Legend for icons

PRODUCT CHARACTERISTICS

- Suitable for outdoor use
- Good chemical resistance
- Flame-retardant
- Wide clamping range
- Halogen-free
- Heat-resistant
- Cold-resistant
- Corrosion-resistant
- Mechanical resistance
- Assembly time
- Low weight
- Oil-resistant
- Space requirement
- Robust
- Acid-resistant
- Reliability
- Voltage
- Interference signals
- Temperature-resistant
- UV-resistant
- Waterproof
- Variety of approval certifications

Please note: the purpose of the icons is to provide you with a quick overview and a rough indication of the product features to which the corresponding information relates. You can find details of product characteristics in the “technical data” sections on the product pages.
<table>
<thead>
<tr>
<th>Content</th>
<th>Page</th>
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</thead>
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<td>SKINTOP® Cable glands</td>
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</table>
Success through values

Rock solid, high performance. Regional roots, global aspirations. Fast, reliable, high quality – and development that is always one step ahead. For products for the railway industry as well. This is Lapp. The southwest region of Germany is considered one of the most innovative and powerful industrial sectors in the world, and for good reason. Lapp is a part of this region, helping to guide it and its success worldwide.

As a completely family run company, we know: Everything that we have achieved since our founding in 1957 is based on the daily commitment of our skilled staff and partnerships with our customers based on trust. Each of them has made a decisive contribution to our mutual success. Today, Lapp is one of the world’s leading manufacturers of cables, leads, cable accessories and systems of the highest level of quality. We have approximately 3,300 employees worldwide. With 17 production sites on four continents, more than 39 sales companies and hundreds of dedicated consulting experts, we are always close by. And not just physically: customer proximity cannot be measured in mere kilometres. It is based on listening, making your challenges our own and developing solutions that help to further your business model. Candid closeness and a trusting, partnership-based cooperation are more than just words for Lapp, they are values upon which we have built our family company.

The result? Intelligent and reliable connectivity solutions precisely tailored to the needs of our globally active customers. For you as well.

Customer-oriented
Successful
Family based
Innovative. Lapp.

- Founded in 1957
- A leading manufacturer of cables, leads, accessories and complete system solutions for connection technology
- Approximately 3,300 employees worldwide
- 17 production facilities
- More than 39 sales companies
- Hundreds of dedicated consulting experts worldwide
- Years of experience in the rail industry
We want to help you become even more productive and successful. This is why we work tirelessly on optimising our processes. We do everything to make sure we always find the best solution for you and also provide you with quick, efficient and effective support.

No matter where you are – we are always by your side. Our plants, sales companies, partners and, above all, our competent teams of advisers ensure we offer you a comprehensive service on every continent. We do not simply distribute cable technology, we also manufacture our products ourselves – which represents another advantage for you. As a manufacturer with 18 of our own production facilities, you will benefit from our expertise in the development, design and manufacture of cables, system products and cable accessories. Thanks to this expertise, we can guarantee that Lapp will provide you with the quality that you require and that you demand.

You can always rely on quality from Lapp – wherever you are in the world. This is also embodied by our strong brands.
Our global corporate network

Find other sales partners in your location:
www.lappgroup.com
The railway industry opens up to great opportunities: Numerous emerging markets around the world are developing with increasing momentum. And their demand for transport systems grows – in Asia and in the Middle East, Eastern Europe, Latin America and more recently in Africa as well. Even in Germany, with its dense transportation infrastructure, the market is growing at a disproportionate rate, in particular in the short-distance sector.

The modernisation of old system alone is a task of Herculean proportions – both for public budgets and for manufacturers and operators.

This is due to the fact that a significant innovation backlog has built up. At the same time, the demand for urban transport and fast short-distance systems grows. For larger distances, high-speed projects are gaining in importance, cities are growing and freight traffic is steadily increasing.

This is coupled with increasingly stringent safety regulations and quality standards that must be met. Fire protection standards are particularly demanding. Based on decades of experience as a full-service provider for electrical cables, cable connections and accessories, Lapp has rounded out its portfolio with products for the railway industry and can offer its customers high-quality solutions in this sector as well.

Lapp now supplies a large number of customers in this market. One of our reference customers is the Korean manufacturer Hyundai-Rotem. They have placed their trust in use for a number of years and have equipped their high-speed trains for the new line of the Korea Train eXpress (KTX) from Seoul to Mokpo and Pusan with Lapp cables. Here, our quality and delivery service were the decisive factors to gain the edge over our competitors.

At the forefront of development. Also for the railway industry.

Lapp.

- Almost 60 years of experience in the development and production of electrical cables, cable connections and accessories
- In-house production expertise
- Current reference project: High-speed trains for the Korea Train eXpress (KTX)
- IRIS certified
We are prepared and have systematically built up our know-how and expertise in the railway technology sector in order to provide convincing arguments to the railway industry regarding our global capabilities.

Because we have a great deal to offer. This starts with the ability to speak your language. Our employees come from 152 countries. With our sales companies and competent consulting teams, we are represented locally around the world, providing you with comprehensive services. An effective customer focus is part of Lapp, as is our keen sense for trends, sectors and markets. Using this as a basis, we develop the components and solutions of tomorrow for your ideas and projects.

Even for complex requirements, we provide you with the perfect solution, from proven standard products to sophisticated custom solutions. We back up these promises with our actions. To make the procurement process as simple as possible, we can connect your inventory management system to our system. And in our e-shop, you can order any of our 40,000+ standard articles, including railway products, with a simple click – including individual price enquiries, availability and delivery time details, as well as shipment tracking.

Our full service, fast worldwide availability and small minimum order quantities reduce the overall cost to our customers. In short: We are your partner, and we always keep your interests in mind, ensure uncomplicated cooperation and provide you with the highest quality from a single source paired with a clear added value for your business.

Clear added value for your company. Optimised total cost for rail equipment providers.

Lapp.

• A local presence, worldwide
• More than 40,000 standard items, for order with the click of a mouse
• Excellent full service
• Fast worldwide availability
• Small minimum order quantities
• Total cost optimisation
• Highest quality
• Complete solutions for the railway industry from a single source = one-stop shop
• e-Service solutions
Technological lead, step-by-step

Our manufacturing facility for the ÖLFLEX® TRAIN is certified in accordance with the IRIS (International Rail Industry Standard), thus operating within the framework of the required processes of the railway industry.

We are a technology group in our sector. We live up to this expectation every day. This is a key success factor for us, something that is more important today in the railway business than ever. Lapp solutions set standards for safety, quality and functionality. And at a great value for money too.

ÖLFLEX® has long become synonymous in the market for power and control cables. Our flexible, oil-resistant cables satisfy the highest demands and can withstand even the very toughest conditions. We have now developed our ÖLFLEX® TRAIN product line, thus providing the railway industry with connectivity solutions of the highest quality that satisfy a wide range of national and international standards.

ÖLFLEX® TRAIN manufacturing technology:
Cable insulation products are usually made of thermoplastic materials, mainly consisting of macromolecules.

When warmed, the mobility of the molecule chains increases, making the plastic soft and malleable and eventually melting – an exclusion criterion for the use of such materials in railway equipment with its demanding safety and environmental conditions and high temperature requirements.

To counteract these factors, ÖLFLEX® TRAIN cables are physically cross-linked in our electron beam system using high-energy beams. This gives them significantly improved mechanical and chemical resistance, even at elevated temperatures.

However, durability and resistance is important not only at high temperatures. In some climatic zones, cables running along the outside of the railways vehicles must be able to withstand temperatures down to -40°C. No problem for cross-linked products from Lapp.

This also applies to our other established brands:

- ÖLFLEX® CONNECT assembled cable solutions
- ETHERLINE® data communication systems for Ethernet technology
- UNITRONIC® data communication systems
- SKINTOP® cable glands
- EPIC® industrial connectors
- SILVYN® cable protection and guiding systems
- FLEXIMARK® marking systems
- HITRONIC® optical data communication systems
Absolute safety on the tracks

The topic is well known: Railway lines must fulfil demanding national and international standards. In addition to these provisions, EU standards has achieved great importance. These include design standards such as EN 50264 and EN 50306. They define the required panel thickness and design and stipulate the mechanical, thermal, fire safety and chemical tests.

These testing standards are part of DIN EN 45545-2: Railway applications – Fire protection on railway vehicles – Part 2: Requirements for fire behaviour of materials and components. It defines the requirements for the fire behaviour.

Lapp has fulfilled the technological requirements for satisfying this standard for railway cables. The result: Cables and wires from Lapp fulfil the key requirements for railway equipment with flying colours. Reliable and safe – up to the highest level defined in EN 45545-2, Hazard Level 3 (HL3).

Arrival in the global railway market.
A sure thing.

Lapp.
Only the toughest tests guarantee the highest quality

**Test centre at Lapp headquarters in Stuttgart**

Our trial and test centre, with its extremely high standards for material testing and quality assurance, is a further guarantee of the decisive quality advancements of Lapp products. It is here that every Lapp Group design is subjected to tough performance and endurance tests. For example, our high-flexibility cables undergo millions of bending cycles at different speeds and extreme bending radii. Only products that survive the “folding chamber” are good enough to be included in our product range.

**Comprehensive quality tests for cables**
- Tensile and shearing strength test
- Resistance test
- Electrical test
- Torsion test
- Torsion-bending test
- Drag chain test
- Roll bending test
- Fire tests

**Quality checks for cable glands**
- Protection class testing - water (IP X3 to X8)
- Protection class testing - dust (IP 5X, IP 6X)
- Oil spray test according to UL 514 B
- Pulling protection testing

**Strict materials testing**
- Infra-red spectroscopy for material identification
- Thermogravimetry to determine material proportions
- Thermal analysis to test the thermal properties of materials
- Climate cabinets to test ageing and storability

**Our test centre is also open for our customers**

A customer-focused mentality and perfect service form part of the Lapp Group company values. We therefore offer our customers the chance to profit from our trial and test centre beyond the scope of quality assurance of our products. We will test your products and carry out material tests in accordance with your wishes. For instance, you might bring us a length of cable whose material composition you wish to find out. We will test it for you using infrared spectroscopy and tell you what materials it contains. Using thermoanalysis we can give you information about the material properties. And we can test materials for aging and shelf-life. In short: The entire know-how of our specialists is available to you for your analysis and quality assurance.

**With expertise in the railway sector. Lapp.**

- ÖLFLEX® TRAIN solutions for the railway industry
- Perfect material properties thanks to electron beam cross-linking in our in-house production facility
- IRIS certified
- In-house test centre at our headquarters
Railway equipment – available soon worldwide

You can forget about long delivery times and high minimum order quantities. We keep railway products in stock for you and deliver quickly. Regardless of where in the world you need them. Even in smaller quantities.

To make this possible, we have built up a close-knit network of logistics centres and professionally trained consulting experts. Our fast, smooth delivery service is based on sophisticated, completely digitised and reliable logistics processes.

Our logistics and service centre in Ludwigsburg is setting the benchmark in many ways: 30,000 m² total floor, fully automated high-rack facility, 120 logistics employees, 30 truck loading ramps, over 90,000 articles and nearly 500,000 km cables delivered every year represent the most important facts.

With our Track & Trace web service, you can always view the current status of your deliveries. Or you can give us your e-mail address and request our evening delivery update. It includes all the details on your current shipment, including the package or shipment number.

Incidentally, When the Lapp logistics centre was constructed, great importance was placed on sustainability and energy saving. The photovoltaic system on the roof, for instance, generates approximately 1,000 MWh of energy per year, thus reducing annual CO₂ emissions by around 650 tonnes.

65,000 m² of storage space in Germany alone enables us to keep 40,000 km of ÖLFLEX® constantly in stock. This is longer than the length of the equator.

Fast and reliable. All over the world. Lapp.
Products for the railway industry at a glance

1 Brake
2 Driver’s Desk
3 Traction Converter
4 Control Cabinets
5 Coupler
6 Train Control System
7 Traction Motor
8 Brake
9 Blower
10 Battery
11 Auxiliary Power Converter
12 Passenger Information System
13 Lavatory
14 Lighting
15 Air Condition
16 Doors

ÖLFLEX® Power and control cables

ÖLFLEX® TRAIN 301
1 2 4 6 8 11 12 13 14 16
ÖLFLEX® TRAIN 310/315 C
1 2 3 4 6 8 11 12 13 15
ÖLFLEX® TRAIN 317 C
1 2 3 4 6 8 11 12 13 15
ÖLFLEX® TRAIN 320/325 C
1 3 8 11 16
ÖLFLEX® TRAIN 327 C
1 3 5 6 8 11 15
ÖLFLEX® TRAIN 331 600V
1 2 3 4 5 6 8 9 10 11 13 14 15 16
ÖLFLEX® TRAIN 340 600V
1 3 4 5 8 9 11 13 15
ÖLFLEX® TRAIN 345 C 600V
1 3 4 5 8 11 13 15
ÖLFLEX® TRAIN 350 300V/355 C 300V
4 5 6 13
ÖLFLEX® TRAIN 361 1,8kV
3 4 7 9 10 11 15
ÖLFLEX® TRAIN 371 1,8kV
3 4 5 7 9 10 11 11
ÖLFLEX® TRAIN 381 3,6kV
7
Overview ÖLFLEX® TRAIN

Single cores according to EN 50306 (Thin Wall)

<table>
<thead>
<tr>
<th>ÖLFLEX® TRAIN 301 TW 300 V</th>
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<tbody>
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<td>Type standard</td>
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<td>With screen</td>
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Multi core cables with twisted pairs according to EN 50306 (Thin Wall)

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<tr>
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## Overview ÖLFLEX® TRAIN

### Multi core cables according to EN 50306 (Thin Wall)

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<th>ÖLFLEX® TRAIN 310 TW-P 300 V</th>
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Multi core cables according to EN 50306 (Thin Wall)
### Single core cables according to EN 50264

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<th>ÖLFLEX® TRAIN 331 600 V</th>
<th>ÖLFLEX® TRAIN 361 1.8 kV</th>
<th>ÖLFLEX® TRAIN 371 1.8 kV</th>
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**Note:** Single core cables according to EN 50264.
## Overview ÖLFLEX® TRAIN

### Multi core cables according to EN 50264

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## EPIC® Industrial connectors

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<td>Solder</td>
<td>IEC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>in metal housing: 24 VAC/60 VDC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>in plastic housing: 250 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>in mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>in mm</td>
<td></td>
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<td></td>
<td></td>
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<td>in mm</td>
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<td></td>
<td></td>
<td></td>
<td>in mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>in mm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**P**: Power  **S**: Signal  **H**: In metal housing: 24 VAC/60 VDC in plastic housing: 250 V
EPIC® rectangular connectors
Flexible, robust connectors for mechanical engineering

The connector system for mechanical and plant engineering and wherever a robust connection system is required. EPIC® Rectangular connectors are available as components. The right connector for any application can be made individually from housings, inserts and contacts. www.lappgroup.com/connectorfinder

For the housing, there are two performance classes to choose from
• EPIC® Standard is robust and there is a flexible choice of cable entries www.lappgroup.com/connector-housing
• EPIC® ULTRA has a high corrosion protection, EMC protection as well as a stainless steel interlocking device

EPIC® inserts are available in a fixed pin design and as a modular system
• EPIC® fixed pin inserts are easy to handle and come in a wide variety of designs
• EPIC® modular inserts offer flexibility with modules for data, signals, power, fibre-optics and pneumatics. This means every insert is individually tailor-made for the relevant modul configuration

Photographs are not to scale and do not represent detailed images of the respective products.

EPIC® circular connectors
Compact connectors for motion control and energy transfer

Circular connections come in two designs, a signal design with gold-plated contacts for transmitting delicate signals and as high-reserve power connectors.

EPIC® SIGNAL connectors are available as M17, M23 and R3.0 (M27)
• The metal housing with an integrated EMC screen contact reliably prevents electromagnetic interferences
• Gold-plated signal contacts reliably transmit with the lowest of currents and voltages

EPIC® POWER connectors are available as M12, M17, LS1 (M23), LS1.5 (M40) and LS3 (M58)
• The integrated EMC cable glands offer strain relief and are perfectly sealed
• High-quality sealing materials for good chemical protection

EPIC® POWERLOCK
• Perfect for transmitting very high currents
• Colour coded and geometrically coded in order to prevent incorrect connections
ÖLFLEX® TRAIN 301 TW 300V
Single-core cable according to EN 50306-2 type M for high requirements in railway applications

Benefits
- Reduced insulation wall thickness, thus space-saving installation
- Good chemical resistance
- Resistant to mechanical influences in harsh environmental conditions
- Extended temperature range
- Reduced flame spreading increase the protection against damage to persons and property in the event of a fire

Application range
- For use in railway vehicles and buses, for fixed and protected installation and applications where limited movement may occur
- Suitable for switchboards and control panels of trains and locomotives
- Also applicable within oily environments and areas with increased ambient temperature

Product features
- Fire behaviour according to EN/IEC:
  - Halogen-free acc. to EN 60754-1
  - No corrosive gases acc. to EN 60754-2
  - No fluorine acc. to EN 60684-2
  - No toxic gases acc. to EN 50305
  - Low smoke density acc. to EN 61034-2
  - Flame-retardant acc. to EN 60332-1-2
  - No flame propagation acc. to EN 50305
- Fire behaviour according to NF: on request / see data sheet
- Chemical properties:
  - Oil resistant acc. to EN 50306
  - Fuel resistant acc. to EN 50306
  - Acid resistant acc. to EN 50306
  - Alkali resistant acc. to EN 50306
  - Ozone resistant acc. to EN 50306

Norm references / Approvals
- EN 50306-2, type M
- EN 45545-2
- NF F 16-101: on request / see data sheet

Product Make-up
- Tinned-copper strand, 19 or 37 wires, SRC (Special Round Conductor)
- Insulation: Electron beam cross-linked Polymer compound acc. to EN 50306
- Colour of core insulation: white

Technical data

<table>
<thead>
<tr>
<th>Classification</th>
<th>ETIM 5.0 Class-ID: EC000993</th>
<th>ETIM 5.0 Class-Description: Single core cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conductor stranding</td>
<td>SRC (special round conductor)</td>
<td>19 or 37 wires acc. to EN 50306-1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Minimum bending radius</th>
<th>4 x OD 3 x OD for careful bending, once at connecting terminal Occasional flexing: 5 x OD (OD = outer diameter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal voltage</td>
<td>U₀/U AC 300/500 V U₀ AC 0,6/1 kV</td>
</tr>
<tr>
<td></td>
<td>U₀ AC 1,2 kV</td>
</tr>
<tr>
<td></td>
<td>V₀ DC 410 V</td>
</tr>
<tr>
<td></td>
<td>V₀ DC 0,9 kV</td>
</tr>
<tr>
<td>Test voltage</td>
<td>3,5 kV AC; 8,4 kV DC</td>
</tr>
<tr>
<td>Temperature range</td>
<td>-45°C to +125°C (20.000 h) Occasional flexing: -35°C to +105°C Short circuit: +160°C (5s)</td>
</tr>
</tbody>
</table>

Art. No. | Conductor cross-section (mm²) | Outer diameter (mm) | Copper index (kg/km) | Weight (kg/km) |
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>15301000</td>
<td>0.5</td>
<td>1.3</td>
<td>4.8</td>
<td>6</td>
</tr>
<tr>
<td>15301001</td>
<td>0.75</td>
<td>1.5</td>
<td>7.2</td>
<td>8</td>
</tr>
<tr>
<td>15301002</td>
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<td>9.6</td>
<td>11</td>
</tr>
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<td>2.1</td>
<td>14.4</td>
<td>17</td>
</tr>
<tr>
<td>15301004</td>
<td>2.5</td>
<td>2.7</td>
<td>24.4</td>
<td>28</td>
</tr>
</tbody>
</table>

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150 / 100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Photographs are not to scale and do not represent detailed images of the respective products.

Similar products
- ÖLFLEX® TRAIN 331 600V refer to page 29
ÖLFLEX® TRAIN 310 TW-P 300V

Multi-core cable according to EN 50306-4 1P type MM for high requirements in railway applications

<table>
<thead>
<tr>
<th>Article number</th>
<th>Number of cores and mm² per conductor</th>
<th>Outer diameter (mm)</th>
<th>Copper index (kg/km)</th>
<th>Weight (kg/km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15310000</td>
<td>4 X 0.5</td>
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<td>15310001</td>
<td>7 X 0.5</td>
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<td>33.6</td>
<td>64</td>
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<tr>
<td>15310002</td>
<td>13 X 0.5</td>
<td>7.8</td>
<td>62.4</td>
<td>120</td>
</tr>
<tr>
<td>15310003</td>
<td>19 X 0.5</td>
<td>8.6</td>
<td>91.2</td>
<td>157</td>
</tr>
<tr>
<td>15310004</td>
<td>37 X 0.5</td>
<td>11.4</td>
<td>177.6</td>
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</tr>
<tr>
<td>15310005</td>
<td>4 X 0.75</td>
<td>5.1</td>
<td>28.8</td>
<td>55</td>
</tr>
<tr>
<td>15310006</td>
<td>7 X 0.75</td>
<td>6.0</td>
<td>50.4</td>
<td>84</td>
</tr>
<tr>
<td>15310007</td>
<td>13 X 0.75</td>
<td>8.7</td>
<td>93.6</td>
<td>162</td>
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<tr>
<td>15310008</td>
<td>19 X 0.75</td>
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<td>138.6</td>
<td>214</td>
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<td>15310009</td>
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<td>266.4</td>
<td>392</td>
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<td>68</td>
</tr>
</tbody>
</table>

Technical data

- Classification: ETIM 5.0 Class-ID: EC000104
- Core identification code: White with black numbers
- Conductor stranding: SRC (special round conductor)
- Nominal voltage: U₉/ₐc 300/500 V
- Protective conductor: G = with GN-YE protective conductor
- Temperature range: -45°C to +125°C (20,000 h)

Benefits

- Reduced insulation wall thickness, thus saving space
- Good chemical resistance
- Resistant to mechanical influences in harsh environmental conditions
- Extended temperature range
- Reduced flame spreading increases the protection against damage to persons and property in the event of a fire

Application range

- For use in railway vehicles and buses, for fixed and protected installation and applications where limited movement may occur
- Suitable for control and monitoring circuits as well as for internal wiring of equipment in trains and locomotives
- Also applicable within oily environments and areas with increased ambient temperature

Product features

- Fire behaviour according to EN/IEC:
  - Halogen-free acc. to EN 60794-1
  - No corrosive gases acc. to EN 60794-2
  - No fluorine acc. to EN 60684-2
  - No toxic gases acc. to EN 50306
  - Low smoke density acc. to EN 60342-2
  - Flame-retardant acc. to EN 60332-3-2
  - No flame propagation acc. to EN 60332-1-2
  - No flame acc. to EN 60332-3-24
- Fire behaviour according to NF: on request / see data sheet
- Chemical properties:
  - Oil resistant acc. to EN 50306
  - Fuel resistant acc. to EN 50306
  - Acid resistant acc. to EN 50306
  - Alkali resistant acc. to EN 50306
  - Ozone resistant acc. to EN 50306
- Norm references / Approvals:
  - EN 50306-4 class P, type MM
  - EN 45545-2

Accessories

- SKINTOP® ST-HF-M refer to page 45
- SKINTOP® MS-HF-M refer to page 47

For current information see: www.lappgroup.com
Power and control cables

Special applications • Rolling stock

ÖLFLEX® TRAIN 315 C TW-P 300V
Screened multi-core cable according to EN 50306-4 3P type MM S for high requirements in railway applications

Benefits

• Reduced insulation wall thickness, thus space-saving installation
• Copper screening complies with EMC requirements and protects against electromagnetic interference
• Resistant to mechanical influences in harsh environmental conditions
• Extended temperature range
• Reduced flame spreading increase the protection against damage to persons and property in the event of a fire

Application range

• In EMC-sensitive environments
• For use in railway vehicles and buses, for fixed and protected installation and applications where limited movement may occur
• Suitable for control and monitoring circuits as well as locking circuits and internal wiring of equipment in trains and locomotives
• Also applicable within oily environments and areas with increased ambient temperature

Product features

• Fire behaviour according to EN/IEC:
  - Halogen-free acc. to EN 60754-1
  - No corrosive gases acc. to EN 60754-2
  - No fluorine acc. to EN 60684-2
  - No toxic gases acc. to EN 50305
  - Low smoke density acc. to EN 61034-2
  - Flame-retardant acc. to EN 60332-1-2
  - No flame propagation acc. to EN 60332-3-24 / EN 60332-3-25 / EN 50305
• Fire behaviour according to NF:
  - on request / see data sheet
• Chemical properties:
  - Oil resistant acc. to EN 5036
  - Fuel resistant acc. to EN 5036
  - Acid resistant acc. to EN 5036
  - Alkali resistant acc. to EN 5036
  - Ozone resistant acc. to EN 5036

Norm references / Approvals

• EN 50306-4 class P, type MM S
• EN 45545-2
• NF F 16-101: on request / see data sheet

Product Make-up

• Tinned-copper strand, 19 or 37 wires, SRC (Special Round Conductor)
• Insulation: Electron beam cross-linked Polymer compound acc. to EN 5036
• Colour of insulation: White with black numbers
• Wrapping: Halogen-free plastic foil
• Screen: Tinned-copper braiding
• Outer sheath: electron beam cross-linked polymer-compound S2 acc. to EN 5036
• Outer sheath colour: Black

Technical data

Classification

ETIM 5.0 Class-ID: EC000104
ETIM 5.0 Class-Description: Control cable

Core identification code

White with black numbers

Conductor stranding

SRC (special round conductor)
19 or 37 wires acc. to EN 50306-1

Minimum bending radius

Fixed installation: 10 x outer diameter
Occasional flexing: 10 x outer diameter

Nominal voltage

U_{0}/U AC 300/500 V
U AC 550 V
V, DC 410 V
Fixed installation:
U_{0}/U AC 0,6/1 kV
U AC 1,2 kV
V, DC 0,9 kV

Test voltage

Core/core: 3,5 kV AC; 8,4 kV DC
Core/screen: 3,5 kV AC; 8,4 kV DC

Protective conductor

G = with GN-YE protective conductor
X = without protective conductor

Temperature range

Fixed installation:
-45°C to +125°C (20,000 h)
Occasional flexing:
-35°C to +105°C
Short circuit: +160°C (5s)

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150 / 100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Packaging size: coil ≤ 30 kg, ≤ 250 m, otherwise drum

Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).

Photographs are not to scale and do not represent detailed images of the respective products.

Similar products

- ÖLFLEX® TRAIN 325 C TW-E 300V refer to page 27
- ÖLFLEX® TRAIN 355 C 300V refer to page 33

Accessories

- SKINTOP® MS-HF-M SC refer to page 48
- SKINTOP® MS-HF-M BRUSH refer to page 49

For current information see: www.lappgroup.com
ÖLFLEX® TRAIN 317 C TW-P 300V
Screened multi-core cable according to EN 50306-4 5P type MM S for high requirements in railway applications

**Benefits**
- Reduced insulation wall thickness, thus space-saving installation
- Copper screening complies with EMC requirements and protects against electromagnetic interference
- Resistant to mechanical influences in harsh environmental conditions
- Extended temperature range
- Reduced flame spreading increase the protection against damage to persons and property in the event of a fire

**Application range**
- In EMC-sensitive environments
- For use in railway vehicles and buses, for fixed and protected installation and applications where limited movement may occur
- Suitable for control and monitoring circuits as well as locking circuits and internal wiring of equipment in trains and locomotives
- Also applicable within oily environments and areas with increased ambient temperature

**Product features**
- Fire behaviour according to EN/IEC:
  - Halogen-free acc. to EN 60754-1
  - No corrosive gases acc. to EN 60754-2
  - No fluorine acc. to EN 60684-2
  - No toxic gases acc. to EN 50306
  - Low smoke density acc. to EN 61034-2
  - Flame-retardant acc. to EN 60332-1-2
  - No flame propagation acc. to EN 60332-3-24 / EN 60332-3-25 / EN 50305

**Technical data**
- **Classification**
  - ETIM 5.0 Class-ID: EC000104
  - ETIM 5.0 Class-Description: Control cable

- **Core identification code**
  - White with black numbers

- **Conductor stranding**
  - SRC (special round conductor) 1 9 or 37 wires acc. to EN 50306-1

- **Minimum bending radius**
  - Fixed installation: 10 x outer diameter
  - Occasional flexing: 10 x outer diameter

- **Nominal voltage**
  - $U_{m}$ AC 1,2 kV
  - $U_{m}$ AC 550 V
  - $U_{m}$ DC 410 V

- **Test voltage**
  - Core/core: 3,5 kV AC; 8,4 kV DC
  - Core/screen: 3,5 kV AC; 8,4 kV DC

- **Temperature range**
  - Fixed installation: -45°C to +125°C (20.000 h)
  - Occasional flexing: -35°C to +105°C
  - Short circuit: +160°C (5s)

**Article number**
- Number of cores and mm² per conductor
- Outer diameter (mm)
- Copper index (kg/km)
- Weight (kg/km)

<table>
<thead>
<tr>
<th>Article number</th>
<th>Number of cores and mm² per conductor</th>
<th>Outer diameter (mm)</th>
<th>Copper index (kg/km)</th>
<th>Weight (kg/km)</th>
</tr>
</thead>
<tbody>
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<td>38,86</td>
<td>150</td>
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<td>330,78</td>
<td>331</td>
</tr>
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<td>2x (2X0,75)</td>
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<td>51,49</td>
<td>179</td>
</tr>
<tr>
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<td>3x (2X0,75)</td>
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<td>77,24</td>
<td>219</td>
</tr>
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<td>12,2</td>
<td>102,99</td>
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</tr>
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<td>180,64</td>
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</tr>
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<td>63,00</td>
<td>208</td>
</tr>
<tr>
<td>15317009</td>
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<td>11,5</td>
<td>94,50</td>
<td>250</td>
</tr>
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<td>4x (2X1)</td>
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<tr>
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<td>7x (2X1,5)</td>
<td>18,4</td>
<td>313,19</td>
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</tr>
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</table>

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum.

Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).

Photographs are not to scale and do not represent detailed images of the respective products.

**Similar products**
- ÖLFLEX® TRAIN 327 C TW-E 300V refer to page 28

**Accessories**
- SKINTOP® MS-HF-M SC refer to page 48
- SKINTOP® MS-HF-M BRUSH refer to page 49

For current information see: www.lappgroup.com
Benefits
- Reduced insulation wall thickness, thus space-saving installation
- Good chemical resistance
- Resistant to mechanical influences in harsh environmental conditions
- Extended temperature range
- Reduced flame spreading increases the protection against damage to persons and property in the event of a fire

Application range
- For use in railway vehicles and buses, for fixed installations and applications where limited movement may occur
- Suitable for control and monitoring circuits as well as locking circuits and internal wiring of equipment in trains and locomotives
- Also applicable within oily environments and areas with increased ambient temperature

Product features
- Fire behaviour according to EN/IEC:
  - Halogen-free acc. to EN 60754-1
  - No corrosive gases acc. to EN 60754-2
  - No fluorine acc. to EN 60684-2
  - No toxic gases acc. to EN 50305
  - Low smoke density acc. to EN 61034-2
  - Flame-retardant acc. to EN 60332-1-2
  - Flame propagation acc. to EN 61034-2 / EN 60332-3-24 / EN 60332-3-25 / EN 50305
- Fire behaviour according to NF:
  - NF F 16-101: on request / see data sheet

Technical data
- Classification
  ETIM 5.0 Class-ID: EC000104
  ETIM 5.0 Class-Description:
  Control cable
- Core identification code
  White with black numbers
- Conductor stranding
  SRC (special round conductor)
  * for careful bending, once at connecting terminal
  Occasional flexing:
  ≤ 12 mm: 3 x OD / 4 x OD*
  > 12 mm: 5 x OD / 4 x OD*
- Nominal voltage
  Uₜ /Uₜ AC 300/500 V
  Vₑ DC 410 V
  Fixed installation:
  Uₜ /Uₜ AC 0,6/1 kV
  Vₑ DC 0,9 kV
- Test voltage
  3,5 kV AC, 8,4 kV DC
- Protective conductor
  G = with GN-YE protective conductor
  X = without protective conductor
- Temperature range
  Fixed installation:
  -45°C to +125°C (20,000 h)
  Occasional flexing:
  -35°C to +105°C
  Short circuit: +160°C (5s)

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Photographs are not to scale and do not represent detailed images of the respective products.

Similar products
- ÖLFLEX® TRAIN 350 300V refer to page 32

Accessories
- SKINTOP® ST-HF-M refer to page 45
- SKINTOP® MS-HF-M refer to page 47

For current information see: www.lappgroup.com
Screened multi-core cable according to EN 50306-4 3E type MM S for high requirements in railway applications

ÖLFLEX® TRAIN 325 C TW-E 300V

Benefits
- Reduced insulation wall thickness, thus space-saving installation
- Copper screening complies with EMC requirements and protects against electromagnetic interference
- Resistant to mechanical influences in harsh environmental conditions
- Extended temperature range
- Reduced flame spreading increase the protection against damage to persons and property in the event of a fire

Application range
- In EMC-sensitive environments
- For use in railway vehicles and buses, for fixed installations and applications where limited movement may occur
- Suitable for control and monitoring circuits as well as locking circuits and internal wiring of equipment in trains and locomotives
- Also applicable within oily environments and areas with increased ambient temperature

Product features
- Fire behaviour according to EN/IEC:
  - Halogen-free acc. to EN 60754-1
  - No corrosive gases acc. to EN 60754-2
  - No fluorine acc. to EN 60684-2
  - No toxic gases acc. to EN 50305
  - Low smoke density acc. to EN 61034-2
  - Flame-retardant acc. to EN 60332-1-2
  - No flame propagation acc. to EN 60332-3-24 / EN 60332-3-25 / EN 50305

- Fire behaviour according to NF: on request / see data sheet
- Chemical properties:
  - Oil resistant acc. to EN 50306
  - Fuel resistant acc. to EN 50306
  - Acid resistant acc. to EN 50306
  - Alkali resistant acc. to EN 50306
  - Ozone resistant acc. to EN 50306

Norm references / Approvals
- EN 50306-4 class E, type MM S
- EN 45545-2
- NF F 16-101: on request / see data sheet

Product Make-up
- Outer sheath colour: Black
- Tinned-copper strand, 19 or 37 wires, SRC (Special Round Conductor)
- Insulation: Electron beam cross-linked Polymer compound acc. to EN 50306
- Colour of insulation: White with black numbers
- Wrapping: Halogen-free plastic foil (optional)
- Screen: Tinned-copper braiding
- Outer sheath: electron beam cross-linked polymer-comound S2 acc. to EN 50306

Technical data
- Classification
  ETIM 5.0 Class-ID: EC000104
  ETIM 5.0 Class-Description: Control cable
- Core identification code
  White with black numbers
- Conductorstranding
  SRC (special round conductor) 19 or 37 wires acc. to EN 50306-1
- Minimum bending radius
  Fixed installation: 10 x outer diameter
  Occasional flexing: 10 x outer diameter
- Nominal voltage
  \( U_{m} \) / AC 300/500 V
  \( U_{0} \) / AC 550 V
  \( V_{DC} \) 410 V
  Fixed installation: \( U_{0} \) / U AC 0,6/1 kV
  \( U_{0} \) / AC 1,2 kV
  \( V_{DC} \) 0,9 V
- Test voltage
  Core/core: 3,5 kV AC; 8,4 kV DC
  Core/screen: 3,5 kV AC; 8,4 kV DC
- Protective conductor
  G = with GN-YE protective conductor
  X = without protective conductor
- Temperature range
  Fixed installation: -45°C to +125°C (20.000 h)
  Occasional flexing: -35°C to +105°C
  Short circuit: +160°C (5s)

<table>
<thead>
<tr>
<th>Article number</th>
<th>Number of cores and mm² per conductor</th>
<th>Outer diameter (mm)</th>
<th>Copper index (kg/km)</th>
<th>Weight (kg/km)</th>
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Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Packaging size: coil ≤ 250 m, otherwise drum

Photographs are not to scale and do not represent detailed images of the respective products.

Similar products
- ÖLFLEX® TRAIN 355 C 300V refer to page 33

Accessories
- SKINTOP® MS-HF-M SC refer to page 48
- SKINTOP® MS-HF-M BRUSH refer to page 49

For current information see: www.lappgroup.com
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ÖLFLEX® TRAIN 327 C TW-E 300V
Screened multi-core cable according to EN 50306-4 5E type MM S for high requirements in railway applications

Benefits
- Reduced insulation wall thickness, thus space-saving installation
- Copper screening complies with EMC requirements and protects against electromagnetic interference
- Resistant to mechanical influences in harsh environmental conditions
- Extended temperature range
- Reduced flame spreading increase the protection against damage to persons and property in the event of a fire

Application range
- In EMC-sensitive environments
- For use in railway vehicles and buses, for fixed installations and applications where limited movement may occur
- Suitable for control and monitoring circuits as well as locking circuits and internal wiring of equipment in trains and locomotives
- Also applicable within oily environments and areas with increased ambient temperature

Product Make-up
- Tinned-copper strand, 19 or 37 wires, SRC (Special Round Conductor)
- Insulation: Electron beam cross-linked Polymer compound acc. to EN 50306
- Colour of insulation: White with black numbers
- Screen: Tinned-copper braid over each pair
- Jacket over screen: electron beam cross-linked polymer-compound S2 acc. to EN 60332-3-24 / EN 60332-3-25 / EN 60305

Technical data
- Classification: ETIM 5.0 Class-ID: EC000104
- Core identification code: White with black numbers
- Core stranding: SRC (Special Round Conductor)
- Insulation: Electron beam cross-linked Polymer compound acc. to EN 50306
- Colour of insulation: White with black numbers
- Screen: Tinned-copper braid over each pair
- Jacket over screen: electron beam cross-linked polymer-compound S2 acc. to EN 60305
- Outer sheath: electron beam cross-linked polymer-compound S2 acc. to EN 60305
- Outer sheath colour: Black

Norm references / Approvals
- EN 50306-4 class E, type MM S
- EN 45545-2
- NF F 16-101: on request / see data sheet

Product features
- Fire behaviour according to NF: on request / see data sheet
- Chemical properties:
  - Oil resistant acc. to EN 50306
  - Fuel resistant acc. to EN 50306
  - Acid resistant acc. to EN 50306
  - Alkali resistant acc. to EN 50306
  - Ozone resistant acc. to EN 50306

Article number   Number of cores and mm² per conductor  Outer diameter (mm)  Copper index (kg/km)  Weight (kg/km)
15327000 2x (2X0,5)  10.7  38.86  179
15327001 3x (2X0,5)  11.4  58.30  212
15327002 4x (2X0,5)  12.4  77.73  254
15327003 7x (2X0,5)  14.7  136.38  375
15327004 2x (2X0,75)  11.5  51.49  213
15327005 3x (2X0,75)  12.2  77.24  250
15327006 4x (2X0,75)  13.4  102.99  307
15327007 7x (2X0,75)  15.9  180.64  449
15327008 2x (2X1)  11.9  63.00  235
15327009 3x (2X1)  12.6  94.50  282
15327010 4x (2X1)  13.8  126.00  342
15327011 7x (2X1)  16.5  220.93  499
15327012 2x (2X1,5)  13.9  88.75  317
15327013 3x (2X1,5)  14.8  133.56  383
15327014 4x (2X1,5)  16.3  181.00  492
15327015 7x (2X1,5)  19.5  313.19  697

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Photographs are not to scale and do not represent detailed images of the respective products.

Accessories
- SKINTOP® MS-HF-M SC refer to page 48
- SKINTOP® MS-HF-M BRUSH refer to page 49

For current information see: www.lappgroup.com
Power and control cables
Special applications • Rolling stock

ÖLFLEX® ACCESSORIES FLEXIMARK® SILVYN® SKINTOP® EPIC® HITRONIC® ETHERLINE® UNITRONIC®

Info

- Meets EN 50264-3-1 type M and EN 45454-2
- High temperature resistance: -45°C up to 120°C
- Highly oil- and fuel-resistant

Benefits
- Good chemical resistance
- Resistant to mechanical influences in harsh environmental conditions
- Extended temperature range
- Reduced flame spreading increase the protection against damage to persons and property in the event of a fire

Application range
- For use in railway vehicles and buses, for fixed installations and applications where limited movement may occur
- Suitable for connecting lamps, heating equipment, switchgear, terminal boxes and power supply
- Also applicable within oily environments and areas with increased ambient temperature

Product features
- Fire behaviour according to EN/IEC:
  - Toxicity of gases acc. to NF X 70-100
  - Low smoke density acc. to NF X 10-702
  - No flame propagation acc. to NF C 32-070, Cat. C1 and C2
- Chemical properties:
  - Oil resistant acc. to EN 50264-3-1
  - Acid resistant acc. to EN 50264-3-1
  - Alkali resistant acc. to EN 50264-3-1
  - Ozone resistant acc. to EN 50264-3-1

Norm references / Approvals
- EN 50264-3-1 type M
- EN 45545-2 HL1, HL2, HL3
- NF F 16-101 - Classification: C / F0 (flammable propagation / smoke)

Product Make-up
- Tinned-copper strand, fine-wire
- Insulation: Electron beam cross-linked Polymer compound EI 109
- Colour: Black or green-yellow

Technical data
- Classification
  - ETIM 5.0 Class-ID: EC000993
  - ETIM 5.0 Class-Description: Single core cable
- Conductor stranding
  - Fine-wired / Finely stranded according to IEC 60228, conductor class 5
- Minimum bending radius
  - Fixed installation:
    - ≤ 12 mm: 3 x OD
    - > 12 mm: 4 x OD
  - Occasional flexing:
    - ≤ 12 mm: 4 x OD
    - > 12 mm ≤ 20 mm: 5 x OD
    - > 20 mm: 6 x OD (OD = outer diameter)
- Nominal voltage
  - $U_0/U_{AC}$ 0.6/1 kV
  - $U_{m}$ AC 1.2 kV
  - $V_0$ DC 0.9 kV
- Test voltage
  - 3,5 kV AC; 8,4 kV DC
- Temperature range
  - Fixed installation:
    - -45°C to +120°C (20.000 h)
  - Occasional flexing:
    - -35°C to +90°C
    - Short circuit: +200°C (5s)

Article number | Conductor cross-section (mm²) | Outer diameter (mm) | Copper index (kg/km) | Weight (kg/km)
--- | --- | --- | --- | ---
15331000 | 1 | 2.5 | 9.6 | 15
15331001 | 1.5 | 3.0 | 14.4 | 22
15331002 | 2.5 | 3.4 | 24.0 | 33
15331003 | 4 | 4.1 | 38.4 | 49
15331004 | 6 | 4.6 | 57.6 | 70
15331005 | 10 | 5.6 | 96.0 | 112
15331006 | 16 | 6.6 | 153.6 | 174
15331007 | 25 | 8.3 | 240.0 | 273
15331008 | 35 | 9.5 | 336.0 | 374
15331009 | 50 | 11.7 | 480.0 | 531
15331010 | 70 | 13.6 | 672.0 | 739
15331011 | 95 | 15.6 | 912.0 | 988
15331012 | 120 | 17.4 | 1152.0 | 1243
15331013 | 150 | 19.6 | 1440.0 | 1558
15331014 | 185 | 21.7 | 1776.0 | 1927
15331015 | 240 | 25.4 | 2304.0 | 2487
15331016 | 300 | 26.8 | 2880.0 | 3085
15331017 | 1 | 2.5 | 9.6 | 15
15331018 | 1.5 | 3.0 | 14.4 | 22
15331019 | 2.5 | 3.4 | 24.0 | 33
15331020 | 4 | 4.1 | 38.4 | 49
15331021 | 6 | 4.6 | 57.6 | 70
15331022 | 10 | 5.6 | 96.0 | 112
15331023 | 16 | 6.6 | 153.6 | 174
15331024 | 25 | 8.3 | 240.0 | 273
15331025 | 35 | 9.5 | 336.0 | 374
15331026 | 50 | 11.7 | 480.0 | 531
15331027 | 70 | 13.6 | 672.0 | 739
15331028 | 95 | 15.6 | 912.0 | 988
1533101015 | 240 | 25.4 | 2304.0 | 2487
1533101016 | 300 | 26.8 | 2880.0 | 3085

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request. Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

For current information see: www.lappgroup.com
ÖLFLEX® TRAIN 340 600V

Multi-core cable according to EN 50264-3-2 type MM for high requirements in railway applications

### Benefits
- Good chemical resistance
- Resistant to mechanical influences in harsh environmental conditions
- Extended temperature range
- Reduced flame spreading increase the protection against damage to persons and property in the event of a fire

### Application range
- For use in railway vehicles and buses, for fixed installations and applications where limited movement may occur
- Suitable for connecting lamps, heating equipment, switchgear, terminal boxes and power supply
- Also applicable within oily environments and areas with increased ambient temperature

### Product features
- Fire behaviour according to EN/IEC:
  - Halogen-free acc. to EN 60754-1
  - No corrosive gases acc. to EN 60754-2
  - No fluorine acc. to EN 60684-2
  - No toxic gases acc. to EN 50305
  - Low smoke density acc. to NF X 10-702
  - No flammable gases acc. to EN 60684-2
  - No corrosive gases acc. to EN 60754-1
- Fire behaviour according to NF:
  - Toxicity of gases acc. to NF X 70-100
  - Low smoke density acc. to NF X 10-702
  - No flame propagation acc. to NF C 32-070, Cat. C1 and C2
- Chemical properties:
  - Oil resistant acc. to EN 50264-3-2
  - Fuel resistant acc. to EN 50264-3-2
  - Acid resistant acc. to EN 50264-3-2
  - Alkali resistant acc. to EN 50264-3-2
  - Ozone resistant acc. to EN 50264-3-2, EN 50305

### Technical data
- Classification:
  - ETIM 5.0 Class-ID: EC000104
  - ETIM 5.0 Class-Description: Control cable
- Core identification code:
  - Black with white numbers
- Conductor stranding:
  - Fine-wired/ Finely stranded according to IEC 60228, conductor class 5
- Minimum bending radius:
  - Fixed installation: ≤ 12 mm: 3 x OD
  - Occasional flexing: ≤ 12 mm: 4 x OD
  - Occasional flexing: > 12 mm ≤ 20 mm: 5 x OD
  - Occasional flexing: > 20 mm: 6 x OD
  - (OD = outer diameter)
- Nominal voltage:
  - U0 / U AC 0.6/1 kV
  - U0 / DC 1.2 kV
- Test voltage:
  - V AC 0.9 kV
  - V DC 0.9 kV
- Protective conductor:
  - G = with GN-YE protective conductor
  - X = without protective conductor
- Temperature range:
  - Fixed installation: -45°C to +90°C
  - Occasional flexing: -35°C to +90°C
  - Short circuit: +200°C (5s)

### Norm references / Approvals
- EN 50264-3-2 type MM
- EN 45545-2 HL1, HL2, HL3
- NF F 16-101 - Classification: C / F0
- EN 50264-3-2 type MM
- EN 60332-3-24 / EN 60332-3-25
- No flammable gases acc. to EN 50305
- No toxic gases acc. to EN 50305
- No flammable gases acc. to EN 60684-2
- No corrosive gases acc. to EN 60754-1
- Halogen-free acc. to EN 60754-1
- Low smoke density acc. to EN 61034-2
- No flammable gases acc. to EN 60684-2
- No toxic gases acc. to EN 50305
- No flammable gases acc. to EN 60684-2
- No toxic gases acc. to EN 50305
- Halogen-free acc. to EN 60754-1

### Accessories
- SKINTOP® ST-HF-M refer to page 45
- SKINTOP® MS-HF-M refer to page 47

For current information see: www.lappgroup.com
**ÖLFLEX® TRAIN 345 C 600V**

Screened multi-core cable according to EN 50264-3-2 type MM S for high requirements in railway applications

### Benefits
- Copper screening complies with EMC requirements and protects against electromagnetic interference
- Good chemical resistance
- Resistant to mechanical influences in harsh environmental conditions
- Extended temperature range
- Reduced flame spreading increase the protection against damage to persons and property in the event of a fire

### Application range
- For use in railway vehicles and buses, for fixed installations and applications where limited movement may occur
- Suitable for connecting lamps, heating equipment, switchgear, terminal boxes and power supply
- Also applicable within oily environments and areas with increased ambient temperature

### Product features
- Fire behaviour according to NF:
  - Toxicity of gases acc. to NF X 70-100
  - Low smoke density acc. to NF X 10-702
  - No flame propagation acc. to NF C 32-070, Cat. C1 and C2
- Chemical properties:
  - Oil resistant acc. to EN 50264-3-2
  - Fuel resistant acc. to EN 50264-3-2
  - Acid resistant acc. to EN 50264-3-2
  - Alkali resistant acc. to EN 50264-3-2
  - Ozone resistant acc. to EN 50264-3-2 (EN 50305)

### Technical data
- **Classification**
  - ETIM 5.0 Class-ID: EC000104
  - ETIM 5.0 Class-Description: Control cable
- **Core identification code**
  - Black with white numbers
- **Conductor stranding**
  - Fine-wired / Finely stranded according to IEC 60228, conductor class 5
- **Minimum bending radius**
  - Fixed installation:
    - ≤ 12 mm: 3 x OD
    - > 12 mm: 4 x OD
  - Occasional flexing:
    - ≤ 12 mm: 4 x OD
    - > 12 mm ≤ 20 mm: 5 x OD
    - > 20 mm: 6 x OD (OD = outer diameter)

#### Nominal voltage
- $U_{1}/U$ AC 0.6/1 kV
- $U_{2}/U$ DC 0.6/630 V

#### Test voltage
- Core/core: 3,5 kV AC, 8,4 kV DC
- Core/screen: 3,5 kV AC, 8,4 kV DC

#### Protective conductor
- G = with GN-YE protective conductor
- X = without protective conductor

#### Temperature range
- Fixed installation:
  - -45°C to +90°C
  - Occasional flexing: -35°C to +90°C
  - Short circuit: +200°C (5s)

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**Accessories**
- SKINTOP® MS-HF-M SC refer to page 48
- SKINTOP® MS-HF-M BRUSH refer to page 49
ÖLFLEX® TRAIN 350 300V
Multi-core cable according to EN 50264-3-2 type MM for high requirements in railway applications

Benefits
- Good chemical resistance
- Resistant to mechanical influences in harsh environmental conditions
- Extended temperature range
- Reduced flame spreading increase the protection against damage to persons and property in the event of a fire

Application range
- For use in railway vehicles and buses, for fixed installations and applications where limited movement may occur
- Suitable for connecting lamps, heating equipment, switchgear, terminal boxes and power supply
- Also applicable within oily environments and areas with increased ambient temperature

Product features
- Fire behaviour according to EN/IEC: - Halogen-free acc. to EN 60754-1
- No corrosive gases acc. to EN 60754-2
- No toxic gases acc. to EN 50305
- Low smoke density acc. to EN 61034-2

Norm references / Approvals
- EN 50264-3-2 type MM
- EN 45545-2 HL1, HL2, HL3
- NF F 16-101 - Classification: C / F0 (flame propagation / smoke)

Product Make-up
- Tinned-copper strand, fine-wire
- Insulation: Electron beam cross-linked Polymer compound EI 109
- Colour of insulation: Black with white numbers
- Outer sheath: electron beam cross-linked polymer-compound EM 104
- Outer sheath colour: Black

Technical data
- Classification
  ETIM 5.0 Class-ID: EC000104
  ETIM 5.0 Class-Description: Control cable
- Core identification code
  Black with white numbers
- Conductor stranded
  Fine-wired / Finely stranded according to IEC 60228, conductor class 5
- Minimum bending radius
  Fixed installation: ≤ 12 mm: 3 x OD
  > 12 mm: 4 x OD
  Occasional flexing: ≤ 12 mm: 4 x OD
  > 12 mm ≤ 20 mm: 5 x OD
  > 20 mm: 6 x OD
  (OD = outer diameter)
- Nominal voltage
  U / U: 300/500 V
  V, DC 450 V
- Test voltage
  2.0 kV AC; 4.8 kV DC
- Protective conductor
  G = with GN-YE protective conductor
  X = without protective conductor
- Temperature range
  Fixed installation: -45°C to +90°C
  Occasional flexing: -35°C to +90°C
  Short circuit: +200°C (5s)

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum
Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).
Photographs are not to scale and do not represent detailed images of the respective products.

Similar products
- ÖLFLEX® TRAIN 340 600V refer to page 30
- ÖLFLEX® TRAIN 355 C 300V refer to page 33

Accessories
- SKINTOP® ST-HF-M refer to page 45
- SKINTOP® MS-HF-M refer to page 47

For current information see: www.lappgroup.com
ÖLFLEX® TRAIN 355 C 300V

Screened multi-core cable according to EN 50264-3-2 type MM S for high requirements in railway applications

**Benefits**
- Copper screening complies with EMC requirements and protects against electromagnetic interference
- Good chemical resistance
- Resistant to mechanical influences in harsh environmental conditions
- Extended temperature range
- Reduced flame spreading increases the protection against damage to persons and property in the event of a fire

**Application range**
- For use in railway vehicles and buses, for fixed installations and applications where limited movement may occur
- Suitable for connecting lamps, heating equipment, switchgear, terminal boxes and power supply
- Also applicable within oily environments and areas with increased ambient temperature

**Product features**
- Fire behaviour according to EN/IEC:
  - Halogen-free acc. to EN 60754-1
  - No corrosive gases acc. to EN 60754-2
  - No flammable acc. to EN 60332-1-2
  - Low smoke density acc. to EN 61034-2
  - Flame-retardant acc. to EN 60332-1-2
  - No flame propagation acc. to EN 50264-3-2
- Chemical properties:
  - Oil resistant acc. to EN 50264-3-2
  - Fuel resistant acc. to EN 50264-3-2
  - Acid resistant acc. to EN 50264-3-2
  - Alkali resistant acc. to EN 50264-3-2
  - Ozone resistant acc. to EN 50264-3-2
  - Low smoke density acc. to EN 61034-2
- Conductor stranding:
  - Fine-wired / Finely stranded according to IEC 60228, conductor class 5

**Technical data**

**Classification**
ETIM 5.0 Class-ID: EC000104
ETIM 5.0 Class-Description: Control cable

**Core identification code**
Black with white numbers

**Conductor stranding**
Fine-wired / Finely stranded according to IEC 60228, conductor class 5

**Minimum bending radius**
Fixed installation:
- ≤ 12 mm: 3 x OD
- > 12 mm: 4 x OD
Occasional flexing:
- ≤ 12 mm: 4 x OD
- > 12 mm: 5 x OD
- > 20 mm: 6 x OD
(OD = outer diameter)

**Nominal voltage**
U / U: 300/500 V
V: AC 600 V
V: DC 450 V

**Test voltage**
Core/core: 2 kV AC; 4,8 kV DC
Core/screen: 2 kV AC; 4,8 kV DC

**Protective conductor**
G = with GN-YE protective conductor
X = without protective conductor

**Temperature range**
Fixed installation:
-45°C to +90°C
Occasional flexing:
-35°C to +90°C
Short circuit: +200°C (5s)

**Fire behaviour according to NF:**
- Toxicity of gases acc. to NF X 70-100
- Low smoke density acc. to NF X 10-702
- No flame propagation acc. to NF C 32-070, Cat. C1 and C2

**Product Make-up**
- Conductor: Fine-wire strands of tinned copper
- Insulation: Electron beam cross-linked Polymer compound E109
- Colour of insulation: Black with white numbers
- Wrapping: Halogen-free plastic foil
- Screen: Tinned-copper braiding
- Outer sheath: electron beam cross-linked polymer-comound EM 104
- Outer sheath colour: Black

**Technical data**

**Classification**
ETIM 5.0 Class-ID: EC000104
ETIM 5.0 Class-Description: Control cable

**Core identification code**
Black with white numbers

**Conductor stranding**
Fine-wired / Finely stranded according to IEC 60228, conductor class 5

**Minimum bending radius**
Fixed installation:
- ≤ 12 mm: 3 x OD
- > 12 mm: 4 x OD
Occasional flexing:
- ≤ 12 mm: 4 x OD
- > 12 mm: 5 x OD
- > 20 mm: 6 x OD
(OD = outer diameter)

**Nominal voltage**
U / U: 300/500 V
V: AC 600 V
V: DC 450 V

**Test voltage**
Core/core: 2 kV AC; 4,8 kV DC
Core/screen: 2 kV AC; 4,8 kV DC

**Protective conductor**
G = with GN-YE protective conductor
X = without protective conductor

**Temperature range**
Fixed installation:
-45°C to +90°C
Occasional flexing:
-35°C to +90°C
Short circuit: +200°C (5s)

**Fire behaviour according to NF:**
- Toxicity of gases acc. to NF X 70-100
- Low smoke density acc. to NF X 10-702
- No flame propagation acc. to NF C 32-070, Cat. C1 and C2

**Product Make-up**
- Conductor: Fine-wire strands of tinned copper
- Insulation: Electron beam cross-linked Polymer compound E109
- Colour of insulation: Black with white numbers
- Wrapping: Halogen-free plastic foil
- Screen: Tinned-copper braiding
- Outer sheath: electron beam cross-linked polymer-comound EM 104
- Outer sheath colour: Black

**Similar products**
- ÖLFLEX® TRAIN 345 C 600V refer to page 31

**Accessories**
- SKINTOP® MS-HF-M refer to page 48
- SKINTOP® MS-HF-M BRUSH refer to page 49

For current information see: www.lappgroup.com
Power and control cables
Special applications • Rolling stock

ÖLFLEX® TRAIN 361 1,8kV
Single-core cable according to EN 50264-3-1 type M for high requirements in railway applications

Benefits
- Good chemical resistance
- Resistant to mechanical influences in harsh environmental conditions
- Extended temperature range
- Reduced flame spreading increase the protection against damage to persons and property in the event of a fire

Application range
- For use in railway vehicles and buses, for fixed installations and applications where limited movement may occur
- Suitable for connecting lamps, heating equipment, switchgear, terminal boxes and power supply
- Also applicable within oily environments and areas with increased ambient temperature

Product features
- Fire behaviour according to EN/IEC:
  - Halogen-free acc. to EN 60754-1
  - No corrosive gases acc. to EN 60754-2
  - No fluorine acc. to EN 60684-2
  - No toxic gases acc. to EN 50305
  - Low smoke density acc. to EN 60332-2-6
  - Flame-retardant acc. to EN 60332-2-6
- Flame propagation acc. to EN 50332-3-24 / EN 50332-3-25 / EN 50305

Technical data
Classification
ETIM 5.0 Class-ID: EC000993
ETIM 5.0 Class-Description: Single core cable
Conductor stranding
Fine-wired/Finely stranded according to IEC 60228, conductor class 5
Minimum bending radius
Fixed installation:
≤ 12 mm: 3 x OD
> 12 mm: 4 x OD
Occasional flexing:
≤ 12 mm: 4 x OD
> 12 mm ≤ 20 mm: 5 x OD
> 20 mm: 6 x OD
(OD = outer diameter)
Nominal voltage
U 0 /U AC 1.8/3 kV
U m AC 3.6 kV
V 0 DC 2.7 kV
Test voltage
6,5 kV AC; 15 kV DC
Temperature range
Fixed installation:
-45°C to +120°C (20.000 h)
Occasional flexing:
-35°C to +90°C
Short circuit: +200°C (5s)

Article number   Conductor cross-section (mm²)  Outer diameter (mm)  Copper index (kg/km)  Weight (kg/km)
ÖLFLEX® TRAIN 361 1,8kV
15361000  1.5  5.6 14.4 48
15361001  2.5  6.0 24.0 61
15361002  4  6.7 38.4 80
15361003  6  7.2 57.6 105
15361004  10  8.2 96.0 153
15361005  16  9.2 153.6 224
15361006  25  10.5 240.0 323
15361007  35  11.7 336.0 431
15361008  50  13.7 480.0 592
15361009  70  15.4 672.0 801
15361010  95  17.8 912.0 1076
15361011  120 19.4 1152.0 1329
15361012  150 21.4 1440.0 1634
15361013  185 23.3 1776.0 2011
15361014  240 26.8 2304.0 2571
15361015  300 28.0 2880.0 3176

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum
Please specify the preferred
Photographs are not to scale and do not represent detailed images of the respective products.

Similar products
- ÖLFLEX® TRAIN 371 1,8kV refer to page 35

Accessories
- SKINTOP® ST-HF-M refer to page 45
- SKINTOP® MS-HF-M refer to page 47
Single-core cable according to EN 50264-3-1 type MM for high requirements in railway applications

Benefits
- High electrical strength and mechanical durability due to dual-layer cable construction
- Good chemical resistance
- Resistant to mechanical influences in harsh environmental conditions
- Extended temperature range
- Reduced flame spreading increase the protection against damage to persons and property in the event of a fire

Application range
- For use in railway vehicles and buses, for fixed installations and applications where limited movement may occur
- Suitable for wiring of control cabinets, distributors, converters, motors and batteries
- Also applicable within oily environments and areas with increased ambient temperature

Product features
- Fire behaviour according to NF:
  - Toxicity of gases acc. to NF X 70-100
  - Low smoke density acc. to NF X 10-702
  - No flame propagation acc. to NF C 32-070, Cat. C1 and C2
- Chemical properties:
  - Oil resistant acc. to EN 50264-3-1
  - Fuel resistant acc. to EN 50264-3-1
  - Acid resistant acc. to EN 50264-3-1
  - Alkali resistant acc. to EN 50264-3-1
  - Ozone resistant acc. to EN 50264-3-1 / EN 50305

Technical data
- Classification
  ETIM 5.0 Class-ID: EC000057
  ETIM 5.0 Class-Description: Low voltage power cable
- Conductor stranding
  Fine-wired / Finely stranded according to IEC 60228, conductor class 5
- Minimum bending radius
  Fixed installation:
  ≤ 12 mm: 3 x OD
  > 12 mm: 4 x OD
  Occasional flexing:
  ≤ 12 mm: 4 x OD
  > 12 mm ≤ 20 mm: 5 x OD
  > 20 mm: 6 x OD
  (OD = outer diameter)
- Nominal voltage
  \( U_0 / U \) AC 1.8/3 kV
  \( U_m \) AC 3.6 kV
  \( V_0 \) DC 2.7 kV
- Test voltage
  6.5 kV AC; 15 kV DC
- Temperature range
  Fixed installation:
  -45°C to +90°C
  Occasional flexing:
  -35°C to +90°C
  Short circuit: +200°C (5s)

Article number | Conductor cross-section (mm²) | Outer diameter (mm) | Copper index (kg/km) | Weight (kg/km)
--- | --- | --- | --- | ---
15371000 | 1.5 | 5.8 | 14.4 | 57
15371001 | 2.5 | 6.2 | 24.0 | 67
15371002 | 4 | 6.5 | 38.4 | 90
15371003 | 6 | 7.4 | 57.6 | 116
15371004 | 10 | 8.8 | 96.0 | 173
15371005 | 16 | 9.6 | 153.6 | 244
15371006 | 25 | 12.3 | 240.0 | 374
15371007 | 35 | 13.3 | 336.0 | 488
15371008 | 50 | 15.3 | 480.0 | 659
15371009 | 70 | 17.0 | 672.0 | 875
15371010 | 95 | 19.8 | 912.0 | 1180
15371011 | 120 | 21.4 | 1152.0 | 1441
15371012 | 150 | 23.8 | 1440.0 | 1788
15371013 | 185 | 25.7 | 1776.0 | 2166
15371014 | 240 | 29.2 | 2304.0 | 2775
15371015 | 300 | 30.4 | 2880.0 | 3367

 Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum

Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils)

Photographs are not to scale and do not represent detailed images of the respective products.

Similar products
- ÖLFLEX® TRAIN 381 3.6kV refer to page 36

Accessories
- SKINTOP® ST-HF-M refer to page 45
- SKINTOP® MS-HF-M refer to page 47
ÖLFLEX® TRAIN 381 3,6kV

Single-core cable according to EN 50264-3-1 type MM for high requirements in railway applications

Benefits
- High electrical strength and mechanical durability due to dual-layer cable construction
- Good chemical resistance
- Resistant to mechanical influences in harsh environmental conditions
- Extended temperature range
- Reduced flame spreading increase the protection against damage to persons and property in the event of a fire

Application range
- For use in railway vehicles and buses, for fixed installations and applications where limited movement may occur
- Suitable for wiring of control cabinets, distributors, converters, motors and batteries
- Also applicable within oily environments and areas with increased ambient temperature

Product features
- Fire behaviour according to NF:
  - Toxicity of gases acc. to NF X 70-100
  - Low smoke density acc. to NF X 10-702
  - No flame propagation acc. to NF C 32-070, Cat. C1 and C2
- Chemical properties:
  - Oil resistant acc. to EN 50264-3-1
  - Fuel resistant acc. to EN 50264-3-1
  - Acid resistant acc. to EN 50264-3-1
  - Alkali resistant acc. to EN 50264-3-1
  - Ozone resistant acc. to EN 50264-3-1 / EN 50305
- Fire behaviour according to EN/IEC:
  - Halogen-free acc. to EN 60754-1
  - No corrosive gases acc. to EN 60754-2
  - No fluorine acc. to EN 60684-2
  - No toxic gases acc. to EN 50305
  - Low smoke density acc. to EN 61034-2
  - Flame-retardant acc. to EN 60332-1-2
  - No flame propagation acc. to EN 60332-1-2 / EN 50305

Norm references / Approvals
- EN 50264-3-1 type MM
- EN 45545-2 HL1, HL2, HL3
- NF F 16-101 - Classification: C / F1 (flame propagation / smoke)

Product Make-up
- Tinned-copper strand, fine-wire
- Insulation: Electron beam cross-linked Polymer compound EI 109
- Outer sheath: electron beam cross-linked polymer-compound EM 104
- Outer sheath colour: Black

Technical data

<table>
<thead>
<tr>
<th>Classification</th>
<th>ETIM 5.0 Class-ID: EC000057 ETIM 5.0 Class-Description: Low voltage power cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conductor stranding</td>
<td>Fine-wired/ Finely stranded according to IEC 60228, conductor class 5</td>
</tr>
<tr>
<td>Minimum bending radius</td>
<td>Fixed installation: ≤ 12 mm: 3 x OD &gt; 12 mm: 4 x OD Occasional flexing: ≤ 12 mm: 4 x OD &gt; 12 mm ≤ 20 mm: 5 x OD &gt; 20 mm: 6 x OD (OD = outer diameter)</td>
</tr>
<tr>
<td>Nominal voltage</td>
<td>U0/U AC 3,6/6 kV U AC 7,2 kV V DC 5,4 kV</td>
</tr>
<tr>
<td>Test voltage</td>
<td>11 kV AC; 26 kV DC</td>
</tr>
<tr>
<td>Temperature range</td>
<td>Fixed installation: -45°C to +90°C Occasional flexing: -35°C to +90°C Short circuit: +200°C (5s)</td>
</tr>
</tbody>
</table>

### Article number | Conductor cross-section (mm²) | Outer diameter (mm) | Copper index (kg/km) | Weight (kg/km) |
<table>
<thead>
<tr>
<th></th>
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<tr>
<td>15381000</td>
<td>2.5</td>
<td>9.0</td>
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<td>15381002</td>
<td>6</td>
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<td>57.6</td>
<td>176</td>
</tr>
<tr>
<td>15381003</td>
<td>10</td>
<td>11.2</td>
<td>96.0</td>
<td>232</td>
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<tr>
<td>15381004</td>
<td>16</td>
<td>12.2</td>
<td>153.6</td>
<td>303</td>
</tr>
<tr>
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<td>240.0</td>
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<tr>
<td>15381006</td>
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<td>747</td>
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<td>15381008</td>
<td>70</td>
<td>19.4</td>
<td>672.0</td>
<td>972</td>
</tr>
<tr>
<td>15381009</td>
<td>95</td>
<td>21.4</td>
<td>912.0</td>
<td>1250</td>
</tr>
<tr>
<td>15381010</td>
<td>120</td>
<td>23.4</td>
<td>1152.0</td>
<td>1557</td>
</tr>
<tr>
<td>15381011</td>
<td>150</td>
<td>25.4</td>
<td>1440.0</td>
<td>1895</td>
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<td>15381012</td>
<td>185</td>
<td>27.5</td>
<td>1776.0</td>
<td>2281</td>
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<td>15381013</td>
<td>240</td>
<td>31.8</td>
<td>2304.0</td>
<td>2982</td>
</tr>
<tr>
<td>15381014</td>
<td>300</td>
<td>33.0</td>
<td>2880.0</td>
<td>3554</td>
</tr>
</tbody>
</table>

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum

Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).

Photographs are not to scale and do not represent detailed images of the respective products.

### Accessories
- SKINTOP® ST-HF-M refer to page 45
- SKINTOP® MS-HF-M refer to page 47

For current information see: www.lappgroup.com
**Data communication systems**

**Bus systems for special applications** • **Bus systems for TCN**

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**UNITRONIC® TRAIN**

LAPP KABEL STUTTGART UNITRONIC® TRAIN

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**Info**

- Small outer diameters for maximum saving of space and weight
- Extremely low attenuation ≤ 5 MHz

**Benefits**

- Good chemical resistance
- Resistant to mechanical influences in harsh environmental conditions
- Extended temperature range
- Reduced flame spreading increase the protection against damage to persons and property in the event of a fire
- EMC-optimised design

**Application range**

- The communication systems WTB (wire train bus) and MVB (multifunction vehicle bus) make up the so-called TCN (train communication network)
- UNITRONIC® TRAIN bus cables are designed for use in TCN acc. IEC 61375 MVB according IEC 61375-3-1 WTB according IEC 61375-2-1
- For use in railway vehicles and buses, for fixed installations and applications where limited movement may occur
- Also applicable within oily environments and areas with increased ambient temperature

**Product features**

- Fire behaviour according to EN/IEC:
  - Halogen-free acc. to EN 60754-1
  - No corrosive gases acc. to EN 60754-2
  - No fluorine acc. to EN 60684-2
  - No toxic gases acc. to EN 50305
  - Low smoke density acc. to EN 60332-1-2
  - Flame-retardant acc. to EN 60332-3-25
- Fire behaviour according to NF:
  - Toxicity of gases acc. to NF X 70-100
  - Low smoke density acc. to NF X 10-702
  - No flame propagation acc. to NF C 32-070, Cat. C1 and C2
- Chemical properties:
  - Oil resistant acc. to EN 50264-1
  - Fuel resistant acc. to EN 50264-1
  - Acid resistant acc. to EN 50264-1
  - Alkali resistant acc. to EN 50264-1
  - Ozone resistant acc. to EN 50264-3-2

**Norm references / Approvals**

- EN 45545-2 HL1, HL2, HL3
- EN 50264-1

**Product Make-up**

- Stranded tinned 19-wire conductor
- Core insulation: Based on Polyolefin
- Outer sheath: electron beam cross-linked polymer-compound EM 104
- Outer sheath colour: Black

**Technical data**

<table>
<thead>
<tr>
<th>Classification</th>
<th>ETIM 5.0 Class-ID: EC000830</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak operating voltage</td>
<td>(not for power applications) 125 V</td>
</tr>
<tr>
<td>Minimum bending radius</td>
<td>Flexing: 10 x outer diameter Fixed installation: 6 x outer diameter</td>
</tr>
<tr>
<td>Test voltage</td>
<td>Core/core: 1000 V Core/screen: 1000 V</td>
</tr>
<tr>
<td>Characteristic impedance</td>
<td>120 ohm (±10%)</td>
</tr>
<tr>
<td>Temperature range</td>
<td>Fixed installation: -45°C to +90°C Occasional flexing: -35°C up to +90°C</td>
</tr>
</tbody>
</table>

**Article number**

<table>
<thead>
<tr>
<th>Article designation</th>
<th>Number of cores and mm² per conductor</th>
<th>Outer diameter (mm)</th>
<th>Copper index (kg/km)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cables for MVB</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2173000</td>
<td>UNITRONIC® TRAIN MVB 1x2x0,5</td>
<td>1x2x0,5</td>
<td>7.4</td>
</tr>
<tr>
<td>2173001</td>
<td>UNITRONIC® TRAIN MVB 1x2x0,5 + 1x0,5</td>
<td>1x2x0,5 + 1x0,5</td>
<td>7.4</td>
</tr>
<tr>
<td>2173002</td>
<td>UNITRONIC® TRAIN MVB 2x2x0,5</td>
<td>2x2x0,5</td>
<td>8.1</td>
</tr>
<tr>
<td>2173003</td>
<td>UNITRONIC® TRAIN MVB 2x2x0,5 + 4x0,25</td>
<td>2x2x0,5 + 4x0,25</td>
<td>8.1</td>
</tr>
</tbody>
</table>

| **Cables for WTB**   |                                      |                     |                       |
| 2173004             | UNITRONIC® TRAIN WTB 1x2x0,75        | 1x2x0,75            | 8.4                   | 33                    |

Photographs are not to scale and do not represent detailed images of the respective products.

For current information see: www.lappgroup.com

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Data communication systems for ETHERNET technology

Industrial Ethernet • Industrial Ethernet for special applications

ETHERLINE® TRAIN
Ethernet cables according to EN 50264-3-1 Type XM for high requirements in railway applications

Benefits
- Good chemical resistance
- Resistant to mechanical influences in harsh environmental conditions
- Extended temperature range
- Reduced flame spreading increase the protection against damage to persons and property in the event of a fire

Application range
- For use in railway vehicles and buses, for fixed installations and applications where limited movement may occur
- Suitable for connecting to of e.g. camera systems, enter-/ infotainment for passengers, ticketing systems
- Also applicable within oily environments and areas with increased ambient temperature

Product features
- Fire behaviour according to NF:
  - Toxicity of gases acc. to NF X 70-100
  - Low smoke density acc. to NF X 10-702
  - No flame propagation acc. to NF C 32-070, Cat. C1 and C2
- Chemical properties:
  - Oil resistant acc. to EN 50264-1
  - Fuel resistant acc. to EN 50264-1
  - Acid resistant acc. to EN 50264-1
  - Alkali resistant acc. to EN 50264-1
  - Ozone resistant acc. to EN 50264-3-2

Norm references / Approvals
- Electrical requirements acc. to IEC 61156-6
- EN 50264-1
- EN 45545-2 HL1, HL2, HL3

Technical data

<table>
<thead>
<tr>
<th>Classification</th>
<th>ETIM 5.0 Class-ID: EC000830</th>
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</thead>
<tbody>
<tr>
<td>ETIM 5.0 Class-Description: Data cable</td>
<td></td>
</tr>
<tr>
<td>Peak operating voltage</td>
<td>(not for power applications) 125 V</td>
</tr>
<tr>
<td>Minimum bending radius</td>
<td>Flexing: 10 x outer diameter Fixed installation: 8 x outer diameter</td>
</tr>
<tr>
<td>Test voltage</td>
<td>Core/core: 1000 V Core/screen: 1000 V</td>
</tr>
<tr>
<td>Characteristic impedance</td>
<td>nom. 100 Ohm acc. to IEC 61156-6</td>
</tr>
<tr>
<td>Temperature range</td>
<td>Fixed installation: -45°C to +90°C Occasional flexing: -35°C up to +90°C</td>
</tr>
</tbody>
</table>

Product Make-up
- Stranded tinned 7-wire conductor
- Core insulation: Based on Polyolefin
- Cat.5e: SF/UTP - copper braid and foil screening as overall screening
- Cat.6 /Cat.7: S/FTP - copper braid as overall screening and pair screening with aluminium compound foil
- Outer sheath: electron beam cross-linked polymer-compound EM 104
- Outer sheath colour: Black

Article number | Article designation | Number of pairs and AWG per conductor | Max. outer diameter (mm) | Copper index (kg/km)
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2170905</td>
<td>ETHERLINE TRAIN FLEX Cat.5e 1x4x22/7 PE</td>
<td>1x4xAWG22/7</td>
<td>6.5</td>
<td>30.4</td>
</tr>
<tr>
<td>2170910</td>
<td>ETHERLINE TRAIN FLEX Cat.5e 1x4x0.5 PE</td>
<td>1x4x0.5/7</td>
<td>7.6</td>
<td>41</td>
</tr>
<tr>
<td>2170907</td>
<td>ETHERLINE TRAIN FLEX Cat.5e 4x2x24/7 PE</td>
<td>4x2xAWG24/7</td>
<td>7.7</td>
<td>38</td>
</tr>
<tr>
<td>2170908</td>
<td>ETHERLINE TRAIN FLEX Cat.6, 4x2x24/7 PE</td>
<td>4x2xAWG24/7</td>
<td>8.4</td>
<td>38</td>
</tr>
<tr>
<td>2170909</td>
<td>ETHERLINE TRAIN FLEX Cat.7 4x2x24/7 PE</td>
<td>4x2xAWG24/7</td>
<td>8.4</td>
<td>38</td>
</tr>
</tbody>
</table>

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Detailed data sheets are available upon request. Please specify the type/dimensions of the required cable.

Photographs are not to scale and do not represent detailed images of the respective products.
EPIC® Industrial connectors
Rectangular connectors • EPIC® H-BE Inserts

EPIC® H-BE 6 Screw termination
The proven standard inserts for easy assembly

EPIC® H-BE 6 Push-In termination
The proven standard inserts for easy assembly

Suitable housing
- EPIC® ULTRA H-B 6
- EPIC® H-B 6 Housings
- EPIC® QUICK & EASY Mounting system
- Refer to Selection Table A10 to select the required inserts and housings

Benefits
EPIC® H-BE 6 Screw termination
- Standard inserts with screw, crimp cage clamp and Push-In termination
- The EPIC® H-BE series is suitable for applications that require a reliable connection when working with high voltages and currents
- Railway applications - Fire protection on railway vehicles: Test according EN 45545-2. Requirement sets R22 and R23. Hazard level HL1, HL2 and HL4

EPIC® H-BE 6 Push-In termination
- Insertion of cores with end sleeves in Push-In inserts gives mounting safety and time saving without any tools
- Easy dismantling and insertion of wires by pushing the orange button
- Test socket for standard 2mm test tip for easy testing of Push-In inserts
- Railway applications - Fire protection on railway vehicles: Test according EN 45545-2. Requirement sets R22 and R23. Hazard level HL1, HL2 and HL4
- The EPIC® H-BE series is suitable for applications that require a reliable connection when working with high voltages and currents

Technical data

| Classification | ETIM 5.0 Class-ID: EC000438 ETIM 5.0 Class-Description: Contact insert for industrial connectors |
| Rated voltage (V) | IEC: 500 V UL: 600 V CSA: 600 V |
| Rated impulse voltage | 6 kV |
| Degree of soiling | 3 |
| Contact resistance | < 2 mOhm |
| Contacts | Copper alloy, hard silver-plated |

Number of contacts
6 + PE

Termination methods
EPIC® H-BE 6 Screw termination Screw termination: 0.5 - 2.5 mm² EPIC® H-BE 6 Push-In termination Push-In termination: 0.14 - 2.5mm²

Stripping length (mm)
EPIC® H-BE 6 Screw termination 8 EPIC® H-BE 6 Push-In termination 10

Cycle of mechanical operation
100

Certifications

Temperature range
-40°C to +100°C, short-term up to +125°C

Application range
EPIC® H-BE 6 Screw termination
- Mechanical engineering
- Plastics industry
- Light & sound technology
- Railway applications / vehicle construction

EPIC® H-BE 6 Push-In termination
- Mechanical engineering
- Plastics industry
- Light & sound technology
- Railway applications / vehicle construction

Suitable tools
EPIC® H-BE 6 Screw termination
- PEW 8.186 crimping pliers refer to main catalogue
- Kraftform® adjustable torque screwdriver/Kraftform Kompakt® Set refer to main catalogue
- Recommended crimping tool when conductor end-sleeves are used: PEW 8.186

Article number   Article description  Contact type  Wire protection  Number of operating contacts  Pieces / PU
<table>
<thead>
<tr>
<th>H-BE 6 screw termination</th>
</tr>
</thead>
<tbody>
<tr>
<td>10190000 EPIC® H-BE 6 SS  male  yes  1 - 6</td>
</tr>
<tr>
<td>10190100 EPIC® H-BE 6 BS  female  yes  1 - 6</td>
</tr>
<tr>
<td>10191000 EPIC® H-BE 6 BS  female  yes  1 - 6</td>
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</tbody>
</table>

H-BE 6 Push-In termination
<table>
<thead>
<tr>
<th>Article number   Article description  Contact type  Wire protection  Number of operating contacts  Pieces / PU</th>
</tr>
</thead>
<tbody>
<tr>
<td>44423200 EPIC® H-BE 6 SP  male  yes  1 - 6</td>
</tr>
<tr>
<td>44423201 EPIC® H-BE 6 BP  female  yes  1 - 6</td>
</tr>
</tbody>
</table>

Photographs are not to scale and do not represent detailed images of the respective products.
EPIC® Industrial connectors
Rectangular connectors • EPIC® H-BE Inserts

EPIC® H-BE 10 Screw termination
The proven standard inserts for easy assembly

EPIC® H-BE 10 Push-In termination
The proven standard inserts for easy assembly

Suitable housing
- EPIC® ULTRA H-B 10
- EPIC® H-B 10 Housings
- EPIC® QUICK & EASY Mounting system
- Refer to Selection Table A10 to select the required inserts and housings

Benefits
EPIC® H-BE 10 Screw termination
- Standard inserts with screw, crimp cage clamp and Push-In termination
- The EPIC® H-BE series is suitable for applications that require a reliable connection when working with high voltages and currents
- Railway applications
  - Fire protection on railway vehicles: Test according EN 45545-2. Requirement sets R22 and R23. Hazard level HL1, HL2 and HL4

EPIC® H-BE 10 Push-In termination
- Insertion of cores with end sleeves in Push-In inserts gives mounting safety and time saving without any tools
- Easy dismantling and insertion of wires by pushing the orange button
- Test socket for standard 2mm test tip for easy testing of Push-In inserts
- Railway applications
  - Fire protection on railway vehicles: Test according EN 45545-2. Requirement sets R22 and R23. Hazard level HL1, HL2 and HL4
- The EPIC® H-BE series is suitable for applications that require a reliable connection when working with high voltages and currents

Technical data

<table>
<thead>
<tr>
<th>Classification</th>
<th>ETIM 5.0 Class-ID: EC000438</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETIM 5.0 Class-Description: Contact insert for industrial connectors</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rated voltage (V)</th>
<th>IEC: 500 V</th>
<th>UL: 600 V</th>
<th>CSA: 600 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated impulse voltage</td>
<td>6 kV</td>
<td></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Rated current (A)</th>
<th>EPIC® H-BE 10 Screw termination</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEC: 16 A</td>
<td></td>
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<tr>
<td>UL: 16 A</td>
<td></td>
</tr>
<tr>
<td>CSA: 16 A</td>
<td></td>
</tr>
<tr>
<td>EPIC® H-BE 10 Push-In termination</td>
<td></td>
</tr>
<tr>
<td>IEC: 16 A</td>
<td></td>
</tr>
<tr>
<td>UL: 13 A</td>
<td></td>
</tr>
<tr>
<td>CSA: 13 A</td>
<td></td>
</tr>
</tbody>
</table>

| Degree of soiling | 3 |
| Contact resistance | < 2 mΩ |
| Contacts | Copper alloy, hard silver-plated |

Application range
EPIC® H-BE 10 Screw termination
- Mechanical engineering
- Plastics industry
- Light & sound technology
- Railway applications / vehicle construction

EPIC® H-BE 10 Push-In termination
- Mechanical engineering
- Plastics industry
- Light & sound technology
- Railway applications / vehicle construction

Suitable tools
EPIC® H-BE 10 Screw termination
- PEW 8.186 crimping pliers refer to main catalogue
- Kraftform® adjustable torque screwdriver / Kraftform Kompakt® Set refer to main catalogue
- Recommended crimping tool when conductor end-sleeves are used: PEW 8.186

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article description</th>
<th>Contact type</th>
<th>Wire protection</th>
<th>Number of operating contacts</th>
<th>Pieces / PU</th>
</tr>
</thead>
<tbody>
<tr>
<td>H-BE 10 screw termination</td>
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<td></td>
<td></td>
<td></td>
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<tr>
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<td>10</td>
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<tr>
<td>1093000</td>
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<td>female</td>
<td>yes</td>
<td>1 - 10</td>
<td>10</td>
</tr>
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<td>1093100</td>
<td>EPIC® H-BE 10 BS</td>
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<td>1093101</td>
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<td>1 - 10</td>
<td>10</td>
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<tr>
<td>H-BE 10 Push-In termination</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>44423202</td>
<td>EPIC® H-BE 10 SP</td>
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<td>yes</td>
<td>1 - 10</td>
<td>10</td>
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<td>44423203</td>
<td>EPIC® H-BE 10 BP</td>
<td>female</td>
<td>yes</td>
<td>1 - 10</td>
<td>10</td>
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</tbody>
</table>

Photographs are not to scale and do not represent detailed images of the respective products.

For current information see: www.lappgroup.com
EPIC® Industrial connectors

Rectangular connectors • EPIC® H-BE Inserts

EPIC® H-BE 16 Screw termination
The proven standard inserts for easy assembly

EPIC® H-BE 16 Push-In termination
The proven standard inserts for easy assembly

Suitable housing
• EPIC® ULTRA H-B 16
• EPIC® H-B 16 Housings
• EPIC® QUICK & EASY Mounting system
• Refer to Selection Table A10 to select the required inserts and housings

Similar products
EPIC® H-BE 16 Schraubanschluss
• Further products with higher numbering in the internet. (H-BE 32, H-BE 48)

Benefits
EPIC® H-BE 16 Screw termination
• Standard inserts with screw, crimp cage clamp and Push-In termination
• The EPIC® H-BE series is suitable for applications that require a reliable connection when working with high voltages and currents
• Railway applications
  - Fire protection on railway vehicles: Test according EN 45545-2. Requirement sets R22 and R23. Hazard level HL1, HL2 and HL4
EPIC® H-BE 16 Push-In termination
• Insertion of cores with end sleeves in Push-In inserts gives mounting safety and time saving without any tools
• Easy dismantling and insertion of wires by pushing the orange button
• Test socket for standard 2mm test tip for easy testing of Push-In inserts
• Railway applications
  - Fire protection on railway vehicles: Test according EN 45545-2. Requirement sets R22 and R23. Hazard level HL1, HL2 and HL4

The EPIC® H-BE series is suitable for applications that require a reliable connection when working with high voltages and currents

Application range
EPIC® H-BE 16 Screw termination
• Mechanical engineering
• Plastics industry
• Light & sound technology
• Railway applications / vehicle construction
EPIC® H-BE 16 Push-In termination
• Mechanical engineering
• Plastics industry
• Light & sound technology
• Railway applications / vehicle construction

Similar products
EPIC® H-BE 16 Screw termination
• Further products with higher numbering in the internet. (H-BE 32, H-BE 48)

Technical data
Classification
ETIM 5.0 Class-ID: EC000438
ETIM 5.0 Class-Description: Contact insert for industrial connectors
Rated voltage (V)
IEC: 500 V
UL: 600 V
CSA: 600 V
Rated impulse voltage
6 kV
Rated current (A)
EPIC® H-BE 16 Screw termination
IEC: 16 A
UL: 16 A
CSA: 16 A
EPIC® H-BE 16 Push-In termination
IEC: 16 A
UL: 13 A
CSA: 13 A
Degree of soiling
3
Contact resistance
< 2 mOhm
Contacts
Copper alloy, hard silver-plated
Number of contacts
16 + PE
Termination methods
EPIC® H-BE 16 Screw termination
Screw termination: 0.5 - 2.5 mm²
EPIC® H-BE 16 Push-In termination: 0.14 - 2.5mm²
Stripping length (mm)
EPIC® H-BE 16 Screw termination
8
EPIC® H-BE 16 Push-In termination
10
Cycle of mechanical operation
100
Certifications
EPIC® H-BE 16 Screw termination
Certified production control:
VDE-REG. no.: B437
UL-tested:
UL File Number: E75770
EPIC® H-BE 16 Push-In termination
UL-tested:
UL File Number: E75770
Temperature range
-40°C to +100°C
short-term up to +125°C

Suitable tools
EPIC® H-BE 16 Screw termination
• PEW 8.186 crimping pliers refer to main catalogue
• Kraftform® adjustable torque screwdriver/ Kraftform Kompakt® Set refer to main catalogue
• Recommended crimping tool when conductor end-sleeves are used: PEW 8.186

For current information see: www.lappgroup.com
EPIC® H-BE 24 Screw termination
The proven standard inserts for easy assembly

EPIC® H-BE 24 Push-In termination
The proven standard inserts for easy assembly

Suitable housing
- EPIC® ULTRA H-B 24
- EPIC® H-B 24 Housings
- EPIC® QUICK & EASY Mounting system
- Refer to Selection Table A10 to select the required inserts and housings

Similar products
EPIC® H-BE 24 Schraubanschluss
- Further products with higher numbering in the internet. (H-BE 32, H-BE 48)

Benefits
EPIC® H-BE 24 Screw termination
- Railway applications
  - Fire protection on railway vehicles: Test according EN 45545-2. Requirement sets R22 and R23. Hazard level HL1, HL2 and HL4
- Standard inserts with screw, crimp cage clamp and Push-In termination
- The EPIC® H-BE series is suitable for applications that require a reliable connection when working with high voltages and currents

EPIC® H-BE 24 Push-In termination
- Insertion of cores with end sleeves in Push-In inserts gives mounting safety and time saving without any tools
- Easy dismantling and insertion of wires by pushing the orange button
- Test socket for standard 2mm test tip for easy testing of Push-In inserts
- Railway applications
  - Fire protection on railway vehicles: Test according EN 45545-2. Requirement sets R22 and R23. Hazard level HL1, HL2 and HL4
- The EPIC® H-BE series is suitable for applications that require a reliable connection when working with high voltages and currents

Technical data

| Classification       | ETIM 5.0 Class-ID: EC000438
| ETIM 5.0 Class-Description: Contact insert for industrial connectors |
| Rated voltage (V)    | IEC: 500 VUL: 600 VCSA: 600 V |
| Rated impulse voltage| 6 kV |
| Rated current (A)    | EPIC® H-BE 24 Screw termination: IEC: 16 A UL: 16 A CSA: 16 A |
|                      | EPIC® H-BE 24 Push-In termination: IEC: 16 A UL: 13 A CSA: 13 A |
| Degree of soiling    | 3 |
| Contact resistance   | < 2 mOhm |
| Contacts             | Copper alloy, hard silver-plated |
| Number of contacts   | 24 + PE |

Termination methods
EPIC® H-BE 24 Screw termination
- Screw termination: 0.5 - 2.5 mm²
- Push-In termination: 0.14 - 2.5mm²

Stripping length (mm)
- EPIC® H-BE 24 Screw termination: 8
- EPIC® H-BE 24 Push-In termination: 10

Cycle of mechanical operation
- 100

Certifications
EPIC® H-BE 24 Screw termination
- Certified production control: VDE-REG. no.: B437
- UL-tested: UL File Number: E75770

EPIC® H-BE 24 Push-In termination
- UL-tested: UL File Number: E75770

Temperature range
- -40°C to +100°C, short-term up to +125°C

Application range
EPIC® H-BE 24 Screw termination
- Mechanical engineering
- Plastics industry
- Light & sound technology
- Railway applications / vehicle construction

EPIC® H-BE 24 Push-In termination
- Mechanical engineering
- Plastics industry
- Light & sound technology
- Railway applications / vehicle construction

Similar products
EPIC® H-BE 24 Screw termination
- Further products with higher numbering in the internet. (H-BE 32, H-BE 48)

Table: Article number, Article description, Contact type, Wire protection, Number of operating contacts, Pieces / PU

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article description</th>
<th>Contact type</th>
<th>Wire protection</th>
<th>Number of operating contacts</th>
<th>Pieces / PU</th>
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<tbody>
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<td>1 - 24</td>
<td>5</td>
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<tr>
<td>10197000</td>
<td>EPIC® H-BE 24 BS</td>
<td>female</td>
<td>yes</td>
<td>1 - 24</td>
<td>5</td>
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<tr>
<td>10194000</td>
<td>EPIC® H-BE 24 SS</td>
<td>male</td>
<td>yes</td>
<td>1 - 24</td>
<td>5</td>
</tr>
<tr>
<td>10197100</td>
<td>EPIC® H-BE 24 BS</td>
<td>female</td>
<td>yes</td>
<td>1 - 24</td>
<td>5</td>
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</table>

<table>
<thead>
<tr>
<th>H-BE 24 Push-In termination</th>
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</thead>
<tbody>
<tr>
<td>44423206</td>
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<td>44423207</td>
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</tbody>
</table>

Photographs are not to scale and do not represent detailed images of the respective products.

For current information see: www.lappgroup.com
EPIC® Industrial connectors
Rectangular connectors • EPIC® H-BS Inserts

Suitable housing
EPIC® H-BS 6
• EPIC® ULTRA H-B 16
• EPIC® H-B 16 Housings
• EPIC® QUICK & EASY Mounting system
EPIC® H-BS 12
• EPIC® ULTRA H-B 16
• Refer to Selection Table A10 to select the required inserts and housings

Benefits
EPIC® H-BS 6
• High rating for currents up to 35 A
• Screw termination up to a conductor cross section of 6 mm²
• Railway applications
  - Fire protection on railway vehicles: Test according EN 45545-2. Requirement sets R22 and R23. Hazard level HL1, HL2 and HL4
EPIC® H-BS 12
• High rating for currents up to 35 A
• Screw termination up to a conductor cross section of 6 mm²
• Two H-BS 6 inserts with different contact-numbering for one housing.

Technical data
Classification
ETIM 5.0 Class-ID: EC000438
ETIM 5.0 Class-Description: Contact insert for industrial connectors
Rated voltage (V)
IEC: 500 V
UL: 600 V
CSA: 600 V
Conductor - conductor: 690 V
Rated impulse voltage
6 kV
Rated current (A)
IEC: 35 A
UL: 35 A
CSA: 35 A
Degree of soiling
3
Contact resistance
< 2 mOhm
Contacts
Copper alloy, hard silver-plated
Number of contacts
EPIC® H-BS 6
6 + PE
EPIC® H-BS 12
12 + PE
Termination methods
Screw termination: 0.5 - 6 mm²
Stripping length (mm)
8
Cycle of mechanical operation
100
VDE-tested
Certified production control:
VDE-REG. no.: B437
UL-tested:
UL File Number: E75770
Temperature range
-40°C to +100°C, short-term up to +125°C

Application range
EPIC® H-BS 6
• Railway applications / vehicle construction
• Plant engineering
• Mechanical engineering
• Drive systems
EPIC® H-BS 12
• Plant engineering
• Mechanical engineering
• Drive systems

Suitable tools
EPIC® H-BS 6
• PEW 8.186 crimping pliers refer to main catalogue
• Kraftform® adjustable torque screwdriver/Kraftform Kompakt® Set refer to main catalogue
EPIC® H-BS 12
• PEW 8.186 crimping pliers refer to main catalogue

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article description</th>
<th>Contact type</th>
<th>Wire protection</th>
<th>Number of operating contacts</th>
<th>Pieces / PU</th>
</tr>
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<tbody>
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<td>10171000</td>
<td>H-BS 6 BS female</td>
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<td>1 - 6</td>
<td>5</td>
<td></td>
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<td>H-BS 12 screw termination</td>
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<td>10173050</td>
<td>H-BS 6 SS male</td>
<td>yes</td>
<td>7 - 12</td>
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<tr>
<td>10171600</td>
<td>H-BS 6 BS female</td>
<td>yes</td>
<td>7 - 12</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

Photographs are not to scale and do not represent detailed images of the respective products.

For current information see: www.lappgroup.com
EPIC® Industrial connectors

Rectangular connectors • EPIC® H-A Inserts

EPIC® H-A 3
H-A inserts with screw termination up to 2.5 mm² wire cross section

Info
• Small power connector for single- or three-phase current
• Easy to assemble due to straight entry of conductors
• Railway applications

EPIC® H-A 4
H-A inserts with screw termination up to 2.5 mm² wire cross section

Info
• Insert for three-phase current application with neutral conductor
• Easy to assemble due to straight entry of conductors
• Railway applications

Suitable housing
• EPIC® H-A 3 Housings
• Refer to Selection Table A10 to select the required inserts and housings

Benefits
• Railway applications
  - Fire protection on railway vehicles: Test according EN 45545-2. Requirement sets R22 and R23. Hazard level HL1, HL2 and HL4
  - The small H-A 3 / H-A 4 are used whenever there is minimal space.
  - Easy to service screw connection
  - Easy cable connection with strait cable entry in the contacts

Application range
• Railway applications / vehicle construction
• Machine and equipment manufacturing
• Control engineering
• Apparatus construction

Suitable tools
• PEW 8.186 crimping pliers refer to main catalogue
• MULTICRIMP 6 crimping pliers refer to main catalogue
• Kraftform® adjustable torque screwdriver/ Kraftform Kompakt® Set refer to main catalogue

Technical data

<table>
<thead>
<tr>
<th>Classification</th>
<th>ETIM 5.0 Class-ID: EC000438 ETIM 5.0 Class-Description: Contact insert for industrial connectors</th>
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<tbody>
<tr>
<td>Rated voltage (V)</td>
<td>IEC: 400 V, UL: 600 V, CSA: 600 V</td>
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<tr>
<td>Rated impulse voltage</td>
<td>4 kV</td>
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<tr>
<td>Rated current (A)</td>
<td>IEC: 23 A, UL: 10 A, CSA: 10 A</td>
</tr>
<tr>
<td>Degree of soiling</td>
<td>3</td>
</tr>
<tr>
<td>Contact resistance</td>
<td>1.5 - 4 mohm</td>
</tr>
<tr>
<td>Contacts</td>
<td>Copper alloy, hard silver-plated</td>
</tr>
<tr>
<td>Number of contacts</td>
<td>EPIC® H-A 3 3 + PE EPIC® H-A 4 4 + PE</td>
</tr>
<tr>
<td>Termination methods</td>
<td>Screw termination: 0.5 - 2.5 mm² (2.5 mm² with conductor end sleeves depending on the crimping profile)</td>
</tr>
<tr>
<td>Stripping length (mm)</td>
<td>6</td>
</tr>
<tr>
<td>Cycle of mechanical operation</td>
<td>100</td>
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<tr>
<td>VDE-tested</td>
<td>Certified production control: VDE-REG. no.: B437 UL-tested: UL File Number: E75770</td>
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<tr>
<td>Temperature range</td>
<td>-40°C to +100°C, short-term up to +125°C</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Article number</th>
<th>Article description</th>
<th>Contact type</th>
<th>Number of operating contacts</th>
<th>Pieces / PU</th>
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</thead>
<tbody>
<tr>
<td>H-A 3 screw termination</td>
<td>H-A 3 SS 10420000</td>
<td>male</td>
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<td>H-A 3 BS 10421000</td>
<td>female</td>
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<td>10</td>
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<tr>
<td>H-A 4 screw termination</td>
<td>H-A 4 SS 10431000</td>
<td>male</td>
<td>1 - 4</td>
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<td></td>
<td>H-A 4 BS 10432000</td>
<td>female</td>
<td>1 - 4</td>
<td>10</td>
</tr>
</tbody>
</table>

Photographs are not to scale and do not represent detailed images of the respective products.
SKINTOP® metric plastic cable glands - SKINTOP® Halogen-free

Benefits
- Maximum reliability
- Extremely flame-retardant according to UL 94 V0
- Completely halogen-free (including sealing material)
- Self-extinguishing, no dripping
- Permanent vibration protection

Application range
- Underground railways and trains
- When the protection of people and property is a priority.
- Public buildings
- Ventilation systems
- Tunnel construction

Norm references / Approvals
- DIN EN 45545-2: 2013
- Filament testing according to EN 60695-2-1/1 +960°C

Product Make-up
- Metric connection thread acc. to DIN EN 60423
- Basis for technical information DIN IEC 62444

Technical data
- Classification
  ETIM 5.0 Class-ID: EC000441
  ETIM 5.0 Class-Description: Cable screw gland
- Caution
  Refer to Appendix T21 for the installation dimensions and torques
- Colour delivered
  Light grey (RAL 7035)
- Material
  Body: Polyamide UL 94V-0 - halogen-free
  Sealing ring: halogen-free polymer compound
  O-ring: halogen-free polymer compound
- Protection rating
  IP 68 - 5 bar
- Temperature range
  -20°C to +100°C

Table:
<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation / size</th>
<th>Clamping range ØF (mm)</th>
<th>SW wrench size (mm)</th>
<th>Overall length, C (mm)</th>
<th>Thread length, D (mm)</th>
<th>Pieces / PU</th>
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<tr>
<td>53111407</td>
<td>M 12 x 1,5</td>
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<td>15</td>
<td>30.0</td>
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<td>100</td>
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<td>53111417</td>
<td>M 16 x 1,5</td>
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<td>19</td>
<td>34.0</td>
<td>8</td>
<td>100</td>
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<td>53111427</td>
<td>M 20 x 1,5</td>
<td>7-13</td>
<td>25</td>
<td>37.0</td>
<td>9</td>
<td>100</td>
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<tr>
<td>53111437</td>
<td>M 25 x 1,5</td>
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<td>M 32 x 1,5</td>
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<td>71.0</td>
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<td>5</td>
</tr>
</tbody>
</table>

Photographs are not to scale and do not represent detailed images of the respective products.

Accessories
- SKINTOP® GMP-HF-M refer to page 46

For current information see: www.lappgroup.com
SKINTOP® GMP-HF-M

Benefits
- Halogen-free
- Extremely flame-retardant according to UL 94 V0
- Self-extinguishing, no dripping

Application range
- For locking SKINTOP® cable glands in boreholes without thread.
- Airports
- Tunnel construction
- Underground railways
- Public buildings

Product Make-up
- Metric connection thread acc. to DIN EN 60423
- Basis for technical information DIN IEC 62444

Note
- Designed for use with SKINTOP® ST-HF-M

Technical data

<table>
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<th>Article number</th>
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<td>M 20 x 1,5</td>
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Photographs are not to scale and do not represent detailed images of the respective products.

Accessories
- SKINTOP® ST-HF-M refer to page 45

For current information see: www.lappgroup.com
Cable glands

SKINTOP® metric nickel-plated brass cable glands  •  SKINTOP® Halogen-free

Info

- Cable gland for railway applications
- Hazard Level: HL 3

Benefits

- Halogen-free and flame-retardant
- Optimum strain relief
- Wide, variable clamping ranges
- Maximum reliability

Application range

- Underground railways and trains
- In areas where mechanical and chemical stability are critical
- When the protection of people and property is a priority.

Norm references / Approvals

- DIN EN 45545-2
- DIN EN 45545-3: 2013-08
- DIN EN 1363-1: 2012-10
- DIN EN 13501-2: Classification E30

Product Make-up

- Metric connection thread acc. to DIN EN 60423
- Basis for technical information DIN IEC 62444

Note

- Refer to SKINTOP® metric accessories for suitable accessories

Technical data

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<td>Cable screw gland</td>
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Caution

Refer to Appendix T21 for the installation dimensions and torques

Material

- Body: nickel-plated brass
- Cap nut: nickel-plated brass
- Insert: polyamide, halogenfree acc. to UL 94 V 0
- Sealing ring: Special elastomere
- O-ring: Special elastomere

Protection rating

IP 68 - 5 bar

Temperature range

dynamic: -25°C up to + 100°C
Fixed: -40°C to +100°C

Article number | Article designation / size | Clamping range ØF (mm) | SW wrench size mm | Overall length, C (mm) | Thread length, D (mm) | Pieces / PU |
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Photographs are not to scale and do not represent detailed images of the respective products.

Accessories

- SKINDICHT® SM-M refer to main catalogue
- SKINMATIC® MH Set refer to main catalogue

For current information see: www.lappgroup.com
Cable glands

SKINTOP® metric nickel-plated brass cable glands • SKINTOP® Halogen-free

**SKINTOP® MS-HF-M SC**

**Benefits**
- Halogen-free and flame-retardant
- Suitable for cables with and without inner sheath
- Low-resistance screen contact, optimum EMC protection
- Highly conductive, flexible EMC contact for clamping various screen diameters
- Few operation steps, easy to assemble

**Application range**
- Underground railways and trains
- For EMC-compliant earthing of the copper braiding, or for cables with copper shaft sheath
- Industrial machinery and plant engineering
- Measurement and control technology
- Automation technology

**Norm references / Approvals**
- DIN EN 45545-2
- DIN EN 45545-3: 2013-08
- DIN EN 1363-1: 2012-10
- DIN EN 13501-2: Classification E30

**Product Make-up**
- Metric connection thread acc. to DIN EN 60423
- Basis for technical information DIN IEC 62444

**Note**
- SKINDICHT® SM-PE-M counter nut should be used to ensure optimum contact with painted, anodised or powder-coated housings
- Refer to SKINTOP® metric accessories for suitable accessories

**Technical data**

| Classification | ETIM 5.0 Class-ID: EC000441 | ETIM 5.0 Class-Description: Cable screw gland |
| Caution | Refer to Appendix T21 for the installation dimensions and torques |
| Material | Body: nickel plated brass |
Cap nut: nickel plated brass |
Insert: halogen-free polyamide acc. to UL 94 V0 |
Sealing ring: special elastomer |
O-ring: special elastomer |
| Protection rating | IP 68 - 5 bar |
| Temperature range | dynamic -25°C up to + 100°C |
| Static -40°C up to +100°C |

**Article number**

<table>
<thead>
<tr>
<th>Article designation / size</th>
<th>Clamping range ØF (mm)</th>
<th>Minimum Ø above braiding (mm)</th>
<th>SW wrench size mm</th>
<th>Overall length, C (mm)</th>
<th>Thread length, D (mm)</th>
<th>Pieces / PU</th>
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Photographs are not to scale and do not represent detailed images of the respective products.

**Accessories**
- SKINDICHT® SM-PE-M refer to main catalogue
SKINTOP® MS-HF-M BRUSH

**Info**
- Cable gland for railway applications
- Hazard Level: HL 3

**Benefits**
- Halogen-free and flame-retardant
- Optimum, low-resistance 360° screen contact
- Faster than any other comparable system
- Maximum reliability
- Maximum assembly freedom during adjustment

**Application range**
- Underground railways and trains
- Automation systems
- High-power drives
- Frequency converters
- Conveyer and transport systems

**Norm references / Approvals**
- DIN EN 45545-2
- DIN EN 45545-3: 2013-08
- DIN EN 1363-1: 2012-10
- DIN EN 13501-2: Classification E30

**Product Make-up**
- Metric connection thread acc. to DIN EN 60423
- Basis for technical information DIN IEC 62444

**Note**
- SKINDICHT® SM-PE-M counter nut should be used to ensure optimum contact with painted, anodised or powder-coated housings
- Refer to SKINTOP® metric accessories for suitable accessories

**Technical data**

**Classification**
- ETIM 5.0 Class-ID: EC000441
- ETIM 5.0 Class-Description: Cable screw gland

**Caution**
Refer to Appendix T21 for the installation dimensions and torques

**Material**
- Body: nickel-plated brass
- Cap nut: nickel-plated brass
- Insert: polyamide, halogen-free acc. to UL 94 V0
- EMC brush: brass wire
- Sealing ring: special elastomer
- O-ring: special elastomer

**Protection rating**
- IP 68 - 5 bar

**Temperature range**
- Dynamic: -25°C up to + 100°C
- Fixed: -40°C to + 100°C

**Article number**

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation / size</th>
<th>Clamping range ØF (mm)</th>
<th>Minimum Ø above braiding (mm)</th>
<th>SW wrench size mm</th>
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Photographs are not to scale and do not represent detailed images of the respective products.

**Accessories**
- SKINDICHT® SM-PE-M refer to main catalogue

For current information see: www.lappgroup.com
Cable glands

SKINTOP® metric nickel-plated brass cable glands • SKINTOP® Halogen-free

SKINTOP® MS-HF-M GRIP

Benefits
• Halogen-free and flame-retardant
• Reliable bending and anti-kink protection
• High strain relief
• For high mechanical stress

Application range
• Saddle clamp strain relief gland for harsh application conditions.
• Portable equipment
• Machines and systems on building sites
• Crane and conveying machinery
• Plant engineering

Norm references / Approvals
• DIN EN 45545-2
• DIN EN 45545-3: 2013-08
• DIN EN 13501-2: Classification E30
• DIN EN 60423
• DIN IEC 62444

Product Make-up
• Metric connection thread acc. to DIN EN 60423
• Basis for technical information DIN IEC 62444

Note
• Refer to SKINTOP® metric accessories for suitable accessories

Technical data

Classification
ETIM 5.0 Class-ID: EC000441
ETIM 5.0 Class-Description: Cable screw gland

Caution
Refer to the instruction leaflet for the installation dimensions and torques

Material
Body: nickel plated brass
Cap nut: nickel plated brass
Insert: halogen-free polyamide acc. to UL 94 V0
Sealing ring: special elastomer
O-ring: special elastomer

Protection rating
IP 68 - 5 bar

Temperature range
dynamic -25°C up to + 100°C
static -40°C up to +100°C

<table>
<thead>
<tr>
<th>Article number</th>
<th>Article designation / size</th>
<th>Clamping range ØF (mm)</th>
<th>SW wrench size mm</th>
<th>Overall length, C (mm)</th>
<th>Thread length, D (mm)</th>
<th>Pieces / PU</th>
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Photographs are not to scale and do not represent detailed images of the respective products.

For current information see: www.lappgroup.com
Protective cable conduit systems and cable carrier systems
Parallel corrugated protective cable conduit systems • FIPLOCK®

Flexible, corrugated cable conduit system in closed and divisible version

Benefits
- The flexible conduit design enables small bending radii and is ideally suited for space-saving installations where space is limited in dry and damp interiors, as well as for outdoor applications
- Robust against mechanical impacts
- Flexible
- Dimensionally stable

Application range
- For use in railway vehicles and buses, for fixed installations and applications where limited movement may occur
- Railway technology
- Public transport equipment

Product features
- Low smoke density
- Self-extinguishing, no dripping
- Halogen-free
- High resistance to oil, petrol, acids and other chemicals
- Good weather and UV-resistance

Technical data

Classification
ETIM 5.0 Class-ID: EC001 175
ETIM 5.0 Class-Description: Corrugated plastic hose

Certifications
IEC EN 61386-23
EN 45545-2 HL1 / HL2 / HL3

Colour delivered
Grey (RAL 7011), UV-resistant
Black (RAL 9005), UV-resistant

Material
PA 6 MOD V0
Silicone-free
Halogen-free
Fire behaviour according to UL 94V-0

Temperature range
-45°C to +120°C

Photographs are not to scale and do not represent detailed images of the respective products.
FIPLOCK® is a registered trademark of Fränkische Industrial Pipes

Similar products
• FIPLOCK® PA12 refer to page 52

For current information see: www.lappgroup.com

If you have any other queries or need further assistance, feel free to ask!
Protective cable conduit systems and cable carrier systems

Parallel corrugated protective cable conduit systems • FIPLOCK®

FIPLOCK® PA12
Flexible, corrugated cable conduit system in closed and divisible version

Benefits
- The flexible conduit design enables small bending radii and is ideally suited for space-saving installations where space is limited in dry and damp interiors, as well as for outdoor applications
- Robust against mechanical impacts
- Highly flexible and high fatigue life
- Dimensionally stable

Product features
- Low smoke density
- Self-extinguishing, no dripping
- Halogen-free
- High resistance to oil, petrol, acids and other chemicals
- Excellent weather and UV-resistance

Application range
- For use in railway vehicles and buses, for fixed installations and applications where continuous movement may occur
- Railway technology
- Public transport equipment
- For indoor and outdoor use
- Carriage roof, Jumper connections, Couplings

Technical data
- Classification
  ETIM 5.0 Class-ID: EC001 175
  ETIM 5.0 Class-Description: Corrugated plastic hose
- Certifications
  IEC EN 61386-23
  EN 45545-2 HL1 / HL2 / HL3
- Colour delivered
  Black (RAL 9005), UV-resistant
- Material
  PA 12 MOD V0
  Silicone-free
  Halogen-free
  Fire behaviour according to UL 94V-0
- Temperature range
  -45°C to +105°C

Table: FIPLOCK® PA12 - Standard weight version (closed)

<table>
<thead>
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<th>Article number</th>
<th>Nominal size</th>
<th>ID x OD mm</th>
<th>Bending radius (mm)</th>
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<th>PU ring (m)</th>
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Table: FIPLOCK® PA12 - Heavy duty version (closed)

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<th>Suitable for FIPLOCK® ONE M</th>
<th>Colour</th>
<th>PU ring (m)</th>
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Table: FIPLOCK® PA12 - Divisible version

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Photographs are not to scale and do not represent detailed images of the respective products.
FIPLOCK® is a registered trademark of Fränkische Industrial Pipes

For current information see: www.lappgroup.com
Info

New conduit fitting system with innovative locking system

Benefits

- Very high tensile strength due to all around tooth system
- Ensures mounting safety due to integrated coding system
- Excellent IP rating
- Cost-saving due to quick and easy installation

Application range

- Suitable for FIPLOCK® PA6 / PA12
- Demand of increased liquid tightness
- For indoor and outdoor use

Product features

- All around locking mechanism due to 360° tooth system
- Locking mechanism with integrated coding system
- Extended sealing range across multiple corrugated conduit waves

Note

- Fitting is not suitable for use with divisible version of FIPLOCK® conduit

Technical data

Classification
- ETIM 5.0 Class-ID: EC001176
- ETIM 5.0 Class-Description: Screw connection for corrugated plastic hose

Certifications
- IEC EN 61386-23
- On request PG or NPT connection thread With 90° elbow

Colour delivered
- Grey (RAL 7005)
- Black (RAL 9005), UV-resistant

Material
- PA 6
  Halogen-free
  Fire behaviour according to UL 94V-0

Protection rating
- IP66/IP67/IP68/IP69

Temperature range
- -45°C to +120°C

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FIPLOCK® is a registered trademark of Fränkische Industrial Pipes

For current information see: www.lappgroup.com
Protective cable conduit systems and cable carrier systems

Liquid-tight conduits • Liquid-tight conduits

SILVYN® HFX-V0 / SILVYN® FCE-V0
Interlocked metal conduit with thick-walled Polyurethane jacket

Benefits
• The flexible conduit design enables small bending radii and is ideally suited for space-saving installations where space is limited in dry and damp interiors, as well as for outdoor applications
• High resistance to oil, petrol, acids and greases
• Liquidtight

Application range
• For use in railway vehicles and buses, for fixed installations and applications where limited movement may occur
• Also applicable within oily environments and areas with increased ambient temperature

Product features
• UV-resistant
• Halogen-free and flame-retardant
• High mechanical and chemical resistance

Product Make-up
• Helically-wound metal protective conduit with interlocked profile
• PUR outer sheath

Technical data
Classification
ETIM 5.0 Class-ID: EC001 179
ETIM 5.0 Class-Description: Protective metallic hose

Certifications
IEC EN 61386-23
EN 45545-2 HL1 / HL2

Colour delivered
Black (RAL 9005), UV-resistant

Material
Metal with PUR sheath
Fire behaviour according to UL 94V-0

Temperature range
-50 °C to +105 °C
Short-term up to +125 °C

Article number   Nominal size  ID x OD mm  Bending radius (mm) Suitable for SILVYN® COMPACT M Suitable for SILVYN® FCE-M  PU ring (m)
SILVYN® HFX-V0
44400248  5/16”  10.1 x 14.4  65  16 x 1.5/20 x 1.5  30
44400241 3/8”  12.6 x 17.8  85  16 x 1.5/20 x 1.5  30
44400253  1/2”  16.0 x 21.1  110  20 x 1.5  30
44400242  3/4”  21.0 x 26.4  140  25 x 1.5  30
44400243  1”  26.5 x 33.1  170  32 x 1.5  30
44400244  1 1/4”  35.1 x 41.8  215  40 x 1.5  15
44400245  1 1/2”  40.3 x 47.8  250  50 x 1.5  15
44400246  2”  51.6 x 59.9  300  63 x 1.5  15

SILVYN® FCE-V0
61814708  12  10.0 x 14.0  50  12 x 1.5  25
61814709  16  13.0 x 17.0  60  16 x 1.5/20 x 1.5  25
61814710  20  17.0 x 21.5  80  20 x 1.5  25
61814711  25  21.2 x 26.0  100  25 x 1.5  25
61814712  32  28.1 x 34.0  125  32 x 1.5  25
61814713  40  37.7 x 44.5  160  40 x 1.5  10
61814714  50  48.4 x 55.5  190  50 x 1.5  10

* Trade product, no Lapp product
Photographs are not to scale and do not represent detailed images of the respective products.

Accessories
SILVYN® HFX-V0
• SILVYN® COMPACT M refer to page 56

SILVYN® FCE-V0
• SILVYN® COMPACT M refer to page 56

For current information see: www.lappgroup.com
Protective cable conduit systems and cable carrier systems

Liquid-tight conduits • Liquid-tight conduits

SILVYN® ZHLS / SILVYN® FCE-LFH
Interlocked metal conduit with thick-walled Polyolefin jacket

Benefits
• The flexible conduit design enables small bending radii and is ideally suited for space-saving installations where space is limited in dry and damp interiors, as well as for outdoor applications
• Liquidtight

Application range
• For use in railway vehicles and buses, for fixed installations and applications where limited movement may occur

Product features
• UV-resistant
• Halogen-free and flame-retardant
• High mechanical and chemical resistance

Product Make-up
• Helically-wound metal protective conduit with interlocked profile
• Outer sheath: halogen-free, thermoplastic polyolefin compound

Technical data

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<td>Material</td>
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<td>Temperature range</td>
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* Trade product, no Lapp product
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Accessories

SILVYN® ZHLS
• SILVYN® COMPACT M refer to page 56

SILVYN® FCE-LFH
• SILVYN® COMPACT M refer to page 56

For current information see: www.lappgroup.com
SILVYN® COMPACT M
Nickel-plated brass fitting with space-saving dimensions in various designs

Benefits
- Space-saving application
- For high mechanical stress
- High tensile strength
- Corrosion-resistant

Application range
- In combination with protective conduit:
- Suitable for SILVYN® HFX-V0 / ZHLS

Product Make-up
- Metric connection thread
- Hexagonal collar
- Threaded sleeve
- Cap nut

Technical data
- Classification
  ETIM 5.0 Class-ID: EC001180
  ETIM 5.0 Class-Description: Screw connection for protective metallic hose
- On request
  Available in stainless steel
  PG or NPT connection thread
- Material
  Body: nickel-plated brass
  Sealing: polyamide
  O-ring: NBR
- Protection rating
  IP 66
  IP 67
  NEMA 4X
- Temperature range
  -45°C to +105°C

Table:

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Photographs are not to scale and do not represent detailed images of the respective products.

Accessories
- SKINDICHT® SM-M refer to main catalogue
Protective cable conduit systems and cable carrier systems

SILVYN® FCE-M

Nickel-plated brass fitting with space-saving dimensions in various designs

Benefits
• High mechanical stability
• High tensile strength
• Space-saving application
• Corrosion-resistant

Product Make-up
• Metric connection thread
• Hexagonal collar
• Threaded sleeve
• Cap nut

Technical data

<table>
<thead>
<tr>
<th>Classification</th>
<th>ETIM 5.0 Class-ID: EC001180</th>
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<td>SILVYN® FCE-F, FCE-S</td>
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<td>Nickel-plated brass</td>
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<table>
<thead>
<tr>
<th>Temperature range</th>
<th>SILVYN® FCE COMPACT: -45°C to +105°C</th>
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<tr>
<td>SILVYN® FCE-F, FCE-S: -55°C to +260°C</td>
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Table: Article number, Metric size, Clear opening (mm), Suitable for SILVYN®, Pieces / PU

Photographs are not to scale and do not represent detailed images of the respective products.

For current information see: www.lappgroup.com
Protective cable conduit systems and cable carrier systems

SILVYN® HIPROJACKET / SILVYN® HIPROSILTAPE

Fireproof cable protection conduit to protect the inner from flames and liquid metal with a temperature up to +1640 °C

Benefits
- Heat-resistant
- Flexible
- Temporarily reduces the temperature in the conduit by up to 30 %
- The protection rating increases to IP67 if SILVYN® HIPROSILTAPE is also used

Application range
- Railway applications / vehicle construction
- Used in areas where cables and wires are exposed to extreme heat

Product Make-up
SILVYN® HIPROJACKET
- Woven glass fibre conduit
- Iron oxide silicone coat

SILVYN® HIPROSILTAPE
- Silicone-rubber compound, self-vulcanising, halogen-free

Technical data

<table>
<thead>
<tr>
<th>Classification</th>
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Certifications

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<td>NF EN ISO 11925-2</td>
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<td>DIN 5510-2 S4/SR2/ST2</td>
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<td>SAE AS 1072 Type 2</td>
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On request
SILVYN® HIPROJACKET
Other sizes, lengths and colours are available upon request

Colour delivered
Red

Material
SILVYN® HIPROJACKET
Glass fibre with iron oxide silicone coat LOI 39,2
SILVYN® HIPROSILTAPE
Silicone-rubber compound, self-vulcanising, halogen-free

Protection rating
SILVYN® HIPROJACKET
IP 54 in combination with SILVYN® HIPROJACKET AMG fitting
IP 67 if SILVYN® HIPROSILTAPE is also used

Temperature range
SILVYN® HIPROJACKET
-55°C to +260 °C permanent temp.
+800°C for approx. 20 min (flame treatment)
+800°C for approx. 20 min (radiation heat)
+1640°C for approx. 15-30 sec (liquid-metal contact)

SILVYN® HIPROSILTAPE
-55°C to +260 °C permanent temp.

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<td>10</td>
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* Trade product, no Lapp product
Photographs are not to scale and do not represent detailed images of the respective products.
Protective cable conduit systems and cable carrier systems
Liquid-tight conduits • SILVYN® HIPROJACKET

Benefits
- High tensile strength
- For high mechanical stress
- 45° and 90° elbow enables optimal assembly

Application range
- In combination with protective conduit: SILVYN® HIPROJACKET

Product Make-up
- Connection thread metric/PG
- Hexagonal collar, straight/45° elbow/90° elbow
- Threaded sleeve
- Cap nut

Note
- It is possible to extend the temperature range by removing the plastic components

Technical data

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</table>

Photographs are not to scale and do not represent detailed images of the respective products.

For current information see: www.lappgroup.com
Marking systems

FLEXIMARK® Cable Marking • Customized System Cable Marking

FLEXIMARK® Stainless steel marking FCC

Benefits
• Markers are sorted prior to delivery
• No time-consuming preparation and installation
• Acid-resistant
• Diverse criteria as ageing resistance and chemical resistance are tested by the independent SP Technical Research Institute of Sweden according to SP 2171 Test Method (see selection table A15)
• Customised stainless steel cable and component marking

Application range
• Markers will be delivered with the desired text (printing service is included in the price)
• Markers could be used in any industry with a demanding environment (e.g. oil & gas, railways)
• Cable and component marking system

Product features
• Included cable ties in article no.83251406, 83251456, 83251426, 83251468:
Stainless steel cable ties LS 4.6-200 (article no.61812950)
• For fastening with cable ties (LS) up to a width of 7.9 mm

Norm references / Approvals
• Achilles JQS certified

Note
• Length of the markers is depending on the number of characters
• All characters are printed in capital letters
• The column “number of characters” refers to the quantity in one line (the maximum amount of characters for a two-line embossing is 30-max.15 per line)
• Ordering process: Customised data will be emailed as an Excel file to the responsible Lapp employee when the order is made-
Column A: Text for the first row- Column B: Text for the second row- Column B or C: Amount of each text

Included
• 1 PU= 1 marker, there is no minimum purchase quantity

Suitable tools
• STEEL GUN HT-338 cable tie pliers

Technical data

<table>
<thead>
<tr>
<th>Classification</th>
<th>ETIM 5.0 Class-ID: EC001288</th>
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<td>ETIM 5.0 Class-Description: Labelling material</td>
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<tr>
<td>Dimensions</td>
<td>Character size (height): 4.5 mm Diameter borehole: 3.2 mm</td>
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<td>On request</td>
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<tr>
<td>Note</td>
<td>Gap between characters: approximately 1 mm</td>
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<tr>
<td>Info</td>
<td>Available characters:A-Ö, 0-9, +/:-;=-.X Earthing sign</td>
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<tr>
<td>Material</td>
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Article number   Article designation  Height (mm)  Product Make-up  Number of characters  Number of markers per PU
83251406  FLEXIMARK® stainless steel SM C FCC LS200 0-15 9.9  with cable tie 0-15 1
83251456  FLEXIMARK® stainless steel SM C FCC LS 16-25 9.9  with cable tie 16-25 1
83251402  FLEXIMARK® stainless steel SM FCC 0-15 9.9  without cable tie 0-15 1
83251454  FLEXIMARK® stainless steel SMG FCC 16-25 9.9  without cable tie 16-25 1
83251450  FLEXIMARK® stainless steel SM FCC 16-25 9.9  with screw hole 0-15 1
83251478  FLEXIMARK® stainless steel SM FCC 16-25 9.9  with screw hole 16-25 1
83251426  FLEXIMARK® stainless steel SM2R FCC LS 0-15 13.9  with cable tie 0-15 1
83251468  FLEXIMARK® stainless steel SM2R FCC LS 16-25 13.9  with cable tie 16-25 1
83251422  FLEXIMARK® stainless steel SM2R FCC 0-15 13.9  without cable tie 0-15 1
83251466  FLEXIMARK® stainless steel SM2R FCC 16-25 13.9  without cable tie 16-25 1
83251451  FLEXIMARK® stainless steel SM2R FCC 0-15 13.9  with screw hole 0-15 1
83251479  FLEXIMARK® stainless steel SM2R FCC 16-25 13.9  with screw hole 16-25 1

Photographs are not to scale and do not represent detailed images of the respective products.
Blank markers could be found on the product page “SP Metalprint” (article no. 83251575 und 83251576).

Similar products
• FLEXIMARK® Stainless steel kit refer to main catalogue
• SP Metal print refer to main catalogue

Accessories
• STEEL GUN HT-338 cable tie pliers refer to main catalogue
• LS steel cable ties refer to main catalogue
**Benefits**
- UV-resistant, resistant against fluids (SAE-AMS-DTL-23053 tested)
- Reduced working time
- Already cut to the exact length
- Covers a wide range of cable diameters, even applicable for single core marking

**Application range**
- Railway applications
- Printing with FLEXIMARK® Software (Download: http://www.lappkabel.com/service/downloadcenter/markingsystem/markingsoftware.html)
- Can be printed with the FLEXIMARK® thermal transfer printer as CAB A4+M and EOS4

**Product features**
- Recommended ribbon: FLEXIMARK® FTI-Y 60-360 BK (article no. 83260201)

**Norm references / Approvals**
- UL 224 approved- E file number: E 228117

**Product Make-up**
- Delivered as a roll of labels

**Technical data**

| Classification | ETIM 5.0 Class-ID: EC001288  
ETIM 5.0 Class-Description:  
Labeling material |
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</thead>
<tbody>
<tr>
<td>On request</td>
<td>Also available as halogen-free and diesel-resistant (with SNCF-NF F00-608 approval) version</td>
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</table>
| RAL            | YellowWhite and other colours available on request  
Also available in white |
| Material       | Polyolefin  
Shrinking ratio: 3:1 |

**Article number**

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<th>Colour</th>
<th>Shrinkage range (mm)</th>
<th>Length (mm)</th>
<th>Number of markers per PU</th>
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Photographs are not to scale and do not represent detailed images of the respective products.
FLEXIMARK® products are sold in packaging units. As example if you like to order 640 labels of LCK 32 you just need to order 1 PU instead of 640 single labels.

**Similar products**
- FLEXIMARK® Organized shrink tube FCC refer to main catalogue

**Accessories**
- HG 2320 hot-air pistol refer to main catalogue
# Tools and cable accessories

## Connection and crimping • Tube cable lugs

### Tube cable lugs KRFN

#### Benefits
- Can be installed via cable glands, allowing pre-assembly
- High-quality electrolytic copper ensures a good crimping quality
- With inspection hole

#### Application range
- Narrow tube cable lugs for stranded and flexible CU-conductors 50-240 mm², suitable for class 2 and class 5
- Adapted for narrow spaces

#### Norm references / Approvals
- In combination with recommended crimp tool fulfill requirements of SS-EN 61238-1, BS 4579:1, VDE 0220:1, EN-IEC 61238:1

#### Suitable tools
- V 1311-A pressing pliers, hydraulic

### Technical data

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### Article number | Article designation | Screw hole Ø (mm) | UL certification | Length (mm) | Pressing dies | d mm | W mm | Pieces / PU |
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Photographs are not to scale and do not represent detailed images of the respective products.

#### Similar products
- Tube cable lugs KR/ KRT/ KRF refer to main catalogue
- Solderless cable lugs KB refer to main catalogue

#### Accessories
- T 2288 pressing pliers refer to main catalogue
- V 1311-A pressing pliers, hydraulic refer to main catalogue
- DKB 0325 + DKB 0360 crimping pliers refer to main catalogue
- PVL 1300 pressing pliers battery-operated refer to main catalogue
### Benefits
- The special design of the cable ties guarantees maximum resistance and safety even in the most extreme applications.
- Steel nose ensures secure and durable binding
- Lock is also resistant to shocks and vibrations
- Fire behaviour according to UL 94V-0

### Product features
- The steel blade is fixed to the tie head and is made from corrosion-resistant, anti-magnetic steel (type 316)

### Norm references / Approvals
- DIN EN 45545-2
- NFF 16-101: I3F1

### Application range
- Underground railways and trains
- In areas where mechanical and chemical stability are critical
- When the protection of people and property is a priority.
- Public utilities

### Technical data

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<tr>
<th>Classification</th>
<th>Colour delivered</th>
<th>Material</th>
<th>Temperature range</th>
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<td>Polyamide 6.6 Halogen-free and silicone-free</td>
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### Product features

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<th>Bundling Ø (mm)</th>
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Photographs are not to scale and do not represent detailed images of the respective products.
The conformity of our products to the relevant European directives and compliance with the provisions contained therein shall be indicated by the CE marking.

Safety

Without exception, our products are tested for application safety in accordance with defined standards and our own regulations, which complement the standards. Relevant legal requirements and safety regulations are also observed. Provided due care and attention is paid, the possibility of product-specific danger to the user may thus reasonably be excluded. Where products are used carelessly or incorrectly, however, considerable danger to persons and the environment may arise. For this reason, our cables must only be processed and/or used responsibly by trained electricians or specialists. This catalogue contains general information for the application of each product. Independent of such information, the application standards DIN VDE 0100; 0298 and DIN VDE 0891 for cables will apply. Excerpts from these standards, as well as complementary selection and application tables, design and installation guidelines, are contained in the tables in the appendix to this catalogue. Our machines and installation tools are – where necessary – designed in accordance with the machine guidelines and display the CE identification mark. It must be noted, however, that our machines and installation tools must only be used by trained specialist personnel and for the purpose for which they were designed.

Processing is only to be done by an authorised electrician! Otherwise, there is the risk of an electric shock or a fire ignited by electric current!

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