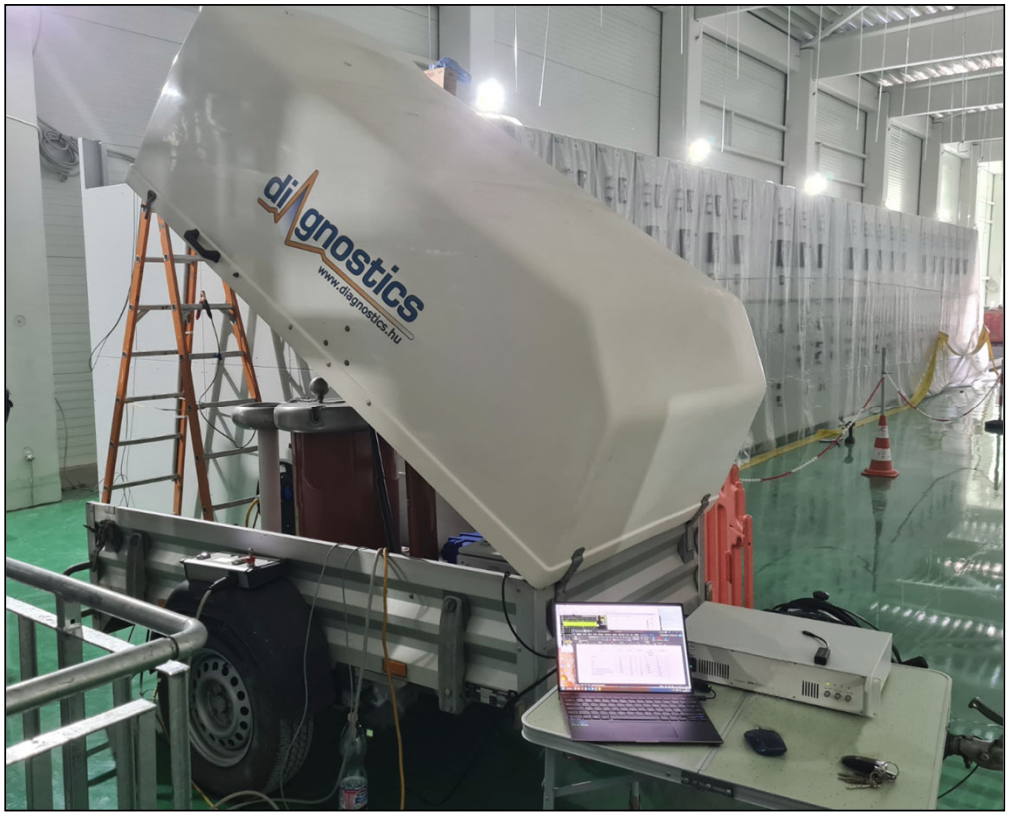

Tokozott kapcsolóberendezés feszpróbák

XXIII. Szigetelésdiagnosztikai Konferencia

Visegrád, 2025. 04. 02-04.

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Középfeszültségű tokozott kapcsolóberendezések üzembehelyezési vizsgálatai

Miért kell egyáltalán a helyszínen feszültségpróbát végezni egy már a gyárban bevizsgált berendezésen?

IEC 62271-200

Edition 3.0 2021-05

INTERNATIONAL STANDARD

High-voltage switchgear and controlgear –
Part 200: AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV

This document should be read in conjunction with IEC 62271-1:2017, to which it refers and which is applicable unless otherwise specified. In order to simplify the indication of corresponding requirements, the same numbering of clauses and subclauses is used as in IEC 62271-1:2017. Amendments to these clauses and subclauses are given under the same numbering, whilst additional subclauses, are numbered from 101.

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Középfeszültségű tokozott kapcsolóberendezések üzembehelyezési vizsgálatai

IEC 62271-200

Edition 3.0 2021-05

8.104 Tests after erection on site

After erection, the assembly shall be tested to check correct operation.

All routine tests of Clause 8 which have not been performed at the manufacturer's premises shall be performed on site.

Additionally, for parts which are assembled on site and for compartments which are gas or liquid filled on site and which all have been previously routine tested, the following is applicable:

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Középfeszültségű tokozott kapcsolóberendezések üzembehelyezési vizsgálatai

IEC 62271-200

Edition 3.0 2021-05

a) Voltage test of the main circuit;

Power-frequency voltage tests in dry conditions should be carried out on the main circuits of an assembly after the erection on site in exactly the same manner as specified in 8.2 for the routine test at the manufacturer's premises.

The power-frequency test voltage should be 80 % of the values indicated in 8.2 and be applied to each phase conductor of the main circuit in succession with the other phase conductors earthed. For the tests, one terminal of the test transformer is connected to earth and to the enclosure of the assembly.

Voltage transformers should be disconnected during dielectric site tests, unless the test frequency used for the site test is high enough to prevent core saturation;

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Table 1 – Rated insulation levels for rated voltages of range I, series I

Rated voltage U_r kV (RMS value)	Rated short-duration power-frequency withstand voltage U_d kV (RMS value)		Rated lightning impulse withstand voltage U_p kV (peak value)	
	Common value	Across the isolating distance	Common value	Across the isolating distance
(1)	(2)	(3)	(4)	(5)
3,6	10	12	20	23
			40	46
7,2	20	23	40	46
			60	70
12	28	32	60	70
			75	85
17,5	38	45	75	85
			95	110
24	50	60	95	110
			125	145
36	70	80	145	165
			170	195
40,5 (NOTE)	80	90	185	215

Próbafeszültség értékek

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Részkisülés mérés a feszültségpróba mellett

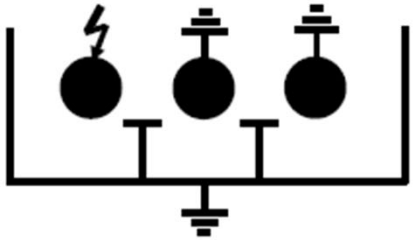
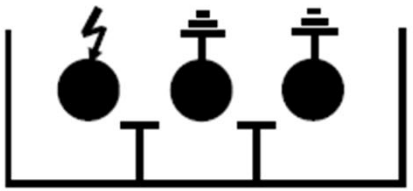
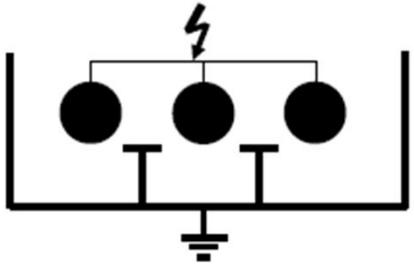
FF.1 General

The measurement of partial discharges is a suitable means of detecting certain defects in the equipment under test and is a useful complement to the dielectric tests. Experience shows that partial discharges may lead in particular arrangements to a progressive degradation in the dielectric strength of the insulation, especially of solid insulation.

On the other hand, it is not yet possible to establish a reliable relationship between the results of partial discharge measurements and the life expectancy of the equipment owing to the complexity of the insulation systems used in metal-enclosed switchgear and control-gear.

The maximum permissible partial discharge quantity at 1,1 U_r and/or 1,1 $U_r/\sqrt{3}$ shall be agreed between the manufacturer and the user.

Table B.1 – Test circuits and procedures

	Single-phase testing		
	Procedure A	**Procedure B**	
Voltage source connected to	Each phase successively	Each phase successively	Three phases simultaneously
Earth-connected elements	Both the other phases and all the parts earthed in service	Both the other phases	All the parts earthed in service
Minimum pre-stress voltage	1,3 U_r	1,3 U_r	1,3 $U_r/\sqrt{3}$
Test voltage	1,1 U_r	1,1 U_r	1,1 $U_r/\sqrt{3}$
Basic diagram			

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Középfeszültségű tokozott kapcsolóberendezések részkisülés mérése

a) Single-phase test circuit

– Procedure A

To be used as a general method.

For measuring the partial discharge quantities, each phase shall be connected to the test voltage source successively, the other two phases and all the parts earthed in service being earthed.

– Procedure B

To be used only for equipment exclusively designed for use in systems with solidly earthed neutral.

For measuring the partial discharge quantities, two test arrangements shall be used.

At first, measurements shall be made at a test voltage of 1,1 U_r (U_r is the rated voltage). Each phase shall be connected to the test voltage source successively, the other two phases being earthed. It is necessary to insulate or to remove all the metallic parts normally earthed in service.

An additional measurement shall be made at a reduced test voltage of 1,1 $U_r/\sqrt{3}$ during which the parts being earthed in service are earthed and the three phases connected to the test voltage source are bridged.

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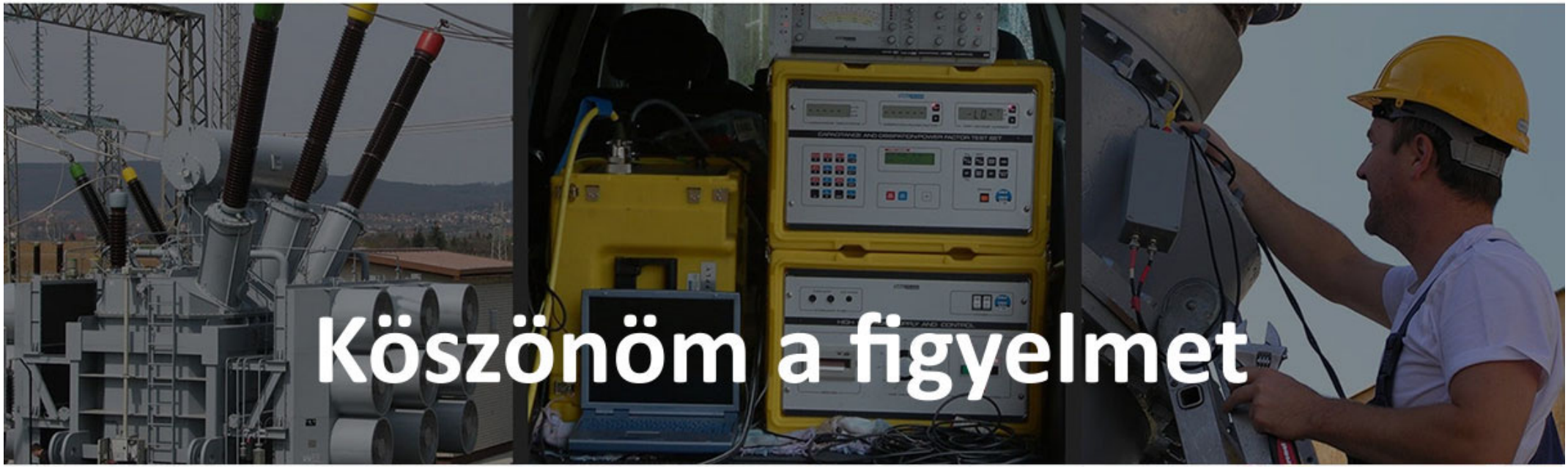
Középfeszültségű tokozott kapcsolóberendezések részkisülés mérése

If performed as routine test or site test, the partial discharge tests shall be carried out after the power-frequency voltage tests of 8.2.

The applied test-voltage is raised to a pre-stress value of at least 1,3 U_r or 1,3 $U_r/\sqrt{3}$ in accordance with the test circuit (refer to Table B.1) and maintained at this value for at least 10 s.

Partial discharges occurring during this period shall be disregarded. The voltage is then decreased without interruption to 1,1 U_r or 1,1 $U_r/\sqrt{3}$ in accordance with the test circuit and the partial discharge quantity is measured at this test voltage after 10 s (refer to Table B.1).



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Annex DD
(normative)

Guide for voltage tests after erection on site

When agreed between manufacturer and user, power-frequeny voltage tests in dry conditions may be carried out on the main circuits of metal-enclosed weitchgear and controlgear after the erection on site in exactly the same manner as specified in Sub-clause 7.1 for the routine test at the manufacturer's premises.

The power-frequency test voltage shall be 80% of the values indicated in Sub-clause 7.1 and shall be applied to each phase conductor of the main circuit in succession with the other phase conductors earthed. For the tests, one terminal of the test transformer shall be connected to earth and to the enclosure of metal-enclosed switchgear and controlgear.

If the voltage test after erection on site replaces the routine test at the manufacturer's premises, the full power-frequency test voltage shall be applied.

D.C. voltage tests are under consideration.