132 kV AC Substation

Outdoor AIS AC Substations
High-voltage Components
Surge arrester, metal oxide
ETS-50-06-12-E2 Rev. 0
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Technical Standard for 145 kV surge arrester
Table of contents

1. Introduction 4
2. Standards and regulations 4
3. Technical requirements 4
   3.1 Discharge class 4
   3.2 Test 4
4. Design requirements 4
   4.1 Corrosion protection 4
   4.2 Insulating base 4
   4.3 High-Voltage terminals 5
   4.4 Mechanical strength 5
5. Documentation 5
6. Appendix 5
   6.1 Appendix 1 High-voltage terminals 5
1. **Introduction**

This standard specifies the minimum requirements for metal oxide surge arresters for outdoor AIS substations for the 132 kV voltage level.

2. **Standards and regulations**

Surge arresters shall comply with the latest version of following standards and regulations.

- Outdoor AIS AC substations common conditions and technical requirements for high voltage apparatus, ETS-50-00
- Metal-Oxide surge arresters without gaps for a.c. systems, IEC 60099
- Selection and dimensioning of high-voltage insulators intended for use in polluted conditions, IEC 60815
- Artificial pollution tests on high-voltage insulators to be used on a.c. systems, IEC 60507
- Other standards referred to in the above standards

3. **Technical requirements**

The surge arrester shall be gapless.

- Maximum system voltage $U_{m}$: 145 kV\textsubscript{rms}
- Rated voltage $U_{r}$: 120 kV\textsubscript{rms}
- Continuous operating voltage $U_{c}$: $\geq$ 92 kV\textsubscript{rms}
- Pressure relief capability: $\geq$ 40 kA\textsubscript{sym}

3.1 **Discharge class**

The line discharge class of the surge arrester shall be a class 4 (Nominal discharge current 20 kA\textsubscript{peak}), in accordance with IEC 60099-4.

3.2 **Test**

The surge arrester shall be tested in accordance with IEC 60099-4, and a declaration of type conformity shall be available from the manufacturer. A test protocol for each surge arrester shall also be available.

4. **Design requirements**

4.1 **Corrosion protection**

External parts shall be made of corrosion-resistant materials. Steel components shall be stainless or hot-dip galvanized. If surfaces are processed, they shall be protected in a permanent way. Combination of materials with different electrochemical potential shall be avoided, unless sufficiently protected from moisture.

4.2 **Insulating base**

The surge arrester shall have an insulating base. No surge counter is required.
4.3 **High-Voltage terminals**
Ø30mm tap placed centrally on the equipment. See appendix 1
Material: Aluminium or aluminium alloy.

4.4 **Mechanical strength**
The minimum requirements for mechanical strength are:

<table>
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<th>Load Type</th>
<th>Requirement</th>
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<tr>
<td>Long-term load (static load)</td>
<td>700 N</td>
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<tr>
<td>Short-term load (dynamic load)</td>
<td>1000 N</td>
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5. **Documentation**
The surge arrester shall be accompanied by the following documentation: data sheets for unit and equipment stating manufacture, type, description, drawings, including:

- Detailed drawings
- Electrical data according to IEC
  - TOV/time curve
  - Residual voltage crest at LI and SI surge
  - Uc
  - Energy absorption kJ/kV
  - Line discharge class
  - Discharge current withstand strength
  - Instructions for measuring leakage current
- Instruction for handling and installation
- Maintenance manuals
- Mechanical data, strength, deflection etc.
- Storage information
- Disposal information

6. **Appendix**

6.1 **Appendix 1 High-voltage terminals**
High-voltage connection terminal for surge arrester:

![Figure 1 Ø30 tap](image)