DATA CENTER POWER



WHITE PAPER

Why power cables are strategic assets for Data Centers?

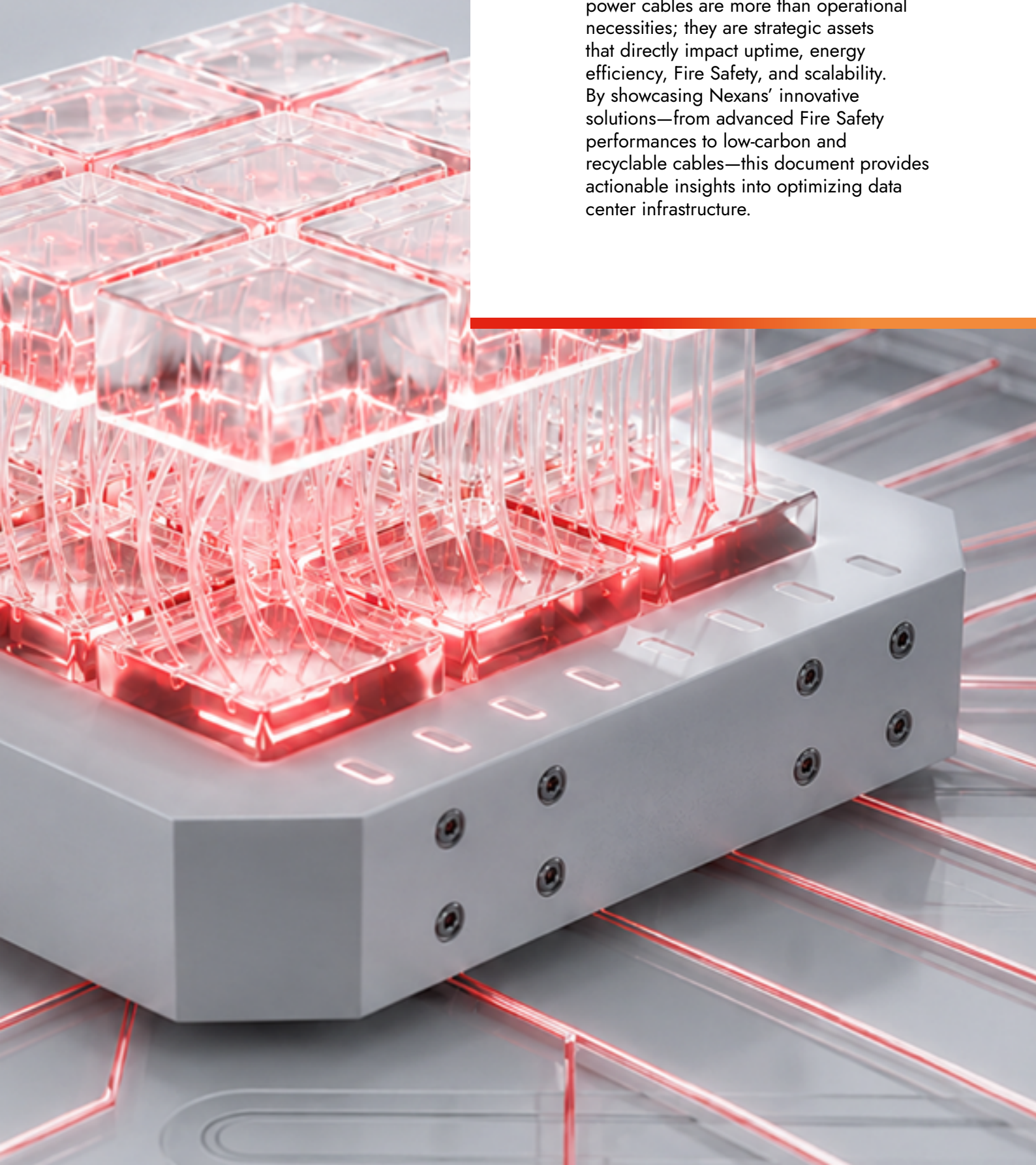
KEY CONSIDERATIONS FOR RELIABILITY, ENERGY AND SCALABILITY

Nexans
ELECTRIFY THE FUTURE



Executive Summary

This white paper highlights how electrical power cables are more than operational necessities; they are strategic assets that directly impact uptime, energy efficiency, Fire Safety, and scalability. By showcasing Nexans' innovative solutions—from advanced Fire Safety performances to low-carbon and recyclable cables—this document provides actionable insights into optimizing data center infrastructure.



Who should read this White Paper and why?

Data Center Operators

→ To enhance reliability, reduce costs, and ensure scalability through improved uptime, energy efficiency, Fire Safety solutions, and sustainable practices, identify turnkey engineering services and compliance with global standards.

Engineering and Procurement Officers

→ To evaluate cost-effective and sustainable cable solutions for data center projects through transparent cost models, long-term savings, recycling benefits and compliance with global standards.

General Contractors

→ To streamline construction projects by collaborating with reliable cabling suppliers and meeting project specifications with high-quality products, compliance with safety and environmental standards, and engineering support.

Sustainability Officers

→ To explore how Nexans supports environmental goals through low-carbon cables and circular economy initiatives that reflects sustainable electrification strategies and lifecycle carbon reduction.

IT Infrastructure Managers and system Integrators

→ To ensure the technical specifications for network and power distribution meet the increasing demands of data centers through scalable cable solutions, optimized performance, and future-proofing capabilities with Nexans' advanced technologies into tailored data center solutions such as superconducting cables, grid monitoring systems, and scalable infrastructure.

Facility Managers

→ To maintain efficient and reliable electrical and cooling infrastructure for data centers with Low Fire-Hazard cables, grid monitoring solutions, and energy-efficient systems.

Empowering the digital backbone thanks to power cables

Data centers are the backbone of the digital economy, powering everything from cloud computing to artificial intelligence.
While much attention is given to servers, cooling systems, and security measures, electrical power cables remain an often overlooked but critical component. These cables are not just a means of transmitting electricity; they are strategic assets that directly impact reliability, efficiency, and scalability.Despite accounting for only about 2% to 2.5% of a data center's total construction costs, the significance of electrical power cables cannot be overstated. Studies have shown that power-related issues are a leading cause of data center outages, with uninterruptible power supply (UPS) failures being a primary contributor.[1]

The financial implications of such outages are substantial. The average cost of unplanned data center downtime is approximately $7,900 per minute, translating to over $690,000 for an average incident lasting 86 minutes.[2]

Moreover, over 60% of data center failures result in at least $100,000 in total losses, with the share of outages costing upwards of $1 million increasing from 11% to 15% between 2019 and 2022.[3]

These figures underscore the critical importance of investing in high-quality electrical power cables. Ensuring the integrity and reliability of these cables can significantly reduce the risk of outages, thereby safeguarding the data center's operations and financial performance.
In addition to the direct financial costs, data center outages can lead to reputational damage, loss of customer trust, and compliance breaches, further emphasizing the need for robust and reliable power infrastructure.
By prioritizing the selection and maintenance of superior power cables, data center operators can enhance overall reliability, minimize downtime, and protect their investments in the increasingly digital and interconnected world.

45%

of networking outages are related with cables

$100,000

70% of data center outages costs $100.000 or more

$7,900

per minute, is the average cost of an unplanned downtime is around

up to 2.5%

cost of cables in a data center

Power cables: more than an operational necessity



They are vital components that ensure the distribution of power from grids or on-site generation systems to critical IT and cooling equipment. Their reliability directly influences uptime, making them essential in avoiding costly downtime or equipment failures.

- High-performance power cables enhance safety and reliability by mitigating risks such as electrical fires, overheating, or short circuits. In densely packed environments, these factors are critical since even minor issues can escalate into significant disruptions. For example, Low Fire-Hazard cables that meet stringent international safety regulations have proven to reduce the likelihood of catastrophic damage, while Fire-Resistant cables will ensure continuity of service for the safety system in case of blaze.[4]

- Investing in advanced power cables is crucial for enhancing energy efficiency in data centers. High-performance cables with optimized conductive materials and superior insulation can significantly reduce transmission losses, leading to substantial cost savings over time.For instance, ABB reports that with highly efficient power supplies and appropriate design, typical power distribution losses of around 20% can be reduced to just 5%.[5]

- In large-scale data centers consuming megawatts of electricity annually, even a modest improvement in energy efficiency can result in significant financial benefits and translated into millions of dollars saved over the facility's lifespan. This is particularly relevant as data centers strive to balance escalating computational demands with sustainable and cost-effective operations.

- Therefore, selecting high-quality power cables is a strategic decision that contributes to both operational efficiency and economic savings in the long term. The strategic role of power cables extends to ensuring scalability. As data centers grow to meet increasing demand, cable infrastructure must support seamless expansion. Modular cable systems and advanced materials allow operators to future-proof their facilities, ensuring adaptability to new technologies and higher power densities. A focus on long-lasting, efficient solutions enables data centers to maintain competitiveness in an evolving digital economy.

1 | https://loadbanks.com/independent-analysis-cites-power-failure-as-the-major-cause-of-data-centre-outages-with-costs-and-consequences-worsening/?utm_source=chatgpt.com
2 | https://loadbanks.com/independent-analysis-cites-power-failure-as-the-major-cause-of-data-centre-outages-with-costs-and-consequences-worsening/?utm_source=chatgpt.com
3 | https://uptimeinstitute.com/about-ui/press-releases/2022-outage-analysis-finds-downtime-costs-and-consequences-worsening?utm_source=chatgpt.com
4 | https://journal.uptimeinstitute.com/datacenter-fire-frequency/
5 | https://new.abb.com/news/detail/113118/the-drive-towards-energy-efficient-data-centres?utm_source=chatgpt.com

Choosing the right power cables

The benefits of high-performance power cables are profound. They ensure reliability by reducing risks of power outages and enhancing uptime, which is critical for achieving the “five nines” standard of availability.

Their contribution to energy efficiency lowers operational expenses and supports sustainability goals, especially in regions with stringent environmental regulations. Furthermore, these cables play a critical role in scalability, enabling data centers to adapt to future demands without significant infrastructure overhauls.

Safety is another advantage, as advanced cables are designed to minimize hazards such as overheating and electrical fires. Finally, while premium cables may involve a higher upfront cost, their long-term durability and efficiency result in substantial cost savings over time.



When selecting electrical cables for data centers, operators **should evaluate several critical factors:**

VOLTAGE RATINGS

Ensure compatibility with data center power requirements, whether low, medium, or high voltage.

FIRE SAFETY

Opt for cables with advanced fire-retardant & fire-resistant properties to enhance safety.

ENERGY EFFICIENCY

Choose cables with low resistance and high conductivity to minimize power loss.

THERMAL PERFORMANCES

Cables must withstand high temperatures in densely packed environments.

DURABILITY AND LIFESPAN

Long-lasting materials reduce the need for frequent replacements.

ENVIRONMENTAL IMPACT

Prioritize cables made with sustainable materials and processes.



Nexans: your strategic partner in power cable solutions

Choosing the right power cables for data centers requires a focus on performance, safety, and sustainability. Nexans offers a comprehensive suite of solutions tailored to the specific needs of data centers, ensuring optimal performance, safety, and sustainability.

1. **Complete range of cables:** low voltage, medium voltage, high voltage

Nexans provides a full spectrum of cables—low, medium, and high voltage—designed to meet the diverse electrical demands of data centers.



LOW VOLTAGE CABLES

These are essential for internal power distribution, connecting various equipment within the data center. Nexans' low voltage cables are engineered for durability and efficiency, ensuring minimal power loss and enhanced performance.



MEDIUM VOLTAGE CABLES

Suitable for connecting the data center to the primary power supply or backup generators, Nexans' medium voltage cables are designed to handle higher power loads with safety and reliability.



HIGH VOLTAGE CABLES

For large-scale data centers with substantial power requirements, high voltage cables are crucial. Nexans' high voltage solutions ensure efficient power transmission over long distances, maintaining system integrity and performance.

2. **Fire Safety expertise:** low fire-hazard & fire resistant cable

Fire hazards pose significant risks in data centers, with electrical faults or obsolete installations contributing to over 25% of building fires in Europe, leading to €25 billion in damages annually. Nexans addresses this challenge by offering a Fire Safety range compliant with the most demanding international safety regulations. Our Low Fire-Hazard cables incorporate technologies to minimize fire spread and the release of corrosive smoke, whereas our Fire-Resistant cables are designed to maintain circuit integrity, ensuring the critical safety systems remain operational under extreme temperatures.

- **Advanced Fire Safety performances**
  Thanks to technologies developed over the last 20 years in our world-leading Innovation Hub, and protected by more than 150 patents, Nexans designs Fire Safety cables providing best-in-class protection for people and assets in the event of a fire.

- **Specialized Safety Certifications**
  Offering cables with specialized certifications for regions with strict safety codes that differentiates Nexans in compliance-sensitive markets.



3. **Innovative cable solutions:** easy installation and enhanced safety features

Nexans brings innovative solutions to maximize efficiency and reliability during the installation phase. With its easy-to-install features, Nexans helps securing on-time project delivery, while protecting users from multiple risks such as injuries or musculoskeletal disorders.

- **Marking Features**
  Visual identification of Nexans cables is facilitated by specific colour codes or beadings that facilitate their recognition on the construction site and thus limit installation errors. The METRIUM metric marking is an innovation that allows to know the exact remaining cable lengths, limiting errors when cutting the cable and waste. Marking areas directly on the cable allow to write on it to streamline on-site operations.

- **Augmented Packaging**
  Nexans cables are available with augmented packaging to simplify cable pulling and transport which can be a heavy charging port. These innovative packagings also reduce friction when pulling cables to reduce the effort when pulling wires and cables.

- **Advanced Cable Ergonomics**
  Our innovative cable designs & solutions, such as improved flexibility or pre-assembled cable kits, reduce the risk of injury while saving time. Combined with the Mobiway™ range, those enhanced solutions maximize safety and efficiency during the installation phase.

- **Mobiway™ Range**
  Mobiway™ is a range of innovative solutions to simplify, secure and make cable installation smarter. Mobiway™ range is a patented smart packaging making easier to unwind and transport cables during electrical installation. Sustainable and connected, this innovative range helps to optimize efficiency while increasing the safety of installers. From electrical wires for residential application to larger section cables for high voltage projects, the Mobiway™ range covers all cable sizes.





4. **Recycling services:** circular economy & sustainability engagement

With global copper consumption projected to reach 40 million tons by 2030, resource scarcity is a growing concern. Nexans' CABLELOOP recycling service processes over 30,000 tons of aluminum and copper cables annually, transforming waste into valuable raw materials and contributing to the circular economy. This initiative ensures full traceability and offers transparent financial valuation based on real-time metal market rates, supporting sustainable electrification and reducing environmental impact.

Sustainability is a growing concern in the tech industry, and data centers are no exception. Nexans addresses this by providing comprehensive recycling services, transforming waste cables into valuable resources and promoting a circular economy.

- **Cable Recycling Experience**
  With over 60 years of experience, Nexans processes approximately 30,000 tons of aluminum and copper cables annually, recovering 18,000 tons of granules and 13,000 tons of polymers each year.

- **CABLELOOP Service**
  Nexans' CABLELOOP is an innovative recycling service that ensures end-to-end traceability and fair valuation based on real-time metal market rates, contributing to sustainable electrification.

5. **Low-carbon cables:** concrete results to reach sustainable objectives

Nexans is committed to reducing greenhouse gas emissions by offering low-carbon cables that integrate recycled materials, including up to 50% recycled plastic and low-carbon aluminum. These cables achieve a 35% to 50% reduction in emissions compared to standard cables. By providing access to detailed CO_2 data for these products, Nexans enables data center operators to monitor and optimize their carbon footprints, aligning with sustainability goals to reduce greenhouse gas emissions.



- **Emission Reduction**
  Nexans' low-carbon power grid cables guarantee a minimum 35% reduction in greenhouse gas emissions compared to standard cables, achieved through the use of low-carbon aluminum and recycled plastics.

- **Local Manufacturing**
  The initiative will be developed in all Nexans countries, supporting local economies and ensuring high-quality production standards.

6. **Superconductivity:** cutting-edge high-temperature superconductor technology

Providing high transmission capacity, a single High-Temperature Superconducting (HTS) cable can transmit up to 3.2 GW of power, making it ideal for the powering of hyperscale data centers. Higher current carrying capacity with less heat generated in the cables which reduced the need for extensive cooling infrastructure.

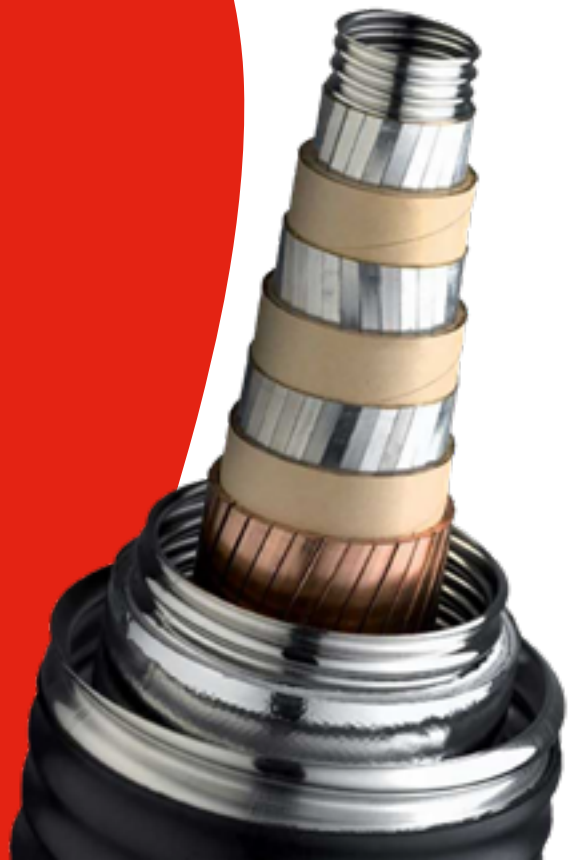
HTS also offers the possibility to Transmit power at Distribution level which enables a reduction of electrical auxiliaries' dimensions and costs such as transformer and an easier process for permitting approvals. Compact design for reduced space requirements and more efficient distribution layouts.

- **Energy Savings**
  Superconducting cables are ultra-efficient conductors with zero or near-zero resistance. The power saving achieved in this way is greater than the energy expended to maintain conductors at a low temperature. By contrast, conventional longdistance transmission systems using aluminum and copper conductors experience power losses of around 10%. This amounts to around 180 TWh annually in Europe alone – enough to power 3 cities.

- **Lower Heat Generation**
  Scalability: Superconducting cables can help scale data center power infrastructure without major redesigns or large physical footprint.

- **Minimized Impact of Civil Engineering**
  HTS cables are up to 10 times narrower than those for conventional cables and lines. Fewer cables are required and there is no need for space between phases. This reduces the need for permitting, minimizes disruption to the public, accelerates deployment and contributes to lower costs.

- **Reduced Environmental Impact**
  With 97% less copper used, no EMF (Electrical Magnetic Field) and only 1/10th of the land required vs the conventional cables. Superconducting cables do not create heat which is ensuring lower cooling requirements inside the data halls.



7. **Supply chain services:** tracking, monitoring and anti-theft digital solutions

ULTRACKER is a suite of innovative supply chain solutions that streamline the order, delivery, and inventory management processes.

Customers can access live updates about their cable delivery status, drums geolocation and anti-theft alarms. Thanks to this unique solution, customers have real-time detailed information on their products.

- **Real-Time Tracking**
  Providing real-time asset tracking worldwide, incident management, and accurate arrival time predictions as well as delivery updates. Supply chain data such as consumption forecast, stock, and order booking are exchanged through ULTRACKER software platform as an interface between Nexans and its customers' information systems.

- **Remote Monitoring**
  ULTRACKER tracks the history of stock movements to help customers monitor and manage cable stocks in real time and triggers an alert to reduce the risk of product shortage or overstock. This automated inventory system boosts performance and speed and helps to reduce costs, decreasing the environmental impact and the working capital required by clients.

- **Anti-Theft Solution**
  Real-time geolocation of cable drums thanks to multi-sensor GPS devices embedded inside the drums providing shipments follow-up, theft detection, remote monitoring of installation projects, residual length management, and a streamlined drum pick-up process. ULTRACKER allows a reduction of cables drums theft and loss by 90% while improving the drums usage rate by 25%, as well as a global reduction of waste.





8. **Electrical reliability monitoring services:** advanced sensor technology in the network

Ensuring the reliability of power supply is crucial for data centers. Nexans' Grid Monitoring services utilize advanced sensors and real-time data analytics to detect early signal before fault occurrence, predict maintenance and ultimately localize the fault to minimize downtime.

By pinpointing exact locations of issues such as short circuits or insulation weaknesses, these services enable swift corrective actions, reducing operational interruptions and enhancing overall efficiency.

- **Preventive Maintenance**
  Nexans' Grid Monitoring services utilize advanced sensors and real-time data analytics to detect early signal before fault occurrence, predict maintenance and ultimately localize the fault to minimize downtime.
- **Advanced Fault Detection**
  By pinpointing exact locations of faults, Nexans' monitoring solutions reduce the need for extensive ground testing and repairs, enhancing operational efficiency.

9. **Engineering services:** optimized costs and grid efficiency

By integrating these advanced solutions, Nexans empowers data centers to achieve higher efficiency, enhanced safety, and a reduced environmental footprint, positioning them for success in an increasingly digital and electrified world.

Designing and implementing an efficient power infrastructure requires specialized expertise. Nexans offers comprehensive engineering services to tailor solutions that meet the specific needs of data centers.

- **Customized Solutions**
  Nexans' engineering team collaborates with data center operators to design cable systems that align with their unique operational requirements, ensuring optimal performance and scalability.
- **Lifecycle Support**
  From initial design to installation and maintenance, Nexans provides end-to-end support, ensuring the longevity and reliability of the power infrastructure.

Power cables are no longer just an operational necessity; they are strategic assets that drive the success of data centers. By investing in high-performance, efficient, and sustainable cables, operators can ensure reliability, reduce costs, and prepare for future growth.
Nexans is committed to empowering data centers worldwide with cutting-edge cable solutions that meet the demands of the digital age.

As a global leader in cable manufacturing, Nexans offers a comprehensive range of solutions tailored for data centers, not only to address the immediate needs but also to contribute to long-term sustainability and efficiency.

- **Complete range of cables**
  Low, medium, high voltage

- **Fire-Resistant Solutions**
  Compliant with the highest safety standards

- **Sustainable Practices**
  Eco-friendly manufacturing processes, recyclable products and recycling services

- **Monitoring and Engineering**
  Tailored to meet specific requirements of maintenance, hyperscale, enterprise, and colocation data centers.





Contact us

For more information on Nexans' data center solutions, visit www.nexans.com

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