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Title

Teknisk requirements Surge arresters

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1 General

1.1 Scope

These requirements cover the general demands of E.ON Elnät Sverige AB in respect of surge arresters of the type metal oxide arrester without spark gap. The requirements apply to the system voltage of 12-145 kV, rated frequency 50 Hz and for indoor or outdoor designs.

These requirements are complement to the requirements set out in the Facility Directive Regional Network.

These requirements are a translation to the Swedish requirements D10-0015664. If the content of this document differs from the Swedish version, the Swedish requirements shall prevail.

1.2 Standards

The surge arresters shall be designed, manufactured and tested in accordance with the most recent edition of applicable Swedish standards. In the absence of such standards, the European Standard (EN) and IEC publications apply. The following standards are specified in this document.

- **SS-EN 60099-4** Metal-oxide surge arresters without gaps for A.C. systems
- **IEC 60518** Dimensional standardization of terminals for high-voltage switchgear and controlgear.
- **IEC 60815** Guide for the selection of insulators in respect of polluted conditions
- **SS-EN 50341** Overhead electrical lines exceeding AC 45 kV

In the event of disparities between this document and the relevant standard, these Technical Requirements shall apply.

2 Changes relative to previous issue

Changes since the previous issue are marked with a vertical line in the margin.

3 Electrical and mechanical requirements

3.1 Rated voltage

The arrester shall have the following rated voltage:

Highest voltage for equipment (kV)	Arrestor placement	Rated voltage (U_r) (kV)
145	Phase	120
”	Neutral	84 ¹⁾
82.5	Phase	90
”	Neutral	60
72.5	Phase	66
”	Neutral	42
52	Phase	54
”	Neutral	36
36	Phase	36
”	Neutral	24
24	Phase	26
”	Neutral	18
12	Phase	13
”	Neutral	10

1) The selection of the rated voltage for the neutral depends on the transformer's insulation in the neutral.

Deviations from the table above shall be specified.

3.2 Rated discharge current

The rated discharge current shall be at least 10 kA for highest voltage for equipment ≤ 145 kV.

Arresters with the rated discharge current ≥ 5 kA shall be used for secondary substations and for cable sections in 12 and 24 kV overhead transmission line networks.

3.3 Line discharge class

Line discharge class according to IEC 60099-4.

Arresters shall, at least, conform to the requirements for line discharge class according to the table below:

Highest voltage for equipment (kV)	Line discharge class
145	2
82.5	2
72.5	2
52	2
36	2
24	1
12	1

3.4 Rated protection level

The maximum residual voltages of the arresters shall not exceed the values set out in the following table.

Highest voltage for equipment (kV)	Discharge current (kA)	Max residual current (kV/U _r)		
		Steep front/FOW ¹⁾	Fast front/lightning ²⁾	Slow front/switching ³⁾ (0.5 kA)
≤ 145	10	3.1 (10 kA)	2.8 (10 kA)	2.2
≤ 26	5	3.6 (5 kA)	3.3 (5 kA)	

1) Steep front/FOW 1/(2-20) μs

2) Fast front/lightning 8/20 μs

3) Slow front/switching 30/60 μs

3.5 Short-circuit capability

Arrester with silicone rubber housing does not need to be equipped with pressure release device but shall however fulfill following short-circuit capability:

Highest voltage for equipment (kV)	Short-circuit capability (kA, 0.2 s)
145	40
≤ 82.5	20

3.6 Creepage distance

The creepage distance shall be in accordance with the Facility directive Regional network.

Creepage distances for surge arresters placed on power lines shall be according to SS-EN 50341.

3.7 Mechanical design

Surge arresters shall be designed to fulfil static and dynamic forces in the most unfavourable direction.

4 Functional requirements

4.1 Insulation

Surge arrester insulator shall be made of silicon rubber (composite).

4.2 Primary terminal

The primary terminal shall be designed for the connection of copper or aluminium conductors with a conductor diameter of 6-13 mm for highest voltage for equipment 12-24 kV and with conductor diameter 20-32 mm for highest voltage for equipment 52-145 kV.

4.3 Earthing terminal

The earthing terminal shall be designed for the connection of copper or aluminium conductors with a conductor diameter of 6-13 mm.

4.4 Insulated base

Surge arresters placed in substations for highest voltage for equipment 52-145 kV shall be equipped with an insulated base.

4.5 Disconnecting device

Surge arresters placed on overhead power lines, shall be equipped with a disconnecting device easily detected from ground level.