

Test report

No. 2014-0421-VU

Date of test: December 2014
Testers: Dipl.-Ing Pröhl,
Dipl.-Ing Wenderoth,
Techniker Backhaus,
Techniker Pfadenhauer

No. of pages: 15

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

Test specimens : Different specimens, see table 1 to 5
on page 9 to 13

Test procedure / bases: random vibration test:
base standard: DIN EN 60068-2-64
test standard: DIN EN 61373 / 2011
shock test:
base standard: DIN EN 60068-2-27
test standard: DIN EN 61373 / 2011

Delivered on : December, 04th 2014

Date of report : December, 19th 2014

Test specimens :

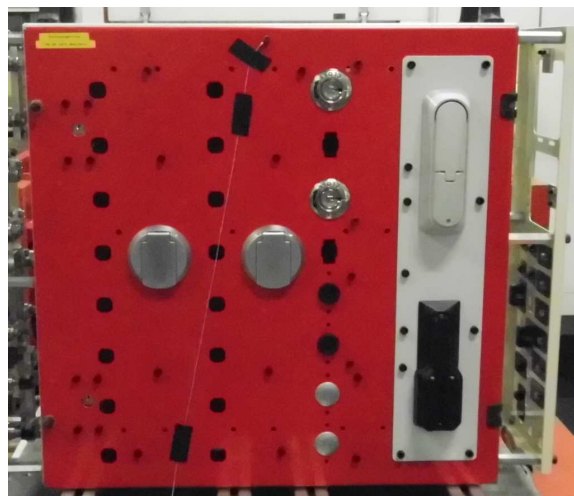


Fig. 1: Test specimens in the fixture

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 M320C18 SN. 5253 PCB M320C18 SN. 11058 PCB 352C22/NC SN. 142775

Electro dynamic shaker:

LDS V8 with connected slip table LPT 750 and power amplifier SPA56K

Test load:	66.0 kN
Frequency range:	5 Hz to 2,500Hz
Sinus, peak:	140 gn
Random, rms:	50.0 gn
Shock, half sine:	198.0 kN
Max. burden:	approx. 750 kg
Max. stroke:	approx. 50.8 mm (p-p)
Diameter of armature:	approx. 440 mm
Slip table:	approx. (750 x 750) mm
Hardware :	LDS Dactron Laser Shaker Control System LAS 200 SN: 8167759
Software:	Dactron Shaker Control Version 8.10.0193
SN:	SP8610-001
PM:	V14
Accelerometers:	PCB M320C18 SN. 5253 PCB M320C18 SN. 11058 PCB 352C22/NC SN. 142775

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 0.964 (m/s ²) ² /Hz 20–150 Hz -6 dB/octave
effective acceleration:	<u>Longitudinal, Transversal, Vertical</u> 5.72 m/s ² (rms)
test duration:	approx 3 x 5 h
total test duration:	approx 15 h (effective vibration time)
test temperature:	room temperature

Diagrams 1 at pages 6 shows exemplarily the regulating channel's excitation during the vibration test.

2.3 Mechanical 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 2 to 3 at pages 7 to 8 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 tests.

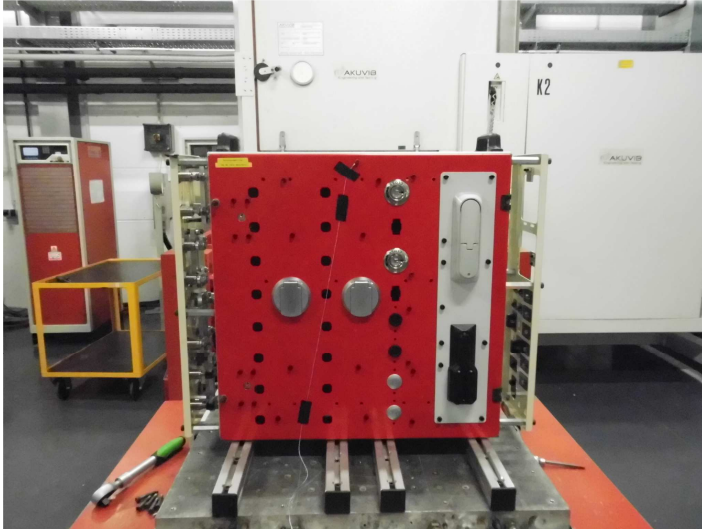


Fig. 2: specimens undergoing the vibration and shock test in first horizontal direction

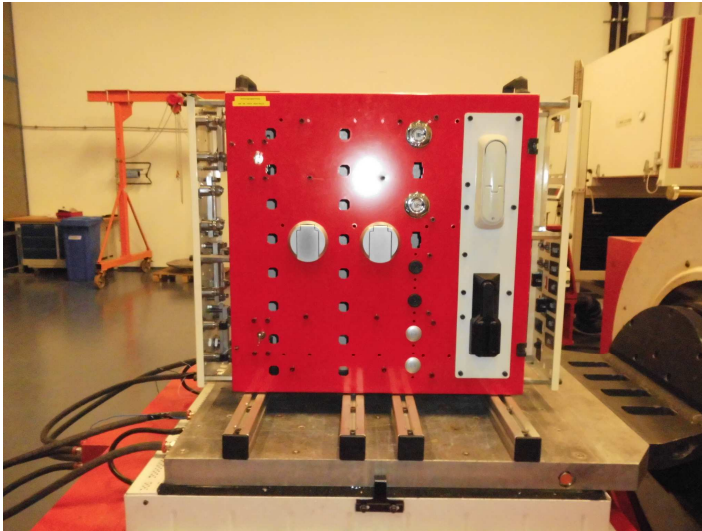


Fig. 3: specimens undergoing the vibration and shock test in second horizontal direction

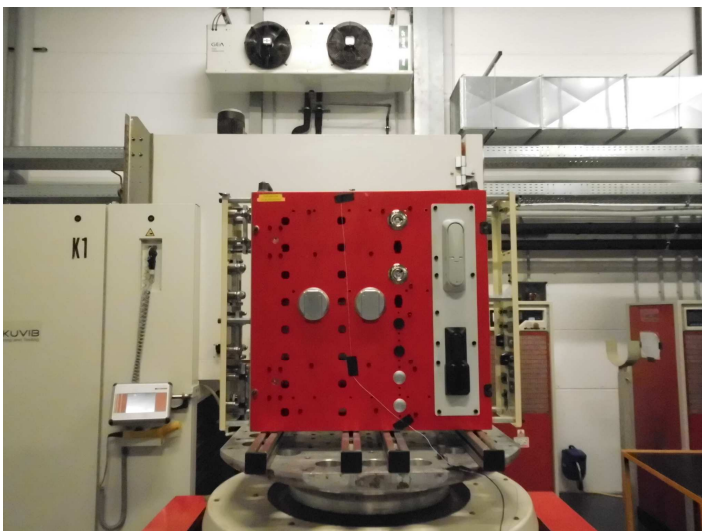


Fig. 4: specimens undergoing the vibration and shock test in vertical direction

3 Test procedure

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

1. long-term vibration test, first horizontal axis
2. positive and negative shock test, first horizontal axis
3. long-term vibration test, second horizontal axis
4. positive and negative shock test, second horizontal axis
5. long-term vibration test, vertical axis
6. positive and negative shock test, vertical 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 unlock during the tests.

Processed by

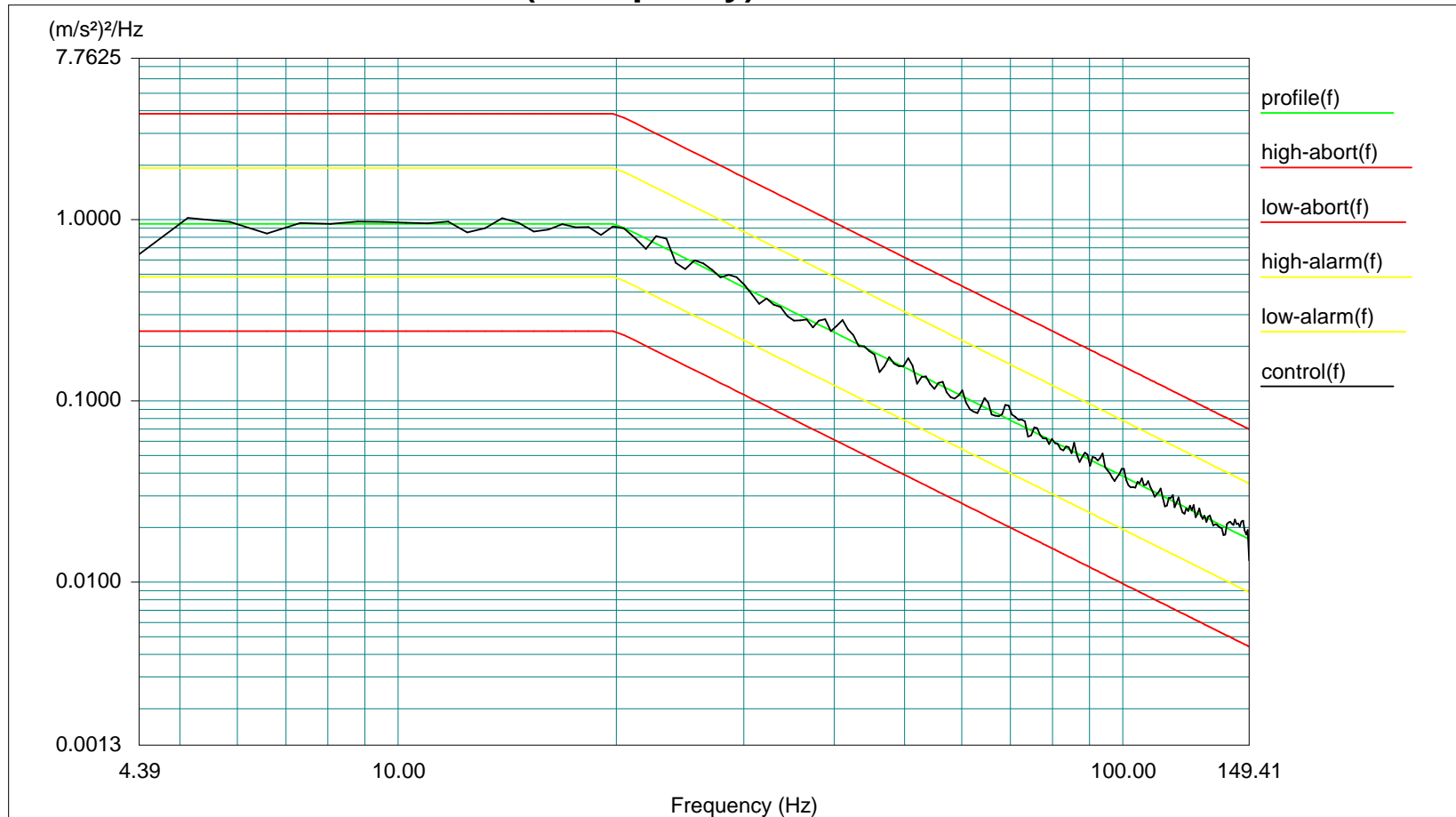


(Dipl.-Ing. Wenderoth)



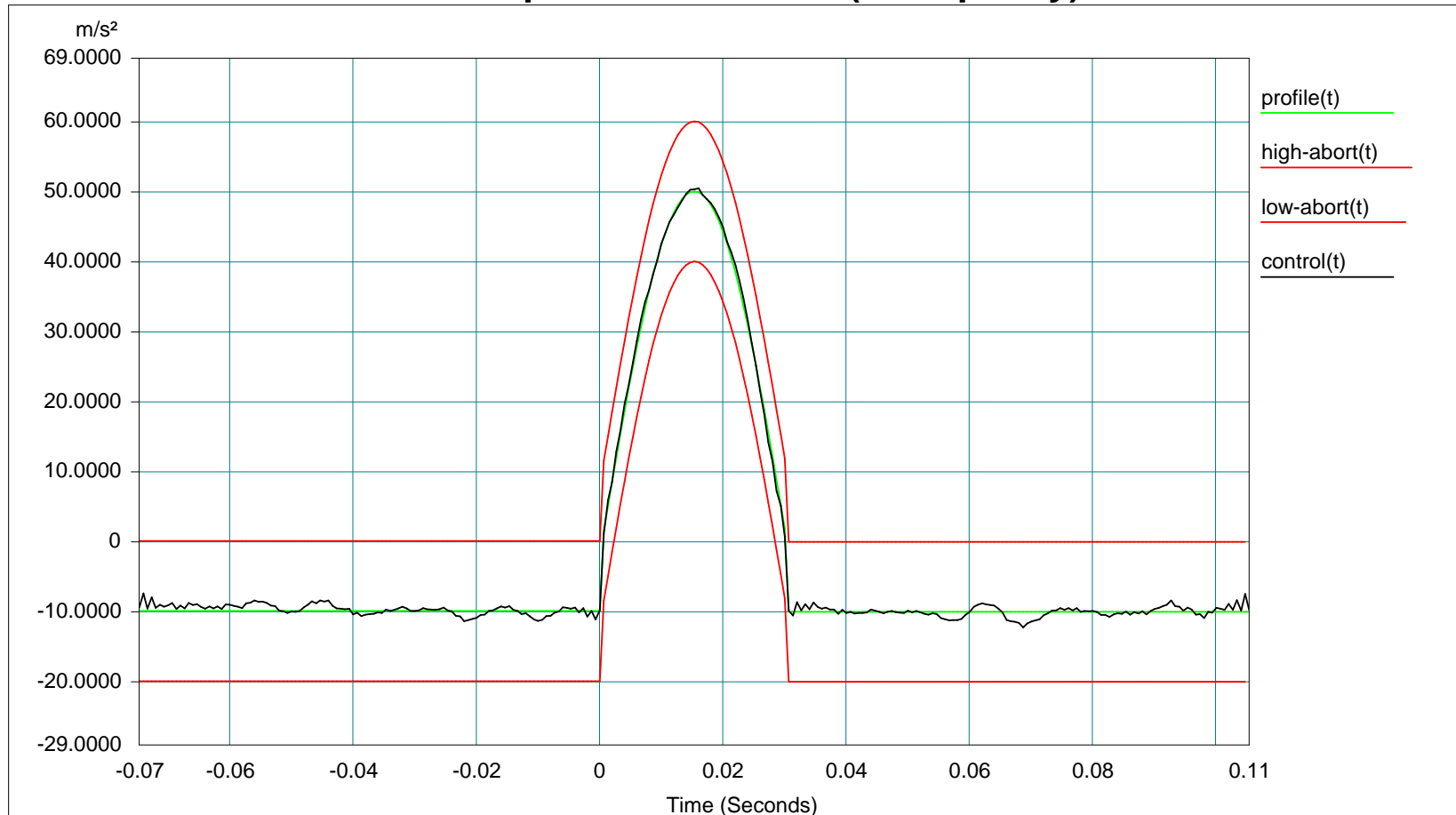
(G. Pfadenhauer)

Diagram 1: Long-term test regulating channel horizontal and vertical direction (exemplarily)



Level: 100 %
 Control RMS: 5.592779 m/s² Full Level Elapsed Time: 05:00:00 Lines: 200 Frame Time: 1.365333 Seconds
 Demand RMS: 5.626909 m/s² Remaining Time: 00:00:00 DOF: 154 dF: 0.732422 Hz

Diagram 2: Shock test regulating channel horizontal and vertical direction positive direction (exemplarily)



Level:	100 %	Block Size:	1024	Elapsed Pulses:	11
Frame Time:	0.682667 Seconds	Control Peak:	50.440758 m/s ²	Control RMS:	9.292383 m/s ²
dT:	0.000667 Seconds	Demand Peak:	50.000000 m/s ²	Demand RMS:	9.224827 m/s ²
Pulse Type:	Half Sine	Amplitude:	50.000000 m/s ²	Full Level Elapsed Pulses:	3
				Remaining Pulses:	7

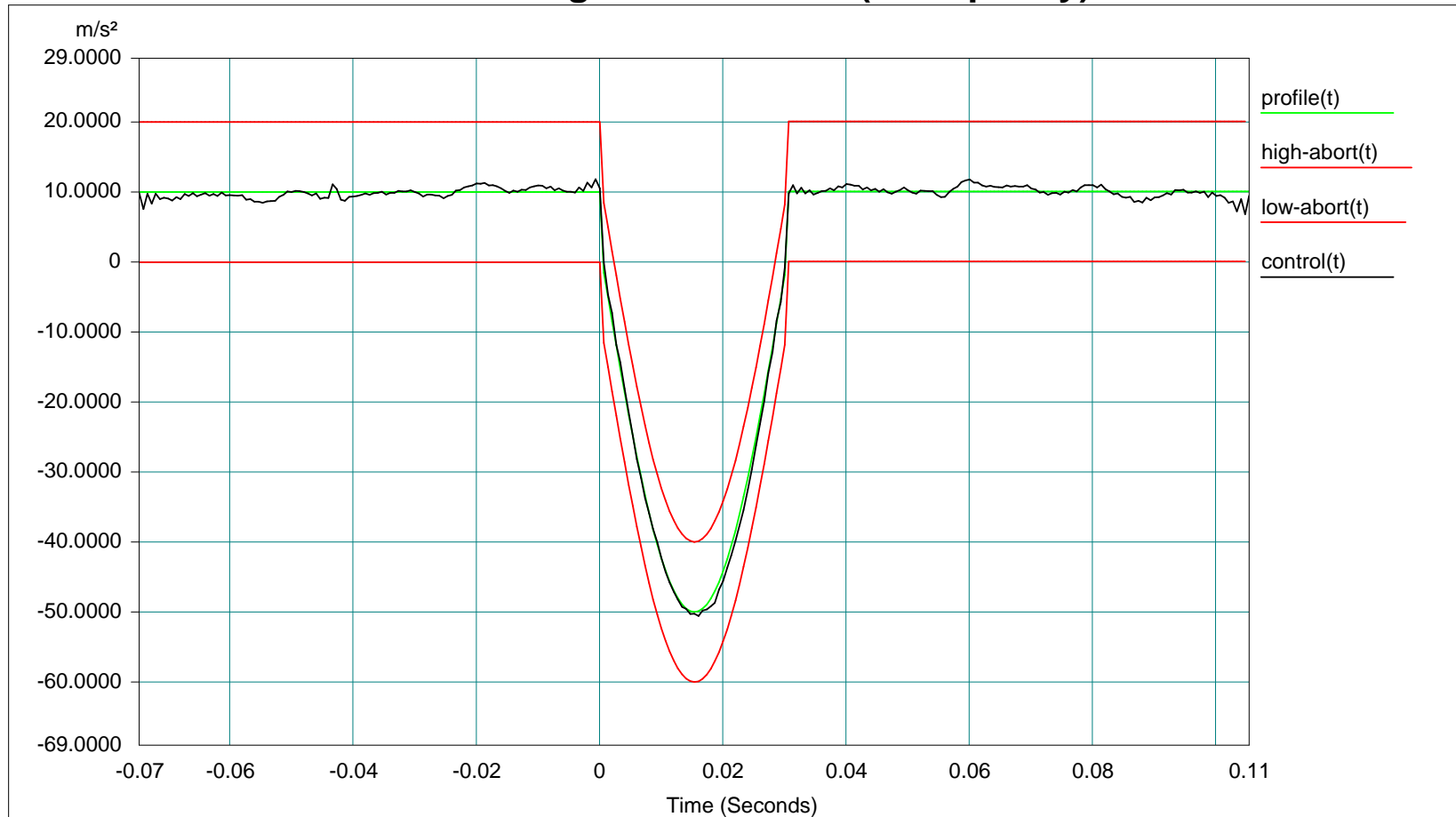
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Diagram 3: Shock test regulating channel horizontal and vertical direction negative direction (exemplarily)



Level:	100 %	Block Size:	1024	Elapsed Pulses:	18
Frame Time:	0.682667 Seconds	Control Peak:	50.576939 m/s ²	Control RMS:	9.333262 m/s ²
dT:	0.000667 Seconds	Demand Peak:	50.000000 m/s ²	Demand RMS:	9.224827 m/s ²
Pulse Type:	Half Sine	Amplitude:	50.000000 m/s ²	Full Level Elapsed Pulses:	6
				Remaining Pulses:	0

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Eng_Ber2014-0421-VU_DIRAK(Pdf-Vorlage)

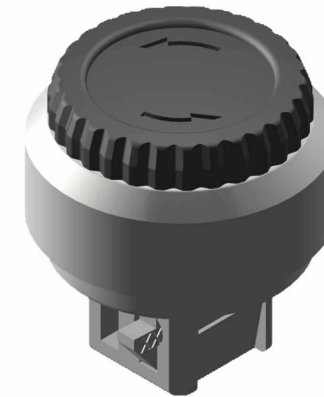
Table 1: Specimens



1-043SL Befestiger 30x14 SNAP-LINE



1-020SL PA Befestiger 9.5 und 12.7 SNAP-LINE



1-034.01SL Unverlierbarer Flex-Befestiger 9.5
SNAP-LINE

Table 2: Specimens



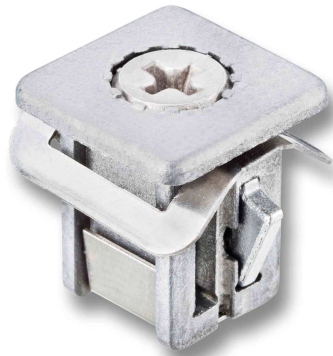
1-034SL Unverlierbarer Flex-Befestiger
9.5 SNAP-LINE



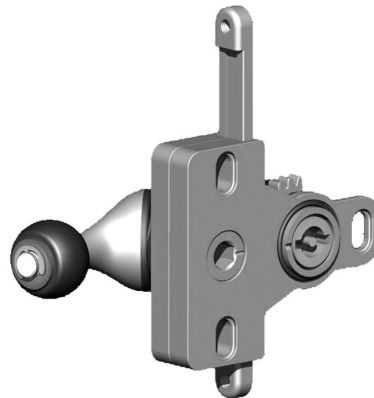
1-035SL Unverlierbarer Befestiger 9.5 SNAP-
LINE



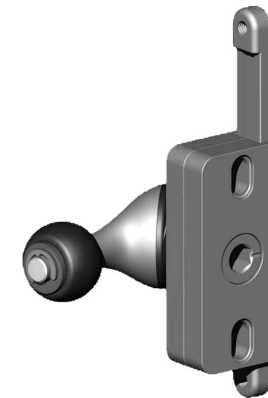
1-041.02SL Unverlierbarer Befestiger 12.7
SNAP-LINE



1-041.06SL Unverlierbarer Befestiger
9.5 SNAP-LINE

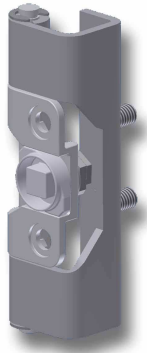


6-504 Kompressions-Verschluss



6-510 Verschlusselement

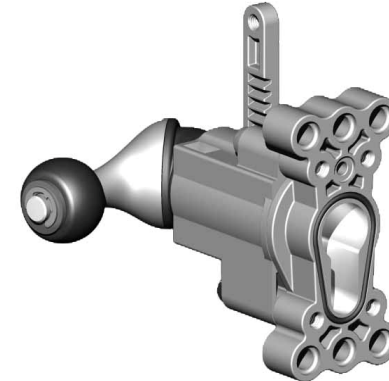
Table 3: Specimens



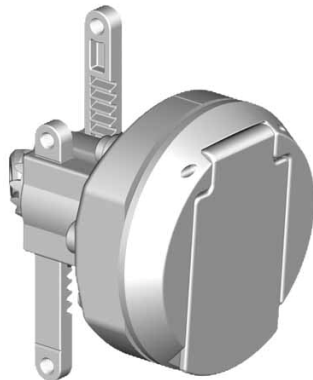
1-162 Flächenbündiger Verschluss mit Scharnierfunktion



2-077SL Schwenkhebel RS PrC SNAP-LINE



6-500 Kompressions-Verschluss PHZ



6-503 Mehrpunkt-Verschluss PHZ mit Schlüsselschild

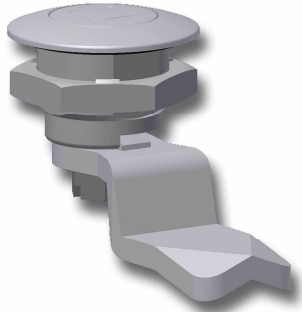


2-126 Doppelzylinder Schwenkhebel RS 105



1-067 Kompressions-Drehriegel Pr 19.1

Table 4: Specimens



1-085.01 Sicherheits-Drehriegel Pr20.1
L18



448-9104.00-00000 Kompressionsverschluss
H=55



2-103 Schwenkebel RS 105 mechanisch /
elektr. mechanisch ELMESS 1102



248-8226.00-00000 Kompressions-
Drehriegel Vkt. konisch



248-8233.00-00000 Kompressions- Drehriegel
Vkt. konisch



7-079 Kompressions-Drehriegel Pr20.1
LH/RH lange Achse

Table 5: Specimens



7-077.01SL Mitnehmer mit Rastscheibe für Standardzungen



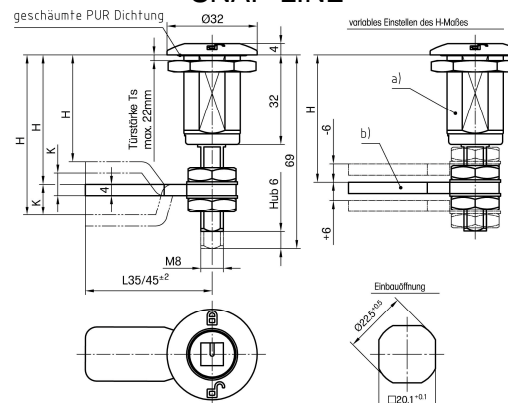
7-077SL Höhenverstellbare Zungen L45 SNAP-LINE



7-078 Kompressions-Drehriegel Pr20.1 LH/RH kurze Achse



1-075 Kompressions-Drehriegel Pr22.1



Zungen für 7-078 und 7-079