High voltage fuse-links

General information
ETI HV fuse-links named VV THERMO are designed to protect devices in switch-gears and other equipment (distribution transformers, capacitors, motors) from thermal and dynamic effects of shortcircuits and overcurrents. Time-current characteristics correspond to standard IEC 60282-1, item 3.3.3. Back-up fuse. They are suitable for installation in:
• indoor and outdoor switchgear
• gas (SF6)-insulated enclosures
• special service conditions (different from normal conditions, described in item 2.1. of standard IEC 60282-1)

The most significant features of ETI high voltage fuses:
• Low temperature rise because of low power dissipation
• High breaking capacity 50 kA
• Possibility of three different striker pin forces: 80 N and 120 N (with integrated temperature dependent limiter) and 50 N.
• Reliable sealing system against humidity irruption
• Low switching voltages
• Upon a request, fuse links can be supplied into no-standard dimensions

Overview of standard and non-standard dimensions

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Technical data on page 663
Standards
ETI VV (Medium Voltage) fuse-links comply with the following standards and specifications:
• IEC 60282-1, Sixth edition 1/2005 “Current limiting fuses”
• DIN 43625 “Hochspannungs-Sicherungen Nennspannung 3,6 bis 36kV”
• “VDE 0670 T402, Wechselstromschaltgeraete fuer Spannungen ueber 1kV, Auswahl von strombegrenzenden Sicherungseinsaetzen fuer Transformatorstromkreise” / IEC 60787 “Application guide for the selection of high-voltage current limiting fuse-links for transformer circuits”
• IEC 60644 “Specification for high-voltage fuse-links for motor circuit applications”
• IEC 60549 “High-voltage fuses for external protection of power capacitors”

Certificates, Test reports
• CESI (Milan, Italy) certificate for 12kV, 17.5kV and 24kV
• KERI (Chang Wong, S.Korea) certificate for 7.2kV and 24kV
• ICMET (Craiova, Romania) test report for 36kV
• Test reports for 25kV, 38.5kV, 40.5kV and 42kV versions

Construction:
ETI high voltage fuses are designed to assure stable and reliable characteristics. The glazed porcelain tube (made in ETI own ceramic factory) is extremely high mechanical and thermal resistant.
Galvanically protected contact caps made of electrolytic copper are nickel - or upon customer request silver plated. Caps are rolled by pressing into the groove of the tube. The tightness of this connection is assured by a special seal resistant to ageing and high temperatures.
The design and method of production of the melting elements ensures precisely tolerances and stable time/current characteristics. Fuse elements are wounded on a ceramic carrier and electrically welded on a special copper strips.
The inside of the tube is filled with quartz sand with an exactly determined granulation and chemical structure. The sand guarantees good and reliable extinguishing of the electric arc.
An important element in the fuse-link construction is also the striker system. Part of that system is temperature sensitive element, which reacts in cases of temperature increasing of the fuse-link due to various reasons. The reaction temperature is set to approximately 250 °C on fuse tube surface. The system reacts in such a way that short time overloads do not cause the fuse to interrupt the circuit unnecessarily. Only when inadmissible values of surrounding temperatures are exceeded, the fuse open the switch via the striker pin. Because of these characteristics, ETI “thermal” striker pin is convenient for the protection of the fuse enclosure of SF6 switchgears which requires additional protection features against inadmissible temperatures of certain switchgear parts.

Striker pin Type description, rated voltage 7,2 kV example:
• VVC; 50N striker force (C mark).
• VVT-D; Temperature limiter (VVT), 80N striker force (D mark).
• VVT-E; Temperature limiter (VVT), 120N striker force (E mark).
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Note 1: Other ratings and dimensions can be supplied by customer request. For particular applications, please contact ETI technical team.

Note 2: Orange colored types according to IEC 60282-1 dimensions.
### High voltage fuse-links

#### Ordering Code Numbers

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Note 1: Other ratings and dimensions can be supplied by customer request. For particular applications, please contact ETI technical team.

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Note 1: Other ratings and dimensions can be supplied by customer request. For particular applications, please contact ETI technical team.

Note 2: Orange colored types according to IEC 60282-1 dimensions.
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Note 1: Other ratings and dimensions can be supplied by customer request. For particular applications, please contact ETI technical team.

Note 2: Orange colored types according to IEC 60282-1 dimensions.
### High voltage fuse-links

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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** derating factor to take into consideration. Special parameters required.

Note 1: Other ratings and dimensions can be supplied by customer request. For particular applications, please contact ETI technical team.

Note 2: Orange colored types according to IEC 60282-1 dimensions.

---

### High voltage fuse-links for liquid-immersed transformers

#### Ordering Code Numbers

<table>
<thead>
<tr>
<th>rated voltage $U_n$ [kV]</th>
<th>Dimension “e” according to DIN and IEC (mm)</th>
<th>rated current [A]</th>
<th>VVT-D Striker type 80N THERMO</th>
<th>Tube diameter “d” (mm)</th>
<th>weight [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>20/36</td>
<td>2A 004265003</td>
<td>53</td>
<td>2.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4A 004265004</td>
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<tr>
<td></td>
<td>6A 004265005</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>10A 004265006</td>
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<tr>
<td></td>
<td>16A 004265007</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>20A 004265008</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>25A 004265009</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>32A 004265010</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>40A 004265011</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>50A 004265012</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>63A 004265013</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>80A ** 004265014</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** derating factor to take into consideration. Special parameters required.

Note 1: Other ratings and dimensions can be supplied by customer request. For particular applications, please contact ETI technical team.

Note 2: Orange colored types according to IEC 60282-1 dimensions.
High voltage fuse-links

High voltage fuse-links for protection of voltage transformers

Ordering Code Numbers

<table>
<thead>
<tr>
<th>Rated voltage $U_0$ [kV]</th>
<th>Dimension &quot;$e&quot; according to DIN and IEC [mm]</th>
<th>Rated current [A]</th>
<th>VVT-D code No.</th>
<th>Tube diameter &quot;$d&quot; [mm]</th>
<th>Weight [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/24</td>
<td>235</td>
<td>2A</td>
<td>004251033</td>
<td>53</td>
<td>1.45</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4A</td>
<td>004251034</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* when choosing right fuse base consider size and rated voltage of fuse-link
** due to safety reasons fuse bases cannot be later adjusted on different length by a user
*** indoor edition of fuse base may not be used for outside applications

Fuse bases for VV fuse-links

1-pole Indoor mounting

<table>
<thead>
<tr>
<th>Type</th>
<th>Rated voltage $U_0$ [kV]</th>
<th>Code No.</th>
<th>Dimension &quot;$e&quot; according to DIN and IEC [mm]</th>
<th>Packaging [pcs]</th>
</tr>
</thead>
<tbody>
<tr>
<td>VVP 7,2 1p-N</td>
<td>7,2</td>
<td>004229010</td>
<td>192</td>
<td>1</td>
</tr>
<tr>
<td>VVP 12 1p-N</td>
<td>12</td>
<td>004239010</td>
<td>292</td>
<td>1</td>
</tr>
<tr>
<td>VVP 17,5 1p-N</td>
<td>17,5</td>
<td>004249010</td>
<td>367</td>
<td>1</td>
</tr>
<tr>
<td>VVP 24 1p-N</td>
<td>24</td>
<td>004259010</td>
<td>442</td>
<td>1</td>
</tr>
<tr>
<td>VVP 36 1p-N</td>
<td>36</td>
<td>004269010</td>
<td>537</td>
<td>1</td>
</tr>
</tbody>
</table>

* when choosing right fuse base consider size and rated voltage of fuse-link
** due to safety reasons fuse bases cannot be later adjusted on different length by a user
*** indoor edition of fuse base may not be used for outside applications

1-pole Outdoor mounting

<table>
<thead>
<tr>
<th>Type</th>
<th>Rated voltage $U_0$ [kV]</th>
<th>Code No.</th>
<th>Dimension &quot;$e&quot; according to DIN and IEC [mm]</th>
<th>Packaging [pcs]</th>
</tr>
</thead>
<tbody>
<tr>
<td>VVP 7,2 1p-Z</td>
<td>7,2</td>
<td>004229030</td>
<td>192</td>
<td>1</td>
</tr>
<tr>
<td>VVP 12 1p-Z</td>
<td>12</td>
<td>004239030</td>
<td>292</td>
<td>1</td>
</tr>
<tr>
<td>VVP 17,5 1p-Z</td>
<td>17,5</td>
<td>004249030</td>
<td>367</td>
<td>1</td>
</tr>
<tr>
<td>VVP 24 1p-Z</td>
<td>24</td>
<td>004259030</td>
<td>442</td>
<td>1</td>
</tr>
<tr>
<td>VVP 36 1p-Z</td>
<td>36</td>
<td>004269030</td>
<td>537</td>
<td>1</td>
</tr>
</tbody>
</table>

* when choosing right fuse base consider size and rated voltage of fuse-link
** due to safety reasons fuse bases cannot be later adjusted on different length by a user

1-pole Indoor mounting with microswitch fuse monitoring

<table>
<thead>
<tr>
<th>Type</th>
<th>Rated voltage $U_0$ [kV]</th>
<th>Code No.</th>
<th>Dimension &quot;$e&quot; according to DIN and IEC [mm]</th>
<th>Packaging [pcs]</th>
</tr>
</thead>
<tbody>
<tr>
<td>VVP 7,2 1p-N + NK 7,2 BSW</td>
<td>7,2</td>
<td>004349019</td>
<td>192</td>
<td>1</td>
</tr>
<tr>
<td>VVP 12 1p-N + NK 12 BSW</td>
<td>12</td>
<td>004349020</td>
<td>292</td>
<td>1</td>
</tr>
<tr>
<td>VVP 17,5 1p-N + NK 17,5 BSW</td>
<td>17,5</td>
<td>004349021</td>
<td>367</td>
<td>1</td>
</tr>
<tr>
<td>VVP 24 1p-N + NK 24 BSW</td>
<td>24</td>
<td>004349022</td>
<td>442</td>
<td>1</td>
</tr>
<tr>
<td>VVP 36 1p-N + NK 7,2 BSW</td>
<td>36</td>
<td>004349023</td>
<td>537</td>
<td>1</td>
</tr>
</tbody>
</table>

* when choosing right fuse base consider size and rated voltage of fuse-link
** due to safety reasons fuse bases cannot be later adjusted on different length by a user
*** Rotation in installation is allowed only with the pin striker pointing upward (as in the photo on the right)
Accessories for VVP fuse bases

<table>
<thead>
<tr>
<th>Type</th>
<th>Rated voltage [kV]</th>
<th>code No.</th>
<th>packaging [pcs]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixing plate for VVP 7,2 3p-N, INDOOR</td>
<td>7,2</td>
<td>004229020</td>
<td>1</td>
</tr>
<tr>
<td>Fixing plate for VVP 12 3p-N, INDOOR</td>
<td>12</td>
<td>004239020</td>
<td>1</td>
</tr>
<tr>
<td>Fixing plate for VVP 17,5 3p-N, INDOOR</td>
<td>17,5</td>
<td>004249020</td>
<td>1</td>
</tr>
<tr>
<td>Fixing plate for VVP 24 3p-N, INDOOR</td>
<td>24</td>
<td>004259020</td>
<td>1</td>
</tr>
<tr>
<td>Fixing plate for VVP 36 3p-N, INDOOR</td>
<td>36</td>
<td>004269020</td>
<td>1</td>
</tr>
<tr>
<td>Fixing plate for VVP 7,2 3p-Z, OUTDOOR</td>
<td>7,2</td>
<td>004229040</td>
<td>1</td>
</tr>
<tr>
<td>Fixing plate for VVP 12 3p-Z, OUTDOOR</td>
<td>12</td>
<td>004239040</td>
<td>1</td>
</tr>
<tr>
<td>Fixing plate for VVP 17,5 3p-Z, OUTDOOR</td>
<td>17,5</td>
<td>004249040</td>
<td>1</td>
</tr>
<tr>
<td>Fixing plate for VVP 24 3p-Z, OUTDOOR</td>
<td>24</td>
<td>004259040</td>
<td>1</td>
</tr>
<tr>
<td>Fixing plate for VVP 36 3p-Z, OUTDOOR</td>
<td>36</td>
<td>004269040</td>
<td>1</td>
</tr>
<tr>
<td>Microswitch NK 7,2 BSW, INDOOR</td>
<td>7,2</td>
<td>004349007</td>
<td>1</td>
</tr>
<tr>
<td>Microswitch NK 12 BSW, INDOOR</td>
<td>12</td>
<td>004349008</td>
<td>1</td>
</tr>
<tr>
<td>Microswitch NK 17,5 BSW, INDOOR</td>
<td>17,5</td>
<td>004349009</td>
<td>1</td>
</tr>
<tr>
<td>Microswitch NK 24 BSW, INDOOR</td>
<td>24</td>
<td>004349010</td>
<td>1</td>
</tr>
<tr>
<td>Microswitch NK 36 BSW, INDOOR</td>
<td>36</td>
<td>004349011</td>
<td>1</td>
</tr>
<tr>
<td>VV universal clip with tail, prepared for M10 screw connection</td>
<td>7,2 - 36</td>
<td>004349015</td>
<td>1</td>
</tr>
<tr>
<td>VV universal clip</td>
<td>7,2 - 36</td>
<td>004349016</td>
<td>1</td>
</tr>
</tbody>
</table>

Fixing plate is used for combining 1-pole fuse bases into 3-pole fuse bases.