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HIGH
POWER
LABORATORY

13 – 193

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INDEPENDENT TESTING LABORATORY NO. 1035 ACCREDITED BY THE CZECH ACCREDITATION INSTITUTE ACCORDING TO ČSN EN ISO/IEC 17025

TEST REPORT
No. 13 - 193

Test object	:	Three-phase dry-type transformer
Type	:	Cast resin transformer
Serial number	:	5100
Ratings		
Rated voltage	:	(20 000 V ± 4 × 2,5 %) / 590 V/ 590 V
Rated power	:	1930 kVA
Rated frequency	:	50 Hz
Manufacturer	:	A. . Srl Via dell'Artigianato 45 – 75100 Matera, Italy
Test performed	:	Ability to withstand the dynamic effects of short-circuit IEC 60076-5:2006, cl. 4.2
Customer		ALTRAFO Srl Via dell'Artigianato 45 – 75100 Matera, Italy
Date of test	:	03.10., 04.10., 07.10. and 08.10.2013

Copy No.: E

Praha 9, Běchovice on 4.11.2013

Tested by:

Radek Heller

Tomáš Adámek

ACCREDITED HIGH POWER LABORATORY zkratovna BĚCHOVICE PRAHA 9 No. 1035

Approved by:

Robert Jech
Head of the Laboratory

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Description of the test object

A three-phase, dry-type, cast resin transformer with three circular concentric windings.

The HV side winding is made of an aluminum foil and the LV side winding is made of an aluminum foil as well.

Ratings assigned by the manufacturer

Type	:	Cast resin
Manufacturer	:	A.L. Srl, Matera, Italy
Serial number	:	5100
Year of manufacture	:	2013
Rated power	:	1930 kVA
Rated frequency	:	50 Hz
HV side rated voltage	:	(20 000 V ± 4 × 2,5 %)
LV1 side rated voltage (d0)	:	590 V
LV2 side rated voltage (yn11)	:	590 V
HV side rated current	:	55,7 A
LV1 side rated current (d0)	:	944 A
LV2 side rated current (yn11)	:	944 A
Connection symbol	:	Dyn11d0
Short-circuit impedance (guaranteed by manufacturer)	:	18 %
Short-circuit impedance (measured by manufacturer)	:	17,57 %
Load loss (guaranteed by manufacturer)	:	21 000 W
Load loss (measured by manufacturer)	:	21 932 W
Type of cooling	:	AN
Total mass	:	5700 kg
Insulating liquid volume	:	---
HV insulation level (LI/AC)	:	125/50 kV
LV insulation level (LI/AC)	:	–/3 kV
Reference temperature	:	120 °C

Documents presented by the manufacturer

The manufacturer guaranteed that the test object submitted for tests was manufactured in accordance with the presented drawings.

The Testing Laboratory Zkratovna verified that these drawings adequately represent the test object.

AM330NPF18X0LL590 Revis. 0	DIMENSIONS	Dimensional drawing
---	HV COILS DIMENSIONS	Dimensional drawing

Test specification

The test procedures, parameters and test assessment criteria are in accordance with IEC 60076-5:2006, cl. 4.2 and IEC 60076-1:2011, cl. 11.2, 11.3, 11.4, 11.5 and IEC 60076-3:2000 cl. 11, 12 and IEC 60076-11:2004 cl. 22.

Test parameters

		Tapping position 5 – nom. 20 000 V		
		min. value	calculated value	max. value
HV symmetrical current	(kA)	0,285	0,317	0,349
LV symmetrical current	(kA)	4,83	5,37	5,91
LV peak current	(kA)	13,02	13,70	14,4
Peak factor			2,55	
		Tapping position 9 – min. 18 000 V		
		min. value	calculated value	max. value
HV symmetrical current	(kA)	0,314	0,349	0,384
LV symmetrical current	(kA)	4,79	5,32	5,85
LV peak current	(kA)	12,88	13,56	14,24
Peak factor			2,55	
		Tapping position 1 – ma. 22 000 V		
		min. value	calculated value	max. value
HV symmetrical current	(kA)	0,260	0,289	0,318
LV symmetrical current	(kA)	4,8[illegible]	5,39	5,93
LV peak current	(kA)	1[illegible]05	13,75	14,43
Peak factor			2,55	

Short-circuit duration : 0,5 s

Summary of tests

All the tests were performed as required by the test specification.

More details of the tests performed are given in the enclosed tables and oscillograms.

Test conditions

Working frequency f = 48,5 Hz ÷ 49,5 Hz

The short-circuit tests were performed in a three-phase test circuit with a value of the supply voltage of ca 72 kV. The routine tests were performed before the short-circuit tests.

The test object was supplied from the HV side; the LV1 (d0) and LV2 (yn11) sides were short-circuited by means of shunts and earthed through the sensor for a fault current measuring. The tank of the transformer was earthed.

After each test the condition of the transformer windings were checked by the measuring of the short-circuit inductance and the result of the measuring was compared with the value measured before the tests.

After the short-circuit tests were repeated routine tests.

The short-circuit tests were recorded by means of a conventional digital camera (see enclosed CD).

The test circuit, including measurement points, is illustrated in the diagram Sch. 1.

The connection of the test object to the test circuit is documented by the photograph on Fig.1.

The tests were witnessed by

Giovanni Azzone, A.L. Srl, Matera, Italy