

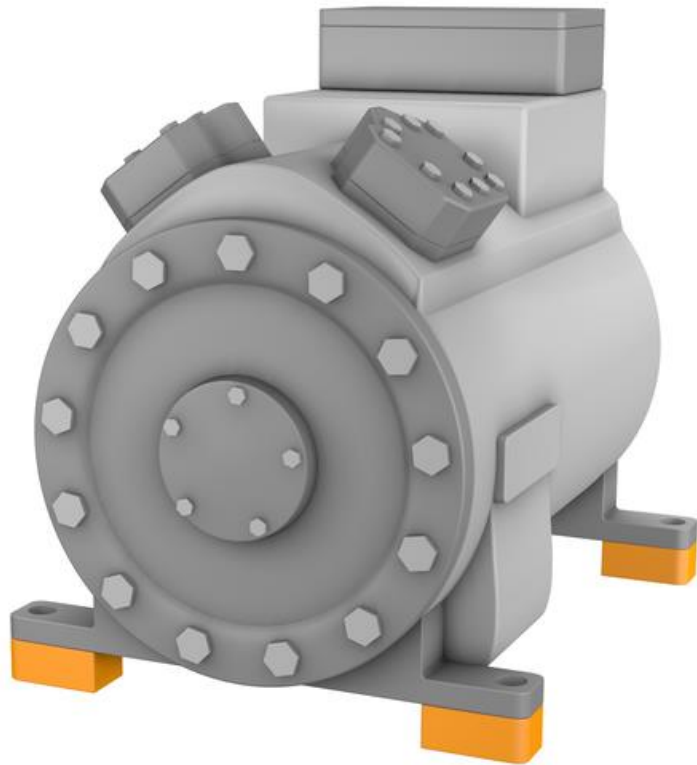
CONNECTING
EXPERTS.

CHILLVENTA eSPECIAL

Refrigeration | AC & Ventilation | Heat Pumps

13.–15.10.2020

NÜRNBERG MESSE



Minimizing Vibrations.

Getzner Solutions for Compressors.

Live from Austria

Presented by:

Thomas Marte, Product Manager
Getzner Werkstoffe GmbH, Bürs, Austria





Why is vibration isolation important at all?

Why is vibration isolation important?



Urbanization

Noise awareness

Living comfort



Why is vibration isolation important?

“ **Acoustic is becoming more and more of a concern for the heat pump industry**

Source: EHPA, White Paper: Heat Pump & Sound, April 2020

Why is vibration isolation important?

“ [...] room for improvement when it comes to heat pump acoustics, especially regarding components integration or interaction.

Source: EHPA, White Paper: Heat Pump & Sound, April 2020

“ [...] whether it is the vibration, the heat pump itself or the (un)correct installation

Source: EHPA, White Paper: Heat Pump & Sound, April 2020

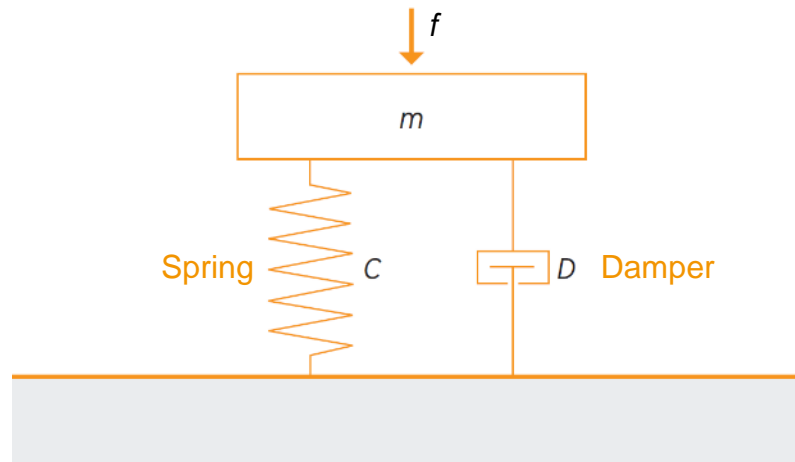
Advances in silent HVAC systems

Vibration isolation



Theoretical physical model

“One-dimension mass-spring system”



$$f_0 = \frac{1}{2 \cdot \pi} \sqrt{\frac{c_{dyn}}{m}} = \frac{1}{2 \cdot \pi} \sqrt{\frac{E \cdot A}{m \cdot d}} [Hz]$$

$$c_{dyn} = \frac{E \cdot A}{d}$$

E ... elasticity modulus $\left[\frac{N}{mm^2} \right]$

A ... surface area $[mm^2]$

d ... material thickness $[mm]$

f_0 ... natural frequency $[Hz]$

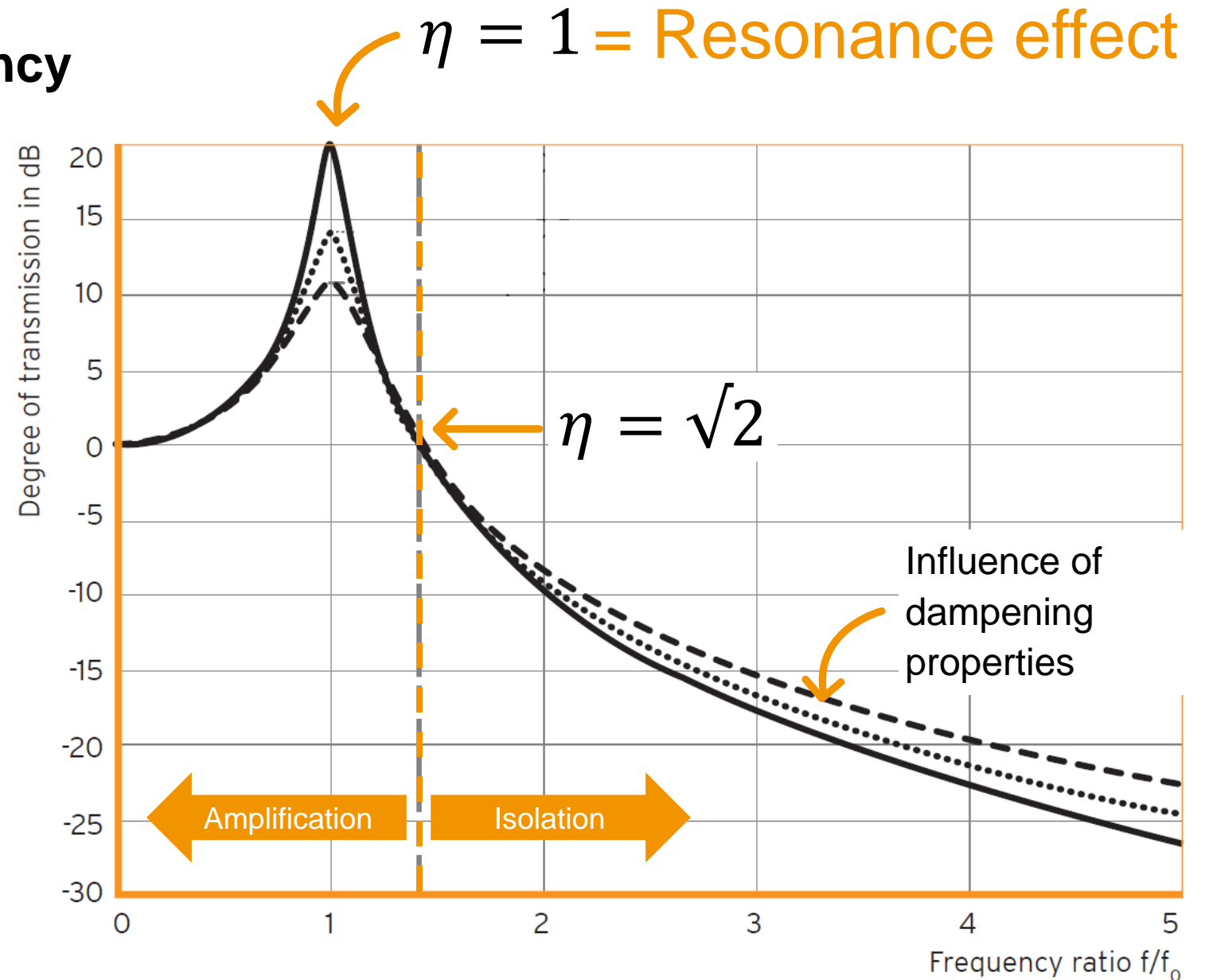
m ... mass $[kg]$

c_{dyn} ... dynamic stiffness $\left[\frac{N}{mm} \right]$


Excitation vs. Natural frequency



$$\eta = \frac{f}{f_0}$$

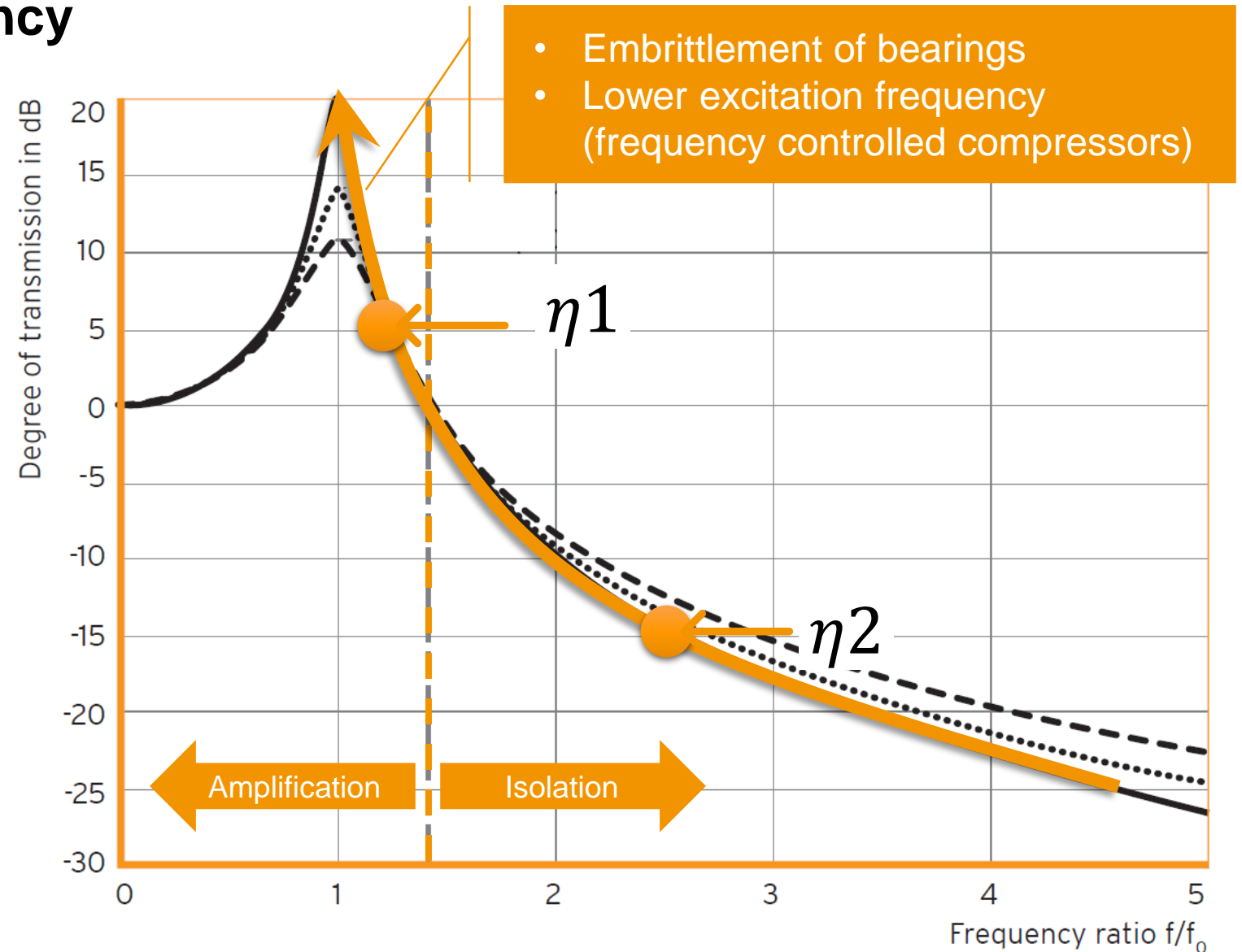


Excitation vs. Natural frequency

 $\eta = \frac{f}{f_0}$

$$\eta_1 = \frac{25}{20} = 1.25$$

$$\eta_2 = \frac{25}{10} = 2.5$$



Common solutions



Solutions

by getzner
sylomer®



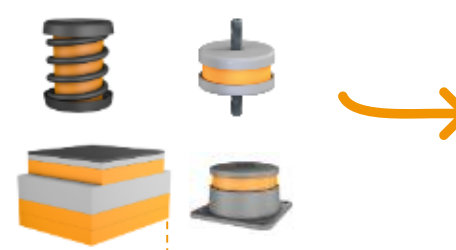
by getzner
sylodyn®



by getzner
sylodamp®



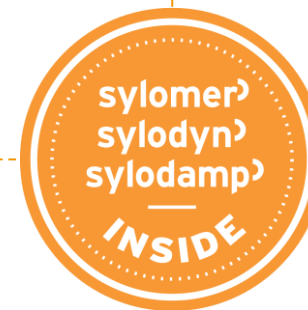
by getzner
isotop®



Getzner PUR
made easy



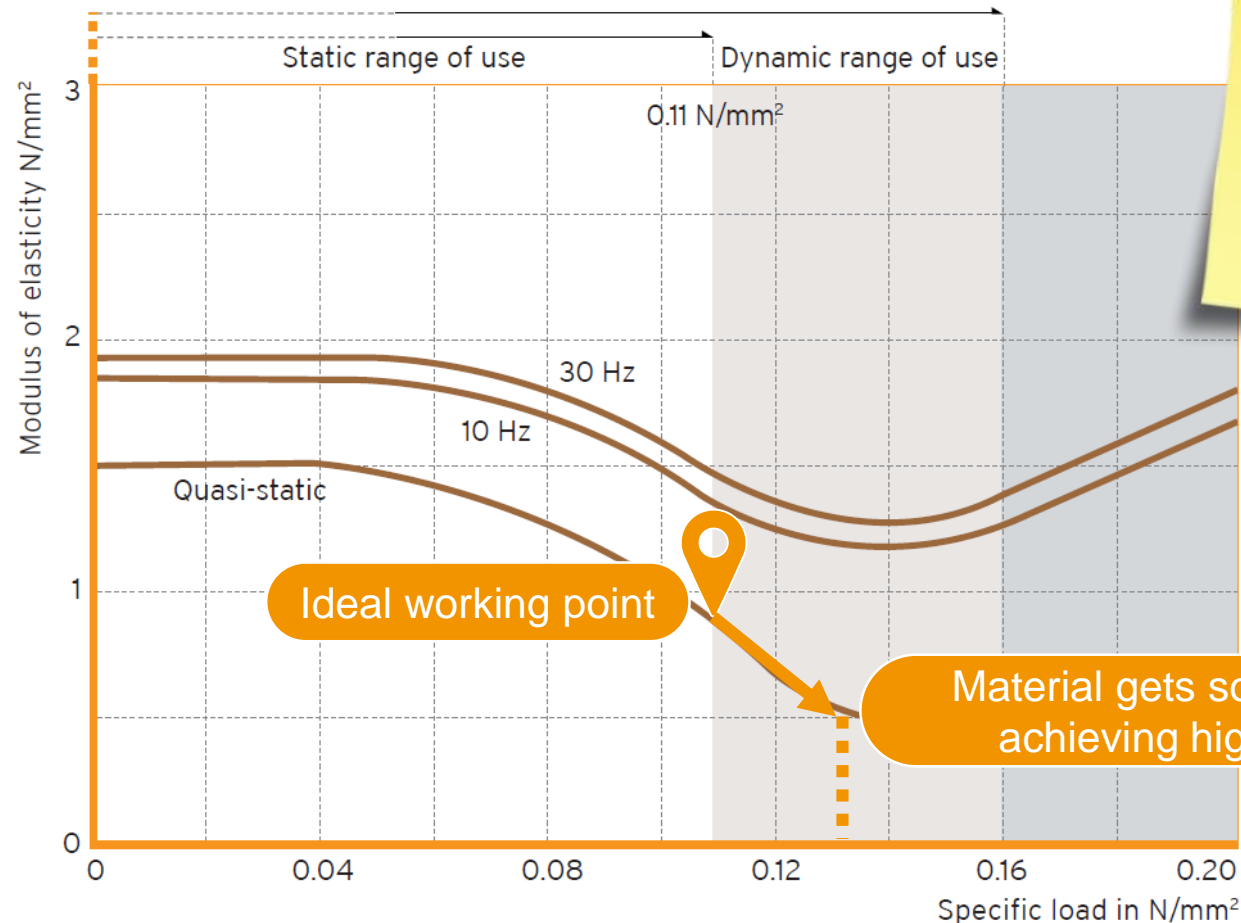
In-house material development and production



Why using a Getzner PUR elastic bearing?



Elastic Getzner Sylomer® and Sylodyn® get softer whilst reaching the dynamic load range achieving higher vibration isolation and noise reduction



No Softener used!
No Diffusion!
No Embrittlement!
= Constant Performance

Vibration isolation



The closer to the source of vibrations ... the better

Source: Alwin Friedrichs, Project Engineer, Getzner

Compressors – the beating heart of HVAC equipment



Compressors – the beating heart of HVAC equipment



Basic Compressor Bearing Concepts

DIRECT BEARING



BEARING WITH ADDITIONAL MASS



Getzner Solutions for Compressors

Isotop® DMSN and DSD

- Sylodamp® inside – for more stability
- Ideal for machines with several start-stop cycles
- Load rating up to 100 kg for DMSN and 650 kg per spring for SD



Getzner Solutions for Compressors

Isotop® MSN-DAMP

- 37.5 mm Sylomer® inside
- Available in three different installation options
- Low overall height of 45 mm



Specifically designed and used for compressor bearings in heat pumps

Getzner Solutions for Compressors

Isotop® Compact

- 25 mm Sylomer® or Sylodyn® inside
- Very low overall height of 30 mm
- Four different installation option including as anti-slip machine base

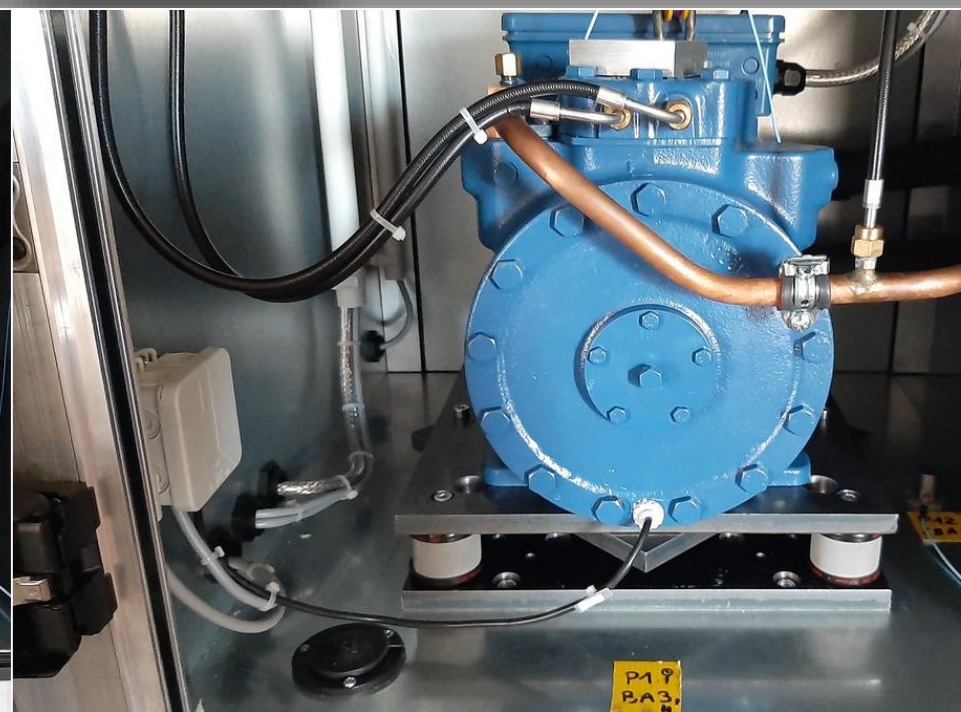
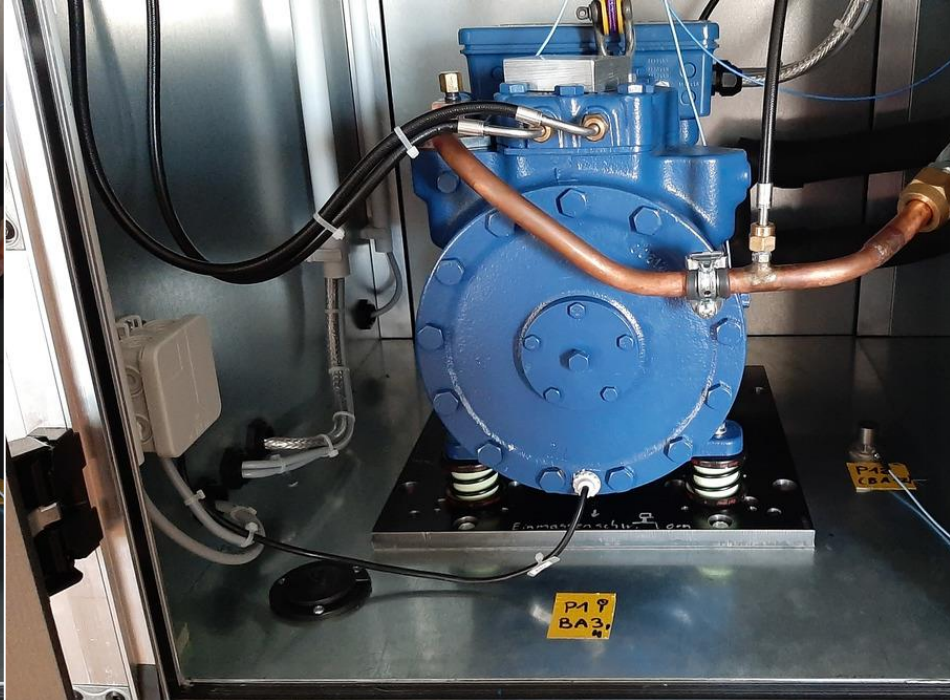
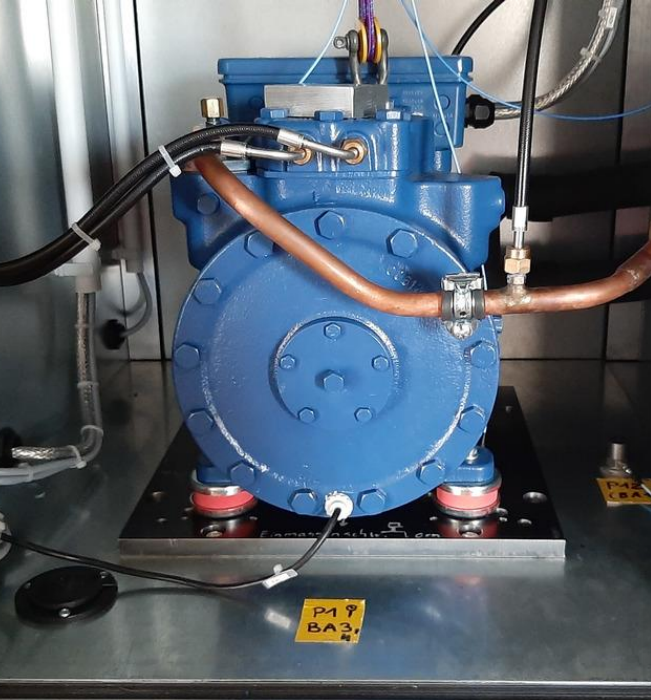


Getzner Solutions for Compressors

Isotop® DZE

- Resilient to compression and tension
- Sylodyn® inside
- Reduces strong amplitudes thanks to Sylodamp®





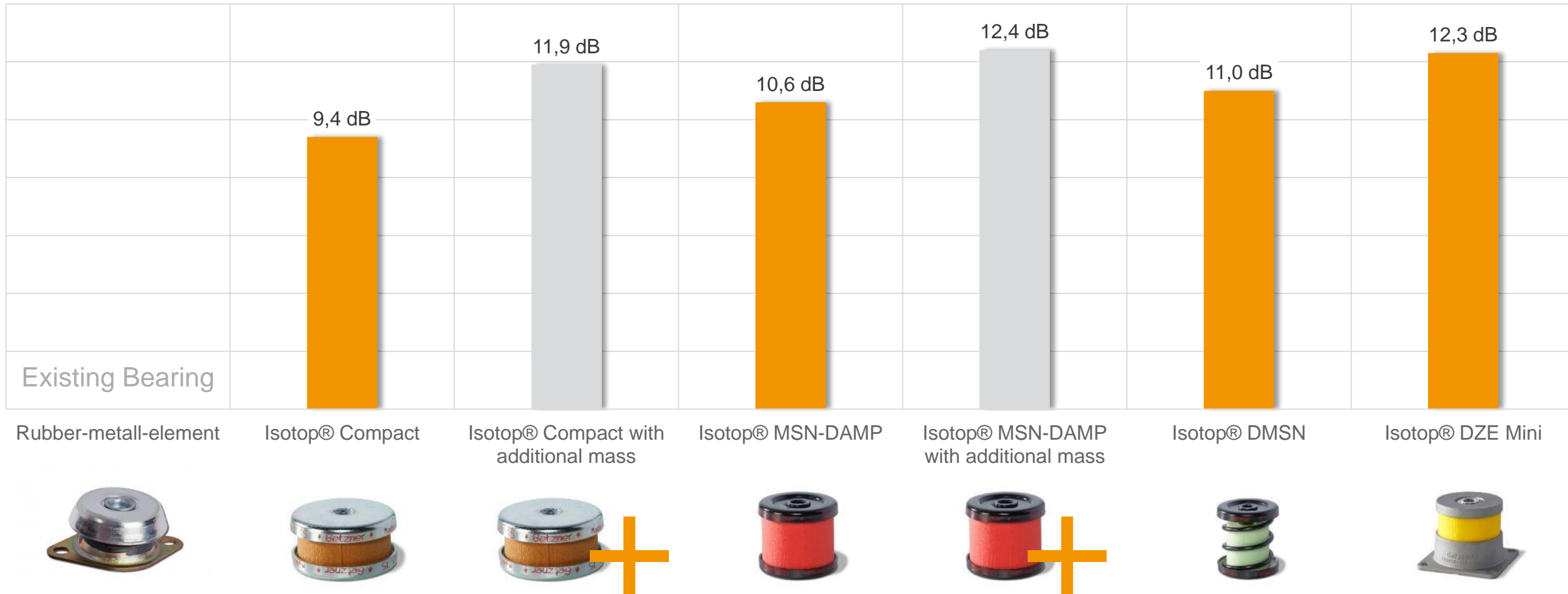
Measurement results

// Improvement of isolation compared to standard rubber-metal element

Compressor operating frequency:

50 Hz

Measurement point: Floor



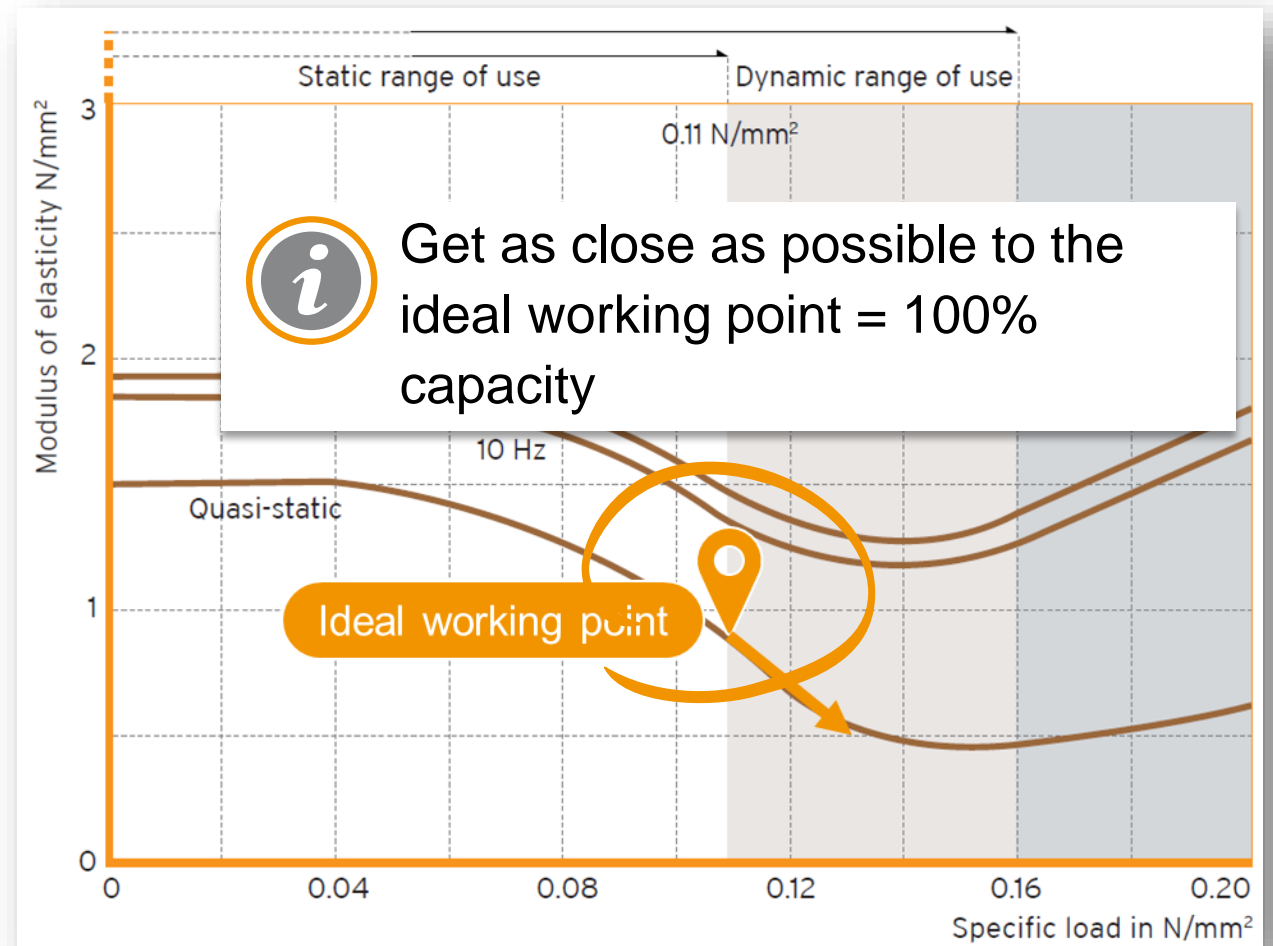
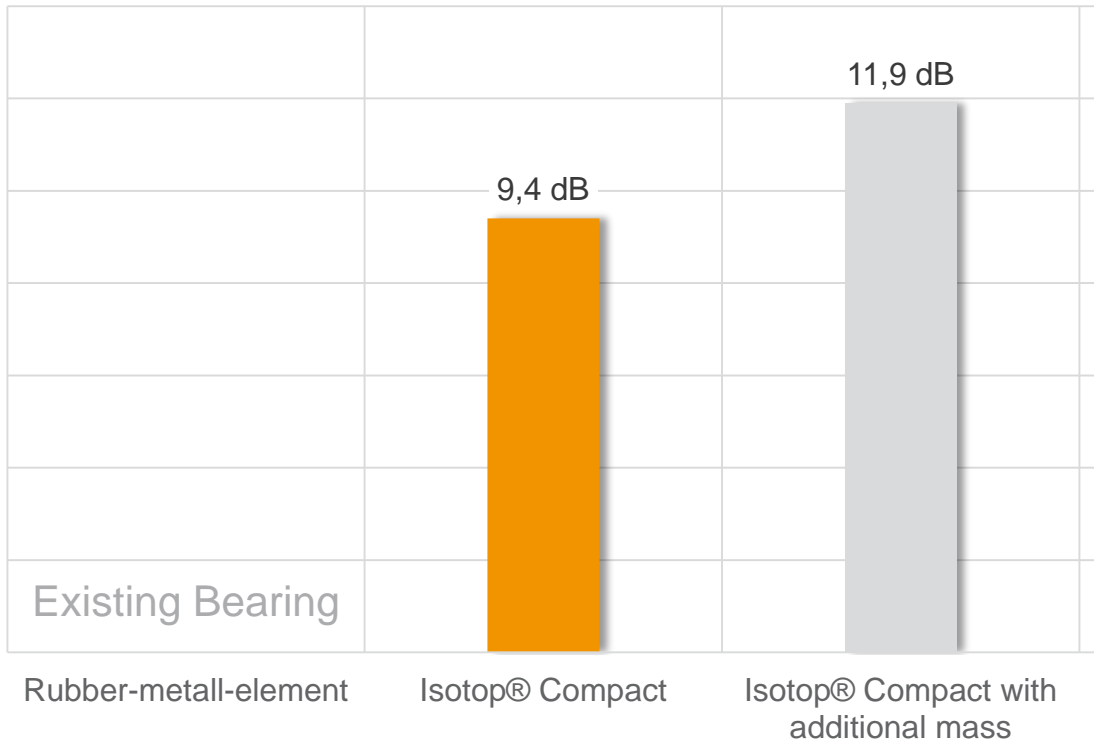
Measurement results

// Improvement of isolation compared to standard rubber-metal element

Compressor operating frequency:

50 Hz

Measurement point: Floor



Measurement results

// Improvement of isolation compared to standard rubber-metal element

Compressor operating frequency:

30 Hz

50 Hz

70 Hz

Measurement point: Floor

Existing Bearing

RUBBER-METALL-
ELEMENT



ISOTOP® COMPACT



ISOTOP® COMPACT
WITH ADDITIONAL
MASS



ISOTOP® MSN-DAMP



ISOTOP® MSN-DAMP
WITH ADDITIONAL
MASS



ISOTOP® DMSN



ISOTOP® DZE MINI



7,6 dB

9,4 dB

6,3 dB

8,0 dB

11,9 dB

6,8 dB

13,7 dB

10,6 dB

7,2 dB

11,6 dB

12,4 dB

9,0 dB

13,7 dB

11,0 dB

9,3 dB

11,3 dB

12,3 dB

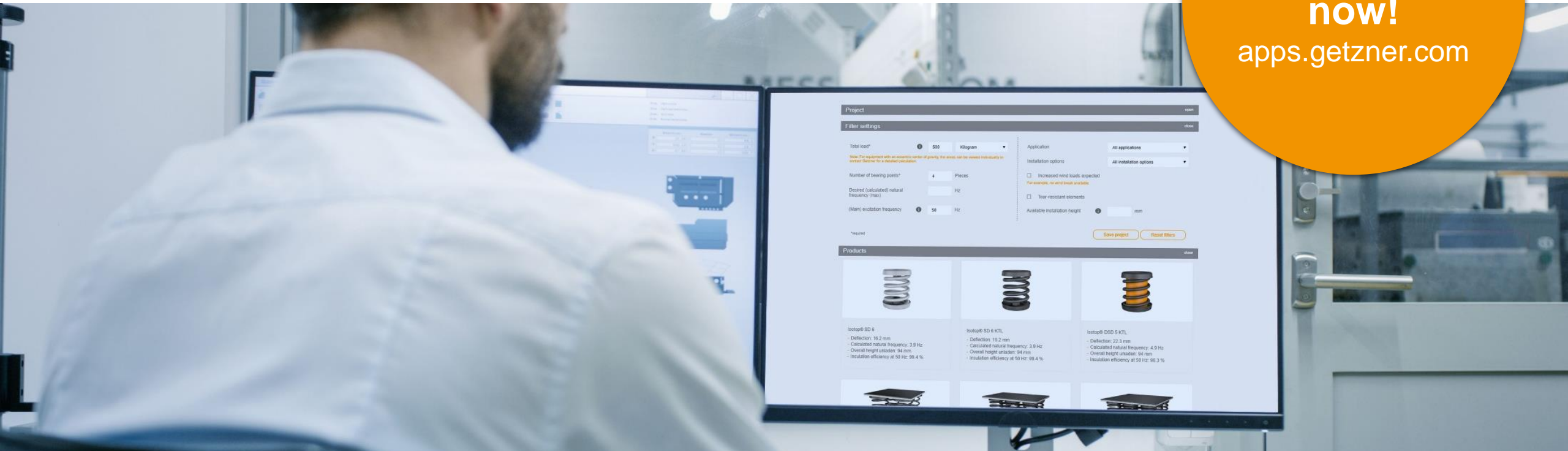
9,0 dB



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Fast



Up-to-date

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Isotop® SD 7

Isotop® SD 7 KTL

Isotop® DSD 6 KTL

Isotop® DSD 6 KTL

Ordering number: **39157**

Your settings:

Total load: 200 kg Bearing points: 1

Product dimensions (unladen)			
Height	h	=	94
Diameter	Ø	=	70
Thread size			M10
Deflection			25.0
Long term deflection (after one day)			25.0
Long term deflection (after one month)			25.0
Natural frequency	f ₀	=	4.3

getzner

engineering a quiet future

Editor: Thomas Marté

Date: 10 March 2020

Your settings: Total load: 500kg, Bearing points: 4, Excitation frequency: 50Hz

Isotop® DSD 5 KTL

Ordering number: **39497**

Thread size	M10
Deflection	22.3 mm
Long term deflection (after one day)	22.3 mm
Long term deflection (after one month)	22.3 mm
Natural frequency	f ₀ 4.9 Hz
Capacity	88 %

Frequency in Hz	Insulation in dB	Degree of insulation in %
2.5	2.5	-33
3.1	4.1	-51
4.0	7.3	-133
4.9	9.8	-211
5.0	9.7	-205
6.3	3.0	-41
8.0	-3.9	35
10.0	-9.0	65
12.5	-13.5	79
16.0	-17.9	87
20.0	-21.6	92
25.0	-25.2	94
31.5	-28.6	96
40.0	-32.1	98
50.0	-35.2	98.3
63.0	-38.3	98.8
80.0	-41.5	99.2
100.0	-44.4	99.4
125.0	-47.2	99.6
160.0	-50.3	99.7
200.0	-53.0	99.8

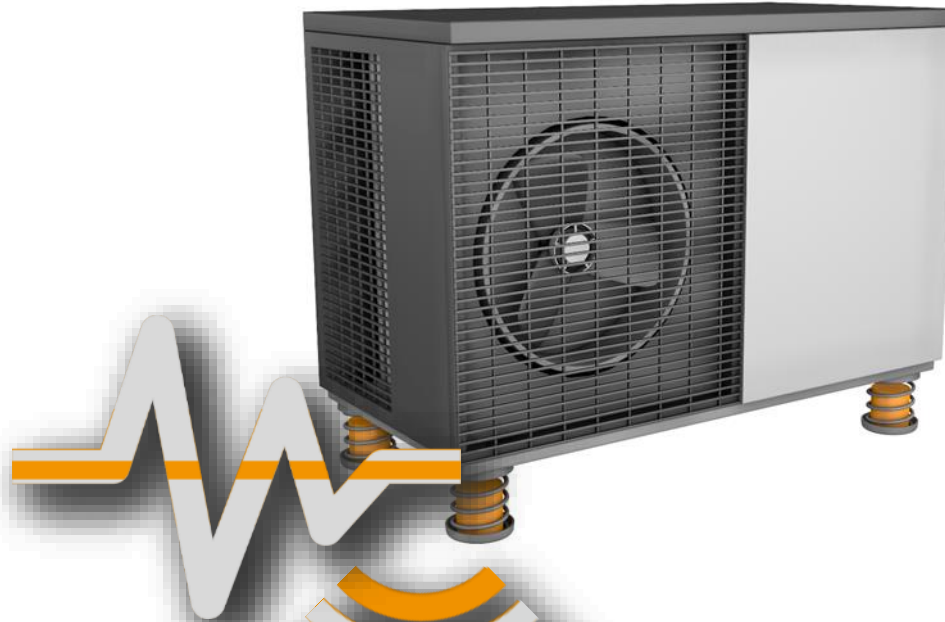
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engineering a quiet future

Possible further advances in silent HVAC systems

Primary Airborne noise



Secondary Airborne noise





Because it makes the difference 

**Thank you for your
attention.**

Take care. Stay healthy. Get connected.

Thomas Marte
Getzner Werkstoffe

**CONNECTING
EXPERTS.**

