



Inženýrsko-výrobní elektrotechnický podnik, a.s.  
**619 00 Brno, Vídeňská 117a, Czech Republic**  
(Power Engineering and Production, joint-stock company)



CZECH TESTING LABORATORIES ASSOCIATION – SDRUŽENÍ ČESKÝCH ZKUŠEBEN A LABORATORŮ



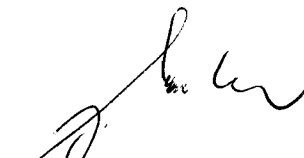
ČLEN ASOCIACE ZKUŠEBEN VYSOKÉHO NAPĚTÍ – MEMBER OF THE MV TEST LABORATORIES ASSOCIATION

**TEST REPORT No.:**

**80-13038**

**Outdoor Voltage Instrument Transformers,  
Type VPT 25**



  
.....  
Dipl.-Ing. Jaromír Mudra, CSc.

Brno, on: Feb. 14, 2002

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Test report No.: 80-13038

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Tested device: Outdoor Voltage Instrument Transformers

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## Type:

VPT 25

## Kind of test:

type test

## Rated values:

Highest voltage for equipment 25 kV  
Rated primary voltage 22 kV  
Rated secondary voltage 100 V  
Rated burden 100 VA  
Accuracy class 3  
Limit burden/load 500 VA

Testing carried out in accordance with  
the following standards and regulations:  
ČSN 35 1302  
ČSN EN 60044-2

## Test required by:

KPB INTRA, s.r.o.  
Ždánská 477  
685 01 Bučovice, Czech Republic

## Test order number:

KPB o201/0688 of Dec. 03, 2001

## Sample registration number:

217/01- 219/01  
prod. Nos.: 007922; 007923; 007927

## Atmospheric conditions:

Air temperature:  
Air pressure:  
Air humidity:

## Manufacturer of the products:

KPB INTRA, s.r.o.  
Ždánská 477  
685 01 Bučovice, Czech Republic

The test report  
includes:

Text pages: 5  
Tables:  
Diagrammes:  
Drawings:  
Photographs:  
Appendices:

## Distribution list:

IVEP ŘT - 2x  
IVEP archives: - 1x  
KPB INTRA - 2x  
ČMI - 1x

## Samples for testing delivered on:

Sept. 03, 2001

## Test result

The VPT 25 outdoor voltage instrument transformers, manufactured by the company KPB INTRA, s.r.o. ,  
**have passed**  
the conditions for type test to ČSN 35 1302 and ČSN EN 60044-2 standards.



## Date of the test:

Sept. 05 to 08, 2001

## Testing personnel:

Dipl.-Ing. Hana Mašková  
Dipl.-Ing. Vlastimil Rada

## Manager of the test laboratory:

Dipl.-Ing. Jaromír Mudra, CSc.



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Tested device: VPT 25 Outdoor Design,  
Voltage Instrument Transformers

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Based on the order No. KPB o201/0688 as of Dec. 03, 2001, issued by the company KPB INTRA s.r.o., type test on 3 pcs of outdoor voltage instrument transformers of VPT 25 type was performed at the IVEP a.s. notified metrology centre, in accordance with the stipulations of the ČSN 35 1302 and ČSN EN 60044-2 standards.

The subject devices are two-pole insulated inductive voltage instrument transformers with the transformer ratio of 22000//100 V, intended to be used for the power supply of measuring and protective devices in power networks with the highest voltage of the system of 25 kV. The transformers were manufactured to drawing No. 020802 and to the N 055 winding specification list.

During the type test the following parameters of the tested transformers were checked and verified:

Accuracy - 100 VA for the No. 3 accuracy class

Insulation level of 25/50/125 kV

Temperature insulation class E

### Scope of the type test

1. Check of proper marking of terminals
2. Lightning impulse test
3. Test using AC voltage on the transformer primary
4. Test using AC voltage on the transformer secondary
5. Partial discharge test
6. Testing under rain conditions
7. Temperature-rise test
8. Short-circuit withstand test
9. Measurement of transformer accuracy

#### 1. Check of proper marking of terminals

The marking of both the primary and secondary terminals meets the requirements of the standards ČSN 35 1302, section 21, and ČSN EN 60044-2, section 11.2.

#### 2. The lightning impulse test

The test was performed using the shock wave of 125 kV, of the 1,2/50 $\mu$ s shape –see the test report No. IVEP 82-0793.

The VPT 25 instrument transformers of outdoor design have met the requirements of the standards ČSN 35 1302, section 21, and ČSN EN 60044-2, section 11.2.

#### 3. Test using AC voltage on the transformer primary side

These tests took place on the primary side of the voltage instrument transformers – see the IVEP . No. 82-0793 test report:

- a) by applied power frequency (50 Hz) voltage of 50 kV
- b) by induced voltage of 50 kV, with a frequency of 200 Hz.

All the VPT 25 voltage instrument transformers subject to testing have passed the requirements of the standards ČSN 35 1302, section 16.2.1, and ČSN EN 60044-2, section 9.2.2.1.

#### 4. Test using AC voltage on the transformer secondary side

This test was done with the AC voltage of 3 kV/50 Hz – see the No. IVEP 82-0793 test report.

The outdoor design, VPT 25 type voltage instrument transformers have met the requirements of the standards ČSN 35 1302, section 17 and ČSN EN 60044-2, section 9.3.

**5. Measurement of partial discharges**

This measurement was conducted in accordance with the test requirements of the ČSN EN 60044-2 standard, on transformers that passed a pre-testing with 80 per cent of the test voltage, to the method B, using the Tettex 9124 detector of partial discharges.

For 1.2  $U_m$  (30 kV) the following values were measured:

Transformer prod. No. 007922, reg. No. 217/01  
terminal A – 15 pC  
terminal B – 2.5 pC

Transformer prod. No. 007923, reg. No. 218/01  
terminal A – 20 pC  
terminal B – 12 pC

Transformer prod. No. 007927, reg. No. 219/01  
terminal A – 18 pC  
terminal B – 18 pC

The VPT 25 voltage instrument transformers **have passed** the requirements of the ČSN EN 60044-2 standard, section 9.2.4., for insulated or compensated power networks of  $U_m = 25$  kV.

**6. Testing under rain conditions**

The test was carried through with the power frequency test voltage of 50 kV – see the IVEP No. 82-0793 test report.

The VPT 25 voltage instrument transformers **have passed** the test requirements of the ČSN EN 60044-2 standard, section 8.4.

**7. The temperature-rise test**

The testing was done on the No. 007923 voltage instrument transformer,

a) at the 500 VA limit load, referred to the rated secondary voltage of 100 V and the power factor of  $\cos \beta = 1$ .

Temperature-rise values measured:

Primary winding – terminals A-B = 32.4 K

Secondary winding – terminals a-b = 31.25 K

Ambient temperature?  $T_{ok} = 20^\circ\text{C}$

b) for 1.2 multiple of the rated primary voltage and the rated secondary burden of 100 VA,  $\cos \beta = 1$ .

Temperature-rise values measured:

Primary winding – terminals A-B = 12 K

Secondary winding – terminals a-b = 18.5 K

Ambient temperature?  $T_{ok} = 21^\circ\text{C}$

The temperature rise values **meet the requirements** of the ČSN 35 1302, section 8 and ČSN EN 60044-2, section 5.4 standards, for the E insulation class.

**8. The short-circuit withstand test**

The test was carried out on the prod. No. 007923 voltage instrument transformer, reg. No. 218/01, powered from the primary side – see the No. IVEP 88-0250 test report. The measured voltage and angle errors prior and after the short-circuit test are shown in the table of measured values. The repeated insulation test using 0.9  $U_{zk}$  AC test voltage brought satisfactory results.

The VPT 25 outdoor voltage instrument transformer has met the requirements of the ČSN EN 60044-2 standard, section 8.2.

### 9. Measurement of transformer accuracy

The measurement was done with the differential method, using the Tettex measuring devices and applied on voltage measuring transformers of the 2765 type, prod. No. 136 176 - calibration sheet No. 817-KL-653-1/01. In the course of the measurement the other following devices were used:

MV voltage divider Tettex- calibration sheet No. 817-KL-653-8/01.

Voltage burden Tettex – type3683/KS – calibration sheet No. 817-KL-653-4/00.

The measured voltage and angle errors for test voltages of 80, 100 and 120 %  $U_N$  are shown in the following table.

Table of measured values

Transformer prod. No.		80% $U_N$	100% $U_N$	120 % $U_N$	$P_N$ VA
007922	$\epsilon_u$ [%]	+1.24	+1.23	+1.21	15
	$\delta_u$ [min]	+2.52	+2.98	+3.72	
	$\epsilon_u$ [%]	+1.13	+1.12	+1.10	25
	$\delta_u$ [min]	+2.0	+3.14	+3.77	
	$\epsilon_u$ [%]	+0.75	+0.74	+0.72	60
	$\delta_u$ [min]	+3.10	+3.55	+4.23	
	$\epsilon_u$ [%]	+0.31	+0.30	+0.28	100
	$\delta_u$ [min]	+3.56	+4.10	+4.60	
007923	$\epsilon_u$ [%]	+0.55	+0.54	+0.53	15
	$\delta_u$ [min]	+3.36	+3.93	+4.63	
Prior and after the short-circuit test	$\epsilon_u$ [%]	+0.44	+0.43	+0.41	25
	$\delta_u$ [min]	+3.83	+4.30	+5.17	
	$\epsilon_u$ [%]	-0.36	-0.38	-0.35	100
	$\delta_u$ [min]	+4.54	+5.0	+5.55	
	$\epsilon_u$ [%]	+0.45	+0.43	+0.42	25
	$\delta_u$ [min]	+3.40	+4.02	+4.7	
	$\epsilon_u$ [%]	-0.34	-0.35	-0.37	100
	$\delta_u$ [min]	+3.57	+4.05	+4.64	
007923	$\epsilon_u$ [%]	+0.08	+0.06	+0.04	60
	$\delta_u$ [min]	+3.55	+4.07	+4.75	
007927	$\epsilon_u$ [%]	+0.77	+0.77	+0.77	15
	$\delta_u$ [min]	+1.65	+1.86	+2.20	
	$\epsilon_u$ [%]	+0.66	+0.66	+0.66	25
	$\delta_u$ [min]	+1.75	+1.97	+2.30	
	$\epsilon_u$ [%]	+0.29	+0.28	+0.28	60
	$\delta_u$ [min]	+2.21	+2.37	+2.62	
	$\epsilon_u$ [%]	-0.13	-0.14	-0.15	100
	$\delta_u$ [min]	+2.64	+2.76	+3.0	



Tested device: VPT 25 Outdoor Design,  
Voltage Instrument Transformers

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The VPT 25 voltage instrument transformers of outdoor design **have met the requirements** of the ČSN 35 1302, section 25 and ČSN EN 60044-2, section 12.2 standards for rated burden of 100 VA, in the accuracy class of 3.

In case of correction in the number of primary turns this type of transformer can also be used in the following accuracy classes:

Accuracy class: 0.2 – 30 VA  
0.5 – 60 VA

In case of using other combinations of rated power values and accuracy classes and when using such transformers for power metering and invoicing of energy, these have to comply with the regulations in force for the verification of-specified measuring equipment.

14. 11. 2002