220 kV AC Substation

Outdoor AIS AC Substations
High-voltage Components
Surge arrester, metal oxide
ETS-50-06-12-D1
### REVISION VIEW

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<thead>
<tr>
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<tbody>
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<tr>
<td>Date</td>
<td>2014-12-01</td>
</tr>
</tbody>
</table>
# 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 220 kV voltage level.

2. Standards and regulations

Surge arresters shall comply with the latest version of the 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 $U_{m}$: $245 \, kV_{rms}$
Rated voltage $U_{r}$: $192 \, kV_{rms}$
Continuous operating voltage $U_{c}$: $\geq 154 \, kV_{rms}$

Pressure relief capability: $\geq 40 \, kA_{sym}$

3.1 Discharge class

The line discharge class of the surge arrester shall be a class 4 (Nominal discharge current $20 \, kA_{peak}$), 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, aluminium alloy or silver-plated copper.

4.4 Mechanical strength
The minimum requirements for mechanical strength are:

- Long-term load (static load) 700 N
- Short-term load (dynamic load) 1000 N

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