TE Connectivity Silicone Suspension / Tension Insulators 70kN
up to LIWV 450kV (BIL)
**TE Connectivity Silicone Suspension / Tension Insulators up to LIWV 450kV (BIL)**

**MV Silicone Tension Insulators**

The high tensile strength of glass fibre has been combined with our HV shed profile, to produce this rugged, lightweight tension insulator for overhead line applications up to LIWV (BIL) rating of 450kV.

The glass fibre core provides high mechanical strength with tensile values of greater than 70kN. TE’s silicone insulator profile utilises similar designs, materials, technology and know how that has been employed for nearly 40 years in the Raychem, Bowthorpe EMP and Axicom medium and high voltage insulator product portfolios.

Silicone is a hydrophobic material with a performance today of both proven tracking and erosion resistance and UV stability that gives a good balance of technical performance in a wide range of climatic and pollution conditions.

The construction consists of TE compact creepage design insulator profile which have the same diameter sheds in order to maximise flashover performance in polluted environments over a minimum insulator length.

The hydrophobic silicone housing is moulded directly over the glass fibre rod and an erosion resistant sealant is used between the end fitting and silicone to give a moisture resistant barrier.

The hot dip galvanised steel end fittings are crimped onto the glass fibre core providing high strength corrosion resistant fixing points.

**Benefits and Key Features**

- TE Connectivity Know how
- TE Connectivity branded, contract manufactured
- 70kN Tension rating (SML)
- Interchangeable metal end fitting selection
- Reliable tensile performance
- Light weight for easier installation
- Silicone housing has excellent hydrophobic properties
- Shed design to minimize insulator length per kV rating
- Shock and vibration resistant,
- Good tracking and erosion resistance performance
- Maintenance free
- Tested in accordance to IEC61109 & IEC62217
- Quality design and manufacture to ISO9001

**Excellent Hydrophobic Properties**

The hydrophobic silicone housing is moulded directly over the glass fibre rod and an erosion resistant sealant is used between the end fitting and silicone to give a moisture resistant barrier.

The hot dip galvanised steel end fittings are crimped onto the glass fibre core providing high strength corrosion resistant fixing points.

Contact us at: insulators@te.com
Insulator Considerations

TE Connectivity 70kN Silicone Suspension / Tension insulator range is designed for 7 different metal end fittings, each of which can be selected with any other to make any combination required.

The overall total insulator length will vary dependant upon the metal end fitting selections.

Electrical Properties Selection

Select either the operating voltage or the LIWV (BIL) rating from the below chart, read off the creepage distance and compare this value with your minimum creepage requirement for your application. If the creepage value is less than your minimum requirement then search down the creepage column until you either exceed or get very close to your actual minimum creepage requirement. Read off the shed number and verify all electrical parameters on the selected row meets the electrical insulation needs.

Metal End Fitting Selection

Choose any combination or orientation, between the seven below metal end fittings and from the table overleaf note the specific characteristics of each end fitting you have selected.

<table>
<thead>
<tr>
<th>Max System Voltage</th>
<th>Nominal Creepage (mm)</th>
<th>Nominal Dry Arc (mm)</th>
<th>Number of Sheds</th>
<th>Min Dry AC Withstand (kV)</th>
<th>Min Wet AC Withstand (kV)</th>
<th>Min Dry AC Flashover (kV)</th>
<th>Min Wet AC Flashover (kV)</th>
<th>Min Lightning Impulse Withstand LIWV (kV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.5</td>
<td>455</td>
<td>205</td>
<td>4</td>
<td>80</td>
<td>50</td>
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<td>80</td>
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<td>8</td>
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<td>100</td>
<td>135</td>
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<td>380</td>
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<td>140</td>
<td>115</td>
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<td>52</td>
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<td>415</td>
<td>10</td>
<td>150</td>
<td>125</td>
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<td>300</td>
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<td>52</td>
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<td>305</td>
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<tr>
<td>65</td>
<td>1890</td>
<td>697</td>
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<td>245</td>
<td>195</td>
<td>255</td>
<td>215</td>
<td>440</td>
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<tr>
<td>65</td>
<td>2330</td>
<td>835</td>
<td>22</td>
<td>290</td>
<td>230</td>
<td>300</td>
<td>260</td>
<td>495</td>
</tr>
</tbody>
</table>

Alternatively cross reference the Lightning Impulse Withstand Voltage (LIWV) kV peak rating chart below, to determine minimum system voltage and then take into account your pollution / creepage considerations.

<table>
<thead>
<tr>
<th>Highest voltage for equipment (Um) (r.m.s. value)</th>
<th>Standard rated short duration power-frequency withstand voltage (r.m.s. value)</th>
<th>Standard rated lightning impulse withstand voltage (LIWV) (r.m.s. value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.6</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>7.2</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>12</td>
<td>28</td>
<td>60</td>
</tr>
<tr>
<td>17.5*</td>
<td>38</td>
<td>75</td>
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<td>52*</td>
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<td>72.5</td>
<td>140</td>
<td>145</td>
</tr>
<tr>
<td>100**</td>
<td>185</td>
<td>170</td>
</tr>
</tbody>
</table>

NB * These Um are non preferred values in IEC 60038 and thus no most frequently combinations standardized in apparatus standards are given

** This Um value is not mentioned in IEC 60038 but has been introduced in the range in some apparatus standards
TE Connectivity Silicone Suspension / Tension Insulators up to LIWV 450kV (BIL)

Specifying and Naming Convention

Specifying Silicone Tension / Suspension Insulators
To specify the correct insulator, it is necessary to define the following characteristics:
- Specified mechanical load (SML) [kN]
- Operating Voltage and or LIWV (BIL) [kV]
- Nominal Creepage Distance [mm]
- Metal End Fittings or couplings

Designation of Silicone Tension / Suspension Insulators
In accordance with IEC 61466-1, composite tension insulators are assigned a reference designation which indicates:
- Insulator type
- Mechanical strength
- Metal End Fitting type

Requirement designation examples:
1) CS 70 S16 B16
2) CS 70 T16N C16N

Where:
CS = Composite longrod insulator
70 = 70kN specified mechanical load
S16 = Top end Socket fitting, according to IEC 120, size 16
B16 = Bottom end Ball fitting, according to IEC 120, size 16
T16N = Top end Tongue fitting, according to IEC 61466-1, size 16N
C16N = Bottom end Clevis fitting, according to IEC 61466-1, size 16N

TE Naming examples:
1) LR-CSxxxSByyyy-zzzzCSG
2) LR-CSxxxTCyyyy-zzzzCSG
EF’s are designed to relevant IEC Spec

TE Naming Conventions

<table>
<thead>
<tr>
<th>IEC designation for composite Long Rod</th>
<th>LR-CSxxxTByyyy-zzzzMMF</th>
</tr>
</thead>
<tbody>
<tr>
<td>SML [kN]</td>
<td>eg: 70</td>
</tr>
<tr>
<td>Top Coupling</td>
<td>eg: B, S, T, C, Y, E, A</td>
</tr>
<tr>
<td>Bottom Coupling</td>
<td>eg: B, S, T, C, Y, E, A</td>
</tr>
<tr>
<td>LIWV Rating (BIL) [kV]</td>
<td>eg: 95, 145, 170, 250, 325, 450</td>
</tr>
<tr>
<td>Creepage [mm]</td>
<td>eg: 455, 558, 660, 766, 865, 968, 1070, 1173, 1890, 2330</td>
</tr>
<tr>
<td>Material</td>
<td>eg: Composite</td>
</tr>
<tr>
<td>Housing</td>
<td>eg: Silicone</td>
</tr>
<tr>
<td>Colour</td>
<td>eg: Grey</td>
</tr>
</tbody>
</table>

Contact your local TE Connectivity Salesperson for either support in selecting your configuration or else with your naming convention ready for a pricing and lead-time quotation
# TE Connectivity Silicone Suspension / Tension Insulators up to LIWV 450kV (BIL)

## Insulator Configuration

<table>
<thead>
<tr>
<th>Schematic</th>
<th>Description</th>
<th>Designation</th>
<th>Operating Length (mm)</th>
<th>Total Length (mm)</th>
<th>Comment</th>
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<td>Insulator Core Silicone Covering FRP Core e-glass Compliant to IEC 61109</td>
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<td></td>
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<td>805</td>
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<td></td>
<td>Ball and Socket Galvanised Steel*</td>
<td>B</td>
<td>82</td>
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<tr>
<td></td>
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<td>S</td>
<td>88</td>
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<td>IEC Spec Size 16</td>
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<td>Tongue and Clevis Galvanised Steel**</td>
<td>T</td>
<td>85</td>
<td>105</td>
<td>IEC Spec Size 16N</td>
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<td>C</td>
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<td>IEC Spec Size 16N</td>
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<tr>
<td></td>
<td>Y and Eye Galvanised Steel**</td>
<td>E</td>
<td>104</td>
<td>119</td>
<td>IEC Spec Size 17</td>
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<tr>
<td></td>
<td></td>
<td>Y</td>
<td>93</td>
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<td></td>
<td>Eye Forged Steel**</td>
<td>A</td>
<td>108</td>
<td>136</td>
<td>IEC Spec Size 17</td>
</tr>
</tbody>
</table>

* compliant to IEC 120  
** compliant to IEC 61466-1

## Overall Tension Insulator Dimensioning

Choose any combination or orientation, between the seven metal end fittings from the table above noting the specific characteristics of each end fitting selected and simply add the respective selected measurements to determine the overall length and the operating length.

**Example 1: (Operating length)**

11 Shed Socket & Ball = (11 Shed = 420mm) (Ball = 82mm) (Socket = 88mm) therefore, 420+82+88 = operating length 590mm

**Example 2: (Total length)**

6 shed Eye (cast), Eye (cast) = (6 shed = 245mm) (Eye = 119mm) (Eye = 119mm), therefore, 245+119+119 = total length 483mm

Contact your local TE Connectivity Salesperson for either support in selecting your configuration or else with your naming convention ready for a pricing and lead-time quotation.
Other TE Energy Insulation products

DA1 Surge Arrester

Bowthorpe EMP DA1 series surge arrester benefits:

- Tested in accordance with IEC60099-4 at independent accredited laboratories
- Direct moulded housing to prevent moisture ingress
- Low residual voltages
- High-energy handling
- Safe non-shattering short circuit behavior to higher current levels
- Maintenance free
- Hydrophobic silicone housing: (Tracking and erosion resistant)
- Excellent cantilever and tensile performance
- Quality design and manufacturing meeting international standards

Raychem EPBI Standoff Insulator

Raychem EPBI standoff insulator benefits:

- High strength FRP core
- Standard stainless steel fittings
- Impenetrable interfacial sealing
- Pollution resistant EVA HV insulation housing in service since the 1970’s.
- Alternating shed configuration for optimal pollution flashover performance
- Lightweight – easy installation and reduced transport costs
- High corrosion resistance
- Excellent performance in polluted environments
- Excellent resistance to vandalism
- Shatterproof design – breakages eliminated during installation.

Contact us at: insulators@te.com
Other TE Energy Insulation and Protection Catalogues and Brochures

**Raychem Polymeric Insulators**
- Raychem EPBI Standoff Insulators (EPBI)  EPP 0415
- Raychem Station Post (RAP)  EPP 0945
- Raychem Suspension Tension Insulators (RST)  EPP 1138
- Raychem Line Post Insulators F-Neck (RLP)  EPP 1376
- Raychem Line Post Insulators Horizontal Clamp (RLP)  EPP 1377
- Raychem Line Post Insulators Vertical Clamp (RLP)  EPP 1378

**Silicone Polymeric Insulators**
- TE 70kN Silicone Tension / Suspension Insulators (LR-70-CSG)  EPP 1930
- TE 120kN Silicone Tension / Suspension Insulators (LR-120-CSG)  EPP 1931

**Surge Arresters**
- Bowthorpe EMP Transmission Line Arrester  EPP 0004
- Bowthorpe EMP Transmission Porcelain Surge Arresters  EPP 0015
- Bowthorpe EMP Transmission Polymeric Surge Arresters  EPP 0016
- Bowthorpe EMP PCA Single Column Polymeric Surge Arrester  EPP 0018
- Raychem LV/MV Metal Oxide Surge Arresters for Distribution Networks  EPP 0533
- Raychem MV Surge Arresters MPA for Indoor Applications  EPP 0533-1
- Raychem MV Surge Arresters RDA for Indoor Applications  EPP 0533-2
- Raychem MV Surge Arresters SPA for Indoor Applications  EPP 0533-3
- Raychem MV Surge Arresters Type HE 60 for DC Railway Applications  EPP 0533-4
- Raychem MV Surge Arresters CPA for cable sheath protection system  EPP 0533-5
- TE Connectivity MV Surge Arresters CLX for covered conductors  EPP 0533-7
- Raychem Metal-Oxide Low Voltage Arresters  EPP 1083
- Bowthorpe EMP MV Surge Arresters OCP Open Cage Polymeric series  EPP 1098
- Bowthorpe EMP surge arrester Distribution metal oxide surge arrester DA1 Series (IEC)  EPP 1496
- Bowthorpe EMP TLPCA transmission line polymeric (class 3) surge arrester range  EPP 1677
- Bowthorpe EMP surge arrester Distribution metal oxide surge arrester DAO Series (IEC)  EPP 1716

**Raysulate Asset Protection**
- Raychem High Voltage Creepage Extenders HVCE  EPP 0355
- Raychem Heat shrinkable busbar insulation tubing BBIT Voltage class 36kV Dia 11-125mm  EPP 0607
- Raychem Heat shrinkable busbar insulation tubing BPTM Voltage class 25kV Dia 6.5-220 mm  EPP 0608
- Raychem Insulation shees HVIS Voltage class 36kV Max busbar width 150mm  EPP 0609
- Raychem Busbar insulation tape HVBT Voltage class 25kV  EPP 0610
- Raychem Medium voltage line cover MVLIC  EPP 0764
- Raychem Medium Voltage Conductor Covers for Outage Prevention MVCC 7-1773453-7 E329
- Raychem Medium Voltage Fusion Tape MVFT 7-1773453-8 E330
- Raychem High Voltage Creepage Extender Wraparound HVCE WA 8-1773444-9 E133

**TE Energy Total Commitment To Quality**

Even the best technology must be backed up by a thorough and consistent quality assurance programme. At TE Energy, we subject every product to an extensive quality control regime which includes the following procedures:

At every production stage, beginning with the raw materials and continuing through to the packaged product, the QC lab tests all physical and electrical characteristics which can influence quality.

By means of batch identification the Quality Assurance Programme ensures traceability backwards all the way to the details of the compound batch test reports. We carry out re-qualification testing on a regular basis.

Quality Assurance at TE Energy is not static, but rather a constantly improving process directed towards our goals: complete customer satisfaction. The TE Energy Insulator and Arrester manufacturing sites are certified according to ISO9001 and ISO14001. Our vendor routine tests and internal incoming inspection, confirm performance of all critical components used in the assembly of our insulators and arresters.

TE Energy also contract manufactures out certain product lines. TE Energy requires that our contract manufacturers are also certified to ISO9001 and to our stringent TE Energy standards, in order to qualify these products as TE Energy branded products.

Contact us at: insulators@te.com
## Other products and brochures available from TE Energy

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Description</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Asset protection</strong></td>
<td>Insulation enhancement systems for substations and overhead. Designed to prevent unplanned outages due to accidental bridging and to help upgrade insulation levels at critical points in systems.</td>
<td>Contact us at: <a href="mailto:assetprotection@te.com">assetprotection@te.com</a></td>
</tr>
<tr>
<td><strong>Low-voltage surge arresters</strong></td>
<td>LV arresters are used to provide protection for LV overhead lines, consumer in-house supplies, distribution transformers and other appliances.</td>
<td>Contact us at: <a href="mailto:surgearresters@te.com">surgearresters@te.com</a></td>
</tr>
<tr>
<td><strong>Medium-voltage surge arresters</strong></td>
<td>Metal oxide varistor, distribution arresters for indoor and outdoor applications for protection of overhead lines, DC locomotives and switchgear applications.</td>
<td>Contact us at: <a href="mailto:surgearresters@te.com">surgearresters@te.com</a></td>
</tr>
<tr>
<td><strong>High-voltage surge arresters</strong></td>
<td>Porcelain and polymeric series parallel and single column constructed arresters for protection of transmission systems up to 550 kV.</td>
<td>Contact us at: <a href="mailto:hvsurgearrester@te.com">hvsurgearrester@te.com</a></td>
</tr>
<tr>
<td><strong>Polymeric insulators</strong></td>
<td>Insulators and insulating components/housings providing reliable solutions for power utilities and railway customers with installations in high pollution environments and applications up to 400 kV.</td>
<td>Contact us at: <a href="mailto:insulators@te.com">insulators@te.com</a></td>
</tr>
<tr>
<td><strong>Porcelain insulators</strong></td>
<td>Insulators for applications up to system voltages of 132 kV. This range of insulators offers a cost-effective solution for low and medium polluted environments.</td>
<td>Contact us at: <a href="mailto:insulators@te.com">insulators@te.com</a></td>
</tr>
</tbody>
</table>

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TE Energy – innovative and economical solutions for the electrical power industry: cable accessories, connectors & fittings, insulators & insulation, surge arresters, switching equipment, street lighting, power measurement and control.

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