



Test certificate

Measurement of the dynamic stiffness of rubber spring elements for the resilient mounting of devices according to ISO 10846-1 and ISO 10846-2

Type of test: Measurement of the transfer stiffness in axial direction (compression stiffness) at a defined velocity-excitation of the test specimen at the input (upper side) and determination of the transmitted alternating force at the blocked output (bottom side).

Client: HILTI AG/Business Unit Installation Systems, Feldkircherstraße 100, PSF 333, 9494 Schaan/Liechtenstein

Date of the test: 2007-11-08

Test report No.: M73 724/1 of 2007-12-03

Test object:

Name:	Mounting element for ventilation systems	Manufacturer:	HILTI
Type:	HILTI T1-M10	Year of manufacture:	2007
		Condition:	new

Technical data:

Diameter:	40 mm	Height (unloaded):	28 mm
Flange model:	1x female screw thread M10 and 1x welded thread bolt M10 (l = 20 mm)		
Material:	EPDM, 55 Shore (A) +/- 5 Shore		
Static stiffness axial (compression stiffness):	s = 230 N/mm (manufacturer's data)		

Test set-up:

Mounting of the test specimen in the test rig according to the specifications of ISO EN 10846; connection of test specimen to the test facilities in the test rig via plane adapter plates.

Initiation of oscillation into the specimen: axial preload: adapted to the dimensions of the test specimen

Static preloads: 250 N – 500 N - 750 N – 1000 N

Test procedure: ISO 10846-1 and ISO 10846-2

Acoustics and vibration – Laboratory measurement of vibro-acoustic transfer properties of resilient elements – Part 1: Principles and guidelines, 1997 and Part 2: Dynamic stiffness of elastic supports for translatory motion – Direct method, 1997

Excitation signal: controlled sine sweep (excitation velocity = constant), measurement range: 10 Hz to 1010 Hz

Test result: vibration damper HILTI T1-M10

Basis: tests with a single test specimen

- The dynamic spring stiffness rises with an increasing frequency.
- The dynamic spring stiffness rises with an increasing static load of the test specimen. In the load range of 250 N up to 1000 N, the dynamic stiffness is estimated to be by a factor of 2.17 up to 3.65 higher compared with the static stiffness.
- For the design of resilient mounting, the dynamic stiffness is to be taken as a basis which shows values differing from the static load of the vibration damper.
 - load of 250 N: 500 N/mm
 - load of 500 N: 530 N/mm
 - load of 750 N: 620 N/mm
 - load of 1000 N: 840 N/mm
- Diagrams: Figure A1 and Figure A2 in Test report No. M73 724/1.
- With a professional planning and appropriate installation of the vibration damper Hilti T1-M10, structure-borne sound reductions as defined by DIN 4109 „Sound insulation in buildings“ of November 1989 are possible.

Place and date: Planegg near Munich, December 3, 2007

Tests carried out by: Peter Holm/Paul Hofmann

Signature:

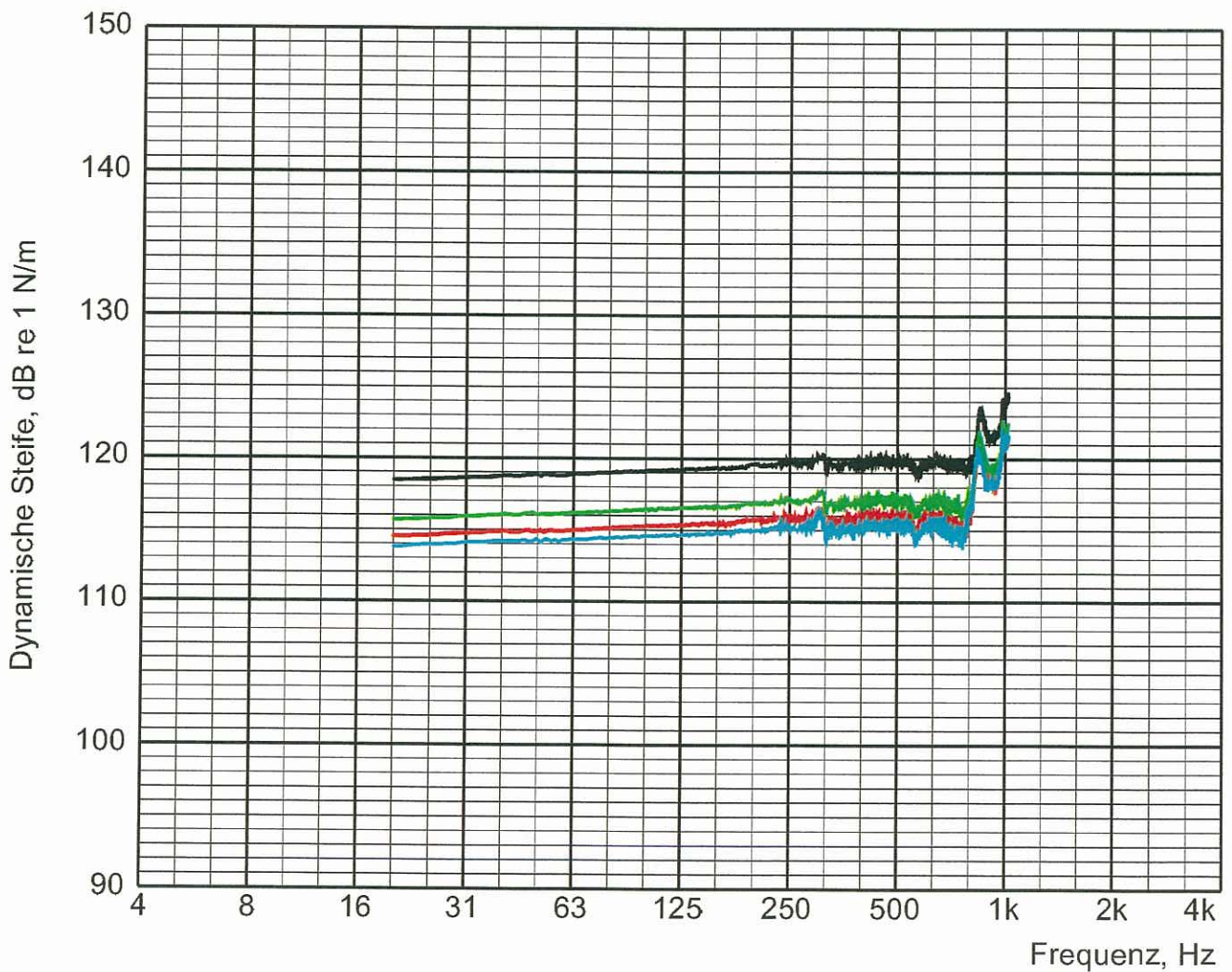
Anhang A

Messergebnisse und Prüfbescheinigung

Dynamische Federsteife Schalldämpfer/Rundpuffer HILTI T1-M10

Abmessungen: d=40 mm, h=40 mm

Steiferichtung axial (Druck)



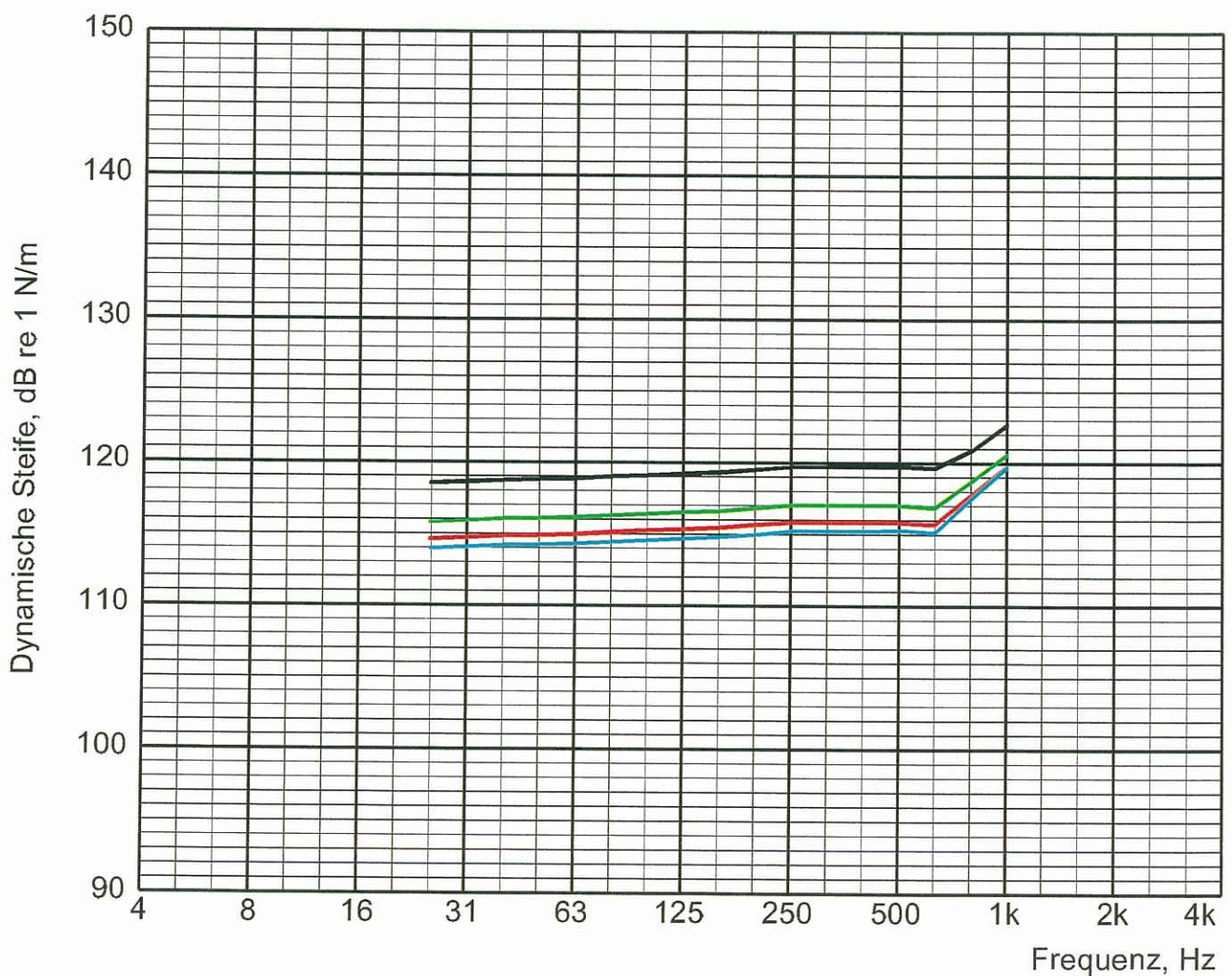
Dynamische Steife als Funktion der statischen Vorbelastung

- Vorlast 1000 N, Anregeschnelle 90 dB
- Vorlast 500 N, Anregeschnelle 90 dB
- Vorlast 750 N, Anregeschnelle 90 dB
- Vorlast 250 N, Anregeschnelle 90 dB

Dynamische Federsteife Schalldämpfer/Rundpuffer HILTI T1-M10

Abmessungen: d=40 mm, h=40 mm

Steiferichtung axial (Druck)



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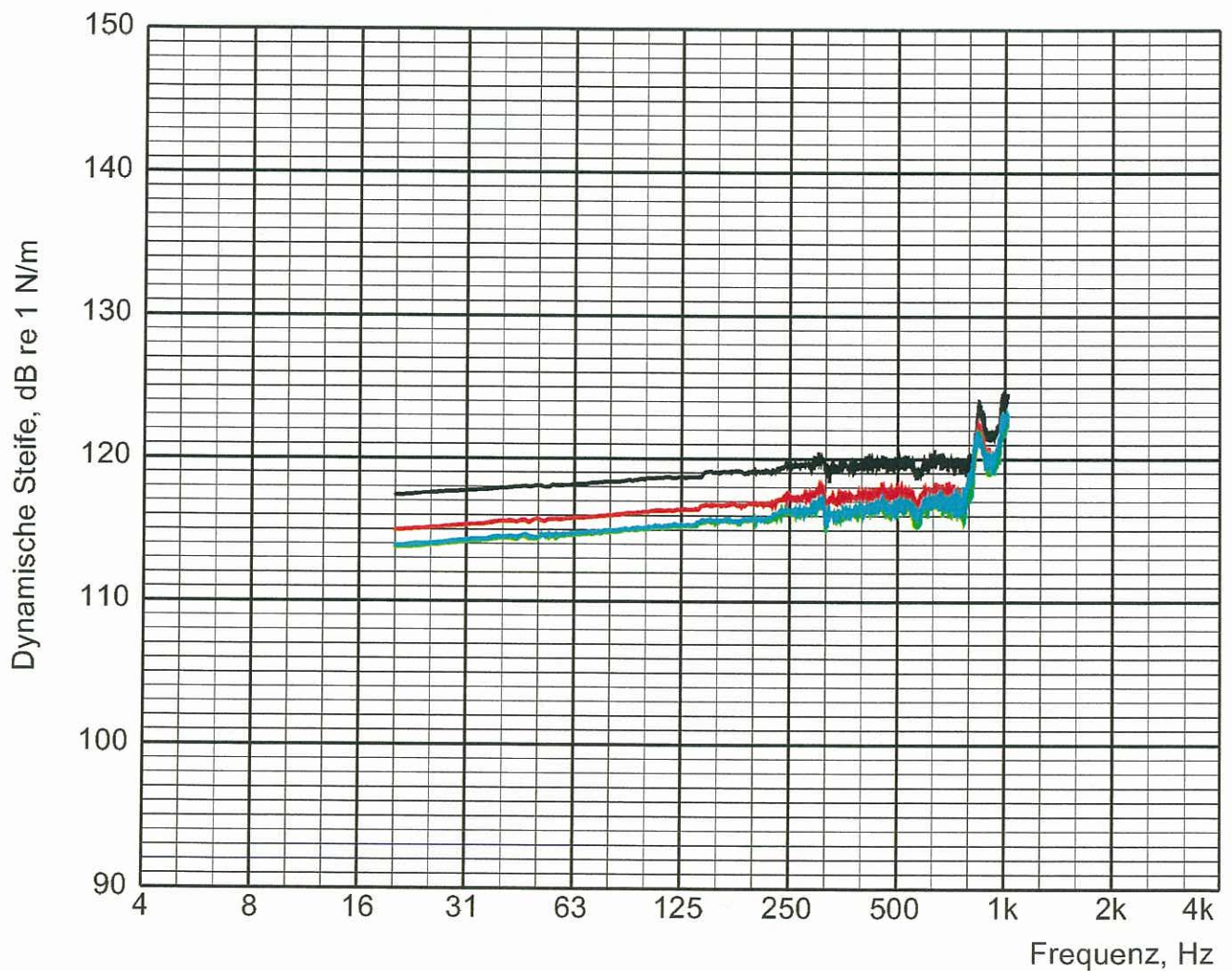
Anhang B

Messergebnisse und Prüfbescheinigung

Dynamische Federsteife Schalldämpfer/Rundpuffer HILTI T2-M8

Abmessungen: d=40 mm, h=40 mm

Steiferichtung axial (Druck)



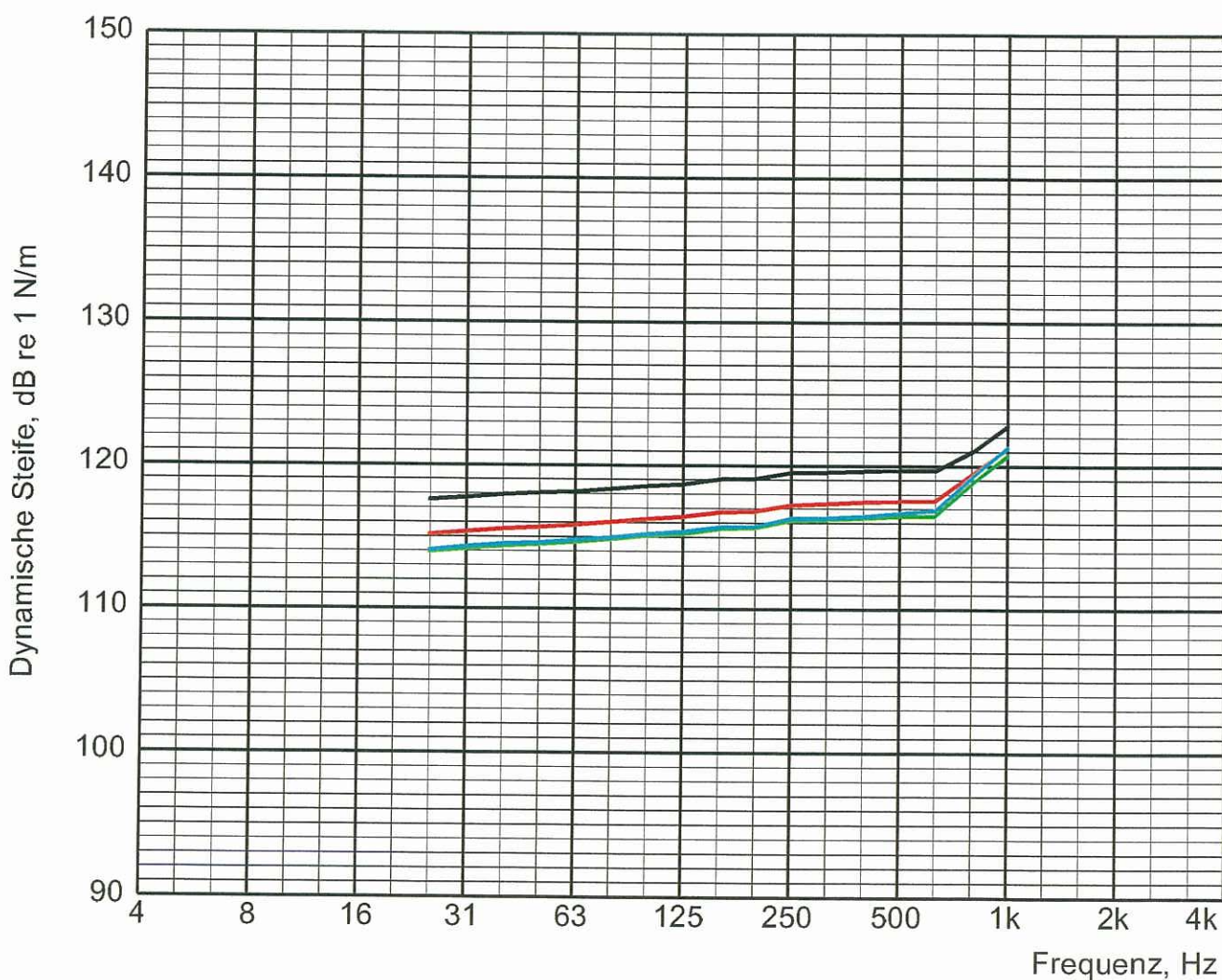
Dynamische Steife als Funktion der statischen Vorbelastung

- Vorlast 1000 N, Anregeschnelle 90 dB
- Vorlast 750 N, Anregeschnelle 90 dB
- Vorlast 500 N, Anregeschnelle 90 dB
- Vorlast 250 N, Anregeschnelle 90 dB

Dynamische Federsteife Schalldämpfer/Rundpuffer HILTI T2-M8

Abmessungen: d=40 mm, h=40 mm

Steiferichtung axial (Druck)



Dynamische Steife als Funktion der statischen Vorbelastung

- Vorlast 1000 N, Anregeschnelle 90 dB
- Vorlast 750 N, Anregeschnelle 90 dB
- Vorlast 500 N, Anregeschnelle 90 dB
- Vorlast 250 N, Anregeschnelle 90 dB