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

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No. of the Test Report: 802532-05/01

Issued:31.3.2009

TEST REPORT

Name of product:	**Power flash protector**
Type of product:	**B20, B20M, B25, B25M, B80, B100**
Ratings:	**255 V AC, 50 Hz, I_{imp}.15 kA,20 kA,30 kA,80 kA, 100 kA**
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:	4
Samples submitted on:	17.6.2008
Location of testing:	EZÚ
Tested from	21.10.2008 **through** 31.3.2009
Other data:	Test report No.08-0609, 08-0610, 08-0611, 08-0611A by Hakel s.r.o. and No.VYZ-0757-0075-01A by Škoda výzkum
The product was tested according to:	EN 61643-11:02+A11:07 (ident. ČSN EN 61643-11:03+A11:07) cl.6.1.1, 6.1.2, 6.5.1, 7.2.2, 7.3, 7.4, 7.4.1, 7.5, 7.5.2, 7.6.5, 7.7.4, 7.7.6, 7.9.2, 7.9.3, 7.9.4, 7.9.5, 7.9.6, 7.9.7, 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 284680078 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 is:
Power flash protector type B20, B20M, B25, B25M, B80, B100, rated values 255 V, 50 Hz, Iimp.15 kA, 20 kA, 30 kA, 80 kA, 100 kA

Supplied by the manufacturer:

1. 4 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. Test carried out in accordance ČSN EN 61643-11 Cl.7.7.4 with the passing result.
4. Test report No.08-0609 dated 09.06.2008 by test lab HAKEL for type B20. Test carried out in accordance with ČSN EN 61643 Cl.7.6.5. with the passing result.
5. Test report No.08-0610 dated 10/06/2008 by test lab HAKEL for type B25. Test carried out in accordance with ČSN EN 61643 Cl.7.6.5. with the passing result.
6. Test report No.08-0611 dated 11/06/2008 by test lab HAKEL for type B80. Test carried out in accordance with ČSN EN 61643 Cl.7.6.5. with the passing result.
7. Test report No.08-0611 dated 11/06/2008 by test lab HAKEL for type B100. Test carried out in accordance with ČSN EN 61643 Cl.7.6.5. with the passing result.
8. Technical list for the insulating compound – SLOVAMID 6 GF 25 FRA 5 by PLASTCOM spol. s r.o., Hattalova 4, 831 03 Bratislava.
9. The product is provided with a catalogue sheet with the wiring diagram, technical data, component specification card.
10. On 30th March a declaration that the SLOVAMID 6 GF25 FRA5 material will be used in all plastic components (all colour shades) was supplied.

Tested according to:

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 provided the following information:

a)	Manufacturer's name or trade mark, type * type B20, B20M, B25M, B80, B100	HAKEL logo and
b)	Location category	inner
c)	number of electrodes	--
d)	Method of assembly	solid
e)	Highest permanent operating voltage Uc *	255V
f)	TSPD type*	type 2, Imax. (8/20) up to 150 kA

f)	TSPD type*	type 2, Imax. (8/20) up to 150 kA
g)	Rated discharge current In for SPD type 1 and 2*type II (T 2) up to 75 kA	
h)	Voltage level Up*	- <1,3 kV,
i)	Rated load current IL	Not required
j)	Protection degree IP *	IP 20
k)	Short-circuit withstand capability -	do 100 kA
l)	Max. recommended Level of overcurrent protection *	In=up to 75 kA
m)	Effect indication of the disconnecter	--
n)	Position when normally used, if significant	on bar DIN 35 mm
o)	Marking of leads *	see catalogue sheet
p)	Installation instructions	Service instructions+catal. Sheet supplied
q)	Type of current *	AC
s)	temperature limit	-40°C up to+80°C

Passed

Label provided on the product:


hakel
N/PE
II T2
B20


hakel
U=255V/50Hz
I=80kA (10/350)
U < 1,3kV
Art.10 080
B80
B100
U = 255 V 50 Hz
I = 100 kA (10/350)
U < 1,3 kV
Art.10001
hakel
I T1

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 is ineffaceable.
Information is legible.

Passed

Cl.7.3. Terminals

7.3.1 In accordance with the manufacturer, terminals for B20, B20M, B25, B25M allow connection of maximum size of conductor 16 mm2.
A test of conductor connection was carried out according to tab.6=16 mm2.
In accordance to the manufacturer, terminals for B80, B100 a HS 10 are recommended to be connected with maximum sizes of 25 mm2 flexible and 50 mm2 solid.
Terminals are possible to be connected with conductors, which are listed in the catalogue sheets.

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 and 2 Nm according to tab.5:
Screws were did not unfastened themselves and no damage to terminal and cover occurred.

Passed

Note: Torque listed in the catalogue sheets is 3 and 4. Nm.

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.7.6.5 Working stress test class I and II.

Test Reports by the company HAKEL No. 08-0609 (B20), 08-0610(B25), 08-0611(B80), 08-0611A(B100) - Pulse 10/350 μs were used with the passing result.

Passed

Cl.7.7.4 – Failure test by temporary overvoltage (TOV)

Test Report ŠKODA VÝZKUM No. VYZ-0757-0075-01A dated 10/01/2008 for surge voltage protectors B20, B20M,, B80, B1000 and HS100 were used with the passing result.

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 B20, B20M, B80, B1000 a HS100 UT/300A/0,2s=1200 V/0,2sec.

Result:
After UT application, no thermal instability occurred. Stability was tested by 30 minute application of UC. 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 ± 2) °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 of 125°C±2°C.

Result:	Measured Ø impression
Yellow material of the cover	1.36 mm
Green material of the cover	0.7 mm
Blue material	1.5 mm

Diameter of the impression cannot be smaller than 2 mm.

Passed

Note: ***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.***

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±15°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±15°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 ignite the tissue paper; 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:

[mm]	Prescribed	Measured
Clearances:		
5) between live parts and body	3	>3
(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 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 MΩ
Insulating resistance cannot be smaller than 5 MΩ.

Passed

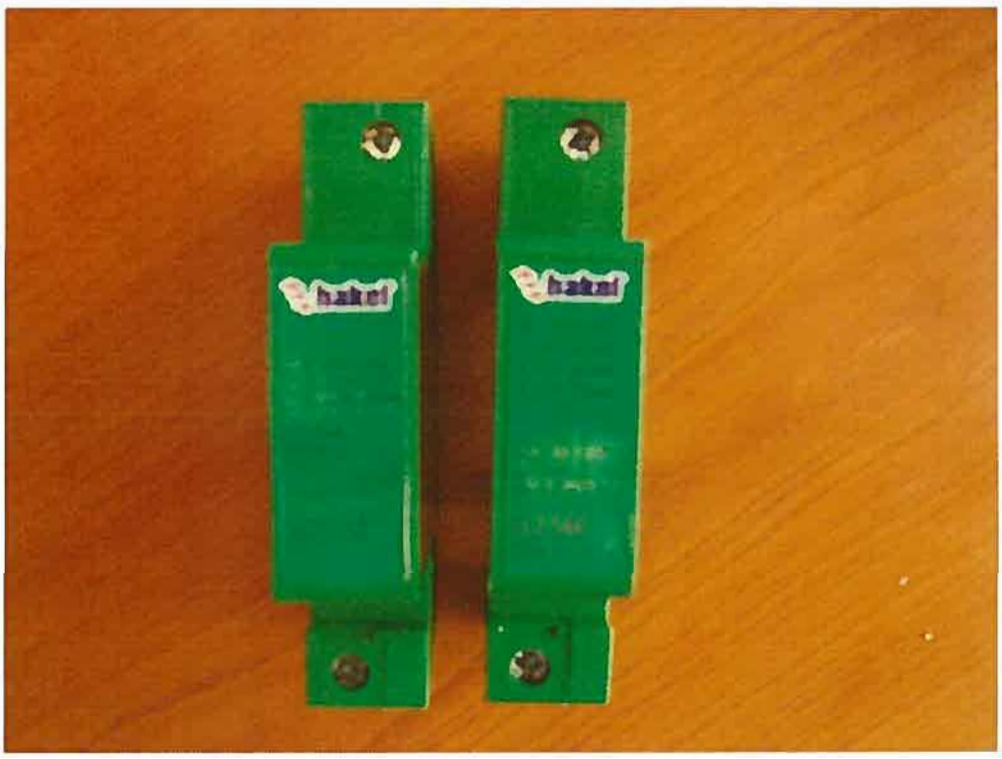
Cl.7.9.8 dielectric strength

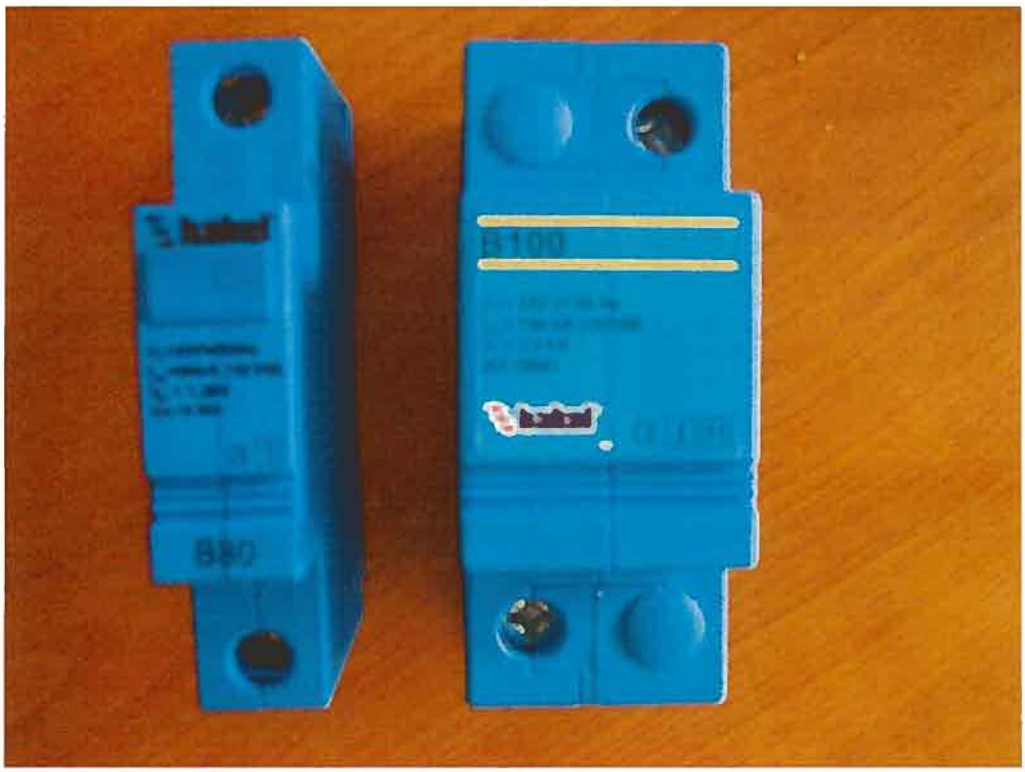
Inside category SPD was tested as stated in 7.9.7.2 a).
SPD type SPUM1 and SPUM3 were tested with alternating voltage in accordance with tab.16 for Uc up to 450 V
=alternating voltage 2.2 kV application for the period of 1 minute. During the test no puncture or flashover occurred.

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

Date: 31st March 2009