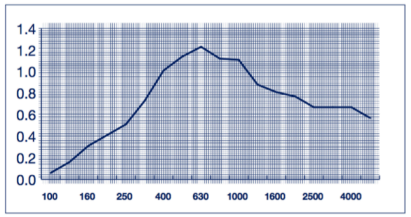
Spazio vuoto / *Free Space* 200 mm lana di roccia / *Mineral Wool* 30 mm

Basse frequenze / *Low frequency* (100-315 Hz): 0.59
Medie frequenze / *Medium frequency* (400-1250 Hz): 0.93
Alte frequenze / *High frequency* (1600-5000 Hz): 0.66

b)

Freq. (Hz)	Risultato / Result
100	0.06
125	0.16
160	0.31
200	0.41
250	0.51
315	0.73
400	1.01
500	1.14
630	1.23
800	1.12
1000	1.11
1250	0.88
1600	0.81
2000	0.77
2500	0.67
3150	0.67
4000	0.67
5000	0.57



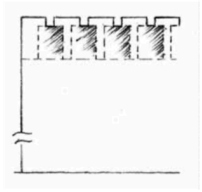


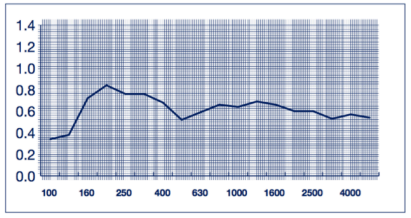
Spazio vuoto / *Free Space* 10 mm Isover / *Isover* 30 mm

Basse frequenze / *Low frequency* (100-315 Hz): 0.36
Medie frequenze / *Medium frequency* (400-1250 Hz): 1.08
Alte frequenze / *High frequency* (1600-5000 Hz): 0.69

c)

Freq. (Hz)	Risultato / Result
100	0.34
125	0.38
160	0.72
200	0.84
250	0.76
315	0.76
400	0.68
500	0.52
630	0.59
800	0.66
1000	0.64
1250	0.69
1600	0.66
2000	0.60
2500	0.60
3150	0.53
4000	0.57
5000	0.54





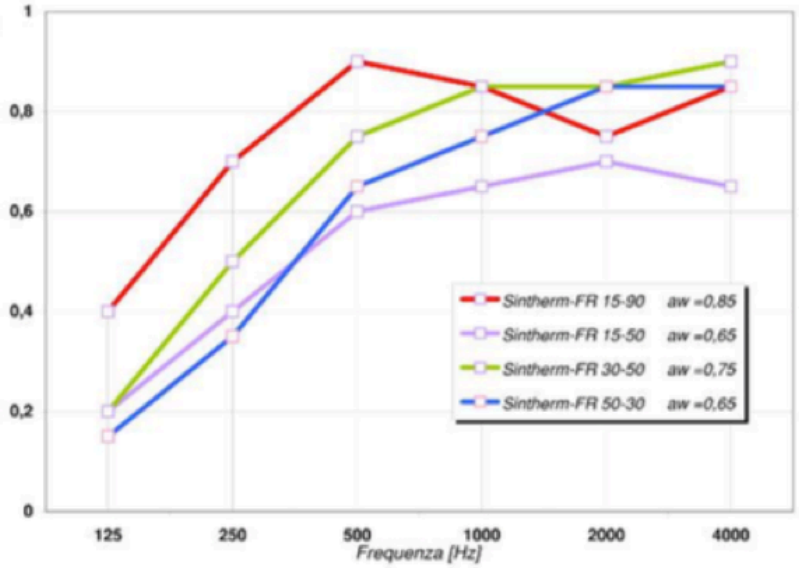
Spazio vuoto / *Free Space* 400 mm senza lana di roccia / *without Mineral Wool*

Basse frequenze / *Low frequency* (100-315 Hz): 0.63
Medie frequenze / *Medium frequency* (400-1250 Hz: 0.63
Alte frequenze / *High frequency* (1600-5000 Hz): 0.58

DATASHEETS

PRESTAZIONI ACUSTICHE

COEFFICIENTE DI ASSORBIMENTO ACUSTICO misurato in camera riverberante UNI EN ISO 354				
Hz	α SINTHERM FR 15.90	α SINTHERM FR 15.50	α SINTHERM FR 30.50	α SINTHERM FR 50.30
125	0,4	0,2	0,2	0,15
250	0,7	0,4	0,5	0,35
500	0,9	0,6	0,75	0,65
1000	0,85	0,65	0,85	0,75
2000	0,75	0,7	0,85	0,85
4000	0,85	0,65	0,9	0,85

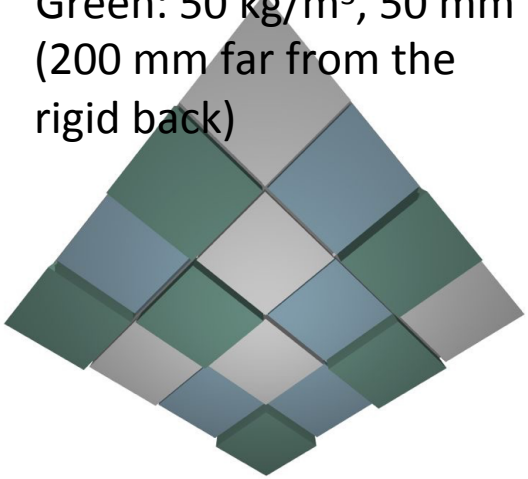


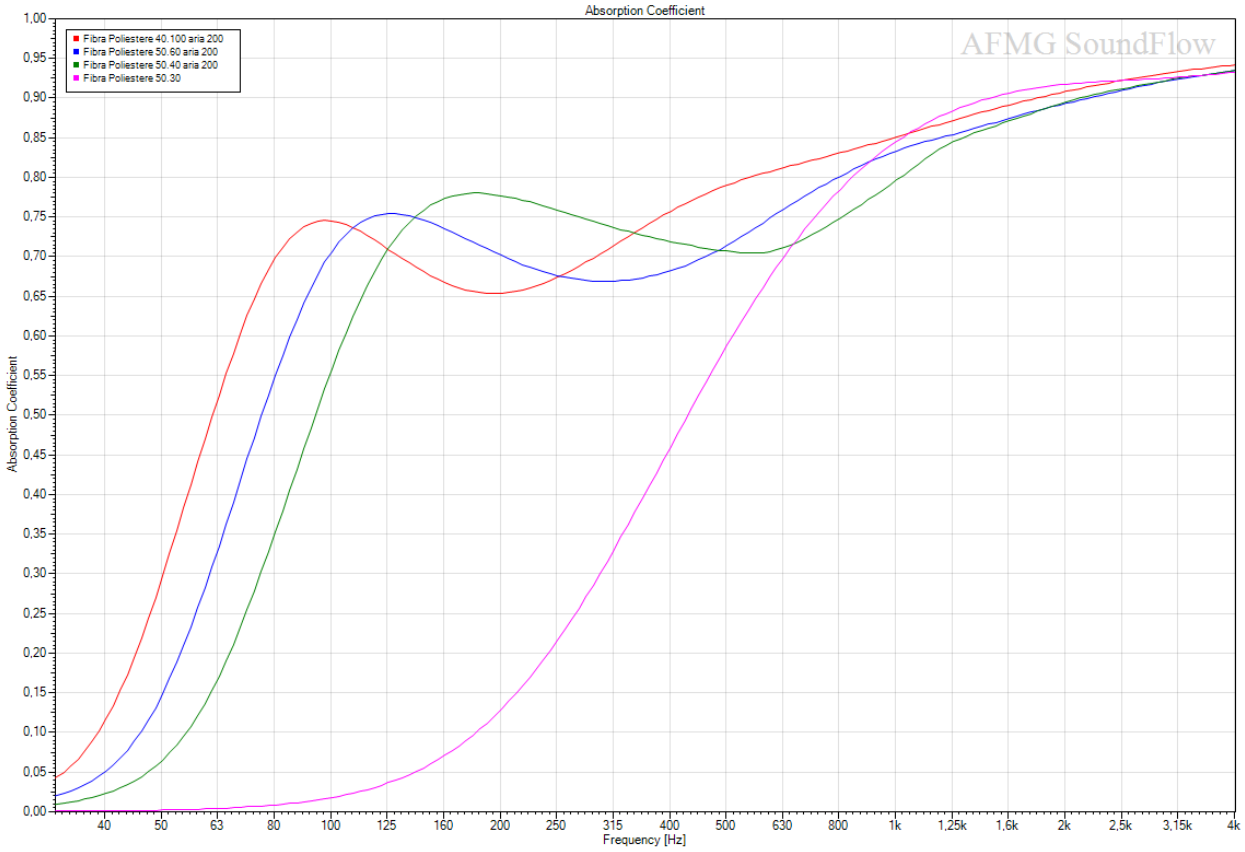
COEFFICIENTE DI ASSORBIMENTO ACUSTICO PONDERATO UNI EN ISO 11654/97				
	SINTHERM FR 15.90	SINTHERM FR 15.50	SINTHERM FR 30.50	SINTHERM FR 50.30
α_w	0,85	0,65	0,75	0,65
Classe assorbimento acustico	B	C	C	C

DATASHEETS

Same panel (polyester fiber) – different mounting and thickness:

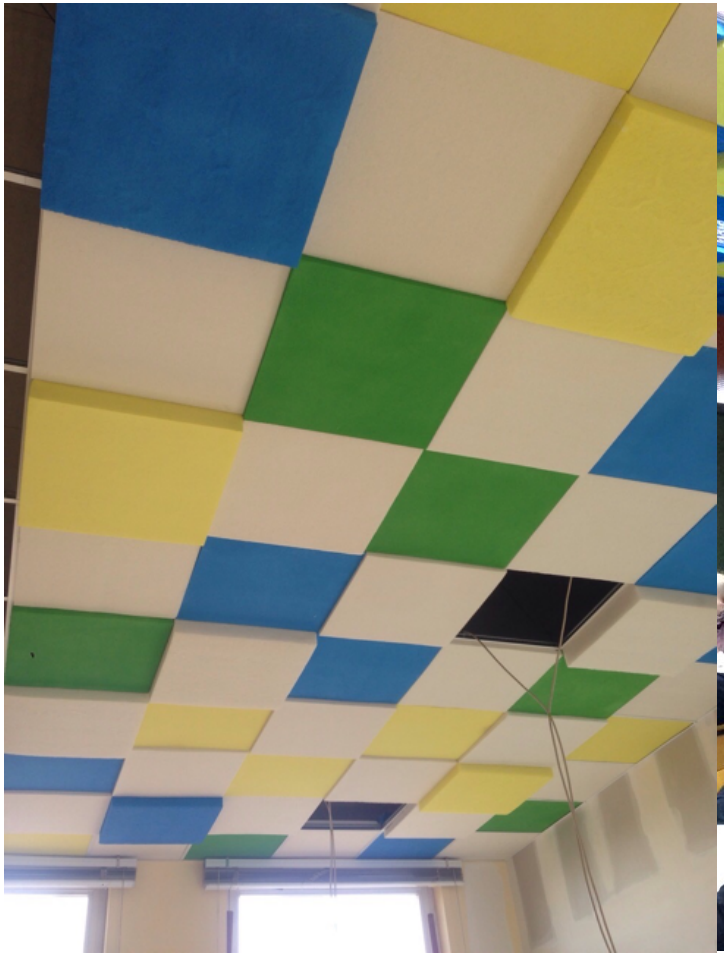
- Pink: (close to the wall)
- Red: 40 kg/m^3, 100 mm (200 mm far from the rigid back)
- Blue: 50 kg/m^3, 60 mm (200 mm far from the rigid back)
- Green: 50 kg/m^3, 50 mm (200 mm far from the rigid back)





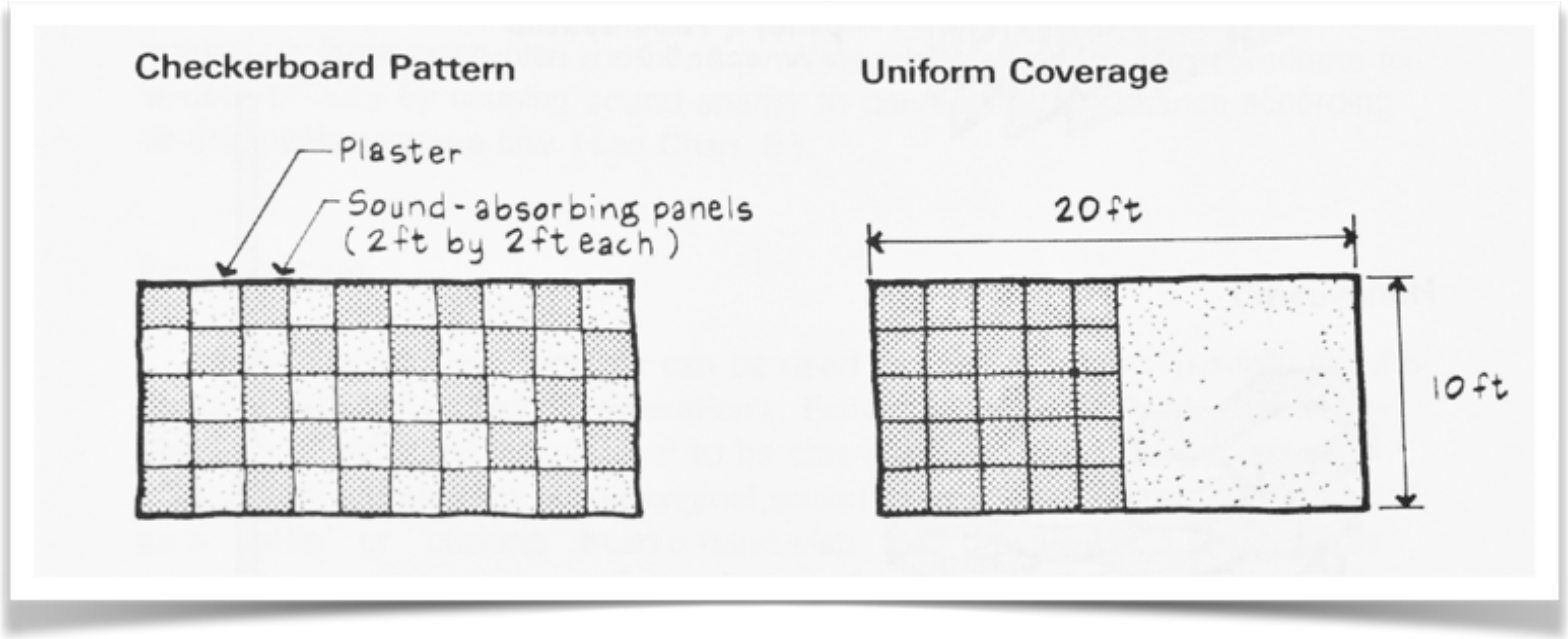
DATASHEETS

Same panel (polyester fiber) – different mounting and thickness:



DATASHEETS

Acoustic absorption coefficient (alpha): **Area effect**



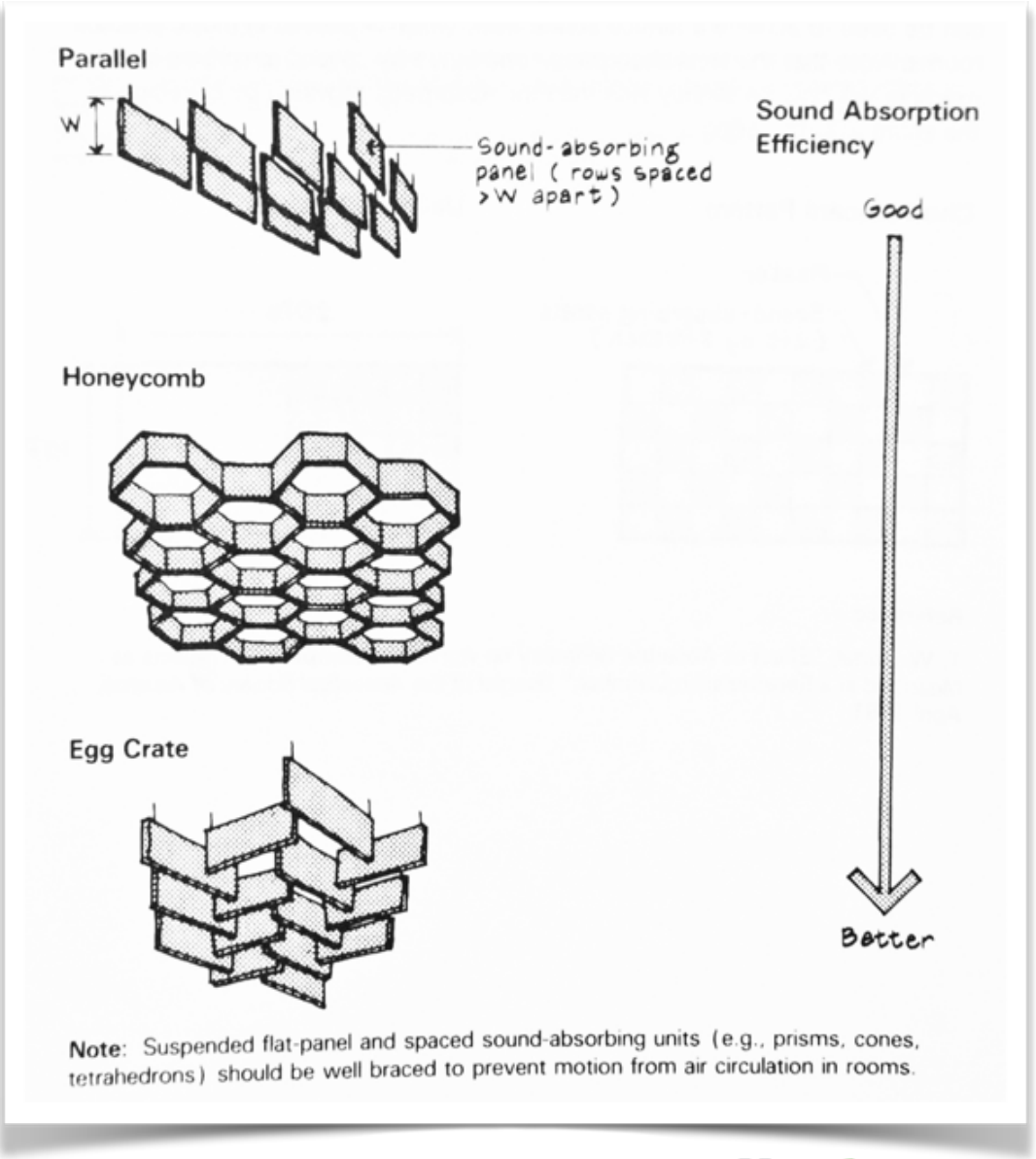
The efficiency of a sound absorbing material may vary according to the distribution and placement in a room. For example 25 absorbent panels will absorb more sound energy when placed in checkerboard rather than uniformly.

This change is due to the sound wave diffraction around the perimeters of panels spaced from each other and additional absorption of their edges.

DATASHEETS

The Area Effect is also important for 3D mounting: a practical case is the baffles installation.

Some patterns are better than others!



DATASHEETS

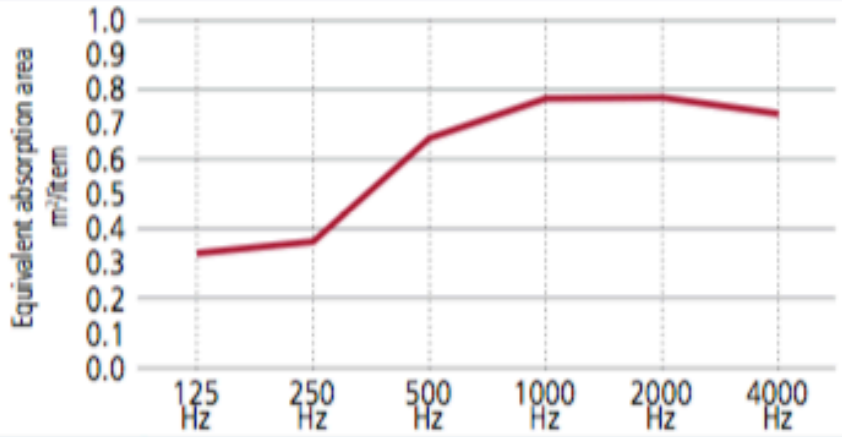
1200x600x50 mm (1 baffle/m2), row distance 83 cm.

➔ Equivalent Acoustic absorption area. It changes if you place them with different distances.

SOUND ABSORPTION

The sound absorption property of islands and baffles is quantified using the equivalent sound absorption area A_{eq} expressed as m² per item. The A_{eq} value is measured in accordance with the ISO 354. This is the area of a fictive absorbing surface of $\alpha_w = 1.00$ which would absorb the same amount of sound as the tested island or baffle.

Rockfon Contour



	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
1200x600x50: single item (1 baffle/m²; row distance: 83cm)	0.32	0.36	0.66	0.78	0.78	0.73

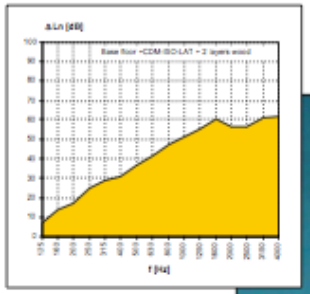
DATASHEETS

IsoPads for floating floors.

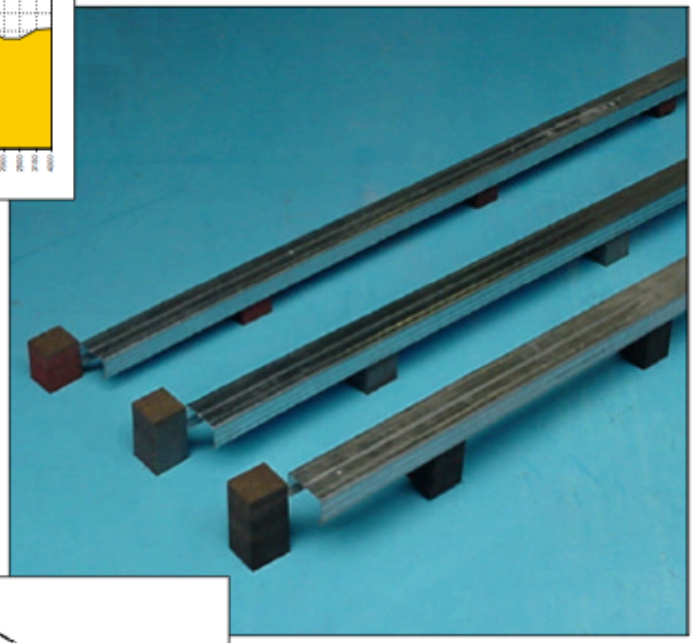
Is a perfect decoupling?

How much do they isolate??!?!

Performance



Product

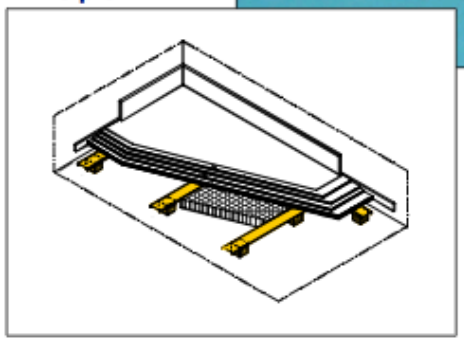


Installation

CDM-ISO-LAT battens

- **TYPE:**
  CDM-79
  CDM-80
  CDM-81
- **Height:**
  31 mm (LAT 30)
  41 mm (LAT 40)
  51 mm (LAT 50)

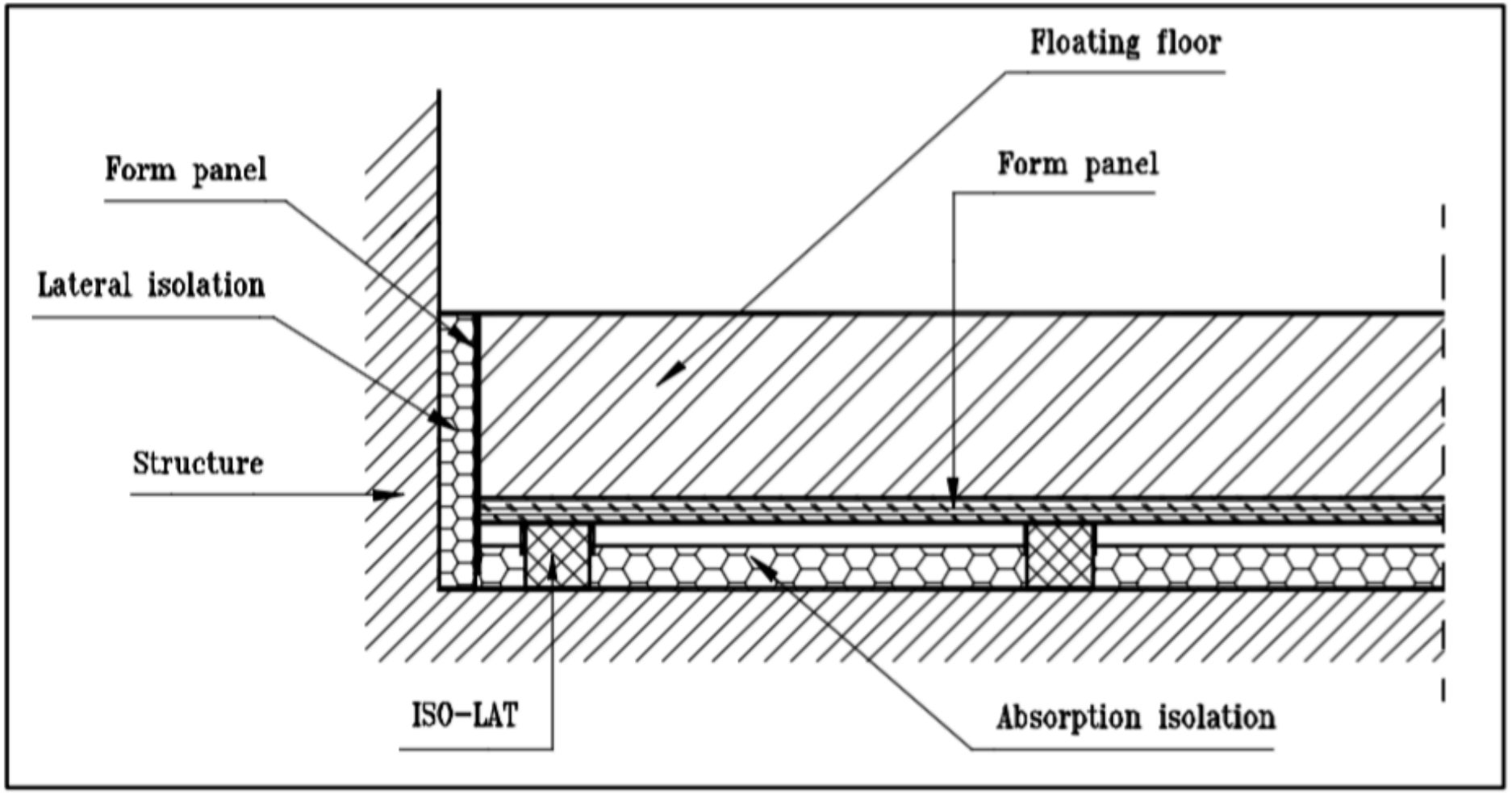
Principle



CDM-ISO-LAT battens:

- guaranteed isolation of the floating floor
- can be used for high loads
- several installation methods possible
- easy to install

DATASHEETS


Floating floor
Form panel
Form panel
Lateral isolation
Structure
ISO-LAT
Absorption isolation

DATASHEETS

The easy way to tell you how much…

3. PERFORMANCES

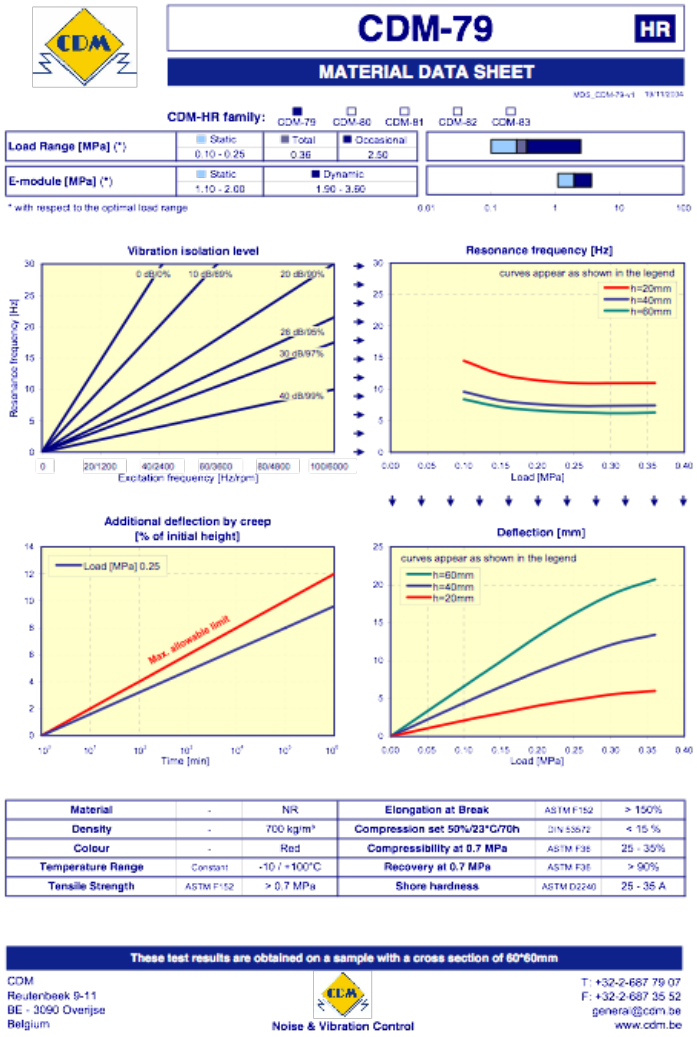
The performance of the **CDM-ISO-LAT** system depends on the load, the impedance of the (concrete) floor elements and the type of ISO-LAT used. Test results are shown on the following pages. As an indication the following isolation improvements can be obtained (between 100 and 500 Hz), when compared to the non-isolated case:

ISO-LAT	Impact noise: ΔLn	Airborne noise: ΔRw
LAT30	29 - 35 dB	10 - 16 dB
LAT40	31 - 37 dB	12 - 18 dB
LAT50	33 - 39 dB	14 - 20 dB

The values given relate to a floating floor of concrete with a thicknessbetween 60 and 120 mm.

DATASHEETS

And the harder way to tell you!
It all depends from the loading…



CDM-79 HR

MATERIAL DATA SHEET

CDM-HR family: CDM-79 CDM-80 CDM-81 CDM-82 CDM-83

Load Range [MPa] (*)	Static 0.10 - 0.25	Total 0.36	Occasional 2.50
E-module [MPa] (*)	Static 1.10 - 2.00	Dynamic 1.90 - 3.60	

* with respect to the optimal load range

Vibration isolation level

Resonance frequency [Hz]

Excitation frequency [Hz/rpm]

Resonance frequency [Hz]

curves appear as shown in the legend

h=20mm
h=40mm
h=60mm

Load [MPa]

Additional deflection by creep [% of initial height]

Load [MPa] 0.25

Max. allowable limit

Time [min]

Deflection [mm]

curves appear as shown in the legend

h=60mm
h=40mm
h=20mm

Load [MPa]

Material	-	NR	Elongation at Break	ASTM F152	> 150%
Density	-	700 kg/m³	Compression set 50%/23°C/70h	DIN 53572	< 15 %
Colour	-	Red	Compressibility at 0.7 MPa	ASTM F36	25 - 35%
Temperature Range	Constant	-10 / +100°C	Recovery at 0.7 MPa	ASTM F36	> 90%
Tensile Strength	ASTM F152	> 0.7 MPa	Shore hardness	ASTM D2240	25 - 35 A

These test results are obtained on a sample with a cross section of 60*60mm

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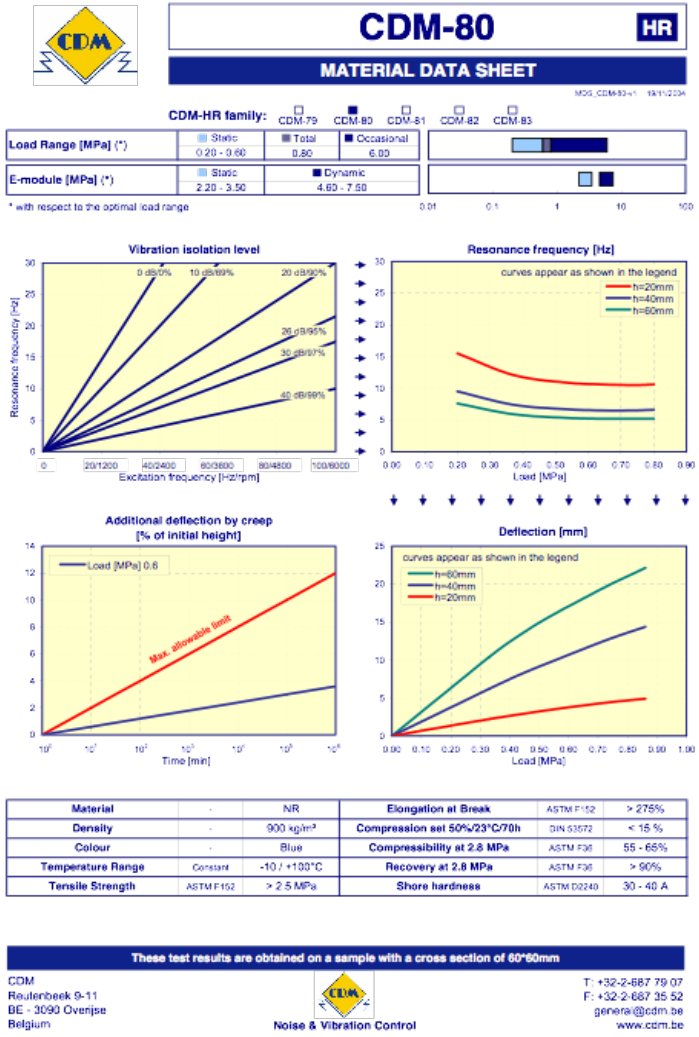
www.cdm.be



CDM-80 HR

MATERIAL DATA SHEET

CDM-HR family: CDM-79 CDM-80 CDM-81 CDM-82 CDM-83

Load Range [MPa] (*)	Static 0.20 - 0.60	Total 0.80	Occasional 6.00
E-module [MPa] (*)	Static 2.20 - 3.50	Dynamic 4.60 - 7.50	

* with respect to the optimal load range

Vibration isolation level

Resonance frequency [Hz]

Excitation frequency [Hz/rpm]

Resonance frequency [Hz]

curves appear as shown in the legend

h=20mm
h=40mm
h=60mm

Load [MPa]

Additional deflection by creep [% of initial height]

Load [MPa] 0.6

Max. allowable limit

Time [min]

Deflection [mm]

curves appear as shown in the legend

h=60mm
h=40mm
h=20mm

Load [MPa]

Material	-	NR	Elongation at Break	ASTM F152	> 275%
Density	-	900 kg/m³	Compression set 50%/23°C/70h	DIN 53572	< 15 %
Colour	-	Blue	Compressibility at 2.8 MPa	ASTM F36	55 - 65%
Temperature Range	Constant	-10 / +100°C	Recovery at 2.8 MPa	ASTM F36	> 90%
Tensile Strength	ASTM F152	> 2.5 MPa	Shore hardness	ASTM D2240	30 - 40 A

These test results are obtained on a sample with a cross section of 60*60mm

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