Test report
No.: 2017-0277-VU

Date of test: June - July 2017
Testers: Dipl.-Ing. Pröhl, Dipl.-Ing. Roter
No. of pages: 13
Applicant/manufacturer: DIRAK GmbH
Königsfelder Straße 1
58256 Ennepetal
Test specimens: Different specimens: see table 1 to 3 on pages 11 to 13
Test procedures / bases: Random vibration test:
   base standard: DIN EN 60068-2-64 (04/2009)
   test standard: DIN EN 61373 (04/1999)
Shock test:
   base standard: DIN EN 60068-2-27 (02/2010)
   test standard: DIN EN 61373 (04/1999)
Delivered on: June 26th, 2017
Date of report: July 18th, 2017
Specimens:

Fig. 1 and 2: Specimens in fixture

Fig. 3 and 4: Specimens in fixture
1 Test equipment and regulation

1.1 Vibration and shock test

Electro dynamic shaker: UD-SAI T2000-44 with connected slip table and power amplifier SAI 120

- Test load: 89 kN
- Frequency range: (2 to 2000 (3000 vertical)) Hz
- Sine, peak: 180 gn
- Random, rms: 100 gn
- Max. load: vertical: approx. 860 kg incl. expander, horizontal: approx. 2,000 kg incl. slip table
- Diameter of armature: approx. 445 mm
- Size expander: approx. (900 x 900) mm
- Size slip table: approx. (1000 x 1000) mm

Regulation and measurement data acquisition:
- Hardware: PC Unholtz-Dickie Corporation
- Software: Vwin II, Version 2.31
- SN: 10011404
- PN: V116
- Accelerometers: Endevco 42A16 SN. 10219
  PCB J320C33 SN. 15795
2 Testing methods

2.1 Visual checks

Before, during and after the vibration and shock tests 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 (1999) 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 Hz to 150 Hz
- Power density: vertical, longitudinal, transversal:
  - 5 Hz – 20 Hz: $1.857 \text{ (m/s}^2\text{/Hz)}$
  - 20 Hz – 150 Hz: $-6 \text{ dB/octave}$
- Effective acceleration: vertical, longitudinal, transversal:
  - $7.9 \text{ m/s}^2\text{(RMS)}$
- Test directions: 3 Raumrichtungen (X, Y, Z)
- Test duration: approx. 5 h / direction
- Total test duration: approx. 15 h (effective vibration time)
- Test temperature: room temperature

Following customers instructions the test was conducted with the profile “vertical” in all three directions.

Diagram 1 on page 8 shows exemplarily the regulating channel’s excitation during the long-term test.
2.3 Shock test

The shock test was conducted in accordance with the standard DIN EN 61373 (1999) Category 1, Class B. The category and class were specified by the customer.

The test parameters were defined as follows:

- **Shock pulse:** half sine
- **Shock duration and amplitude:** vertical, longitudinal, transversal: 30 ms AT 50m/s²
- **Test directions:** 6 directions
- **Number of shocks:** 3 / direction
- **Test temperature:** room temperature

Following customers instructions the test was conducted with the profile “longitudinal” in all three directions.

Diagrams 2 to 3 on 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 tests.
The findings presented in this report apply exclusively to the specimen submitted for testing. No part of this publication may be duplicated without the prior consent in writing of the testing laboratory.

Fig. 5: Specimens during the vibration and shock test in the first horizontal direction

Fig. 6: Specimens during the vibration and shock test in the second horizontal direction

Fig. 7: Specimens during the vibration and shock test in vertical direction
3 Test procedure

The tests were conducted in the following order:

1. Random vibration test, long term test, first horizontal direction 26.06.2017
2. Shock test, first horizontal direction 26.06.2017
3. Shock test, second horizontal direction 26.06.2017
4. Random vibration test, long term test, second horizontal direction 26.06.2017
5. Random vibration test, long term test, vertical direction 28.07.2017

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 self unlock during the tests

The customer will continue investigations on the test specimens.

Processed by

(Dipl.-Ing. Pröhl) (Head of laboratory)
(Dipl.-Ing. Roter) (test engineer)
Diagram 1: Long-term test regulating channel (exemplarily)
Diagram 2: Shock test regulating channel, positive direction (exemplarily)

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Date: 18.07.2017
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Diagram 3: Shock test regulating channel, negative direction (exemplarily)
<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-078</td>
<td>Compression Latch Pr20.1, zinc die</td>
</tr>
<tr>
<td>1-079</td>
<td>Compression Latch Pr20.1, zinc die</td>
</tr>
<tr>
<td>6-045.01</td>
<td>Cage Nuts</td>
</tr>
<tr>
<td>6-045.02</td>
<td>Cage Nuts</td>
</tr>
<tr>
<td>6-045.03</td>
<td>Cage Nuts</td>
</tr>
<tr>
<td>6-045</td>
<td>Cage Nuts</td>
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</tbody>
</table>
Table 2: Specimens, part 2

<table>
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<tr>
<th>Part Number</th>
<th>Description</th>
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<tbody>
<tr>
<td>7-071</td>
<td>Compression Latch with spring loaded flap</td>
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<tr>
<td>1-112</td>
<td>Flash Quarter-Turn L22-66</td>
</tr>
<tr>
<td>3-211/3-215</td>
<td>Compression Rod Latch with re-direction</td>
</tr>
<tr>
<td>248-8250.RH-00000</td>
<td>FLUSH COMPRESSION LATCH RH</td>
</tr>
<tr>
<td>248-8253.RH-00000</td>
<td>FLUSH COMPRESSION LATCH RH</td>
</tr>
<tr>
<td>248-8254.RH-00000</td>
<td>FLUSH COMPRESSION LATCH RH</td>
</tr>
</tbody>
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### Table 3: Specimens, part 3

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>248-8046.00-00000</td>
<td>COMPRESSION LATCH SHORT AXIS</td>
</tr>
<tr>
<td>248-8002.00-000LH</td>
<td>COMPRESSION LATCH W.CAM L.H</td>
</tr>
<tr>
<td>248-8010.5G-00000</td>
<td>COMPLATCH W. CLIP RH SIGNAL</td>
</tr>
<tr>
<td>248-8012.00-AS0XX</td>
<td>CAM WITH PLUG AS A.H VARIABLE</td>
</tr>
<tr>
<td>7-088</td>
<td>FLUSH COMPRESSION LATCH RH/LH</td>
</tr>
<tr>
<td>7-086</td>
<td>FLUSH COMPRESSION LATCH RH/LH</td>
</tr>
</tbody>
</table>