BETApower® Fireprotec sets new standards

Building and transport infrastructures have to meet extremely stringent requirements to provide protection against the consequences of faults and fire. LEONI's BETAflam® non-toxic, flame retardant products have set the standards in this area for the past 15 years. These cables are standard products in safety-relevant civil engineering installations. Now LEONI is carrying its expertise in safety cable systems over to voltage classes beyond 1000 V, by developing its TRI-DELTA XDME medium voltage cable further. The BETApower® Fireprotec 12 / 20 kV achieves a fire safety standard of 180 minutes, which makes it unique in this market.

The new cable design meets stringent requirements and guarantees genuine benefits
- Low in weight and easy to install
- Shorter installation time
- Lower electrical losses, and lower energy costs
- Lower electromagnetic radiation
- Lower installation costs

BETApower® Fireprotec is ideally suited to new buildings, opening new options for the design of energy supply and generation facilities. It also achieves astonishing results when used to replace conventional medium voltage cables. Compared to a conventional low voltage safety installation (in high-rise buildings, for example) the installation costs are reduced by up to 60 %. Thanks to a compact construction, the newly developed BETApower® Fireprotec can be included in conventional pipe-work systems or on riser tracks.

BETApower® Fireprotec – the best solution for your applications.

Cost comparison in building development

<table>
<thead>
<tr>
<th>Specification</th>
<th>Variante 1 BETApower® Fireprotec</th>
<th>Variante 2 LV Safety Cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum output</td>
<td>kVA 1000</td>
<td>1000</td>
</tr>
<tr>
<td>Transformers</td>
<td>kVA 3 x 1000</td>
<td>-</td>
</tr>
<tr>
<td>Feed at network levels</td>
<td>kV 5 (11)</td>
<td>7 (0.4)</td>
</tr>
<tr>
<td>Investment costs</td>
<td>CHF 169'000</td>
<td>435'000</td>
</tr>
</tbody>
</table>

Unique fire safety levels

MV cable with insulation integrity to a minimum of 180 minutes in the event of fire
LONG SERVICE LIFE
LONGITUDINALLY AND TRANSVERSELY WATERTIGHT
HALOGEN-FREE ECOLOGY

Expert’s report / Expertise
Confirmation on preparation of an expert's report / Bescheinigung über die Durchführung einer Expertise
CERTIFIED

Product
Polymer insulated medium voltage cable
Product

Applicant
LEONI Studer AG
Hammertassasse 20
CH-4655 Dübendorf SO
Manufacturer
LEONI Studer AG
Hammertassasse 25
CH-4655 Dübendorf SO
Factory
LEONI Studer AG
Hammertassasse 20
CH-4655 Dübendorf SO
Trade mark
BETApower®
Handelsmarke

Type / Model
BETApower® F8P 1 x 63027 - 1 x 63041

Ratings, characteristics
VDE 0297-1994
Normative documents safety
Normative Documenti Sicurezza
Fire standard
TSI EN 50204-1
Technical Features
The BETApower® F8P 1 x 63027 - 1 x 63041 is a longitudinally and transversely watertight, halogen-free cable for electrical energy distribution in order to prevent the propagation of fire. It is designed to meet the requirements of the Normative Documents, following the EN 50204-1 standard.

The results are given in the reports Ref: 15-K-0116.

Due to the unavailability of the technical documentation, the following certificates were not issued:
- VDE 0297-1994
- TSI EN 50204-1

For the product an expert's report with regard to the information in the normative documents, reference to the following technical documentation:
- The BETApower® F8P 1 x 63027 - 1 x 63041 is a longitudinally and transversely watertight, halogen-free cable for electrical energy distribution in order to prevent the propagation of fire. It is designed to meet the requirements of the Normative Documents, following the EN 50204-1 standard.

For the product application, further specifications and information are available from LEONI Studer AG, Hammertassasse 20, CH-4655 Dübendorf SO.

Electrosuisse
Swiss Certification Body
Ernst Obrecht
Product Certification

QS Certification
BETApower® Medium voltage cables
with circuit integrity

BETApower® Fireprotec 12 / 20 kV

Applications
Medium voltage wiring with insulation integrity in the event of fire.
Use in safety-relevant construction designs in:
■ public buildings
■ tunnels
■ underground train systems
■ civil engineering works

Construction
■ Conductor
  Copper multi-compacted conductor according to VDE 0295 / IEC 60228, class 2
■ Internal semi-conductor layer / XLPE dielectric / External semi-conductor layer
  Extruded in a single process, welded boundary layers
■ Semi-conductor swelling tape
  Padded strip, longitudinally watertight
■ Aluminium shielding, tubular
  Aluminium tape, overlapped and glued, transversely watertight
■ Sheath
  Polyolefin-Copolymer, black
■ Thermal barrier
  Special intumescent intermediate layer
■ Outer sheath
  Polyolefin-Copolymer, double layer, black with red longitudinal stripes

Electrical characteristics
Rated voltage
U/U₀ 20/12 kV (10/6 kV upon request)
A voltage (Uₙ) of 20 % more than the normal voltage is admissible at continuous operation.
Test voltage
4 × U₀ at 50 Hz during 20 min
Partial discharge test
Test voltage 4 × U₀
level < 2 pC during 20 min

Advantages
■ Insulation integrity maintained for over 180 minutes
■ Flame retardant, no fire propagation
■ Longitudinally and transversely watertight
■ Long service life
■ Halogen-free / Ecology
■ Reduced shielding losses
■ Robust abrasion resistant sheath
■ Compact / light / modular

Thermal characteristics
Continuous operation + 90 °C
Emergency operation +130 °C (< 8 hrs/day; <100 hrs/annum) +250 °C (max. 5 s)

Bending radius
during laying > 15 x outer Ø
fixed > 11 x outer Ø

Pulling on conductors
Max. 60 N/mm² (1 x conductor cross section x 60 N/mm²)

Standards / Material properties
■ Construction: CENELEC HD 620 S1
■ Halogen-free: IEC 60754-1, EN 50267-2-1
■ No corrosive gases: EN 50267-2-3
■ No toxic gases: NES 02-713
■ Flame retardant: IEC 60332-1, EN 60332-1
■ No flame propagation: IEC 60332-3-24, EN 60332-3-24
■ Circuit integrity based on: IEC 60331-11 and 21; BS 6387 C

Specialties
■ Open tray laying as well as in tubes
■ Special design with a copper tube screen upon request
■ Compact construction
■ Recommendation: For an optimized shield connection use end and connecting elements provided by LEONI
■ Electrosuisse certified, SEV

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## Construction

<table>
<thead>
<tr>
<th>Construction</th>
<th>Conductor Ø × mm²</th>
<th>Outer Ø</th>
<th>Weight</th>
<th>Tensile Strength</th>
<th>Fire Load</th>
<th>AC Resistance</th>
<th>Capacity</th>
<th>Inductance</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mm</td>
<td>mm</td>
<td>kg/km</td>
<td>max. kN</td>
<td>kWh/m</td>
<td>Ω/km, 60 °C</td>
<td>µF/km</td>
<td>mH/km</td>
<td>mH/km</td>
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<tr>
<td>1 × 50/27 Al</td>
<td>19.80</td>
<td>39.50</td>
<td>1997</td>
<td>3.0</td>
<td>7.42</td>
<td>0.448</td>
<td>0.182</td>
<td>0.446</td>
<td>0.631</td>
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<tr>
<td>1 × 95/32 Al</td>
<td>23.40</td>
<td>43.10</td>
<td>2637</td>
<td>5.7</td>
<td>8.77</td>
<td>0.224</td>
<td>0.230</td>
<td>0.403</td>
<td>0.588</td>
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<tr>
<td>1 × 150/34 Al</td>
<td>26.10</td>
<td>45.80</td>
<td>3254</td>
<td>9.0</td>
<td>9.72</td>
<td>0.144</td>
<td>0.265</td>
<td>0.379</td>
<td>0.564</td>
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<tr>
<td>1 × 185/38 Al</td>
<td>27.90</td>
<td>47.60</td>
<td>3693</td>
<td>11.1</td>
<td>10.41</td>
<td>0.116</td>
<td>0.288</td>
<td>0.367</td>
<td>0.551</td>
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<tr>
<td>1 × 240/39 Al</td>
<td>30.20</td>
<td>49.90</td>
<td>4335</td>
<td>14.4</td>
<td>11.21</td>
<td>0.089</td>
<td>0.318</td>
<td>0.353</td>
<td>0.538</td>
</tr>
</tbody>
</table>

1 x 300/41 Al available upon request
1 x 400/45 Al available upon request

## Current rating

### Laying in tube in earth

<table>
<thead>
<tr>
<th>Construction</th>
<th>Laying in tube in earth</th>
<th>Current load¹  /  Industrial load²</th>
<th>60 °C</th>
<th>90 °C</th>
<th>130 °C</th>
<th>Emergency service³</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n × mm²</td>
<td>A</td>
<td>60 °C / A</td>
<td>90 °C / A</td>
<td>130 °C / A</td>
<td>90 °C / A</td>
</tr>
<tr>
<td>1 × 50/27 Al</td>
<td>154 / 181</td>
<td>180 / 212</td>
<td>194 / 229</td>
<td>227 / 267</td>
<td>230 / 268</td>
<td></td>
</tr>
<tr>
<td>1 × 95/32 Al</td>
<td>225 / 265</td>
<td>263 / 310</td>
<td>283 / 333</td>
<td>332 / 391</td>
<td>335 / 393</td>
<td></td>
</tr>
<tr>
<td>1 × 150/34 Al</td>
<td>291 / 342</td>
<td>335 / 394</td>
<td>366 / 431</td>
<td>422 / 497</td>
<td>433 / 500</td>
<td></td>
</tr>
<tr>
<td>1 × 185/38 Al</td>
<td>328 / 386</td>
<td>379 / 446</td>
<td>414 / 487</td>
<td>478 / 562</td>
<td>490 / 565</td>
<td></td>
</tr>
<tr>
<td>1 × 240/39 Al</td>
<td>380 / 447</td>
<td>439 / 517</td>
<td>480 / 564</td>
<td>554 / 652</td>
<td>568 / 656</td>
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</table>

### Laid in air

<table>
<thead>
<tr>
<th>Construction</th>
<th>Laid in air</th>
<th>Current load¹  /  Emergency service³</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n × mm²</td>
<td>60 °C / A</td>
</tr>
<tr>
<td>1 × 50/27 Al</td>
<td>185 / 207</td>
<td>263 / 292</td>
</tr>
<tr>
<td>1 × 95/32 Al</td>
<td>278 / 313</td>
<td>396 / 442</td>
</tr>
<tr>
<td>1 × 150/34 Al</td>
<td>360 / 406</td>
<td>514 / 575</td>
</tr>
<tr>
<td>1 × 185/38 Al</td>
<td>412 / 466</td>
<td>589 / 660</td>
</tr>
<tr>
<td>1 × 240/39 Al</td>
<td>484 / 549</td>
<td>692 / 779</td>
</tr>
</tbody>
</table>

¹ Load factor 24 h, 100 % nominal current (main application: power plants)
² Load factor 10 h, 100 % and 14 h, 60 % nominal current (standard application)
³ Maximum 8 h a day and maximum 100 h a year
⁴ Inner diameter of tube at least 3 x overall diameter
⁵ Inner diameter of tube at least 1.5 x cable diameter

Basis of calculation: Depth of laying 1 m, ground temperature 20 °C, air temperature 30 °C, shields connected to earth on both sides, specific thermal resistance 1K m/W, protected against direct sunlight, each cable system laid separately.
For our – BETApower® Fireprotec - product assortment, all common medium-voltage mountings and connecting elements are available. The installation of the mountings for BETApower® Fireprotec cables requires professional skilled precision work in order to guarantee the highest measure of safety for all operating conditions.

For the shield earthing of the cable terminations, we recommend the use of our earthing set developed by LEONI. These cable terminations provide connections, which are proven from decades of practical installation.

<table>
<thead>
<tr>
<th>ZB – ME Earthing Set</th>
<th>ZB1 – ME Earthing Set</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typ</td>
<td>Article no.</td>
</tr>
<tr>
<td>ZB – ME 20/25 – 95</td>
<td>218464</td>
</tr>
<tr>
<td>ZB – ME 20/120 – 240</td>
<td>218465</td>
</tr>
</tbody>
</table>

In order to guarantee the outstanding fire properties of BETApower® Fireprotec as well with regard to its connections along the line, we recommend using our tested fire prevention sleeves:

<table>
<thead>
<tr>
<th>Sleeve type</th>
<th>Article no.</th>
<th>Cable construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>93-AP611-15, 050-070</td>
<td>308286</td>
<td>1x50/27 Al</td>
</tr>
<tr>
<td>Fireprotec Splice, 20 kV</td>
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<tr>
<td>93-AP621-15 095-240</td>
<td>308147</td>
<td>1x95/32 Al</td>
</tr>
<tr>
<td>Fireprotec Splice, 20 kV</td>
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<td></td>
</tr>
<tr>
<td>93-AP631-15 240-300</td>
<td>308718</td>
<td>1x300/41 Al</td>
</tr>
<tr>
<td>Fireprotec Splice, 20 kV</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Additional accessory products are available on request.
Fireprotec Splice
Tested by Electrosuisse certification body in cooperation with 3M company

Our splices for BETApower Fireprotec were tested according to BS 6387 C in regard to their fire behaviour in our in-house fire laboratory at LEONI Studer AG, Däniken (Switzerland).
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