



Slovenski inštitut za  
kakovost in meroslovje  
Slovenian Institute of  
Quality and Metrology

# Poročilo o preskusu / Test Report

Št. / No.:

T211-0395R/12

Datum / Date:

2012-10-23

<b>Proizvod / Product</b> Heating element Model: 12/18/6000 Ratings: 230 V; 50 Hz; 1800-2400 W; IP65; class I	<b>Listov / Pages</b> 9
<b>Naročnik / Applicant</b> ELMERA Elektromehanički obrt za izradu svih vrsta grijača Ivanec, Gorica 34, 10290 Zaprešić, Croatia	<b>Vrsta preskusa / Test procedure</b> Vibration, shock and IK10 test
<b>Proizvajalec / Manufacturer</b> ELMERA Elektromehanički obrt za izradu svih vrsta grijača Ivanec, Gorica 34, 10290 Zaprešić, Croatia	<b>Št. Merjencev / No. of Items tested</b> 1
<b>Blagovna znamka / Trade Mark</b> ELMERA	<b>Mapa predmeta št. / Subject File No.</b> C20121524
<b>Standardi – predpisi / Standards - regulations</b> EN 50125-3:2003, clause 4.13.1 and 4.13.2 EN 50102:1995/A1:1998	<b>Kraj preskusa / Place of test</b> SIQ, Tržaška 2 Ljubljana, Slovenia
	<b>Opomba / Remark</b> /

## Zaključek / Conclusion

Tested product complies with the requirements of stated standards.

The test results relate only to the items tested.

Date of receipt of test items: 2012-08-27

Date of performance of tests: 2012-08-27 to 2012-10-18

The report T212-0395R/12 supersedes the report T212-0395/12 due to added on rail shock test in clause 3.2.

Odgovoren za preskušanje / Responsible for the test

Mirko Čoko

Vodja področja / Department Manager

dr. Miha Otrin

Slovenski inštitut za kakovost in meroslovje • Slovenian Institute of Quality and Metrology  
Tržaška cesta 2, SI-1000 Ljubljana, Slovenia • t: +386 1 4778 100 • f: +386 1 4778 444 • e: info@siq.si • http://www.siq.si  
Razmnoževanje poročila, razen v celoti, ni dovoljeno / This report shall not be reproduced except in full

## 1 TEST EQUIPMENT

- Vibration system DERRITRON-VP 700 /TW36000/DVC1600, ser No. 012 (2013-05-06),
- Piezoelectric accelerometer ENDEVCO, model 213E, ser No. NJ08 (2013-07-20),
- Charge amplifier B&K, Type 2626, ser No.422311 (2012-10-24),
- Vertical hammer mass 5 kg, r=50 mm (IK10 as specified by the standard),
- High voltage tester ELABO Type 92-1G3 (2013-01-14),
- Shock testing machine RAVENSTEIN ST 800, test accessory controlled by the piezoelectric accelerometer ENDEVCO, model 213E, ser No. NJ08 (2013-07-20)

Note: The date of the recommended recalibration is given for each measuring instrument (in brackets).

## 2 EQUIPMENT UNDER TEST (EUT)

Heating element, model 12/18/6000 was subjected to the vibration and shock test according to standard EN 50125-3:2003 clauses 4.13.1 and 4.13.2 and IK10 test (degree of protection provided by enclosures of electrical equipment against external mechanical impacts) according to standard EN 50102:1995/A1:1998.

The fixation of the EUT on the electro-dynamic shaker VP700 in vertical, transversal and longitudinal axis is shown in Figures 1 to 3.

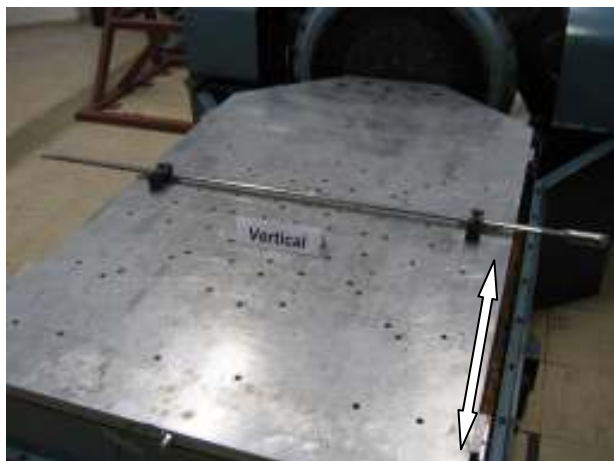


Figure 1



Figure 2



Figure 3

### 3 TEST CONDITIONS

#### 3.1 Vibration test random (EN 50125-3:2003, clause 4.13.1, Figure C.2)

Vibration parameters vertical axis:

- Environmental temperature 24<sup>0</sup>C,
- Total frequency range: 5 ÷ 2000 Hz,
- Frequency 5 Hz: Accel. Spectral. Density: 1.0 (m/s<sup>2</sup>)<sup>2</sup>/Hz,
- Frequency 820 Hz: Accel. Spectral. Density: 20 (m/s<sup>2</sup>)<sup>2</sup>/Hz,
- Frequency 2000 Hz: Accel. Spectral. Density: 2.0 (m/s<sup>2</sup>)<sup>2</sup>/Hz,
- RMS value of acceleration: 130 m/s<sup>2</sup>,
- Duration of the test: 5 hours

The random vibration profile is presented in a diagram (Figure 4).

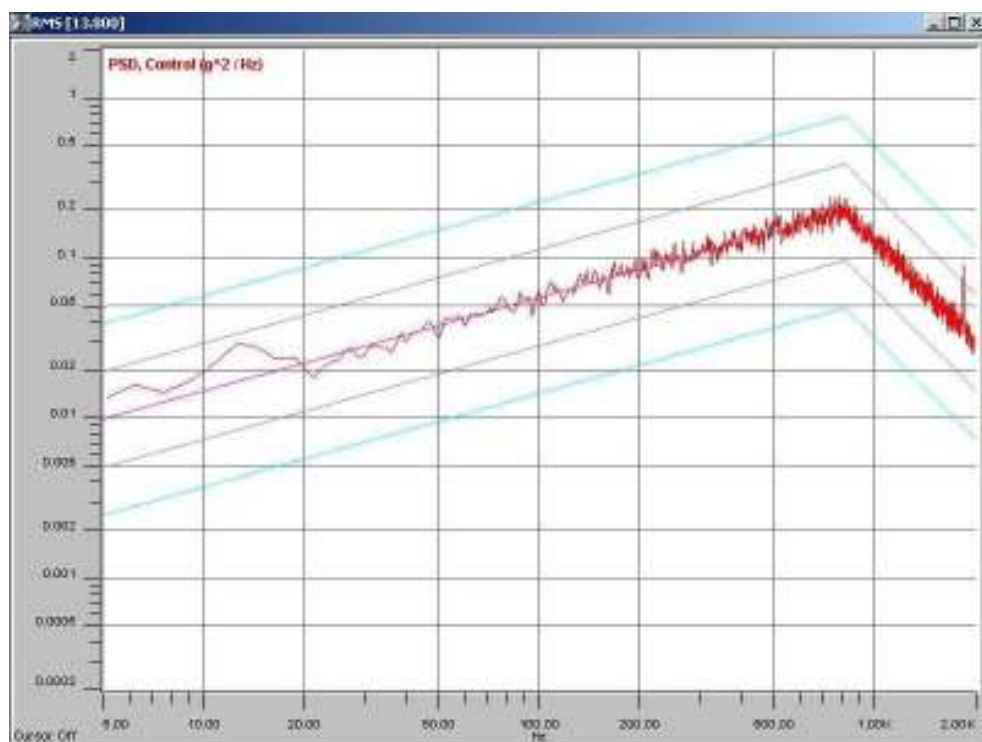


Figure 4

Vibration parameters transversal axis:

- Environmental temperature 24<sup>0</sup>C,
- Total frequency range: 5 ÷ 2000 Hz,
- Frequency 5 Hz: Accel. Spectral. Density: 0.1 (m/s<sup>2</sup>)<sup>2</sup>/Hz,
- Frequency 200 Hz: Accel. Spectral. Density: 0.8 (m/s<sup>2</sup>)<sup>2</sup>/Hz,
- Frequency 430 Hz: Accel. Spectral. Density: 2.2 (m/s<sup>2</sup>)<sup>2</sup>/Hz,
- Frequency 2000 Hz: Accel. Spectral. Density: 1.0 (m/s<sup>2</sup>)<sup>2</sup>/Hz,
- RMS value of acceleration: 50 m/s<sup>2</sup>,
- Duration of the test: 5 hours

The random vibration profile for transversal axis is presented in a diagram (Figure 5).

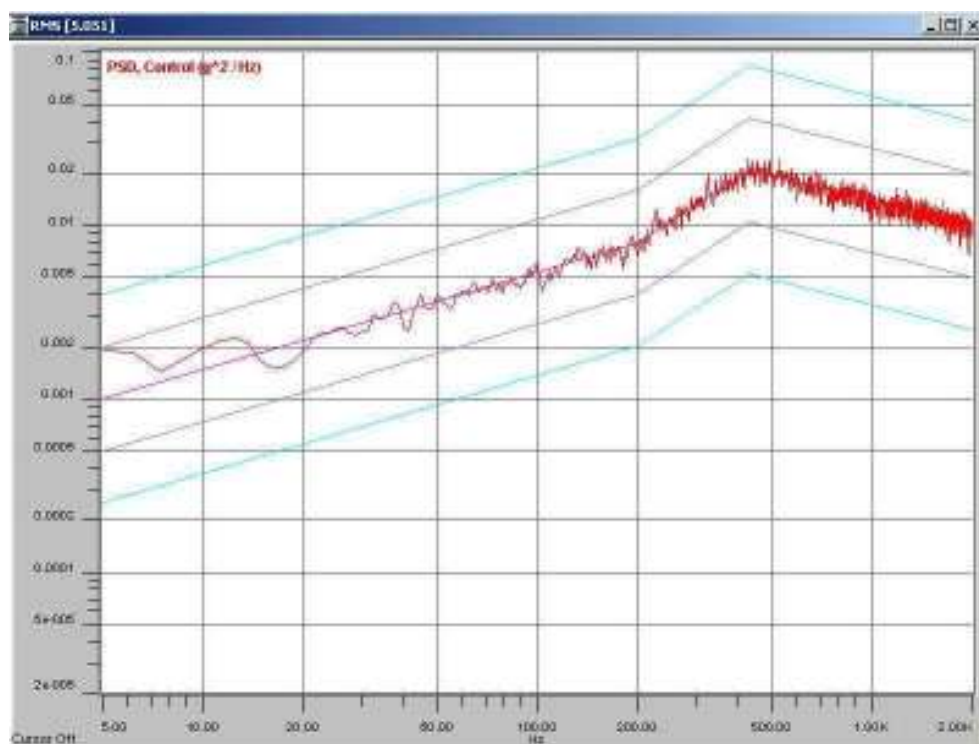


Figure 5

Vibration parameters longitudinal axis:

- Environmental temperature 24<sup>0</sup>C,
- Total frequency range: 5 ÷ 2000 Hz,
- Frequency 5 Hz: Accel. Spectral. Density: 0.2 (m/s<sup>2</sup>)<sup>2</sup>/Hz,
- Frequency 100 Hz: Accel. Spectral. Density: 0.04 (m/s<sup>2</sup>)<sup>2</sup>/Hz,
- Frequency 650 Hz: Accel. Spectral. Density: 6.0 (m/s<sup>2</sup>)<sup>2</sup>/Hz,
- Frequency 2000 Hz: Accel. Spectral. Density: 4.0 (m/s<sup>2</sup>)<sup>2</sup>/Hz,
- RMS value of acceleration: 90 m/s<sup>2</sup>,
- Duration of the test: 5 hours

The random vibration profile for transversal axis is presented in a diagram (Figure 6).

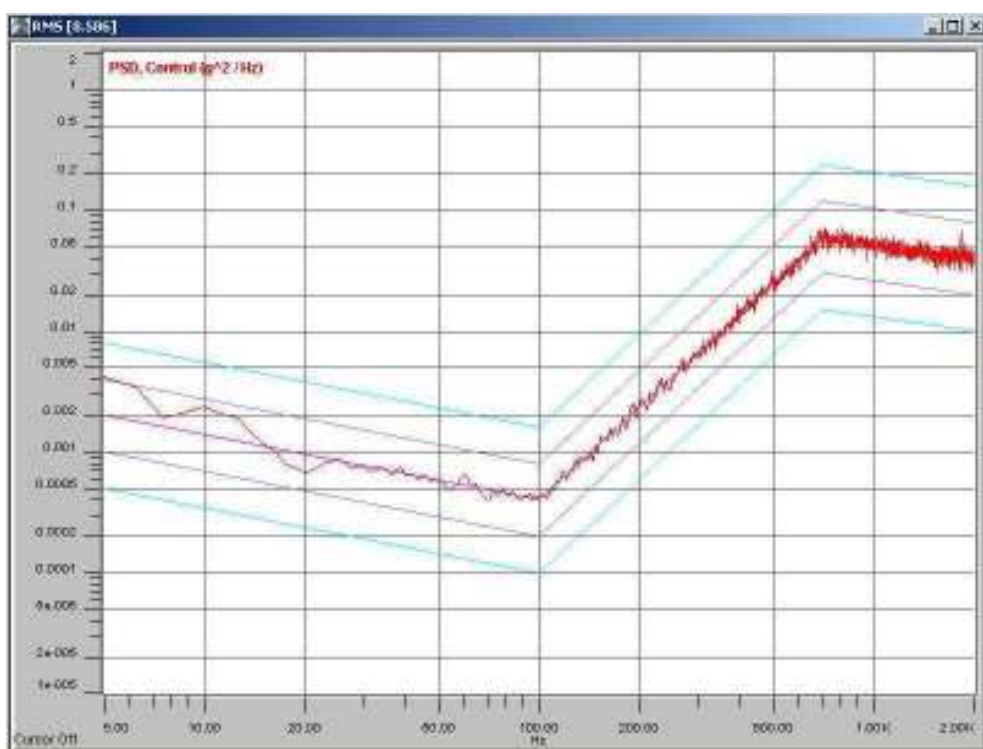


Figure 6

**Conclusion:** After the test no visible damages were observed. The impedance on the heater was measured after each stage of the test. There was no change of impedance.



### 3.2 Shock test (EN 50125-3:2003, clause 4.13.2, Table 6)

#### Shock parameters vertical axis on sleeper:

- Environmental temperature 23<sup>0</sup>C,
- Pulse shape-half sine,
- Acceleration: 800 m/s<sup>2</sup>,
- Duration of the pulse: 2 ms,
- Number of shocks 18: 9 shocks in two directions of the vertical axis

The shock parameters in positive and negative direction are shown in Figures 7 and 8 (x axis: time [s]; y axis: acceleration [g]).



Figure 7: Positive direction

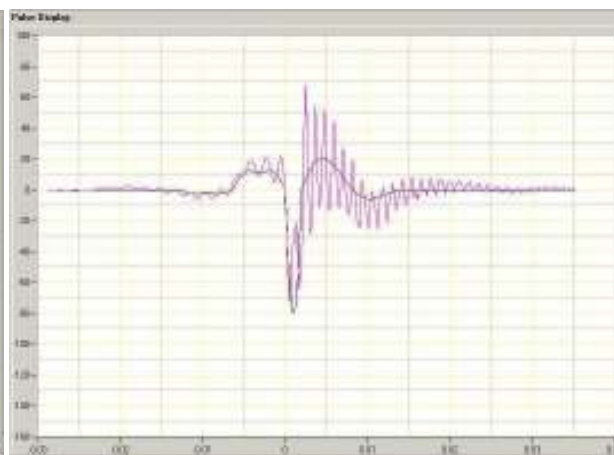


Figure 8: Negative direction

**Conclusion:** After the test no visible damages were observed. The impedance on the heater was measured. There was no change of impedance.

#### Shock parameters on rail track position in vertical, transversal and longitudinal axis:

- Environmental temperature 23<sup>0</sup>C,
- Pulse shape-half sine,
- Acceleration: 2500 m/s<sup>2</sup>,
- Duration of the pulse: 1 ms,
- Number of shocks 30: 10 shocks in each axis

The fixation of the EUT on the shock machine Ravenstein in vertical, transversal and longitudinal axis is shown in Figures 9 to 11.

**Conclusion:** After the test no visible damages were observed. The impedance on the heater was measured. There was no change of impedance.



Figure 9: Transversal axis



Figure 10: Vertical axis



Figure 11: Longitudinal axis

### 3.3 IK 10 (degree of protection provided by enclosures of electrical equipment against external mechanical impacts EN 50102:1995)

The testing hammer falls freely from a rest through specified vertical height onto the enclosure surface. The fall of the hammer is guided by the tube.

- Environmental temperature 23<sup>0</sup>C,
- Vertical height: 400 mm; Energy 20 J,
- Number of impacts: 5 evenly distributed on the face of the enclosure,
- Non-operating condition

**Conclusion:** After the IK 10 test there were no cracks observed on the enclosure. There were small plastic deformation of the metal housing but it has no influence on correct operation of the sample or impair safety (Figures 12 and 13). The impedance on the heater was measured. There was no change of impedance.



Figure 12



Figure 13

### 3.4 Electric strength test

Immediately following the vibration, shock and IK10 test the dielectric strength test with 1250 V a.c. has been conducted between terminals and enclosure. The voltage was applied and maintained for a period of one minute between the points indicated (Figures 14 and 15). The test was passed successfully.



Figure 14



Figure 15



#### **4 RESULTS AND CONCLUSIONS: GENERAL**

After the test the sample was visually checked.

- No visible damages were observed.
- Following the acceptance conditions, the equipment under test sustained the test conditions for IK10 degree of protection.
- The electric strength test was passed successfully.

Tested product complies with the requirements of standards EN 50125-3:2003, clause 4.13.1, Figure C.2 and 4.13.2 and standard EN 50102:1995/A1:1998.