150 kV AC Substation

Outdoor AIS AC Substations
High-voltage Components
Surge arrester, metal oxide
ETS-50-06-12-E1 Rev. 0
## REVISION VIEW

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<td>2013.06.17</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 150 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 $U_m$: $170 \, \text{kV}_{\text{rms}}$

Rated voltage $U_r$: $132 \, \text{kV}_{\text{rms}}$

Continuous operating voltage $U_c$: $\geq 106 \, \text{kV}_{\text{rms}}$

Pressure relief capability: $\geq 40 \, \text{kA}_{\text{sym}}$

3.1 **Discharge class**

The line discharge class of the surge arrester shall be a class 4 (Nominal discharge current $20 \, \text{kA}_{\text{peak}}$), 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:

- 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](image)