



**Power to the Train – Traction all over!
Reliable High Voltage Systems for Rolling Stock**

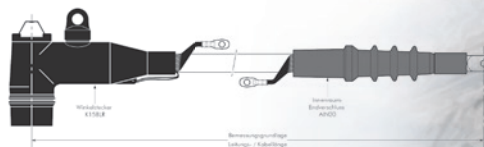
Power to the Train - Traction all over!

Electric locomotives and motor-coach trains require a reliable supply and distribution of power. Once the power is transferred from the overhead wire – usually on an AC voltage level of 15 or 25 kV – through the pantograph into the vehicle, distributed to the train sections or supplied to a 6 kV-transformer.

In order to minimise the danger when dealing with these high voltages, high-quality materials are essential at every step of the way. Not only that, but special safety requirements must be taken into account as early as the design and planning stage for a high-voltage system. As well as the functional requirements, the necessary air insulation clearances, possible vibrations and deviations, installation options and many more things have to be considered.

The Nexans Rolling Stock division supports its customers in this with tried-and-tested, pre-assembled cable loop. We supply connectors with inner and outer cone suitable for a wide range of device connecting elements in line with EN 50180 and EN 50181, flexible or self-supporting terminations, additional currency transformers or jumper solutions. An almost innumerable array of locomotives, electric motor-coach trains are already rolling with our solutions.

Our references include the TGV (Alstom), the series locomotives BR 189 (Siemens), E109 (Skoda) and the 434 family commonly used on suburban light railways and the coaches series Regina (Bombardier) for the Scandinavian market.



Reap the Benefits of our Flexibility and Experience

With us, you get everything from one source, from the customer-orientated design of a complete high-voltage distribution system through single cable loops right up to technical documentation and test certificates.

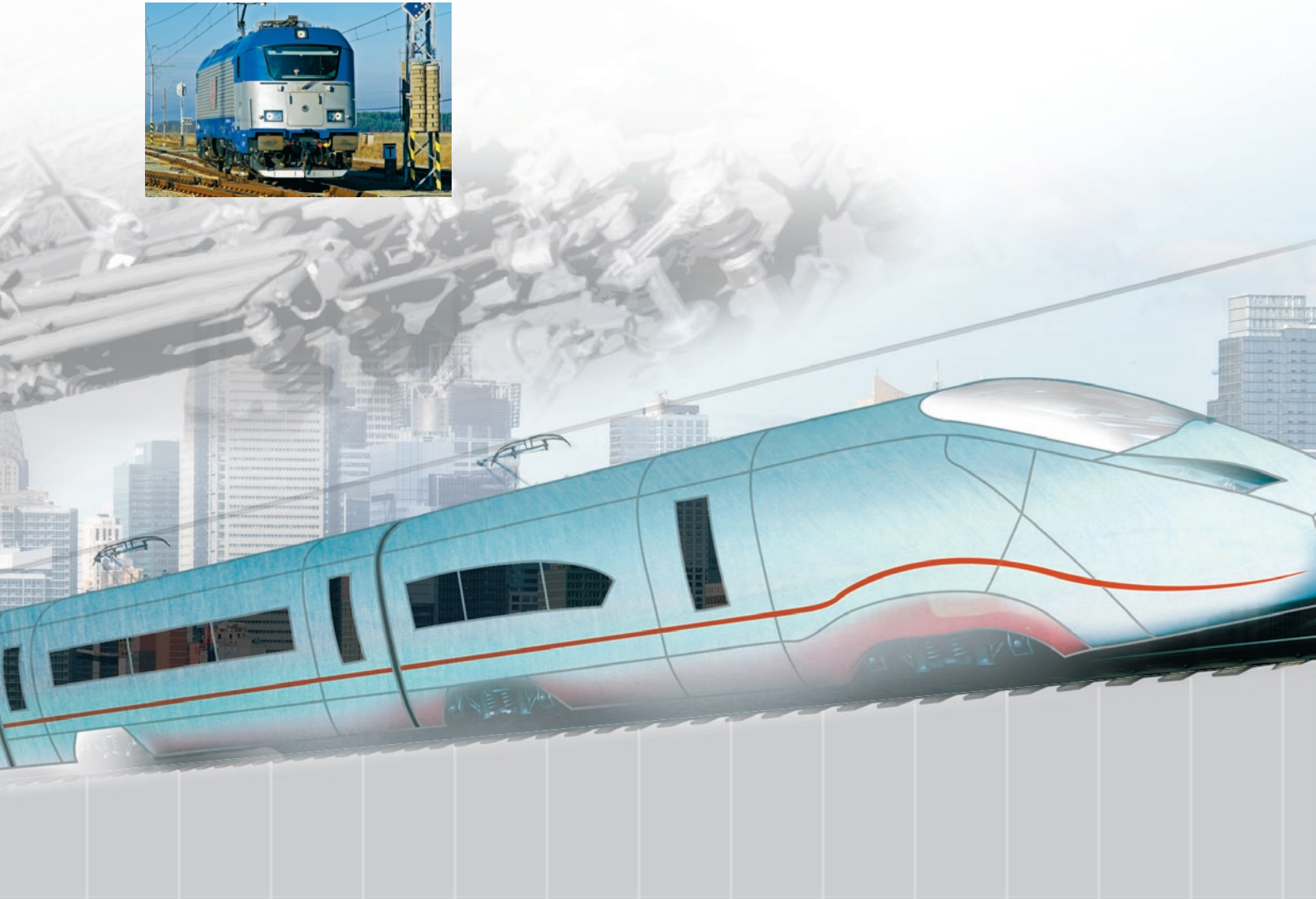
Our services include:

- Designing complete high-voltage distribution systems in accordance with customer specifications
- Complete assembly of individual cable loops as per customer requirements
- Measuring cable loops on site

- Compiling technical documentation
- High-voltage and partial discharge testing of cable loops (routine testing)
- Training

Nexans preassembles cables and lines - on site or at the factory - over many years.

Not only that, but as one of the world's largest cable manufacturers, we are also leaders in the development and production of accessories for the medium and high voltage level. This means that we can choose between various trailing cables from the FLAMEX product family to meet your individual requirements and complement these with the proven accessories of the



The Route is our Goal

When power needs to flow from the pantograph to the transformer or from carriage to carriage, a cable is always involved. New avenues have been opened up in this respect in recent years – instead of the relatively rigid VPE insulation, flexible rubber-insulated cables with fine stranded copper conductors have become established. There are many arguments in favour of the new cable generation of high-voltage distribution:

- Smaller outer diameter
- Smaller bending radii
- Easier, more flexible handling
- New options with regard to laying

These rubber-insulated cables also fulfil all safety requirements in case of fire: they are flame-retardant, halogen-free and, – in case of fire –, produce neither smoke nor toxic gases. Nexans operates three international competence centres for material and product development, which also include fire laboratories.

RHEYHALON (N)TMCGCXHOE 26/45 kV

Flexible, screened highvoltage cable from 50 - 240 mm²
Oil-, diesel-, ozone- and UV-resistant cable in line with EN 50 264 -1

FLAMEX Panto 26/45 kV

Flexible, screened highvoltage cable, 95 mm²
Oil-, diesel-, ozone- and UV-resistant cable in line with EN 50264 and NFF 16101 (approval by SNCF)

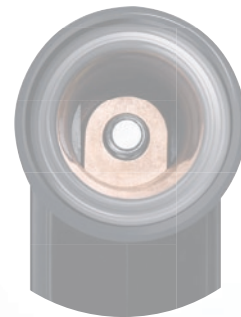
FLAMEX JumPa 26/45 kV

Flexible, screened highvoltage cable, 95 mm²
Oil-, diesel-, ozone- and UV-resistant cable
Specially designed and tested for flexible solutions in the car-

riage transition area (jumper), where there can be severe vibrations, temperature fluctuations and sharp deflections.

Naturally, the design of the cables is aligned to all common connector and terminal types. At Nexans, development is conducted hand in hand with our customers.

Whatever you want to connect, Nexans has the right solution.



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Our Customers are spoilt for Choice Connector or Termination

A cable alone does not make a cable loop – in fact, the connection components are essential. The selection of accessories is aligned to the associated connection types. The quality of the connectors and terminations offered by Nexans has already been proven in millions of applications. Even so, we test all fittings as early as the production phase. As if that is not enough, our specialists test everything for functionality again after assembly.

Terminations

The silicon slip-on terminations are among the standard products offered by Nexans

AIN – Indoor terminations

AFN – Outdoor terminations

We have expanded the selection of terminations especially for use in the rail industry to include the new termination with support function. This allows also freestanding assembly on the vehicle roof.

STAB – Self-supporting terminations

Connectors

Here, too, Nexans can boast proven products. In accordance with the required cone system and the space available, there is range of connectors to choose from, such as from the

400 TB series

All connectors are made out of EPDM material, they are earthed by an outer conducting layer. This means that partial electrical discharges between the connector surface and the air are prevented. EPDM (ethylene-propylene-diene monomer rubber) contains no volatile substances which settle on the surface and wear away the

grounding over a long period of time. Connectors can still be removed after decades, as the lubricant used during connector assembly cannot diffuse into the material. Instead, it remains in the space between the connector and feed-through.

Jumper/Carriage transition solution

The jumpers on the cable loops require special treatment. These freely suspended connections between two carriages must be flexible at all times, as they are subject to strong vibrations, high temperature fluctuations and deviations within a small space. In some cases, it must also be possible to break the connection quickly. Nexans can provide tried-and-tested solutions for these cases as well.



the right solutions!



Global expert in cables and cabling systems

With energy as the basis of its development, Nexans, the worldwide leader in the cable industry, offers an extensive range of cables and cabling systems. The Group is a global player in the infrastructure, industry, building and Local Area Network markets. Nexans addresses a series of market segments: from energy, transport and telecom networks to shipbuilding, oil and gas, nuclear power, automotives, electronics, aeronautics, material handling and automation. Nexans is a responsible industrial company that regards sustainable development as integral to its global and operational strategy. Continuous innovation in products, solutions and services, employee development and engagement, and the introduction of safe industrial processes with limited environmental impact are among the key initiatives that place Nexans at the core of a sustainable future.

With an industrial presence in 39 countries and commercial activities worldwide, Nexans employs 22,700 people and had sales in 2009 of 5 billion euros. Nexans is listed on NYSE Euronext Paris, compartment A.

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