

Test report

No. 2010-0186-VU

Date of test: July 2010
Testers: Dipl.-Ing Pröhl,
Dipl.-Ing Wenderoth

No. of pages: 15

**Applicant /
manufacturer:** Dirak GmbH
Königsfelder Straße 1
58256 Ennepetal

Test specimens : Different specimens, see table 1 to 5
on page 11 to 15

Test procedure / bases: random vibration test:
base standard: DIN EN 60068-2-64
test standard: DIN EN 61373
shock test:
base standard: DIN EN 60068-2-27
test standard: DIN EN 61373

Delivered on : July, 19th 2010

Date of report : July, 22nd 2010

Test specimens :

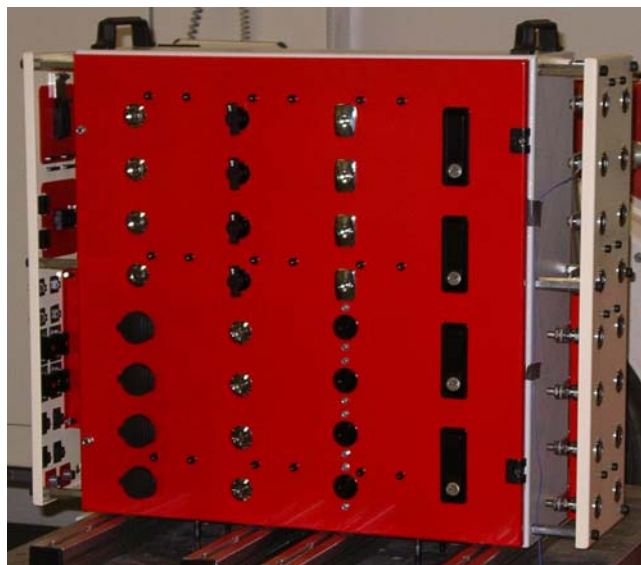


Fig. 1: Test specimens in the fixture

1 Test equipment and regulation

1.1 Random vibration and shock test

electrodynamic shaker LDS V875 with connected slip table LPT 750 und power amplifier SPA40K,

test load:	35,0 kN
frequenzy range:	5 Hz to 3000 Hz
sinus, peak:	110 gn
random, rms:	75,0 gn
shock, half sine:	106,8 kN
max. burden:	750 kg
max. stroke:	50,8 mm (p-p)
sliptable:	app. 750 x 750 mm
hardware :	LDS Dactron Laser Shaker Control System LAS 200 SN: 5111113 R28
software:	Dactron Shaker Control Version 5.82

Accelerometers:	PCB 352A21	SN. 98115
	PCB M320C18	SN. 5253
	PCB M320C18	SN. 5254

2 Testing methods

2.1 Visual checks

After each direction the specimens were subjected to a visual check.

2.2 Random Vibration test, (long-term test)

The vibration test was conducted in accordance with the standard DIN EN 61373, Category 1, Class B. The category and class were specified by the customer.

The test parameters were defined as follows:

excitation mode:	Random
frequency range:	5–150 Hz
power density:	<u>Longitudinal, Transversal, Vertical</u> 5–20 Hz 1.857 (m/s ²) ² /Hz 20–150 Hz -6 dB/octave
effective acceleration:	<u>Longitudinal, Transversal, Vertical</u> 7.9 m/s ² (rms)
test duration:	3 x 5 h
total test duration:	15 h (effective vibration time)
test temperature:	room temperature

Diagrams 1 to 3 at pages 6 to 8 show the regulating channel's excitation during the vibration test.

2.3 Shock test

The shock test was conducted in accordance with the standard DIN EN 61373, Category 1, Class B. The category and class were specified by the customer.

The test parameters were defined as follows:

shock pulse:	Halbsinus
shock duration and amplitude:	<u>Longitudinal, Transversal, Vertical</u> 30 ms bei 50m/s ²
test directions:	6 Richtungen
number of shocks:	18 (3 x 6 directions)
test temperature:	room temperature

Diagrams 4 to 5 at pages 9 to 10 show the regulating channel's shock excitation in the positive and negative directions.

The following pictures show the test specimens undergoing the vibration and shock test on the shaker.

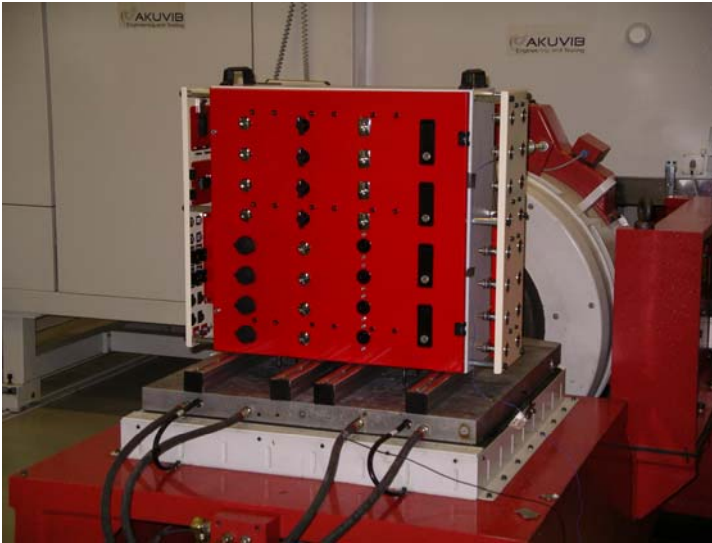


Fig. 2: specimens undergoing the vibration and shock test in longitudinal direction

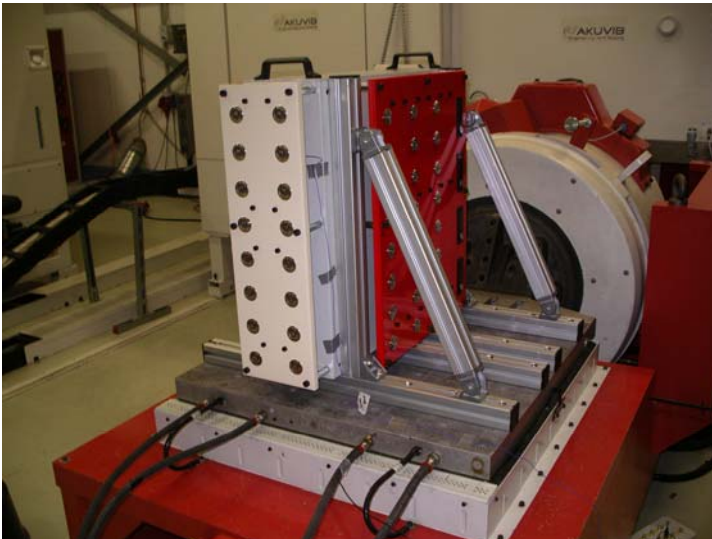


Fig. 3: specimens undergoing the vibration and shock test in transversal direction

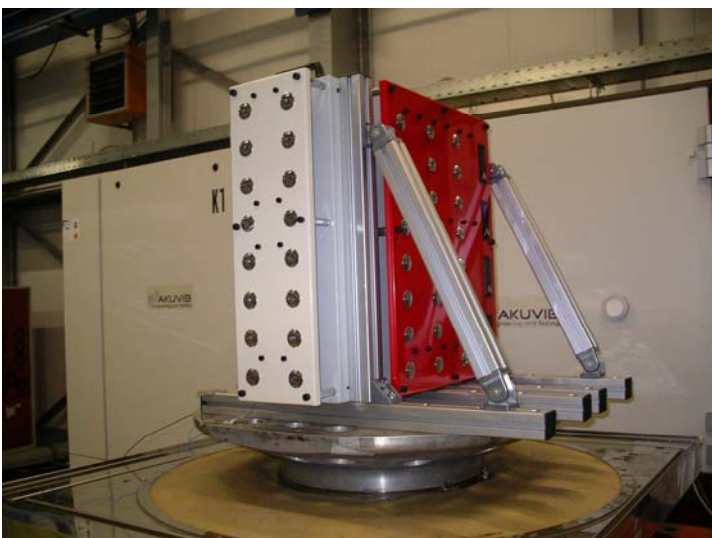


Fig. 4: specimens undergoing the vibration and shock test in vertical direction

3 Test procedure

The vibration and shock tests were conducted in the following order:

1. long-term vibration test, vertical axis
2. positive and negative shock test, vertical axis
3. long-term vibration test, transversal axis
4. positive and negative shock test, transversal axis
5. long-term vibration test, longitudinal axis
6. positive and negative shock test, longitudinal axis

4 Result

The visual inspection of the specimens after testing could not detect any cracks, chipping, deformation, abrasion, or other mechanical damage.

The specimens did not open during the tests.

Processed by

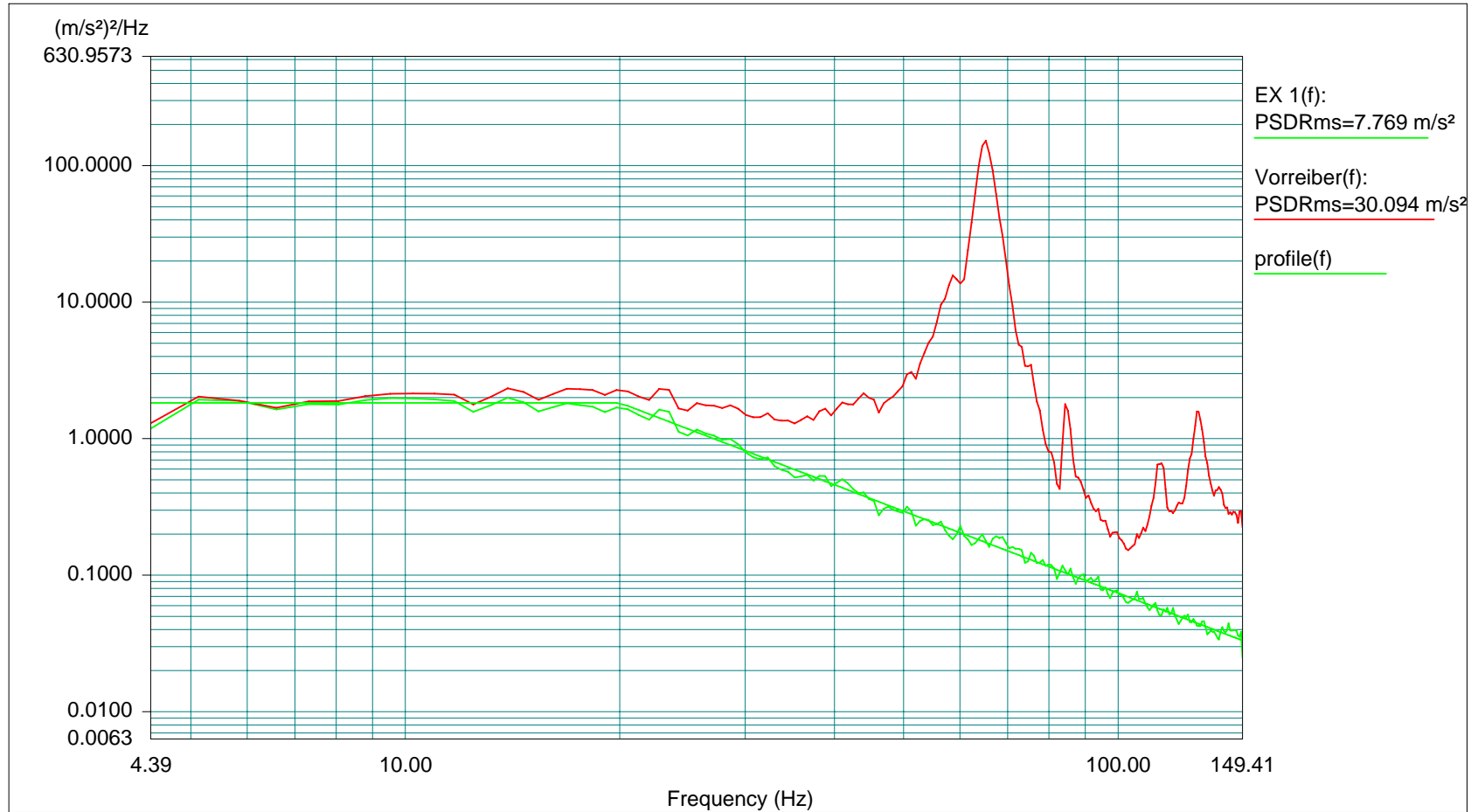


(Dipl.-Ing. Pröhl)



(Dipl.-Ing. Wenderoth)

Diagram 1: Long-term test regulating channel, longitudinal



Level: 100 %

Control RMS: 7.769327 m/s^2 Full Level Elapsed Time: 05:00:00 Lines: 200 Frame Time: 1.365333 Seconds

Demand RMS: 7.809752 m/s^2 Remaining Time: 00:00:00 DOF: 154 dF: 0.732422 Hz

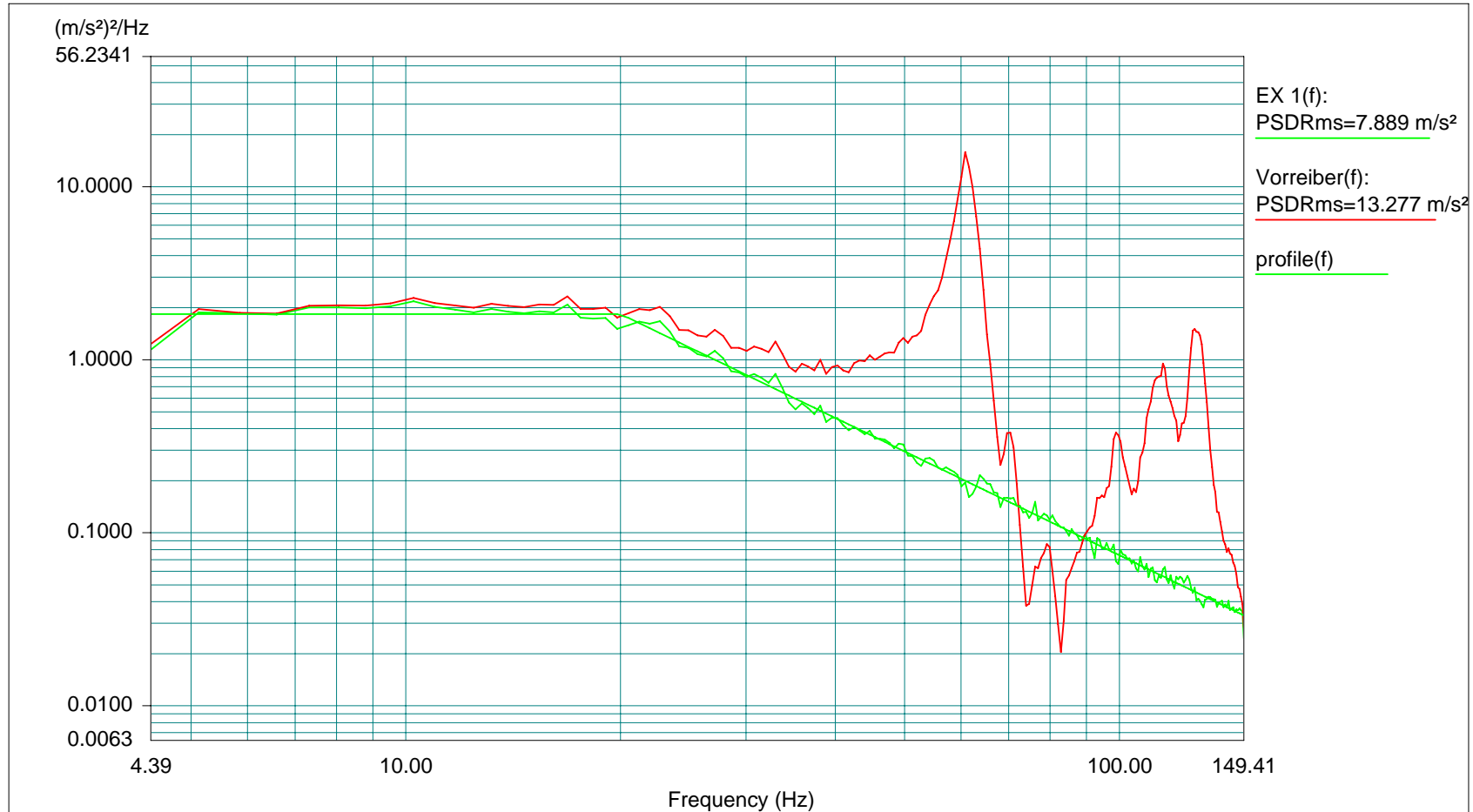
Test report A10-0186-VU

date: July, 22nd 2010
 page 6 of 15

Processed by Pröhl

Eng_Ber2010-0186-VU_Dirak_Hülsmann(Pdf-Vorlage).doc

Diagram 2: Long-term test regulating channel, transversal



Level: 100 %

Control RMS: 7.889270 m/s^2 Full Level Elapsed Time: 05:00:00 Lines: 200 Frame Time: 1.365333 Seconds

Demand RMS: 7.809752 m/s^2 Remaining Time: 00:00:00 DOF: 154 dF: 0.732422 Hz

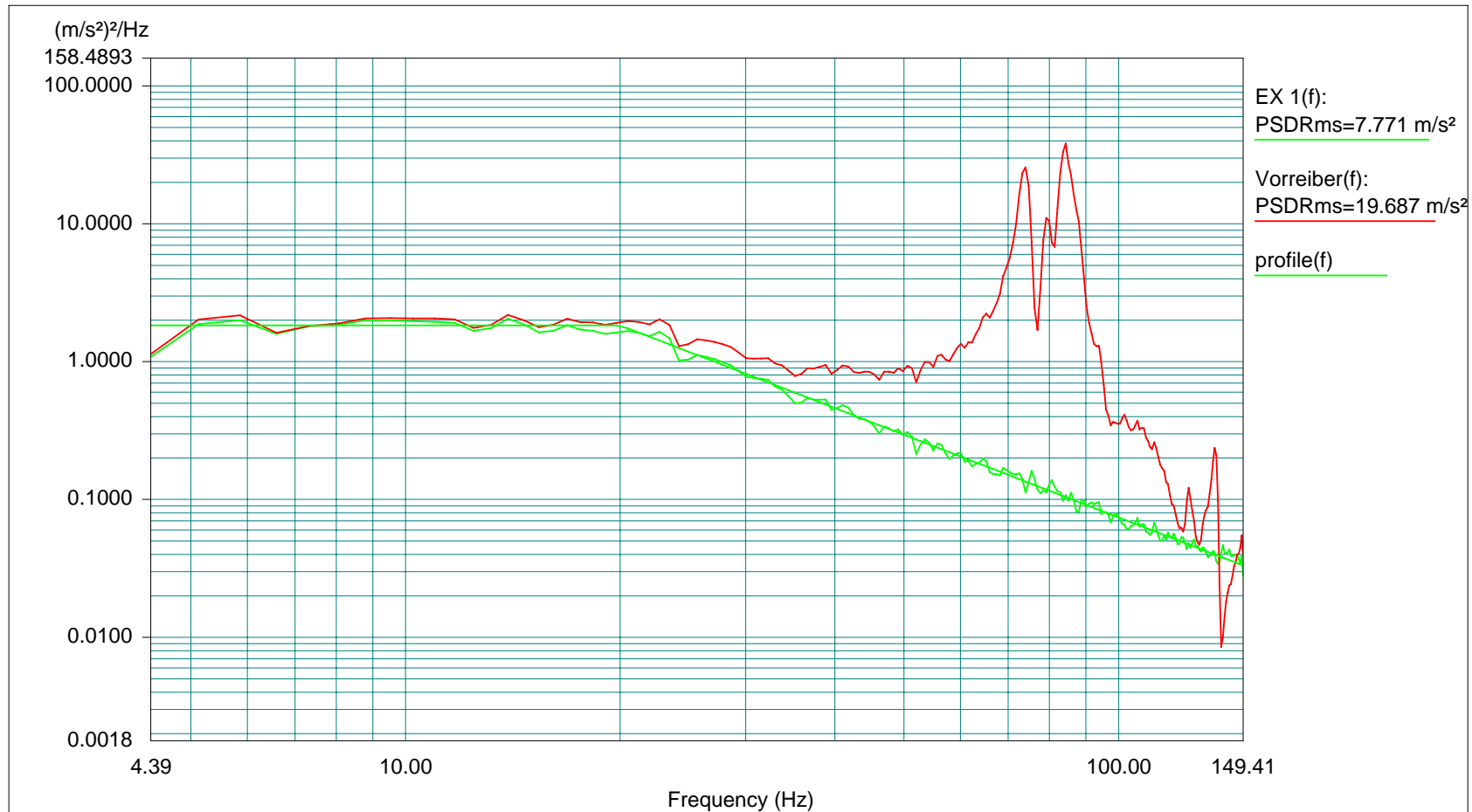
Test report A10-0186-VU

date: July, 22nd 2010
 page 7 of 15

Processed by Pröhl

Eng_Ber2010-0186-VU_Dirak_Hülsmann(Pdf-Vorlage).doc

Diagram 3: Long-term test regulating channel, vertical



Level: 100 %
 Control RMS: 7.770842 m/s² Full Level Elapsed Time: 05:00:00 Lines: 200 Frame Time: 1.365333 Seconds
 Demand RMS: 7.809752 m/s² Remaining Time: 00:00:00 DOF: 154 dF: 0.732422 Hz

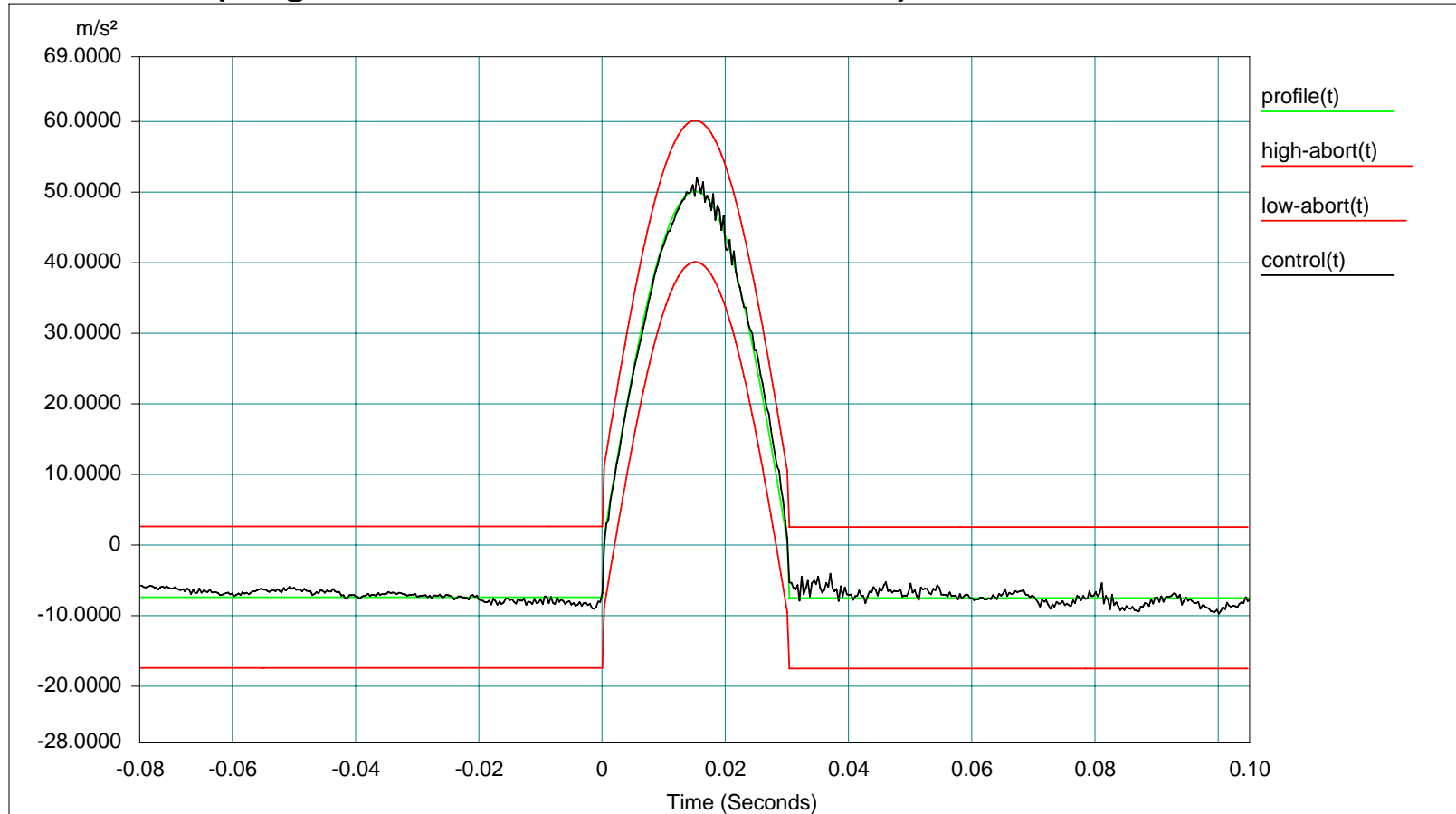
Test report A10-0186-VU

date: July, 22nd 2010
 page 8 of 15

Processed by Pröhl

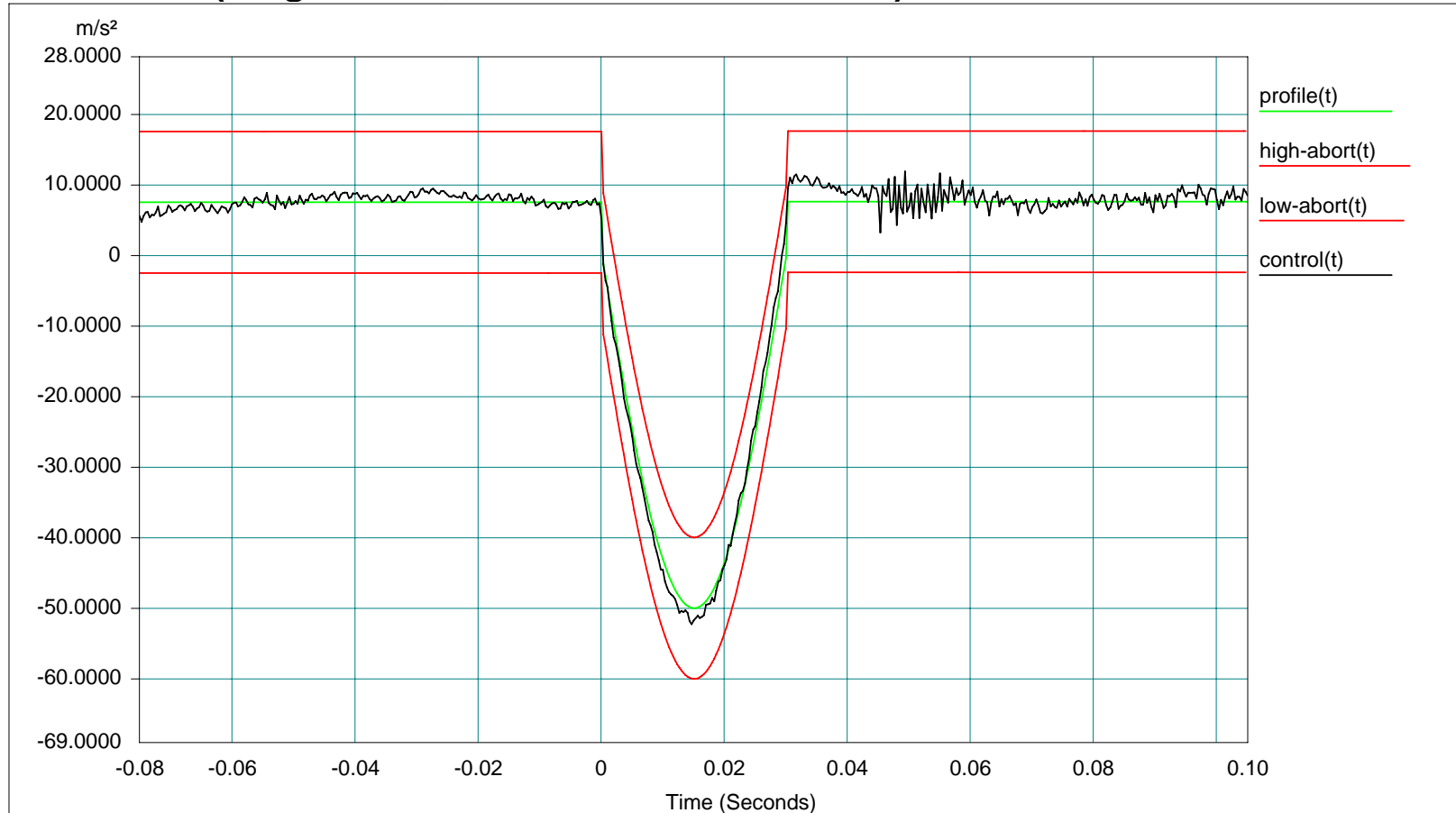
Eng_Ber2010-0186-VU_Dirak_Hülsmann(Pdf-Vorlage).doc

**Diagram 4: Shock test regulating channel positive
(longitudinal, transversal and vertical)**



Level: 100 %	Block Size: 2048	Elapsed Pulses: 11
Frame Time: 0.682667 Seconds	Control Peak: 51.899006 m/s ²	Control RMS: 8.837430 m/s ²
dT: 0.000333 Seconds	Demand Peak: 50.000000 m/s ²	Demand RMS: 8.806992 m/s ²
Pulse Type: Half Sine	Amplitude: 50.000000 m/s ²	Full Level Elapsed Pulses: 3
		Remaining Pulses: 7

**Diagram 5: Shock test regulating channel negative
(longitudinal, transversal and vertical)**



Level: 100 %	Block Size: 2048	Elapsed Pulses: 18
Frame Time: 0.682667 Seconds	Control Peak: 52.251457 m/s^2	Control RMS: 9.070041 m/s^2
dT: 0.000333 Seconds	Demand Peak: 50.000000 m/s^2	Demand RMS: 8.806992 m/s^2
Pulse Type: Half Sine	Amplitude: 50.000000 m/s^2	Full Level Elapsed Pulses: 6
		Remaining Pulses: 0

Test report A10-0186-VU

date: July, 22nd 2010
page 10 of 15

Processed by Pröhl

Table 1: Specimens



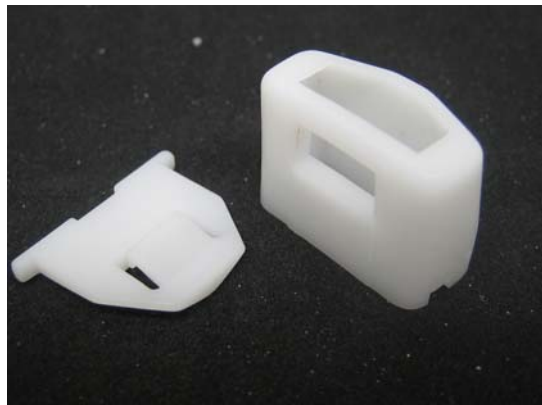
100-8001.00-00000 Zug,- Drehriegel kpl.



220-9313.00-00000 Zug,- Drehriegel klein kpl.



100-9001.00-00000 Kompressionsdrehriegel nach Produktsystem.



200-9622.00-00000 Gleitschuh für Zunge.



220-9313.00-00000 Zug,- Drehriegel klein.



248-8003.00-00000 Kompressionsverschluss kpl.

Table 2: Specimens



248-9103.00-00000 und 248-9152.00-00000
Kompressions - Drehriegel Vkt.8 RH-LH kurz.



250-8040.00-00000 Zug,- Drehriegel kpl.



282-9001.00-00000 Schnappverschluss PA.



248-9203.00-00000 und 248-9252.00-00000
Kompressions- Drehriegel Vkt.8 RH_LH lang.



413-9003.00-000XX Bügelgriff SNAP- LINE.



291-9001.00-00000 Zug,- Drehriegel kpl

Table 3: Specimens



255-8024.00-00000 Sicherheitsdrehriegel kpl.



255-8024.00-00000 Sicherheitsdrehriegel VA.



255-8026.00-00000 Sicherheitsdrehriegel GDZn.



255-9417.00-00000 Sicherheitsdrehriegel L36
Bahn



255-9421.00-00000 Sicherheitsdrehriegel Vkt.6
Bahn



418-9301.33-000XX Klippscharnier

Table 4: Specimens



282-9402.00-00000 Hebelverschluss
verschließend



282-9414.00-00003 Hebelverschluss verschließend
mit Federbolzen



294-9001.00-000XX Befestigungselement kpl.



294-9003.00-000XX D-SNAP Befestiger



294-9103.00-0XXXX D-SNAP Befestiger



294-9205.00-000XX D- SNAP Befestiger

Table 5: Specimens



448-9101.00-02016 Kompressionsverschluss
H22