



ELECTROTECHNICAL TESTING INSTITUTE
Pod Lisem 129
171 02 Praha 8 - Troja

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No. of the Test Report: 802532-01/01

Issued:30.3.2009



TEST REPORT

Name of product: Overvoltage protection
Type of product: SPUM series: SPUM1-240(DS), SPUM1-385 (DS),
SPUM3-240 (DS), SPUM3-385(DS)
Ratings: AC 240 V, 3x416/240 V, In 20 kA, IP 20
Serial number: ---
Manufacturer: HAKEL spol. s r. o., Bratří Štefanů 980, 500 03
Hradec Králové, Slezské Předměstí,
Czech Republic
Production site: HAKEL spol. s r. o., Bratří Štefanů 980, 500 03
Hradec Králové, Slezské Předměstí,
Czech Republic
EZÚ product coding system: 020499 – other
Ordering firm: HAKEL spol. s r. o., Bratří Štefanů 980, 500 03
Hradec Králové, Slezské Předměstí,
Czech Republic
Number of tested samples: 3
Samples submitted on: 17.6.2008
Location of testing: EZÚ
Tested from 27.10.2008 **through** 30.3.2009
Other data: Test report EZÚ No.701127-01/01 and Test report
No.07-1101 z 1.11.2007 by HAKEL spol.s r.o.
The product was tested according to: EN 61643-11:02+A11:07
(ident. ČSN EN 61643-11:03+A11:07)
cl.6, 6.1.1, 6.1.2, 6.5.1, 7.2.2, 7.3, 7.4, 7.5, 7.5.2,
7.7.6, 7.9.2, 7.9.3, 7.9.4, 7.9.5, 7.9.6, 7.9.8

The test results contained in this report refer to the tested items only. The values presented in this report were measured with the accuracy specified in the testing regulations. All measuring instruments used are properly traceable.

This Report shall not be reproduced ~~except as a whole.~~

Compiled by: Rezková Alena

Approved by: Hlavatý Jan

Testing laboratory
technical manager

Phone: +420 266104111

Fax: +420 284688070

E-mail: testing@ezu.cz
<http://www.ezu.cz>



Order from 27th June 2008
 Samples supplied on 17th June 2008
 Contract signed on 07th August 2008

Subject of certification:

Overvoltage protection SPUM series: SPUM1-240(DS), SPUM1-385(DS), SPUM3-240(DS), SPUM3-385(DS), rated values 240 V and 3x416/240 V, In 20 kA , IP 20

Supplied by the manufacturer:

1. 3 pcs of samples
2. Test record No. 07-1101 dated 1/11/2007- about the temporary overvoltage characteristics TOV in accordance with chapter 7.7.6 of the regulation EN 61643-11 with a passing result by the company HAKEL spol. s.r.o.
3. Technical sheet for the insulating compound – SLOVAMID 6 GF 25 FRA 5 by PLASTCOM spol. s.r.o., Hattalova 4, 831 03 Bratislava.
4. The product is provided with a catalogue sheet with the wiring diagram, technical data, component specification card.
5. Drawing documentation – exchange module, lower part, terminal-knives configuration, varistor configuration, etc.
6. On 30/03 a statement that the SLOVAMID 6 GF25 FRA5 material will be used in all plastic components (all colour shades) was supplied.

Tested in accordance with:

EN 61643-11:02+A11:07 (ident. ČSN EN 61643-11:03 +A11:07)

Cl.6 Requirements

6.1.1 Identification

Manufacturer must provide the following minimal amount of information:

Manufacturer supplied the following information:

	Manufacturer's name or trade mark, tape *		HAKEL logo and
	type SPU M1-240, SPU M3-240-		
a)	Location category		inside
b)	number of electrodes		--
c)	method of assembly		solid
d)	Highest permanent operating voltage U_c *		AC 3x500/282 VAC SPU M3,
e)	SPD type*		type 2, $I_{max.}$ (8/20)40 kA L/N
f)	Rated discharge current I_n for SPD, types 1 and 2*	type II (T 2)	I_n 20 kA L/N
g)	Voltage level U_p *	-	<1,3 kV, <1,8 kV, <1,3 V,
h)	Rated load current I_L		Not required
i)	Protection degree IP *		IP 20
j)	Short-circuit withstand capability	-	60 kAef

- k) Max. Recommended level of overcurrent protection* In=20 kA
(L/N)
- l) Disconnecter effect indication optical
- m) Position when normally used, if significant on bar DIN 35 mm
- n) Marking of leads * See catal. sheet
- o) installation instructions Service instructions + catal. Sheet supplied
- p) Type of current * AC

Passed

Label provided on the product:



Passed

Cl.6.1.2 Marking

Marking point a), e), g), h), j), l), o), and q) are required on the body or permanently attached to the body of SPD.

Marking must be ineffaceable and legible and cannot be placed over screws and removable components.

Findings:

Information marked * are stated on the body of the instrument and marking is legible.

Other data is stated in the technical documentation:

Passed

Cl.6.5.1 Protection against direct contact

This clause was tested in accordance with 7.4.1

Passed

Cl.7.2.2 Ineffaceability of the marking test

Marking in form of self-adhesive label and it is ineffaceable.

Information is legible.

Passed

Cl.7.3 Terminals

7.3.1 In accordance with the manufacturer, terminals allow maximum size of conductor 16 mm².

A test of conductor connection was carried out according to tab.6=16 mm².

Terminals are possible to be connected with conductors of size 16 mm².

Passed

7.3.2 Screw terminals

7.3.2.1

A reliability test of screws, current-carrying parts and connections.

Screws of the terminals were tightened 5 times with torque 1.8 Nm according to tab.5:

Screws were did not unfastened themselves and no damage to terminal and cover occurred.

Passed

Cl.7.4 Protection against direct contact test**Cl. 7.4.1 Insulation parts**

Tested with a test finger in accordance with ČSN EN 60529:1993 .

It was not possible to touch the live parts during the test.

Passed

Cl.7.5 Defining of the measured terminating voltage

According to tab.10 – a defining of the measured terminating voltage for class to II is done through test 7.5.2.

Passed

Cl.7.5.2 Test method of measuring of the residual voltage at the current pulse of 8/20.

This test was carried out in the short-circuit testing station Běchovice for the needs of certification of the old version SPD (PII and SPU series) – see EZÚ certificate No. 1070299 dated 09/08/2007 valid till 30/04/2010 and EZÚ test record No. 701127-01/01 dated 11/04/2007.

New construction of the SPUM series was subject to efforts to not significantly change the dimensioning of the dominant voltage or performance parameters of the resulting SPD in order to not repeat the short circuit tests.

Passed

Cl.7.7.6 Test of the characteristics of the temporary overvoltage TOV

Test record number 07-1101 dated 1st November 2007 was used.
For SPUM1 $U_T/5\text{sec}=335/5\text{sec}$ (only MOV section).

After U_T application, no thermal instability occurred. Stability was tested by 30 minute application of U_C . No built-in thermal disconnecter was activated. No test sample was mechanically damaged.

Passed

Cl.7.9.2 Mechanical strength

- 7.9.2.1 Tested with a beater from the height of 200 mm in accordance with tab.13. Total number of 4 strokes were applied.

After the test, there was no damage or breach of the desired protection degree.

Passed

Cl.7.9.4 Thermal resistance

-7.9.3.1 Tested in the heat cabinet with temperature $(100 \pm 2)^\circ\text{C}$ for the period of 1 hour.

After the test (during the test) no deformations occurred; it was not possible to touch the live parts.

Passed

7.9.3.2 Tested with a ball-pointed tool which impresses the tested part with the force of 20 N for the period of 1 hour at temperature $125^\circ\text{C}\pm 2^\circ\text{C}$.

Result:	Measured Ø of the impression
Yellow material of the cover	1.3 mm
Green material of the cover	0.7 mm
Diameter of the impression cannot be smaller than 2 mm.	

Passed

Cl.7.9.4 – Resistance to abnormal heat and fire

Tested in accordance with ČSN EN 60695-2-11:01 – temperature of the glow-wire $850\pm 15^{\circ}\text{C}$.

In accordance with the declaration dated 30th March 2009, all products consisting of plastic components (all colour shades) shall be made of the SLOVAMID 6 GF25 FRA5 material. This material was used for all products from the order 802532-02/01 type PIIIM, which were tested with the glow-wire of temperature $850\pm 15^{\circ}\text{C}$.

Result:

Yellow material (supplied on 11/03/2009) made of SLOVAMID 6 GF25 FRA5 material burns upon the touch of the glow-wire, trickles but does not set the tissue paper on fire; after removal of the glow-wire burning stops in 1 second.

Passed

Cl.7.9.5 Creepage distances and clearances test

Creepage distances and clearances for the SPD – inner category – were tested according to the table.15:

On 11th March 2009 the newly modified samples were supplied; they were for the order 802532-02/01-type PIIIM where were measured the following clearances (Construction will be the same for the type SPUM1 and SPUM3):

[mm]	Prescribed	Measured
Clearances:		
5) between live parts and body	3	3.22
(input terminal against the outside surface of the casing)		Passed

Cl.7.9.6 Surface railway resistance

The used insulation material SLOVAMID 6 GF 25 FRA 5 which has some specific characteristics in the natural version:

Sneak currents CTI, A: $>225\text{ V}$ (see the technical sheet provided by PLASTCOM spol.s r.o., Hattalova 4, 831 03 Bratislava).

In accordance with IEC 60112, the result A with the test voltage of 175 V.

Passed

Cl.7.9.7 Insulating resistance

-7.9.1 The sample was put in the humidity chamber with RV 91-95 % of humidity. The test samples were left in the humidity chamber for 48 hours.

-7.9.2 Once extracted the product from the humidity chamber, after 30-60 minutes the insulating resistance was measured for the period of 60 seconds at DC 500 V.

a) Between all interconnected live parts and the SPD body accessible to random touch. Insulating resistance measured was $> 1000 \text{ M}\Omega$
Insulating resistance cannot be smaller than $5 \text{ M}\Omega$.

Passed

Cl.7.9.8 dielectric strength

Inside category SPD was tested as stated in 7.9.7.2 a).

SPD type SPU1 and SPUM3 were tested with alternating voltage according to tab.16 U_c up to 450 V = alternating voltage 2.2 kV applied for 1 minute. During the test no puncture or flashover occurred.

Passed

Apparatus used:

Humidity chamber	ZP 76 - 3970
Hygrometer	DKP 16 667
PPU 311	DKP 16 979
El. strength WIP 6	ZP 76 - 3921
Thermistor thermometer	DHM 20 233
Torque screwdriver	N 700900-N 700903
Test finger	DHM 21 365, DHM 21 371
Test beater	DKP 3317
Glow-wire	ZP 82 - 4477
Electronic stop-watch	DKP 10 122
Heating box	ZP 76 - 3902, ZP 84 - 4628
Electronic slide gauge	DHM 551392



Tested by: Rezková Alena

Re Alena

Date: 30/03/2009