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Low-voltage switchgear and controlgear –

Part 1:
General rules

Appareillage à basse tension –

Partie 1:
Règles générales

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7.2.2 Temperature-rise

The temperature-rises of the parts of an equipment, measured during a test carried out under the conditions specified in 8.3.3.3, shall not exceed the values stated in this subclause.

NOTE 1 Temperature-rise in normal service may differ from the test values, depending on the installation conditions and size of connected conductors.

NOTE 2 The temperature-rise limits given in Tables 2 and 3 apply to equipment tested in new and clean condition. Different values may be prescribed by product standards for different test conditions and for devices of small dimensions but not exceeding the above values by more than 10 K.

7.2.2.1 Terminals

The temperature-rises of terminals shall not exceed the values stated in Table 2.

7.2.2.2 Accessible parts

The temperature-rises of accessible parts shall not exceed the values stated in Table 3.

NOTE The temperature-rise limits of other parts are given in 7.2.2.8.

7.2.2.3 Ambient air temperature

The temperature-rise limits given in Tables 2 and 3 are applicable only if the ambient air temperature remains within the limits given in 6.1.1.

7.2.2.4 Main circuit

The main circuit of an equipment shall be capable of carrying the conventional thermal current of the equipment without the temperature-rises exceeding the limits specified in Tables 2 and 3 when tested in accordance with 8.3.3.3.4.

7.2.2.5 Control circuits

The control circuits of an equipment, including control circuit devices to be used for the closing and operating operations of an equipment, shall permit the rated duty according to 4.3.4 and also the temperature-rises tests specified in 8.3.3.3.5 to be made without the temperature-rises exceeding the limits specified in Tables 2 and 3.

7.2.2.6 Windings of coils and electromagnets

With current flowing through the main circuit the windings of coils and electromagnets shall withstand their rated voltage without the temperature-rises exceeding the limits specified in 7.2.2.8 when tested in accordance with 8.3.3.3.6.

NOTE This subclause does not apply to pulse-operated coils, whose operating conditions are defined by the manufacturer.

7.2.2.7 Auxiliary circuits

Auxiliary circuits of an equipment including auxiliary switches shall be capable of carrying their conventional thermal current without the temperature-rise exceeding the limits specified in Tables 2 and 3, when tested in accordance with 8.3.3.3.7.

NOTE If an auxiliary circuit forms an integral part of the equipment, it suffices to test it at the same time as the main equipment, but at its actual service current.

Table 1 – Standard cross-sections of round copper conductors and approximate relationship between mm² and AWG/kcmil sizes
(see 7.1.8.2)

Rated cross-section mm²	AWG/kcmil size	Equivalent metric area mm²
0,2	24	0,205
0,34	22	0,324
0,5	20	0,519
0,75	18	0,82
1	–	–
1,5	16	1,3
2,5	14	2,1
4	12	3,3
6	10	5,3
10	8	8,4
16	6	13,3
25	4	21,2
35	2	33,6
–	1	42,4
50	0	53,5
70	00	67,4
95	000	85,0
–	0000	107,2
120	250 kcmil	127
150	300 kcmil	152
185	350 kcmil	177
–	400 kcmil	203
240	500 kcmil	253
300	600 kcmil	304

NOTE The dash, when it appears, counts as a size when considering connecting capacity (see 7.1.8.2).

Table 2 – Temperature-rise limits of terminals
(see 7.2.2.1 and 8.3.3.3.4)

Terminal material	Temperature-rise limits [a, c] K
Bare copper	60
Bare brass	65
Tin plated copper or brass	65
Silver plated or nickel plated copper or brass	70
Other metals	[b]

[a] The use in service of connected conductors significantly smaller than those listed in Tables 9 and 10 could result in higher terminals and internal part temperatures and such conductors should not be used without the manufacturer's consent since higher temperatures could lead to equipment failure.

[b] Temperature-rise limits to be based on service experience or life tests but not to exceed 65 K.

[c] Different values may be prescribed by product standards for different test conditions and for devices of small dimensions, but not exceeding by more than 10 K the values of this table.

Table 3 – Temperature-rise limits of accessible parts
(see 7.2.2.2 and 8.3.3.3.4)

Accessible parts	Temperature-rise limits [a] K
Manual operating means:	
Metallic	15
Non-metallic	25
Parts intended to be touched but not hand-held:	
Metallic	30
Non-metallic	40
Parts which need not be touched during normal operation [b]:	
Exteriors of enclosures adjacent to cable entries:	
Metallic	40
Non-metallic	50
Exterior of enclosures for resistors	200[b]
Air issuing from ventilation openings of enclosures for resistors	200[b]

[a] Different values may be prescribed by product standards for different test conditions and for devices of small dimensions but not exceeding by more than 10 K the values of this table.

[b] The equipment shall be protected against contact with combustible materials or accidental contact with personnel. The limit of 200 K may be exceeded if so stated by the manufacturer. Guarding and location to prevent danger is the responsibility of the installer. The manufacturer shall provide appropriate information, in accordance with 5.3.