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Edition 2.0 2012-09

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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AMENDMENT 1
AMENDEMENT 1

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

Appareillage à haute tension –
Partie 100: Disjoncteurs à courant alternatif

IEC 62271-100:2008/A1:2012

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

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

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

This amendment has been prepared by subcommittee 17A: High-voltage switchgear and controlgear, of IEC technical committee 17: Switchgear and controlgear.

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

FDIS	Report on voting
17A/1009/FDIS	17A/1019/RVD

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

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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- withdrawn,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

The contents of the corrigendum of December 2012 have been included in this copy.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

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1.1 Scope

Replace, in the existing Note 1, "non-simu0ltaneity" *by* "non-simultaneity".

Replace the existing eighth paragraph by the following new paragraph:

This standard does not cover self-tripping circuit-breakers with tripping devices that cannot be made inoperative during testing.

3.1.128
effectively earthed neutral system

This correction to definition 3.1.128 applies to the French text only.

3.4.116
circuit-breaker class M1

Replace the existing definition of this term by the following new definition:

circuit-breaker with normal mechanical endurance as demonstrated by specific type tests

3.4.117
circuit-breaker class M2

Delete the existing parentheses in the definition of this term.

Delete the existing note of this term.

3.7.145
pre-insertion time

Replace the existing term, definition and note by the following new term and new definition:

pre-insertion time (of a closing resistor)
interval of time during a closing operation between the instant of contact touch of the resistor elements in any one pole and the instant of contact touch in the breaking unit of that pole

Add, after the existing note of 3.7.159, the following new term and definition 3.7.160 as follows:

3.7.160
insertion time (of an opening resistor)
interval of time during an opening operation between the instant of separation of the arcing contacts in the main interrupters of any one pole and the instant of contact separation in the resistor interrupters in that pole

3.8 Index of definitions

Add, to the existing alphabetical list, the following new line:

Insertion time (of an opening resistor) 3.7.160

Replace, in the existing alphabetical list, "Pre-insertion time" *by* "Pre-insertion time (of a closing resistor)"

4.2 Rated insulation level

Add, after the existing text of this subclause, the following new paragraph and new Table 36:

For circuit-breakers with rated voltages 1 100 kV and 1 200 kV, Table 36 applies.

Table 36 – Rated insulation levels for rated voltages of 1 100 kV and 1 200 kV

Rated voltage U_r (kV r.m.s. value)	**Rated short-duration power-frequency withstand voltage** U_d kV (r.m.s. value)		**Rated switching impulse withstand voltage** U_s kV (peak value)			**Rated lightning impulse withstand voltage** U_p kV (peak value)	
	Phase-to-earth and between phases (Note 3)	**Across open switching device and/or isolating distance** (Notes 1 and 3)	**Phase-to-earth and across open switching device**	**Between phases** (Notes 3 and 4)	**Across isolating distance** (Notes 2 and 3)	**Phase-to-earth and between phases**	**Across open switching device and/or isolating distance** (Notes 2 and 3)
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
1 100	1 100 1 450	$\frac{1\,100 \times 2}{\sqrt{3}}$	1 550	2 635	1 550 + (900)	2 250	2 250 + (630)
		1 100 + (635)	1 800	2 880		2 400	2 400 + (630)
1 200	1 200 1 600	$\frac{1\,200 \times 2}{\sqrt{3}}$	1 800	2 970	1 675 + (980)	2 400	2 400 + (685)
		1 200 + (695)	1 950	3 120		2 550	2 550 + (685)
		1 200 + (695)	1 950	3 120		2 550	2 550 + (685)

NOTE 1 In column (3) the values in brackets are r.m.s. values.

NOTE 2 In column (6), values in brackets are the peak values of the power-frequency voltage $U_r \times \sqrt{2}/\sqrt{3}$ applied to the opposite terminal (combined voltage).

In column (8), values in brackets are the peak values of the power-frequency voltage 0,7 $U_r \times \sqrt{2}/\sqrt{3}$ applied to the opposite terminal (combined voltage).

NOTE 3 Values of column (2) are applicable as follows:

a) the smaller value is for type tests, phase-to-earth, the larger value is for the withstand voltage between phases;

b) the smaller value is for routine tests, phase-to-earth and across the open switching device.

The values of columns (3), (5), (6) and (8) are applicable for type tests only.

NOTE 4 These values are derived using the multiplying factors given in Table 3 of IEC 60071-1:2006.

4.6 Rated peak withstand current (I_p)

Add, between the existing first and second paragraphs of this subclause, the following new paragraph:

For circuit-breakers with rated voltages higher than 800 kV, the standard d.c. time constant is 120 ms and the rated peak withstand current equal to 2,7 times the rated short-time withstand current for 50 Hz and 60 Hz.

4.7 Rated duration of short circuit (t_k)

Replace the existing text and note of this subclause by the following new sentence:

Subclause 4.7 of IEC 62271-1 is applicable.

4.101.2 DC time constant of the rated short-circuit breaking current

Replace the existing text before Note 1 by the following new text:

a) For circuit-breakers with rated voltages up to and including 800 kV

The standard d.c. time constant is 45 ms. The following are special case d.c. time constants, related to the rated voltage of the circuit-breaker:

– 120 ms for rated voltages up to and including 52 kV;

– 60 ms for rated voltages from 72,5 kV up to and including 420 kV;

– 75 ms for rated voltages 550 kV and 800 kV.

These special case time constants recognise that the standard value may be inadequate in some systems. They are provided as unified values for such special system needs, taking into account the characteristics of the different ranges of rated voltage, for example their particular system structures, design of lines, etc.

Add, after the existing Note 3, the following new text:

b) For circuit-breakers with rated voltages higher than 800 kV

The standard d.c. time constant is 120 ms. Note 3 is also applicable in this case.

4.102.1 Representation of TRV waves

Replace the existing seventh and eighth paragraphs of this subclause by the following new paragraphs:

If a circuit-breaker with a rated voltage equal to or less than 800 kV has a short-line fault rating, the ITRV requirements are covered if the short-line fault tests are carried out using a line with a time delay less than 100 ns (see 6.104.5.2 and 6.109.3) unless both terminals are not identical from an electrical point of view (for instance when an additional capacitance is used as mentioned in Note 4 of 6.109.3). When terminals are not identical from an electrical point of view, test circuits which produce an equivalent TRV stress across the circuit-breaker may be used.

For circuit-breakers with a rated voltage higher than 800 kV, the ITRV requirements are considered to be covered if the short-line fault tests are carried out using a line with a time delay less than 100 ns and a surge impedance of 450 Ω unless both terminals are not identical from an electrical point of view (for instance when an additional capacitance is used as mentioned in Note 4 of 6.109.3). When terminals are not identical from an electrical point of view, test circuits which produce an equivalent TRV stress across the circuit-breaker may be used.

Since the ITRV is proportional to the busbar surge impedance and to the current, the ITRV requirements can be neglected for all circuit-breakers with a rated short-circuit breaking current of less than 25 kA and for circuit-breakers with a rated voltage below 100 kV. In addition the ITRV requirements can be neglected for circuit-breakers installed in metal enclosed gas insulated switchgear (GIS) because of the low surge impedance. ITRV requirements can also be neglected for circuit-breakers directly connected to a busbar with a total source side capacitance of more than 800 pF.

4.102.2 Representation of TRV

Replace the existing item a) by the following new item a):

a) Four-parameter reference line (see Figure 10):

u_1 = first reference voltage, in kilovolts;

t_1 = time to reach u_1, in microseconds;

u_c = second reference voltage (TRV peak value), in kilovolts;

t_2 = time to reach u_c, in microseconds.

TRV parameters are defined as a function of the rated voltage (U_r), the first-pole-to-clear factor (k_{pp}) and the amplitude factor (k_{af}) as follows:

$$u_1 = 0{,}75 \times k_{pp} U_r \sqrt{\frac{2}{3}}$$

t_1 for terminal fault is derived from u_1 and the specified value of the rate of rise u_1/t_1 = RRRV;

t_1 for out-of-phase = 2 × t_1 (for terminal fault)

$$u_c = k_{af} \times k_{pp} U_r \sqrt{\frac{2}{3}}$$

1) For rated voltages up to and including 800 kV, k_{af} is equal to:
   – 1,4 for terminal fault and short-line fault;
   – 1,25 for out-of-phase.

   $t_2 = 4t_1$ for terminal fault and short-line fault;

   t_2 for out-of-phase = between t_2 (for terminal fault) and $2t_2$ (for terminal fault).

2) For rated voltages higher than 800 kV:

   A four-parameter reference line is specified for terminal fault and short-line fault test-duties and a two-parameter reference line (see b) and Figure 11) for out-of-phase test-duties. k_{af} is equal to:
   – 1,5 for terminal fault and short-line fault;
   – 1,25 for out-of-phase.

   $t_2 = 3t_1$ for test-duty T100 and for the supply side circuit for short-line fault.

   $t_2 = 4{,}5t_1$ for T60.

   For out-of-phase test duties OP1 and OP2, time t_3 is derived from u_c and a rate of rise of 1,54 kV/µs.

Replace the existing item c) by the following new item c):

c) Delay line of TRV (see Figures 10 and 11):

t_d = time delay, in microseconds;

u' = reference voltage, in kilovolts;

t' = time to reach u', in microseconds.

The delay line starts on the time axis at the rated time delay and runs parallel to the first section of the reference line of rated TRV and terminates at the voltage u' (time co-ordinate t').

For rated voltages lower than 100 kV:

t_d = 0,15 × t_3, for terminal fault and out-of-phase in the case of cable systems;

t_d = 0,05 × t_3, for terminal fault and short-line-fault in the case of line systems;

t_d = 0,15 × t_3, for out-of-phase in the case of line systems;

$u' = u_c/3$;

t' is derived from t_d and t_3 according to Figure 11, $t' = t_d + t_3/3$.

For rated voltages from 100 kV up to and including 800 kV:

t_d = 2 µs for terminal fault and for the supply side circuit for short-line fault;

t_d = 2 µs to 0,1 × t_1 for out-of-phase;

$u' = u_1/2$;

t' is derived from u', u_1/t_1 (RRRV) and t_d according to Figure 10, $t' = t_d + u'/\text{RRRV}$.

For rated voltages higher than 800 kV:

t_d = 2 µs for terminal fault and for the supply side circuit for short-line fault;

$u' = u_1/2$;

t' is derived from u', u_1/t_1 (RRRV) and t_d according to Figure 10, $t' = t_d + u'/\text{RRRV}$.

t_d = 2 µs to 0,05 × t_3 for out-of-phase;

$u' = u_c/3$, t' is derived from u_c and a rate-of-rise of 1,54 kV/µs.

4.102.3 Standard values of TRV related to the rated short-circuit breaking current

Replace the existing second paragraph of this subclause by the following new paragraphs:

Table 3 gives values for rated voltages of 100 kV up to 170 kV for effectively earthed systems. Table 4 gives values for rated voltages of 100 kV up to 170 kV for non-effectively earthed systems. Table 5 gives values for rated voltages of 245 kV and above.

The TRV peak values given in Tables 1, 2, 3, 4, 5 and 37 shall be met. The values for the amplitude factor are given for information only.

Table 5 – Standard values of transient recovery voltage[a] – Rated voltages 245 kV and above for effectively earthed systems – Representation by four parameters

Replace the existing title of Table 5 by the following new title:

Table 5 – Standard values of transient recovery voltage [a]– Rated voltage 245 kV and above for effectively earthed systems

Add, before the existing table footnotes [a] and [b], the following new lines to Table 5:

1 100	Terminal fault	1,2	1,50	808	404	1 617	1 212	2	404	204	2
	Short-line fault	1	1,50	674	337	1 347	1 011	2	337	170	2
	Out-of-phase	2	1,25	-	-	2 245	1 458	2-73	748	559	1,54
1 200	Terminal fault	1,2	1,50	882	441	1 764	1 323	2	441	222	2
	Short-line fault	1	1,50	735	367	1 470	1 101	2	367	186	2
	Out-of-phase	2	1,25	-	-	2 449	1 590	2-80	816	610	1,54

Table 6 – Standard multipliers for transient recovery voltage values for second and third clearing poles for rated voltages above 1 kV

Add, after the existing line "For effectively earthed systems" *of this table, the following new line:*

1,2	0,95	0,95	0,83	0,83

Table 7 – Standard values of initial transient recovery voltage – Rated voltages 100 kV and above

Replace, in the existing header of this table, the symbol "F_i" *by* "f_i ".

Add, before the existing note of this table, the following new lines:

1 100	0,173	0,208	1,5
1 200	0,173	0,208	1,5

Replace, in the existing note of this table, the words "can be roughly represented by a resulting surge impedance Z_i of about 260 Ω in the case of a rated voltage lower than 800 kV and by a resulting surge impedance Z_i of about 325 Ω in the case of a rated voltage of 800 kV." *by* " can be roughly represented by a resulting surge impedance Z_i of about 260 Ω with the exception of rated voltage 800 kV for which the resulting surge impedance Z_i is about 325 Ω. "

*Replace, in the existing table footnote *, the words* "short-circuit breaking current" *by* " short-circuit current ".

4.103 Rated short-circuit making current

Replace the existing text of this subclause by the following new text and Table 37:

The rated short-circuit making current (see Figure 8) of a circuit-breaker is related to:

– the a.c. component of the rated short-circuit current;

– the d.c. time constant of the rated short-circuit current;

– the rated frequency.

The rated short-circuit making current is obtained by multiplying the r.m.s. value of the a.c. component of the rated short-circuit breaking current (see 4.101) with the peak factor given in Table 37.

Table 37 – Peak factors for the rated short-circuit making current

Peak factor p.u.	**Frequency** Hz	**Time constant** ms
2,5	50	45
2,6	60	45
2,7	50 or 60	> 45

4.105 Characteristics for short-line faults

Replace the existing first paragraph of this subclause by the following new paragraph:

Characteristics for short-line faults tests are required for class S2 circuit-breakers designed for direct connection to overhead lines, irrespective of the type of network on the source side, having a rated voltage equal or higher than 15 kV and less than 100 kV and a rated short-circuit breaking current exceeding 12,5 kA. Characteristics for short-line faults are also required for all circuit-breakers designed for direct connection to overhead lines having a rated voltage of 100 kV and above and a rated short-circuit breaking current exceeding 12,5 kA.

Delete, in the first indent of the existing item a), the existing words “corresponding to the rated voltage U_r”.

Replace, in the existing note of this subclause, the words "(see Table 8)" *by* "(see L.3)".

Replace, in the existing item b) of this subclause, the first dashed item by the following new dashed item:

– standard values of the RRRV factor, based on the line surge impedance Z, the peak factor k and the line side time delay t_{dL} that are given in Table 8. For determination of the line side time delay and the rate-of-rise of the line side voltage, see Figure 16;

Table 8 – Standard values of line characteristics for short-line faults

Replace the existing Table 8 by the following new table:

Rated voltage U_r kV	Surge impedance Z Ω	Peak factor k	RRRV factor 50 Hz s[b] (kV/μs)/kA	 60 Hz	Time delay t_{dL} μs
$15 \leq U_r \leq 38$	450	1,6	0,200	0,240	0,1
$48,3 \leq U_r \leq 170$	450	1,6	0,200	0,240	0,2
$245 \leq U_r \leq 800$	450	1,6	0,200	0,240	0,5
$U_r > 800$	330 [a]	1,6	0,147	0,176	0,5

NOTE These values cover the short-line faults dealt with in this standard. For very short lines ($t_L < 5t_{dL}$) not all requirements as given in the table can be met. The procedures for approaching very short lines are given in IEC 62271-306 [4].

[a] As described in 4.102.1, a value of 450 Ω may be used during testing to cover ITRV requirements.

[b] For the RRRV factor s, see Annex A.

Table 9 – Preferred values of rated capacitive switching currents

Add, before the existing notes of this table, the two following new lines:

1 100	1 200	-	-	-	-	-
1 200	1 300	-	-	-	-	-

This correction to Note 3 of this table applies to the French text only.

Add, after the existing Note 4 of this table, the following new Note 5:

NOTE 5 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 interruption.

4.109.1 Rated break-time

Replace this existing text and notes of this subclause by the following new text and note:

The rated break time of a circuit-breaker is the maximum interval between the energizing of the trip circuit and the interruption of the current in the main circuit during test duties T30, T60 and T100s in all poles under the following conditions:

– rated auxiliary supply voltage and frequency;

– rated pressures for operation, insulation and interruption;

– an ambient air temperature of (20 ± 5) °C.

According to 6.102.3.1, the basic short-circuit test-duties, with the exception of T100a, should be carried out at the minimum auxiliary supply voltage and/or pressures for operation and/or interruption. For convenience of testing, the auxiliary supply voltage may be the rated or maximum value as long as it does not affect the making or breaking capability. (The operating times of some circuit-breakers may vary with the auxiliary supply voltage). In order to verify the rated break time during these test-duties, the maximum break time should be amended to take account of the lower auxiliary supply voltage and pressures as follows:

$$t_{bmax} = t_{bm} + t_w - (t_{om} - t_{or})$$

where

t_{bmax} is the maximum determined break time;

t_{bm} is the longest of the minimum recorded break times during test-duties T30, T60 and T100s;

Note that t_{bm} corresponds to the last pole-to-clear in case of a three-phase test.

t_w is the necessary arcing window expressed in ms;

- for single-phase tests in substitution for three-phase conditions
  - non-effectively earthed neutral systems: $t_{we} = 150 - d\alpha$
  - effectively earthed neutral systems: $t_{we} = 180 - d\alpha$
- for three-phase tests
  - $t_{we} = 60 - d\alpha$

t_{we} is expressed in electrical degrees

$t_w = T \times t_{we}/360$

T period of power frequency (20 ms for 50 Hz, 16,7 ms for 60 Hz)

$d\alpha$ is the tripping impulse step in the search for the minimum arcing time, it is equal to18 electrical degrees

t_{om} is the maximum recorded opening time on no-load, with minimum auxiliary supply voltage and pressures for operation and/or interruption.

t_{or} is the maximum recorded opening time on no-load, with auxiliary supply voltage and pressures for operation with the rated condition.

If the maximum break time determined according to this procedure exceeds the rated break time, the test-duty that has given the longest break time may be repeated with auxiliary supply voltage and pressure for operation and interruption at their rated values.

The rated break time is defined based on the minimum arcing time because the longest recorded arcing time during the tests can be longer than under the actual field condition.

NOTE The break time during a make-break operation may be longer than that of a single break operation for some circuit-breaker designs. Such longer break times may impact system protection strategy and stability if the delay is longer than the relay time. Users should advise the manufacturer of the maximum allowable break time during make-break operations.

Table 11 – Type tests

Replace, in the existing Table 11, the existing twentieth line on short-line fault tests by the following new line:

Short-line fault tests *#	$U_r \geq$ 15kV and I_{sc} > 12,5 kA, in case of direct connection to overhead lines	6.109

6.2.11 Voltage test as a condition check

Replace the existing text and notes of this subclause by the following new text, new Notes 1 and 2 and new Table 38:

Subclause 6.2.11 of IEC 62271-1 is not applicable; the tests specified there are replaced with the following:

Where after mechanical or environmental tests (see 6.101.1.4) the insulating properties across open contacts of a circuit-breaker cannot be verified by visual inspection with sufficient reliability, a power-frequency withstand voltage test in dry condition according to 6.2.11 of IEC 62271-1 across the open circuit-breaker shall be applied as a condition check. For GIS and dead tank circuit-breakers test conditions refer to Table 38.

For gas enclosed vacuum circuit-breakers the voltage test as a condition check may not be sufficient. For such cases the vacuum integrity shall be demonstrated.

Where after making, breaking or switching tests (see 6.102.9) a voltage test is performed as a condition check, the following conditions shall apply:

For circuit-breakers with an asymmetrical current path, the connections shall be reversed. The complete tests shall be carried out once for each arrangement of the connections. For dead tank and GIS circuit-breakers having a symmetrical current path, a test to earth is required with the circuit-breaker in closed position. When a test to earth is required, the rated insulation voltages across open contacts and to earth may be different. For such cases, each of the rated values corresponding to the test condition shall be used as the reference value for the determination of the test voltage. These requirements are summarised in Table 38.

– Circuit-breakers with $U_r \leq 72{,}5$ kV

  A 1 min power-frequency voltage test shall be performed. The test voltage shall be 80 % of the value in Tables 1a or 1b, column (2) of IEC 62271-1.

– Circuit-breakers with 72,5 kV < $U_r \leq 245$ kV

  An impulse voltage test shall be performed. The crest value of the impulse voltage shall be 60 % of the highest relevant value in Tables 1a or 1b, column (4) of IEC 62271-1.

– Circuit-breakers with 300 kV ≤ $U_r \leq 420$ kV

  An impulse voltage test shall be performed. The crest value of the impulse voltage shall be 80 % of the rated switching impulse withstand voltage given in Tables 2a or 2b of IEC 62271-1. In case of GIS circuit-breakers the crest value of the impulse voltage shall be 80 % of the rated switching impulse withstand voltage given in Table 103 of IEC 62271-203.

– Circuit-breakers with 550 kV ≤ $U_r \leq 800$ kV

  An impulse voltage test shall be performed. The crest value of the impulse voltage shall be 90 % of the rated switching impulse withstand voltage given in Tables 2a or 2b of IEC 62271-1. In case of GIS circuit-breakers the crest value of the impulse voltage shall be 90 % of the rated switching impulse withstand voltage given in Table 103 of IEC 62271-203.

– Circuit-breakers with $U_r > 800$ kV

  An impulse voltage test shall be performed. The crest value of the impulse voltage shall be 90 % of the rated switching impulse withstand voltage given in Tables 2a of IEC 62271-1. In case of GIS circuit-breakers the crest value of the impulse voltage shall be 90 % of the rated switching impulse withstand voltage. Examples of rated switching impulse withstand voltage values for GIS equipment are given in Table G.1 of IEC 62271-203.

Where an impulse voltage test shall be carried out, the waveshape of the impulse voltage shall be either a standard switching impulse or a waveshape according to the TRV specified for terminal fault test-duty T10. Five impulses of each polarity shall be applied. The circuit-breaker shall be considered to have passed the test if no disruptive discharge occurs. In the case that a T10 waveshape is used, timing tolerances on the TRV waveshape of -10 % and +200 % on time t_3 are permitted.

NOTE 1 Comparative tests have shown that there are almost no differences in the behaviour of the circuit-breakers, both in new and in worn conditions, when testing is performed with standard switching impulses or with TRV impulses with a waveshape in accordance with terminal fault T10, respectively.

NOTE 2 If the tests are performed using the TRV impulse with a T10 waveshape, equivalence is maintained to the standard switching impulse if the following rules are applied:

– the damping of the TRV should be such that the second peak of the TRV oscillation is not higher than 80 % of the first one;

– the voltage should be in the range of 50 % of its peak value 2,5 ms after time to peak.

Table 38 – Test requirements for voltage tests as condition check for GIS and dead tank circuit-breakers

No. of series connected breaks	Arrangement of the current path	Circuit-breaker position		
		Open (one side)	Open (other side)	Closed
Single	Symmetrical	Y	N	Y
	Asymmetrical	Y	Y	N
Multi	Symmetrical	Y	N	Y
	Asymmetrical	Y	Y	Y
Y: necessary to apply voltage. N: not necessary to apply voltage.				

6.6.2 Test current and duration

Replace the existing text of this subclause by the following new text:

Subclause 6.6.2 of IEC 62271-1 is applicable.

6.101.3.3 Low temperature test

Replace, in the existing items d) and h) of this subclause, the words "Table 12 of IEC 62271-1" *by* "Table 13 of IEC 62271-1".

6.101.3.4 High-temperature test

Replace, in the existing item r) of this subclause, the words "Table 12 of IEC 62271-1" *by* "Table 13 of IEC 62271-1".

6.101.6.1 General

Replace the existing fifth paragraph of this subclause by the following new paragraph:

Some examples of forces due to wind, ice and weight on flexible and tubular connected conductors (not including wind or ice load or the dynamic loads on the circuit-breaker itself) are given as a guidance in Table 14.

Table 14 – Examples of static horizontal and vertical forces for static terminal load test

Add, at the end of the existing Table 14, the following new line:

1 100 – 1 200	4 000 – 6 300	3 500	3 000	2 500