

**Test Object:** Voltage instrument transformers

**Type:** VTS 25 – Schneider version

**Ratings:**

Serial number		013285/2003	013286 /2003
Rated primary voltage	[ V ]	22 000/ $\sqrt{3}$	22 000/ $\sqrt{3}$
Rated secondary voltage	[ V ]	100/ $\sqrt{3}$	100/ $\sqrt{3}$
Rated voltage of residual winding	[ V ]	100/3	100/3
Highest voltage for equipment Um	[ kV ]	25	25
Power frequency withstand voltage	[ kV ]	50	50
Lightning-impulse withstand voltage	[ kV ]	125	125
Rated frequency	[ Hz ]	50	50
Rated output of measuring winding	[ VA ]	50	50
Accuracy class of measuring winding		0,5	0,5
Rated output of the residual winding	[ VA ]	100	100
Accuracy class of residual winding		6P	6P
Thermal limiting output	[ VA ]	400	400

**Manufacturer:** KPB Intra s.r.o, BUČOVICE

**Test performed:** Dielectric tests according to requirements of customer:  
Lightning impulse test on primary winding  
Power - frequency withstand test on primary windings  
Partial discharge measurement

**Test specification:** ČSN EN 60044 – 2 (2001), ČSN 351302 (10/1997)  
IEC 60044 – 2 (1997)

**Test results:** The transformers VTS 25, version Schneider has been tested in accordance with IEC 60044-2, ČSN EN 60044 – 2 (2001) and ČSN 351302 (10/1997). Transformers are considered to comply with the above standards.

**Date of test:** 15. 3. 2003

19. 3. 2003

**Date of issue**

Otakar Beneš  
**Test manager**

Zdeněk Otřisal  
**Laboratory manager**

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The test object produced in accordance with the description has been subjected to the dielectric tests in compliance with Standards ČSN EN 60044 – 2 (2001), ČSN 351302 (10/1997) and IEC 60044 – 2 (1997).

**TEST PROGRAM:**

**Standard:**

- |  |   |
|--|---|
| <b>1. Verification of terminal markings</b>                    | ČSN EN 60044 – 2, cl. 9.1<br>IEC 60044 – 2, cl. 9.1<br>ČSN 35 13 02, cl. 15 |
| <b>2. Lightning impulse test on primary winding</b>            | ČSN EN 60044 – 2 cl. 8.3<br>IEC 60044 – 2, cl. 8.3<br>ČSN 35 13 02, cl. 13  |
| <b>3. Power - frequency withstand test on primary windings</b> | ČSN EN 60044 – 2 cl. 9.2<br>IEC 60044 – 2, cl. 9.2<br>ČSN 35 13 02, cl. 16  |
| <b>4. Partial discharge measurement</b>                        | ČSN EN 60044 – 2 cl. 9.2<br>IEC 60044 – 2, cl. 9.2<br>ČSN 35 13 02, cl. 16  |

All tests and measurements have been performed in Technical laboratory ABB s.r.o. EJF, Brno.

**Persons attending the tests:**

Ing. Hana Mašková, IVEP Brno

Ing. Vlastimil Rada, IVEP Brno

**Contents:**

Results of tests performed on transformer:

VTS 25 serial No.: 013285 / 2003.....	page 3
VTS 25 serial No.: 013286 / 2003.....	page 4

**Devices and equipment used:**

Test transformer 100 kV Nr. 93425

Measuring system and PD - detector TETTEX type 9124 Nr. 136810

Impulse generator TUR Dresden Nr. 94272

Digital Impulse Voltage Measuring System TR – AS 25-8 , Dr. STRAUSS

**List of symbols used:**

$P_{s1}$	Rated output of the secondary winding	[ VA ]
$P_{s2}$	Rated output of the secondary winding	[ VA ]
$P_k$	Thermal limiting output	[ VA ]
$U_p$	Rated primary voltage	[ V ]
$U_{zk}$	Test voltage	[ kV ]
$U_m$	Highest system voltage / highest voltage for equipment	[ kV ]
$U_{s1}$	Rated secondary voltage	[ V ]



<b>Standard :</b> ČSN EN 60044 – 2, IEC 60044 – 2 , ČSN 351302					
<b>Type of transformer :</b>		<b>VTS 25</b>		<b>serial Nr.:</b> 013285/2003	
<b>Ratings :</b>					
<b>U<sub>p</sub> [ V ]</b>	22000/√3	<b>U<sub>s1</sub> [ V ]</b>	100/√3	<b>U<sub>s2</sub> [ V ]</b>	100/3
<b>Accuracy:</b>	0,5 / 6P	<b>P<sub>s1</sub> [ VA ]</b>	50	<b>P<sub>s2</sub> [ VA ]</b>	100
<b>U<sub>i</sub> [ kV ]</b>	25 / 50 / 125	<b>f [ Hz ]</b>	50	<b>P<sub>k</sub> [ VA ]</b>	400

**1. Verification of terminal markings:** ČSN EN 60044 – 2, cl. 9.1, IEC 60044 – 2, cl. 9.1,  
ČSN 35 13 02, cl. 15

- Result: It was verified that the terminal markings are correct and in accordance with drawings.

**2. Lightning - impulse test:** ČSN EN 60044 – 2, cl. 8.3, IEC 60044 – 2, cl. 8.3,  
ČSN 35 13 02, cl. 13

- The test voltage was connected to the primary terminal A. The primary voltage terminal intended to be earthed in service and all end secondary voltage terminals were connected together and to earth.
- Voltage form was in accordance with IEC 60060-1, see appendix 1.

Test voltage	impulses	flashovers	Result:
+ 125 kV	15	0	has passed
– 125 kV	15	0	has passed

**3. Power-frequency withstand test on primary winding:** ČSN EN 60044 – 2, cl. 8.3,  
IEC 60044 – 2, cl. 8.3, ČSN 35 13 02, cl. 13

- The test voltage was connected to the primary terminal A. The primary voltage terminal intended to be earthed in service and all end secondary voltage terminals were connected together and to earth.
- The primary insulation of transformer was subjected to the specified induced voltage test with an elevated frequency :

Test voltage	frequency	test duration	Result:
50 kV	77,6 Hz	60 sec.	has passed

**4. Partial discharge measurement:** ČSN EN 60044 – 2, cl. 9.2, IEC 60044 – 2, cl. 9.2,  
ČSN 35 13 02, cl. 13

- The test voltage was connected to the primary terminal A. The primary voltage terminal intended to be earthed in service and all end secondary voltage terminals were connected together and to earth.

Test voltage	Partial discharge level	Result:
$U_{zk} = 1,2 U_m = 30$ kV	$q = 25$ pC	has passed
$U_{zk} = 1,2 U_m / \sqrt{3} = 17,3$ kV	$q = 1$ pC	has passed



## Technical Laboratory

TEST REPORT No. 1VLRO16192

Page 4 of 4

issued by a Technical laboratory in accordance with EN 45001

<b>Standard :</b> ČSN EN 60044 – 2, IEC 60044 – 2, ČSN 351302					
<b>Type of transformer :</b>		<b>VTS 25</b>		<b>serial Nr.:</b> 013286/2003	
<b>Ratings :</b>					
<b>U<sub>p</sub> [ V ]</b>	22000/√3	<b>U<sub>s1</sub> [ V ]</b>	100/√3	<b>U<sub>s2</sub> [ V ]</b>	100/3
<b>Accuracy:</b>	0,5 / 6P	<b>P<sub>s1</sub> [ VA ]</b>	50	<b>P<sub>s2</sub> [ VA ]</b>	100
<b>U<sub>i</sub> [ kV ]</b>	25 / 50 / 125	<b>f [ Hz ]</b>	50	<b>P<sub>k</sub> [ VA ]</b>	400

**1. Verification of terminal markings:** ČSN EN 60044 – 2, cl. 9.1, IEC 60044 – 2, cl. 9.1,  
ČSN 35 13 02, cl. 15

- Result: It was verified that the terminal markings are correct and in accordance with drawings.

**2. Lightning - impulse test:** ČSN EN 60044 – 2, cl. 8.3, IEC 60044 – 2, cl. 8.3,  
ČSN 35 13 02, cl. 13

- The test voltage was connected to the primary terminal A. The primary voltage terminal intended to be earthed in service and all end secondary voltage terminals were connected together and to earth.
- Voltage form was in accordance with IEC 60060-1, see appendix 1.

Test voltage	impulses	flashovers	Result:
+ 125 kV	15	0	has passed
- 125 kV	15	0	has passed

**3. Power-frequency withstand test on primary winding:** ČSN EN 60044 – 2, cl. 8.3,  
IEC 60044 – 2, cl. 8.3, ČSN 35 13 02, cl. 13

- The test voltage was connected to the primary terminal A. The primary voltage terminal intended to be earthed in service and all end secondary voltage terminals were connected together and to earth.
- The primary insulation of transformer was subjected to the specified induced voltage test with an elevated frequency :

Test voltage	frequency	test duration	Result:
50 kV	76,4 Hz	60 sec.	has passed

**4. Partial discharge measurement:** ČSN EN 60044 – 2, cl. 9.2, IEC 60044 – 2, cl. 9.2,  
ČSN 35 13 02, cl. 13

- The test voltage was connected to the primary terminal A. The primary voltage terminal intended to be earthed in service and all end secondary voltage terminals were connected together and to earth.

Test voltage	Partial discharge level	Result:
$U_{zk} = 1,2 U_m = 30$ kV	$q = 45$ pC	has passed
$U_{zk} = 1,2 U_m / \sqrt{3} = 17,3$ kV	$q = 9$ pC	has passed