

Test Object : Voltage instrument transformers for indoor use

Type : VTS 12

Ratings:

Design: cast resin insulated for indoor use			
Serial number:		027067	032169
Rated primary voltage	[V]	6000/ $\sqrt{3}$	10000/ $\sqrt{3}$
Rated voltage of secondary winding (a- n)	[V]	100/ $\sqrt{3}$	100/ $\sqrt{3}$
Rated voltage of secondary winding (da-dn)	[V]	---	100/3
Rated output of secondary winding (a- n)	[VA]	30	30
Accuracy class of secondary winding (a- n)		0,5	0,5
Rated output of secondary winding (da-dn)	[VA]	---	50
Accuracy class of secondary winding (da-dn)		---	6P
Highest voltage for equipment Um	[kV]	7,2	12
Power frequency withstand voltage	[kV]	20 (32)	28 (42)
Lightning-impulse (chopped) withstand voltage	[kV]	60 (70)	75 (90)
Rated frequency	[Hz]	50	50
Thermal limiting output	[VA]	400	400

Manufacturer: KPB Intra s.r.o, BUČOVICE

Test performed : Dielectric tests: Lightning impulse test on primary winding
Power - frequency withstand test on primary winding
PD measurement

Test specification : GOST 1516.3-96, GOST 1983 - 2001
KPB Intra s.r.o, order Nr. 003000124/2007

Test results : The transformers VTS 12, serial number 027067 and 032169, have been tested in accordance with GOST 1516.3-96 and GOST 1983-2001. Transformers are considered to comply with the above standards.

Date of test : 13. 2. 2007

13.2.2007

Date of issue

Test manager

Laboratory manager

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- The transformers VTS 12, serial number 027067 and 032169 have been subjected to the dielectric tests in compliance with Standard GOST 1516.3-96, GOST 1983 – 2001 for voltage classes:
- 6 kV (Highest voltage for equipment $U_m = 7,2$ kV) and
- 10 kV (Highest voltage for equipment $U_m = 12$ kV)

TEST PROGRAM:

Standard

- | | |
|---|------------------------------------|
| 1. Verification of terminal markings | GOST 1516.3-96
GOST 1983 – 2001 |
| 2. Lightning impulse test | GOST 1516.3-96
GOST 1983 – 2001 |
| 3. Power - frequency withstand test on primary windings | GOST 1516.3-96
GOST 1983 – 2001 |
| 4. Partial discharge measurement | GOST 1516.3-96
GOST 1983 – 2001 |

Results of tests performed on transformer VTS 12:

Serial No.: 027067

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Serial No.: 032169

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

Ambient air conditions during tests:

Temperature:	20,8° C
Rel. humidity:	36%
Pressure:	1003 hPa

Devices and equipment used:

1. High Voltage Test System WGBS, HIGHVOLT Pruftechnik Dresden GmbH
2. Digital partial discharge measuring system LDS-6, LEMKE Diagnostic GmbH
3. Impulse voltage test system IPF 20/400L, Nr 522423
4. Digital Impulse Voltage Measuring System TR – AS 25-8 , Dr.STRAUSS

List of symbols used:

U_m	Highest system voltage / highest voltage for equipment	[kV]
U_p	Rated primary voltage	[kV]
U_{s1}	Rated secondary voltage	[V]
U_{s2}	Rated secondary voltage	[V]
f	Rated frequency	[Hz]
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_{zk}	Test voltage	[kV]
q	Partial discharge level	[pC]

Standard:	GOST 1516.3-96, GOST 1983 – 2001		
Type :	VTs 12		
Transformer ratio: 6000/ $\sqrt{3}$ // 100/ $\sqrt{3}$	Serial No. : 027067		
Voltage class: (GOST 1516.3-96): 6	Highest voltage for equipment $U_m = 7,2$ kV		

1. Verification of terminal markings: GOST 1516.3-96, GOST 1983 – 2001

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

2. Lightning - impulse test: GOST 1516.3-96, GOST 1983 – 2001

- Voltage form: lightning impulse 1,2 / 50 μ s was in accordance with GOST 1516.2 (IEC 60060-1).

Test voltage	impulses	flashovers	Result:
+ 60 kV	15	0	satisfactory
– 60 kV	15	0	satisfactory

- Voltage form: chopped wave +/- 1,2 / (2-5) μ s:

Test voltage	impulses	flashovers	Result:
+ 70 kV	15	0	satisfactory
– 70 kV	15	0	satisfactory

3. Power-frequency withstand test on primary windings: GOST 1516.3-96, GOST 1983 – 2001.

3.1 Separate source withstand voltage test:

- Test voltage was connected between primary voltage terminal intended to be earthed and earth

Test voltage	Frequency	Test duration	Result:
3 kV	50 Hz	60 s	satisfactory

3.2 Induced voltage withstand test:

- The primary insulation of transformer was subjected to the specified induced voltage test with an elevated frequency.

Test voltage	Frequency	Test duration	Result:
32 kV	215 Hz	60 sec.	satisfactory

4. Partial discharge measurement: GOST 1516.3-96, GOST 1983 – 2001

- Test voltages were selected with respect to customer's requirement for $U_m = 7,2$ kV.

Table 1. Partial discharge values for transformer VTs 12, Serial. No.: 027067

Test voltage:	Partial discharge level:	Note: (PD limit = 50/20 pC)
$U_t = 1,3 U_m - 10s$ (9,4 kV)	$q = 2,0$ pC	Informative value
$U_t = U_m - 1min$ (7,2 kV)	$q = 0,2$ pC	Satisfactory
$U_t = 1,1 U_m / \sqrt{3} - 1 min$ (4,6 kV)	$q = 0,2$ pC	Satisfactory

Standard:	GOST 1516.3-96, GOST 1983 – 2001		
Type :	VTS 12		
Transformer ratio :	10000/ $\sqrt{3}$ // 100/ $\sqrt{3}$ / 100/3	Serial No. :	032169
Voltage class:	(GOST 1516.3-96): 10	Highest voltage for equipment $U_m = 12$ kV	

1. Verification of terminal markings: GOST 1516.3-96, GOST 1983 – 2001

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

2. Lightning - impulse test: GOST 1516.3-96, GOST 1983 – 2001

- Voltage form: lightning impulse 1,2 / 50 μ s was in accordance with GOST 1516.2 (IEC 60060-1)

Test voltage	impulses	flashovers	Result:
+ 75 kV	15	0	satisfactory
- 75 kV	15	0	satisfactory
- Voltage form: chopped wave +/- 1,2 / (2-5) μ s:

Test voltage	impulses	flashovers	Result:
+ 90 kV	15	0	satisfactory
- 90 kV	15	0	satisfactory

3. Power-frequency withstand test on primary windings: GOST 1516.3-96, GOST 1983 – 2001.

3.1 Separate source withstand voltage test:

- Test voltage was connected between primary voltage terminal intended to be earthed and earth

Test voltage	Frequency	Test duration	Result:
3 kV	50 Hz	60 s	satisfactory

3.2 Induced voltage withstand test:

- The primary insulation of transformer was subjected to the specified induced voltage test with an elevated frequency.

Test voltage	Frequency	Test duration	Result:
42 kV	210 Hz	60 sec.	satisfactory

4. Partial discharge measurement: GOST 1516.3-96, GOST 1983 – 2001

- Test voltages were selected with respect to customer's requirement for $U_m = 12$ kV.

Table 1. Partial discharge values for transformer VTS 12, Serial. No.: 032169

Test voltage:	Partial discharge level:	Note: (PD limit = 50/20 pC)
$U_t = 1,3 U_m - 10s$ (15,6 kV)	$q = 16$ pC	Informative value
$U_t = U_m - 1min$ (12 kV)	$q = 5,4$ pC	Satisfactory
$U_t = 1,1 U_m / \sqrt{3} - 1 min$ (7,6 kV)	$q = 0,2$ pC	Satisfactory