CABLE SOLUTIONS AND SERVICES FOR URBAN MASS TRANSIT SECURITY

Nexans
BRINGS ENERGY TO LIFE

SUSTAINABLE URBAN MASS TRANSIT NEEDS SAFE AND

A combination of circumstances is providing tremendous stimulus to the world's Urban Mass Transit systems: pollution, energy concerns, urbanization, congestion, economic development, and the desire for a better quality of life. Everywhere on the planet, urban and suburban transport systems are being built, upgraded or expanded.

China, India, Korea and Southeast Asian countries (Thailand, Singapore) are massively investing in subways, while Australia is dealing with urban sprawl through light rail, tramways and intermodal solutions, like the Paramatta project in Sydney. Major cities in Central and South America are modernizing subway infrastructure: in Mexico City, Santiago (Chile) and Brazil. In the US, suburban commuter trains are being built to better serve cities like Tampa and Orlando. Meanwhile, metros are being improved and expanded in world-class metropolises like London, Paris, Moscow, Istanbul, and Cairo.

Urban rail is dependent on the quality of the infrastructure that supports it, including cables and cabling systems for power, signalling and telecommunications. You, as an operator, want sustainable Urban Mass Transit which means moving the maximum number of people safely through the network in a comfortable, reliable and cost-effective way, one that is "accessible, safe, environmentally-friendly, and affordable," in the words of the International Transport Forum.

What Mass Transit operators expect:

- Improved fire-performance in tunnels, stations and public areas
- Reliability through quality input at all levels, and system redundancy
- Higher passenger capacity through Communications-Based Train Control (CBTC)
- SCADA (Supervisory Control and Data Acquisition), signalling and LAN infrastructure
- Worldwide certification, project planning resources, and post-installation support
- On-time delivery, conformity to specs, variable flow provisioning
- Modular, upgradeable solutions and lower operating/maintenance costs

RELIABLE CABLE INFRASTRUCTURE FROM NEXANS

Nexans produces a wide choice of power, signalling and telecommunications cables and components, specifically adapted to Urban Mass Transit infrastructures for subways, light rail, tramways and automated people movers. Medium and low-voltage power and feeder cables include vital accessories. In addition to signalling and control cables, Nexans also provides axle counter and latest-generation balise cables. For advanced telecommunications and train control, Nexans offers traditional communications, radiating and data cables and optical fiber/copper cables to support Metropolitan Area Networks (MANs) for Centralized Traffic Control. In public areas and tunnels, virtually all cables are Low Fire Hazard (LFH) cable, meaning that they are fire-retardant, and assure low toxicity and minimal smoke to enhance survival, firefighting and emergency operations.

Nexans also advises operators about evolving specifications and standards, provides customized engineering, ensures local content and technology transfers, and has a long tradition of working with preferred suppliers and prime contractors on international Urban Mass Transit megaprojects. We are engaged in ongoing R&D to keep all products competitive, compatible and environmentally-friendly.

Nexans for safety, performance and comfort:

- All power, signalling and telecommunications cables and components
- Advanced characteristics, like EMC, fire-performance and waterproofing
- European-based expertise for metros and tramways worldwide
- Complete train control cabling for Communications-Based Train Control (CBTC)
- Custom engineering for country-specific and technological challenges (e.g. Maglev)
- Innovative cables and installation for trackside, tunnels and stations
- Open standards, interoperability and international delivery logistics
- Full support, from R&D and design to maintenance and training

NEXANS' CABLE EXPERTISE CONTRIBUTES TO YOUR

POWER CABLES

Medium-voltage power and feeder cables

MV feeder cables (6/10, 12/20 or 18/30 KV depending on country) carry power to substations along metro lines. Special solutions include Ethylene Propylene Rubber or Silicone insulations for flexibility, and special XLPE insulations that can withstand water, oil, heat, stress and extreme temperatures, while meeting Low Fire Hazard (LFH) cable requirements thanks to newest developed sheathing compounds. New designs offer non-hygroscopic characteristics, direct burial for underground-to-surface transitions, and core ceramifiable cables to keep alarms and essential services operating during a fire.

> *Nexans is upgrading MV cables for the London Underground to satisfy the power needs of new vehicles. We power subway systems in Paris, Berlin and Hamburg, and the MAGLEV Transrapid in Shanghai. Recent successes include Athens, Mexico City, Sao Paulo, Santiago, and Istanbul, where we provided 200 km of 35 KV LFH cables.*

Low-voltage power cables

These ≤1KV cables are PVC for tramways, and halogen-free, low smoke and fire-retardant for subways. They are generally used for traction, station equipment (lighting, escalator, automatic doors) and tunnels (ventilation). Cables for emergency equipment are also fire-resistant for circuit integrity.

> *These cables are used in the entire Paris underground system and in all Paris tramways, including 60 km of new tram lines to be built around the city circumference and to connect suburban communities through tram-train services.*

Power accessories for medium and low voltage

Nexans produces medium-voltage accessories, such as joints and terminations, plug-in connectors and bushings, as well as low-voltage cabinets for aerial and underground applications.

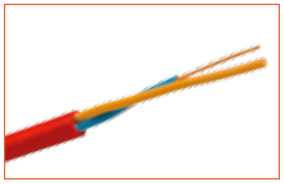
> *Nexans has delivered MV and LV connectivity for subways, suburban express lines, and tramways in France and Germany, and supplied cable joints for Shanghai's state-of-the-art Transrapid.*

Grounding/earthing cables

Nexans manufactures low-voltage cables for grounding purposes in many sizes, insulation types and fire-behavior specifications.

> *To protect persons and material against lightning strikes on Paris' suburban express rail system, the RER, uses Nexans large cross-section LV cables.*

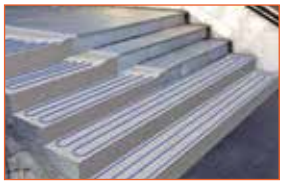
Safety cables



High requirements for fire retardancy or even fire resistance are met by several product ranges of low-voltage cables in different sizes under various brand names, like ALSECURE PREMIUM®.

> *Nexans supplies armored safety cables under a longstanding contract with France's RATP, operator of the Paris Metro.*

Radiant heating cables and mats



Nexans heating cables provide roof de-icing and subsurface heating for railway stations, walkways, tram stops, subway entrances, and adjacent intermodal parking lots.

> *Used in Nordic countries, China and North America to eliminate snow accumulation and ice, Nexans heating cables were installed in Beijing's "Bird's Nest Stadium" which is served by the Olympic subway line.*

URBAN TRANSIT SECURITY

SIGNALING CABLES

Signalling and control cables

Copper, multi-pair signaling and control cables are hybrid energy/telecom cables providing low-voltage energy and two-way telecommunications for wayside equipment, vital relays and systems for advanced train control.

> *Nexans is involved in the London Underground's Jubilee Northern Upgrade Program which will overhaul, upgrade and refit signalling on key lines. Other subway projects include the Daegu Subway line and Incheon International Airport in Korea, Santiago, Sao Paolo, New Delhi and Hanoi, Reims, and Algiers. In the US, Nexans is a prime supplier to AnsaldoSTS (Pittsburg). In Australia, Nexans has just extended its supply contract with Railcorp.*

Axle counter cables

These cables connect trackside counting points which determine train presence, direction of travel, length, number of wagons and integrity.

> *While enhancing CCTV, communication and radio systems in the London Underground, Nexans is continuing to supply axle counter cables for the system's Thales-based train control system.*

Balise cables

Nexans advanced balise cables are flexible, resistant and have Electromagnetic Compatibility (EMC) for HF communications to eventually integrate a fully radio-based GSM-R traffic management system.

> *Recent projects include the Marmaray project (to link the European and Anatolian halves of Istanbul by an undersea earthquake-proof tunnel under the Bosphorus), and the New Delhi metro.*

TELECOMMUNICATIONS CABLES

Communications cables

From multi-pair telephone, radioflex and data cables to sophisticated hybrid copper/fiber for train control, control-to-control, voice/video, etc.

> *For the London Underground, Nexans has outfitted emergency signal post telephones along the line to provide communications backup for subway drivers.*

Optical fiber cables

To serve complex signalling and telecommunications for train control, Nexans has developed MANs and LANs optical fiber cables, and is also an expert in GSM-R technology. To meet the security concerns of tunnels and urban metro systems, we produce metal-armored and all-dielectric OF cables. Increasingly, cost-efficient, compact micro cables are being used in dense subway networks.

> *Lisbon's intermodal Gare do Oriente uses Nexans optical-fiber-based LANs to coordinate rail, subway and surface transit, while an all-dielectric cable is used in the London Underground. Recent successes include the ongoing RATP contract (Paris), light rail for the Algiers suburbs, the Caracas subway, and tramways worldwide.*

Station range cables

For the final two hundred meters to stations, Nexans offers both copper and hybrid copper/optical fiber cables for data transmission, which can be incorporated into a LAN or access network.

> *Nexans has also developed a universal cable which uses copper and a special filling mass, which means that it can be installed underground, and extended safely into subway and train stations.*

Fiber access routing technology

Nexans' splicing modules and jointing sleeves optimize fiber routing, thus guaranteeing network integrity. They are easily implemented as an end-to-end solution in distribution frames, splicing closures and access points.

> *Nexans has provided special jointing sleeves for many urban rail projects in Europe. Robust closures can handle repeated re-entries and accept a fiber-copper mix.*

ODFs and closures

Our modular Optical Distribution Frames provide a complete architecture for main exchange nodes or point-of-presence applications. Splice protection closures are used along the line or at access points to the local loop.

> *Nexans can adapt several types of splicing and distribution modules to cover all possible OF installations, including wall mounts or underground chambers while offering water-tightness and superior fire performance.*

Radiating cables

These perforated coaxial cables act like antennas in confined environments, like tunnels or subway stations, where conventional antennas cannot operate. They are extremely important for radio-based technologies.

> *Nexans provided integral cabling for the 35 kilometer Lötschberg railway tunnel in Switzerland, the longest land tunnel in the world. Along with energy and optical fiber links, radiating cables assure full GSM-R operability. Nexans has also been supplying radiating cables to the London Underground for many years.*

LIST fire-detection system

Nexans furnishes a complete linear fire-detection system for difficult environments (like tunnels) providing early warning and no false alarms. It is easy-to-install, zone programmable, and offers EMC.

> *Using multiple sensors, the system can pinpoint fires in subway and train tunnels accurate, and requires neither maintenance nor calibration.*

SERVICE AND SUPPORT FOR SUSTAINABILITY

GLOBAL EXPERTISE

The fact that we master all cabling technologies means that we are able to efficiently upgrade old infrastructures and install new ones from end-to-end. Since urban transit systems are often faced with financial constraints, Nexans can provide technical advice concerning optimal cost-efficiency.

LOCAL PRESENCE

With our European experience and knowledge of international standards, we can act anywhere on the globe, even on major transnational products, often providing our customers with local manufacturing capability, technology transfers, and fast delivery. Key products have been fully qualified worldwide.

TECHNICAL LEADERSHIP

Familiar with traditional and new train technologies, like radio-based CBTC technology and Maglev power systems, Nexans research centers in Nuremberg and Lyon have continued to innovate in terms of raw materials and new compounds, always taking an environmentally-safe approach.efficiency through modular subsystems.

Nexans brings energy to life through an extensive range of cables and cabling solutions that deliver increased performance for our customers worldwide. Nexans' teams are committed to a partnership approach that supports customers in four main business areas: Power transmission and distribution (submarine and land), Energy resources (Oil & Gas, Mining and Renewables), Transportation (Road, Rail, Air, Sea) and Building (Commercial, Residential and Data Centers). Nexans' strategy is founded on continuous innovation in products, solutions and services, employee development, customer training and the introduction of safe, low-environmental-impact industrial processes. In 2013, Nexans became the first cable player to create a Foundation to introduce sustained initiatives for access to energy for disadvantaged communities worldwide. Nexans is an active member of Europacable, the European Association of Wire & Cable Manufacturers, and a signatory of the Europacable Industry Charter. The Charter expresses its members' commitment to the principles and objectives of developing ethical, sustainable and high-quality cables. We have an industrial presence in 40 countries and commercial activities worldwide, employing close to 26,000 people and generating sales in 2015 of 6.2 billion euros. Nexans is listed on NYSE Euronext Paris, compartment A.

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