SLOVENSKI STANDARD
SIST EN IEC 62271-100:2021/oprA1:2023

01-oktober-2023

Visokonapetostne stikalne in krmilne naprave - 100. del: Odklopniki za izmenični tok - Dopolnilo A1

Amendment 1 - High-voltage switchgear and controlgear - Part 100: Alternating-current circuit-breakers

Hochspannungs-Schaltgeräte und -Schaltanlagen - Teil 100: Wechselstrom-Leistungsschalter

Amendement 1 - Appareillage à haute tension - Partie 100: Disjoncteurs à courant alternatif

Ta slovenski standard je istoveten z: **EN IEC 62271-100:2021/prA1:2023**

ICS:

29.130.10	Visokonapetostne stikalne in krmilne naprave	High voltage switchgear and controlgear

SIST EN IEC 62271-100:2021/oprA1:2023 **en**

17A/1387/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER:	
IEC 62271-100/AMD1 ED3	
DATE OF CIRCULATION:	CLOSING DATE FOR VOTING:
2023-09-01	**2023-11-24**
SUPERSEDES DOCUMENTS:	
17A/1375/CD, 17A/1381/CC	

IEC SC 17A : SWITCHING DEVICES	
SECRETARIAT: Sweden	SECRETARY: Mr Arjan Bronsveld
OF INTEREST TO THE FOLLOWING COMMITTEES: SC 17C,SC 32A	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: ☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☐ SAFETY	
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TITLE:

Amendment 1 - High-voltage switchgear and controlgear - Part 100: Alternating-current circuit-breakers

PROPOSED STABILITY DATE: 2028

NOTE FROM TC/SC OFFICERS:

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 100: Alternating current circuit-breakers

AMENDMENT 1

FOREWORD

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Amendment 1 to IEC 62271-100:2021 has been prepared by subcommittee SC 17A, Switching devices of IEC technical committee 17: High-voltage switchgear and controlgear.

The text of this Amendment is based on the following documents:

Draft	Report on voting
17A/XX/FDIS	17A/XX/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this Amendment is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications/.

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- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

EXPLANATORY NOTE (not part of the amendment)

IEC 62271-100:2021 there is a slight difference for the calculation of u_c for T10 in Tables 20 and 21. The u_c value for T10 must be the same for k_{pp} 1,3 and k_{pp} 1,5 because both conditions also cover transformer limited faults. For voltage ratings higher than 170 kV u_c also covers cases of 3-phase line faults with effectively earthed neutral systems. See also the notes in Tables 20 and 21. By increasing the k_{af} from 1,76 to 1,765 the u_c values are practically the same again for k_{pp} 1,3 and k_{pp} 1,5.

3.5.130

alternative operating mechanism

Change the definition as follows.

operating mechanism where a change in the power kinematic chain of the original operating mechanism or the use of a partly or entirely different operating mechanism leads to the same mechanical characteristics.

Note 1 to entry: An alternative operating mechanism can utilise an operating principle different from the original one (for example the alternative mechanism can be spring-operated and the original hydraulic).

3.7.112
terminal fault

Replace the definition by the following.

short-circuit on at least one of the terminals of the circuit-breaker

Note 1 to entry: The terminal fault current has contributions from the source side only.

5.104 Rated operating sequence

Replace the text in 5.104 by the following.

The rated operating sequence is O – t – CO – t' – CO, where

O represents an opening operation;

CO represents a close-open operating cycle with the shortest possible close-open time such that the circuit-breaker reaches the fully closed and latched position prior to opening

The time parameters are as follows:

– Circuit-breaker for auto-reclosing: t = 3 min [a)] and t'= 3 min [a)];

– Circuit-breaker for rapid auto-reclosing: t = 0,3 s and t' = 3 min [a)];

– Circuit-breaker not for auto-reclosing: t > 3 min [b)] and t' > 3 min [b)].

[a)] Alternative values may be used, for example 15 s or 1 min.

[b)] To be specified by the manufacturer.

5.106.1 Rated capacitive currents

Replace Table 1 by the following.

Table 1 – Preferred values of rated capacitive currents

	Line	Cable	Single capacitor bank	Back-to-back capacitor bank	
Rated voltage U_r kV	Rated line-charging breaking current I_l A	Rated cable-charging breaking current I_c A	Rated single capacitor bank breaking current I_{sb} A	Rated back-to-back capacitor bank breaking current I_{bb} A	Rated back-to-back capacitor bank inrush making current I_{bi} kA
3,6	10	10	400	400	20
4,76	10	10	400	400	20
7,2	10	10	400	400	20
8,25	10	10	400	400	20
12	10	25	400	400	20
15	10	25	400	400	20
15,5	10	25	400	400	20
17,5	10	31,5	400	400	20
24	10	31,5	400	400	20
25,8	10	31,5	400	400	20
27	10	31,5	400	400	20
36	10	50	400	400	20
38	10	50	400	400	20
40,5	10	50	400	400	20
48,3	10	80	400	400	20
52	10	80	400	400	20
72,5	10	125	400	400	20
100	20	125	400	400	20
123	31,5	140	400	400	20
145	50	160	400	400	20
170	63	160	400	400	20
245	125	250	400	400	20
300	200	315	400	400	20
362	315	355	400	400	20
420	400	400	400	400	20
550	500	500	400	400	20
800	900	-	-	-	-
1 100	1 200	-	-	-	-
1 200	1 300	-	-	-	-

	Line	Cable	Single capacitor bank	Back-to-back capacitor bank

NOTE 1 The values given in this table are chosen for standardisation purposes. They are preferred values and cover the majority of typical applications. If different values are needed, any appropriate value can be specified as rated value.

NOTE 2 For actual cases, the inrush currents can be calculated based on *IEC TR 62271-306 [4]*.

NOTE 3 The peak of the inrush current can be higher or lower than the preferred values stated in this table depending on system conditions, for example whether or not current limiting reactors are used.

NOTE 4 Preferred values for rated voltages 1 100 kV and 1 200 kV are based on applications at 50 Hz. Higher values of current could be possible in the future in systems operated at 60 Hz, however experience shows that these higher currents would not lead to a higher stress for the circuit-breaker as the recovery voltage is generally the dominant factor for breaking.

7.2.5 Criteria to pass the test

Replace the text by the following.

Subclause 7.2.5 of IEC 62271-1:2017 is applicable with the following addition.

If disruptive discharges occur and evidence cannot be given during testing that the disruptive discharges were on self-restoring insulation, the circuit-breaker shall be dismantled and inspected after the completion of the dielectric test series. If damage (for example tracking, puncture, etc.) to non-self-restoring insulation is observed, the circuit-breaker has failed the test.

For metal-enclosed circuit-breakers tested with test bushings that are not part of the circuit-breaker, disruptive discharges across the test bushings can be disregarded.

7.2.10 Partial discharge tests

Replace the text by the following.

Subclause 7.2.10 of IEC 62271-1 is applicable with the following addition.

This test is only applicable to GIS and dead-tank circuit-breakers.

Partial discharge tests are normally not required to be performed on the complete circuit-breaker. However, in case of dead-tank and GIS circuit-breakers using components for which a relevant IEC standard exists, that requires partial discharge measurements (for example, bushings, see IEC 60137:2017 [8]), evidence shall be provided by the manufacturer showing that those components have passed the partial discharge tests as required by the relevant IEC standard.

7.2.12.101 Condition after mechanical or environmental test

Replace the text by the following.

Where after mechanical or environmental tests (see 7.101.1.4) the insulating properties across open contacts of a circuit-breaker cannot be verified by visual inspection with sufficient reliability, a voltage test as condition check in dry condition across the open circuit-breaker according to 7.2.12 of IEC 62271-1:2017 or 7.2.12.103 of this document shall be applied. For metal enclosed circuit-breakers test conditions refer to Table 7. For multi-unit live tank circuit-breakers with identical units according to 7.102.4.2.3 the voltage test as a condition check may be performed as unit test.

7.101.1.3 Characteristics and settings of the circuit-breaker to be recorded before and after the tests

Replace the indents by the following.

– rated supply voltage and filling pressure for operation;
– maximum supply voltage and maximum pressure for operation;
– maximum supply voltage and minimum functional pressure for operation (if applicable);
– minimum supply voltage and minimum functional pressure for operation;
– minimum supply voltage and maximum pressure for operation.

7.101.3.1 General requirements

Remove the first sentence in the first paragraph.

Add the following first sentence to the second paragraph.

The tests may be combined.

7.102.4.1 Single-phase testing of a single pole of a three-pole circuit-breaker

Replace the second paragraph by the following:

Depending on the circuit-breaker design this document permits single-pole testing to cover three-phase conditions. In those cases where the circuit-breaker is equipped with one operating mechanism for all three poles, a complete three-pole assembly shall be supplied for the tests.

Replace the third paragraph by the following:

For short-circuit tests, in order to establish whether single-pole testing to cover three-phase conditions is permitted, verification tests for making and breaking shall be performed. Furthermore, it shall be checked that the operating characteristics of the circuit-breaker to be single-phase tested correspond to the provisions of 7.101.1.1.

7.102.9.2 Condition of the circuit-breaker after making and breaking tests

Remove the note.

173 **7.105.2 Short-circuit making current**

174 **7.105.2.1 General**

175 *Remove the note.*

176

177

178 **7.105.5 TRV for short-circuit breaking tests**

179 **7.105.5.1 General**

180 *Replace Tables 16, 17, 18 and 19 by the following.*

181 **Table 16 – Values of prospective TRV for class S1 circuit-breakers rated for k_{pp} = 1,5**

U_r	Test-duty	k_{pp}	k_{af}	u_c	t_3	t_d	u'	t'	u_c/t_3
kV		p.u	p.u	kV	µs	µs	kV	µs	kV/µs
3,6	T100	1,5	1,4	6,17	40,7	6,10	2,06	19,7	0,152
	T60	1,5	1,5	6,61	17,9	2,68	2,20	8,65	0,370
	T30	1,5	1,6	7,05	8,95	1,34	2,35	4,32	0,788
	T10	1,5	1,7	7,50	8,95	1,34	2,50	4,32	0,838
4,76	T100	1,5	1,4	8,16	44,8	6,73	2,72	21,7	0,182
	T60	1,5	1,5	8,74	19,7	2,96	2,91	9,54	0,443
	T30	1,5	1,6	9,33	9,87	1,48	3,11	4,77	0,945
	T10	1,5	1,7	9,91	9,87	1,48	3,30	4,77	1,00
7,2	T100	1,5	1,4	12,3	51,5	7,73	4,12	24,9	0,240
	T60	1,5	1,5	13,2	22,7	3,40	4,41	11,0	0,584
	T30	1,5	1,6	14,1	11,3	1,70	4,70	5,48	1,24
	T10	1,5	1,7	15,0	11,3	1,70	5,00	5,48	1,32
8,25	T100	1,5	1,4	14,1	54,0	8,09	4,72	26,1	0,262
	T60	1,5	1,5	15,2	23,7	3,56	5,05	11,5	0,638
	T30	1,5	1,6	16,2	11,9	1,78	5,39	5,74	1,36
	T10	1,5	1,7	17,2	11,9	1,78	5,73	5,74	1,45
12	T100	1,5	1,4	20,6	61,8	9,27	6,86	29,9	0,333
	T60	1,5	1,5	22,0	27,2	4,08	7,35	13,1	0,811
	T30	1,5	1,6	23,5	13,6	2,04	7,84	6,57	1,73
	T10	1,5	1,7	25,0	13,6	2,04	8,33	6,57	1,84
15	T100	1,5	1,4	25,7	67,7	10,2	8,57	32,7	0,380
	T60	1,5	1,5	27,6	29,8	4,47	9,19	14,4	0,925
	T30	1,5	1,6	29,4	14,9	2,23	9,80	7,20	1,97
	T10	1,5	1,7	31,2	14,9	2,23	10,4	7,20	2,10
15,5	T100	1,5	1,4	26,6	68,7	10,3	8,86	33,2	0,387
	T60	1,5	1,5	28,5	30,2	4,53	9,49	14,6	0,943
	T30	1,5	1,6	30,4	15,1	2,27	10,1	7,30	2,01
	T10	1,5	1,7	32,3	15,1	2,27	10,8	7,30	2,14

U_r kV	Test-duty	k_{pp} p.u	k_{af} p.u	u_c kV	t_3 μs	t_d μs	u' kV	t' μs	u_c/t_3 kV/μs
17,5	T100	1,5	1,4	30,0	72,5	10,9	10,0	35,0	0,414
	T60	1,5	1,5	32,1	31,9	4,79	10,7	15,4	1,00
	T30	1,5	1,6	34,3	16,0	2,39	11,4	7,71	2,15
	T10	1,5	1,7	36,4	16,0	2,39	12,1	7,71	2,28
24	T100	1,5	1,4	41,2	85,0	12,7	13,7	41,1	0,484
	T60	1,5	1,5	44,1	37,4	5,61	14,7	18,1	1,18
	T30	1,5	1,6	47,0	18,7	2,80	15,7	9,04	2,52
	T10	1,5	1,7	50,0	18,7	2,80	16,7	9,04	2,67
25,8	T100	1,5	1,4	44,2	88,4	13,3	14,7	42,7	0,500
	T60	1,5	1,5	47,4	38,9	5,84	15,8	18,8	1,22
	T30	1,5	1,6	50,6	19,5	2,92	16,9	9,40	2,60
	T10	1,5	1,7	53,7	19,5	2,92	17,9	9,40	2,76
27	T100	1,5	1,4	46,3	90,7	13,6	15,4	43,8	0,511
	T60	1,5	1,5	49,6	39,9	5,99	16,5	19,3	1,24
	T30	1,5	1,6	52,9	20,0	2,99	17,6	9,64	2,65
	T10	1,5	1,7	56,2	20,0	2,99	18,7	9,64	2,82
36	T100	1,5	1,4	61,7	107	16,1	20,6	51,8	0,576
	T60	1,5	1,5	66,1	47,2	7,07	22,0	22,8	1,40
	T30	1,5	1,6	70,5	23,6	3,54	23,5	11,4	2,99
	T10	1,5	1,7	75,0	23,6	3,54	25,0	11,4	3,18
38	T100	1,5	1,4	65,2	111	16,6	21,7	53,5	0,589
	T60	1,5	1,5	69,8	48,7	7,30	23,3	23,5	1,43
	T30	1,5	1,6	74,5	24,3	3,65	24,8	11,8	3,06
	T10	1,5	1,7	79,1	24,3	3,65	26,4	11,8	3,25
40,5	T100	1,5	1,4	69,4	115	17,2	23,1	55,5	0,605
	T60	1,5	1,5	74,4	50,5	7,58	24,8	24,4	1,47
	T30	1,5	1,6	79,4	25,3	3,79	26,5	12,2	3,14
	T10	1,5	1,7	84,3	25,3	3,79	28,1	12,2	3,34
48,3	T100	1,5	1,4	82,8	127	19,0	27,6	61,4	0,652
	T60	1,5	1,5	88,7	55,9	8,38	29,6	27,0	1,59
	T30	1,5	1,6	94,6	27,9	4,19	31,5	13,5	3,39
	T10	1,5	1,7	101	27,9	4,19	33,5	13,5	3,60
52	T100	1,5	1,4	89,2	132	19,8	29,7	63,9	0,674
	T60	1,5	1,5	95,5	58,2	8,73	31,8	28,1	1,64
	T30	1,5	1,6	102	29,1	4,37	34,0	14,1	3,50
	T10	1,5	1,7	108	29,1	4,37	36,1	14,1	3,72
72,5	T100	1,5	1,4	124	166	24,9	41,4	80,1	0,750
	T60	1,5	1,5	133	72,9	10,9	44,4	35,2	1,83
	T30	1,5	1,6	142	36,5	5,47	47,4	17,6	3,90
	T10	1,5	1,7	151	36,5	5,47	50,3	17,6	4,14