Surge arresters are used to protect the insulation of gas-insulated switchgear and connected cables, transformers etc. against all kind of transient atmospheric and switching overvoltages.

**Surge arrester design**

The surge arrester is constructed from a stack of serially connected, extremely non-linear metal-oxide (MO) resistors in a single phase metallic enclosure under pressurized SF₆-gas. The MO resistors of ABB surge arresters are manufactured by ABB using a high-field ceramic resistor material, composed primarily of zinc oxide (ZnO) mixed with several other metal oxides. The surge arrester is designed and type tested according to IEC 62271-203 and IEC 60099-4.

**Main features**

- Compact design
- Very low amount of SF₆-gas
- Very good protection performance
- Low residual voltages
- High energy absorption capacity
- MO-resistors from own ABB facilities
- Long-term stable characteristics of the MO-resistors
Technical data

Rated voltage ELK-3: 420 kV
Max. system voltage: 420 kV
Rated frequency: 50/60 Hz
Type designation: AZ32M
Max. dimension of enclosure: Ø 624 mm
Height: 2362 mm
Minimum functional pressure of SF₆-gas (20 °C): 450 kPa
Weight without gas (mass): 402 kg
Nominal discharge current: 20 kA
Line discharge class acc. to IEC: 5
Energy absorption capability (U₀): 19.8 kJ/kV
Repetitive charge transfer rating (Qᵢ): 4.8 As (C)
Long-duration current impulse: A · 2 ms

Insulation withstand voltage
Rated power-frequency withstand voltage: 650 kV
Rated lightning impulse withstand voltage, 1.2/50 µs: 1425 kV
Rated switching impulse withstand voltage, 250/2500 µs: 1050 kV

Power-frequency voltage vs. time characteristic (TOV)
Specified energy related to U₀: 17 kJ/kV
TOV for t=1s with preheating to 60 °C and application of specified energy: x U₀
TOV for t=10s with preheating to 60 °C and application of specified energy: x U₀
TOV for t=100s with preheating to 60 °C and application of specified energy: x U₀
TOV for t=1200s with preheating to 60 °C and application of specified energy: x U₀

Legend
1 Enclosure
2 Grading electrode
3 Metal oxide resistor discs
4 Bushing for continuous current measurement and surge monitoring
Residual Voltages

<table>
<thead>
<tr>
<th>Continuous operating voltage</th>
<th>Rated voltage</th>
<th>Steep current impulse wave 1/., µs</th>
<th>Lightning current impulse wave 8/20 µs</th>
<th>Switching current impulse Wave 30/60 µs</th>
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<tbody>
<tr>
<td>Uc</td>
<td>Ur</td>
<td>10 kA</td>
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<td>kVrms</td>
<td>kVpeak</td>
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<td>986</td>
<td>1039</td>
<td>807</td>
</tr>
</tbody>
</table>

- samples preheated to 60°C
- with «prior duty» injected energy: 17.05 kJ/kV Uc

Power-frequency voltage versus time characteristics

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