



compact,  
smart,  
powerful



Transmission or distribution, the need to move more power underground is increasing

More high-capacity transmission lines are needed for a number of reasons, most notably to bring renewable power to market. However the public wants new transmission lines to be out of sight and away from environmentally sensitive areas. Impact on flora and fauna must be minimized. With all these demands, siting a new transmission line becomes almost impossible.

Continued load growth in densely populated urban areas raises questions about how to move more power in an already crowded underground environment. This is further complicated by the need to enhance distribution system reliability while complying with public expectations of underground service within and around urban areas.

**HTS cables are ideal for applications that are difficult, if not impossible, to address with conventional products.**

New solutions to address difficult transmission and distribution problems

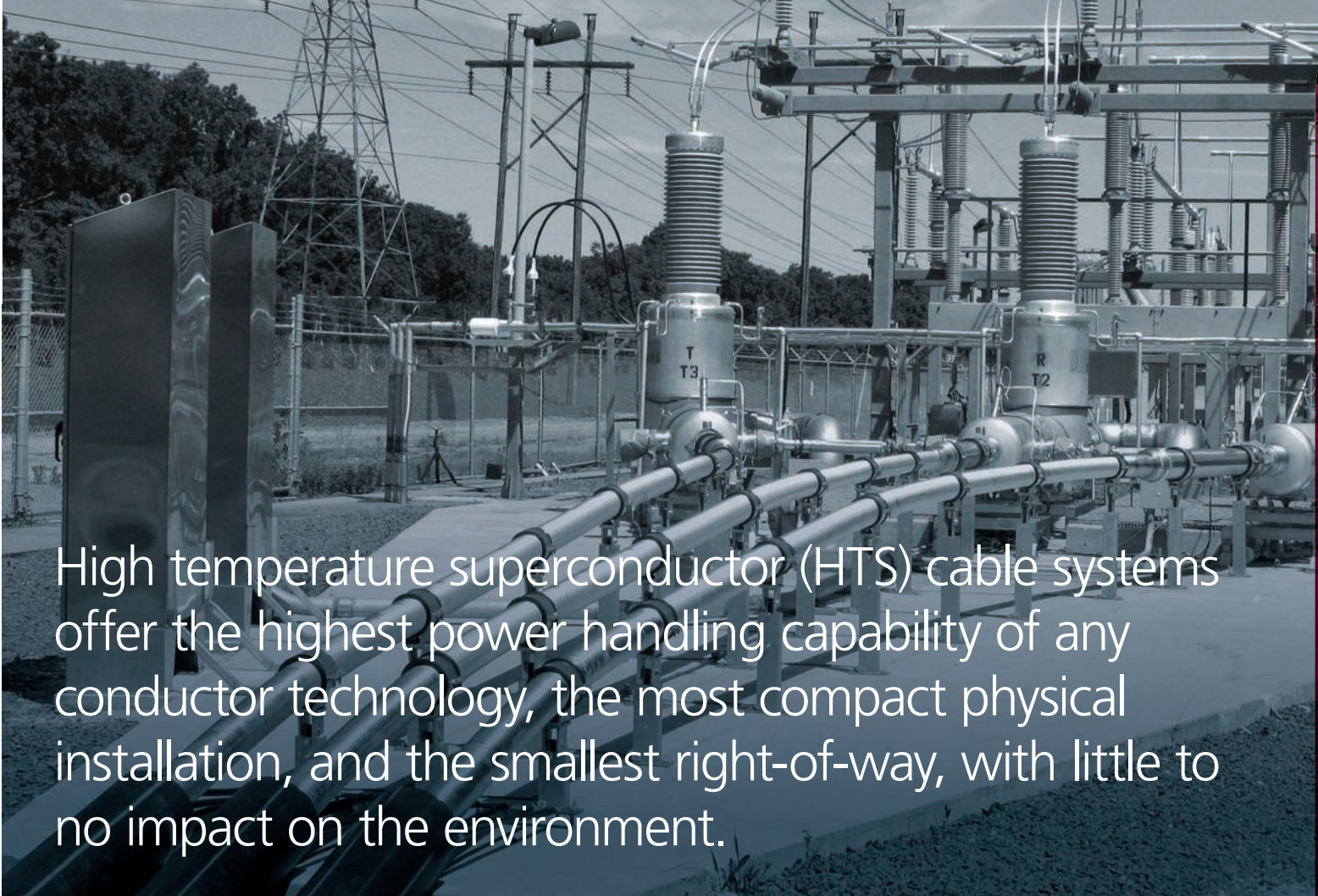
HTS cables utilize superconductor wires to carry current in place of conventional aluminum or copper conductors. These cables can transmit incredibly high levels of power, even at lower voltages, and do not interact with the environment. This reduces right-of-way requirements, simplifies permitting and siting, speeds project implementation and reduces construction costs.

Superconductors give the cable a set of highly unique operational and application properties that create new opportunities to solve complex challenges, both in transmission and distribution systems.

**Unique properties create new opportunities.**



- Increase circuit power transfer capacity
- Solve difficult right-of-way requirements
- Address complex environmental concerns
- Improve network reliability
- Control high fault currents



High temperature superconductor (HTS) cable systems offer the highest power handling capability of any conductor technology, the most compact physical installation, and the smallest right-of-way, with little to no impact on the environment.

Eliminating issues with network expansion

HTS cable systems eliminate many issues associated with expanding transmission and distribution circuits and networks:

- Limited cable ampacity
- Need for multiple cable circuits
- Limited right-of-way
- Environmental limitations
- Excessive fault currents

Benefits of using AMSC HTS cable systems

- Improved transmission capacity
- Control of fault current levels
- Minimal right-of-way requirements
- Simplified placement considerations
- Immune to from high ambient temperature environments
- No EMF interaction with the environment
- Improved load-serving capacity
- Enhanced system reliability

Your HTS cable resource

- Cooperative consulting with your engineering department or preferred design firm
- Completely engineered cable systems, including cables, HV terminations, refrigeration system, control and protection scheme
- Installation, commissioning and testing services

10 times more power

By carrying up to 10 times the current of conventional cables of the same voltage class, HTS cables provide power transfer capacity comparable to two or three higher voltage levels.

This presents many opportunities:

- Use of lower voltage cable circuits allows narrower rights-of-way, simplified siting and permitting requirements, as well as smaller, more compact, lower cost substations and related equipment.
- Use of fewer cable circuits when moving a high-capacity overhead line underground.
- Cost-effective “right sizing” of a cable circuit by easily installing a single cable with multiple times the capacity needed.

No EMF interaction for simplified installation

HTS cables are magnetically self-shielding and emit little to no external magnetic field (EMF). Likewise, they are immune to the effects of external EMF. This results in simplified cable installation, as the normal heating effects of nearby metallic infrastructure or other cable circuits disappear. The self-shielding property also makes HTS cables the most environmentally EMF-friendly power conductors available

Ideal for installation in difficult rights-of-way

HTS cables are ideal for use when upgrading circuits or moving large amounts of power in a limited space. Refrigeration ensures that HTS cables remain independent from the thermal environment in which they are located. The combination of EMF immunity and thermal isolation means that typical cable de-rating or physical placement concerns do not apply to HTS cables. This makes them a perfect choice for even the most complicated rights-of-way, regardless of whether it is for direct burial or placement in ducts or tunnels.

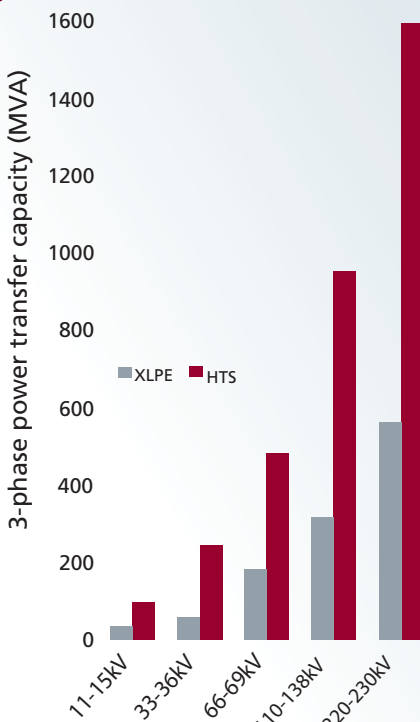
Lower impedance for improved power flow

HTS cables have lower impedances than conventional cables. This significantly increases the distance they carry power before requiring reactive compensation. This lower impedance also positively affects power flow and reduces line losses, especially in networked applications.

Fault current limiting for ultimate control

A unique option available with HTS cables manufactured using AMSC’s Amperium® wire is a managed, dual impedance characteristic. This enables the cable to act as a high-capacity cable under normal conditions, while instantly transitioning to a high-resistance impedance during high magnitude faults, effectively limiting the available short-circuit current.

This capability creates a range of new application opportunities. For example, power transfer capacity can be increased while decreasing or maintaining fault current levels, or substations can be paralleled to increase reliability or load-serving capability.



XLPE cable ratings shown without any de-rating factors applied

<sup>1</sup>Applicable to any cold dielectric HTS cable with a superconductor shield layer



# HTS Cable Systems for AC Networks

## About AMSC's Gridtec Solutions

AMSC's Gridtec Solutions are a set of engineering planning services and advanced grid systems that optimize network reliability, efficiency and performance from the point of generation through transmission and distribution. We supply components, systems and solutions to some of the industry's biggest names. From wind parks to solar power plants and from utilities to large industrial manufacturers, our commitment is to deliver the right solution for our customers, each and every time. Whether a simple component or complex system-level solution, we focus on ensuring that the investment is right, and right for you – delivering reliability, security, efficiency, scalability and tangible long-term benefits.

**For invaluable advice and compelling solutions, we are the partner you can turn to.**

## About AMSC®

AMSC (NASDAQ: AMSC) generates the ideas, technologies and solutions that meet the world's demand for smarter, cleaner ... better energy. Through its Windtec Solutions, AMSC enables manufacturers to launch best-in-class wind turbines quickly, effectively and profitably. Through its Gridtec Solutions, AMSC provides the engineering planning services and advanced grid systems that optimize network reliability, efficiency and performance. The company's solutions are now powering gigawatts of renewable energy globally and enhancing the performance and reliability of power networks in more than a dozen countries. Founded in 1987, AMSC is headquartered near Boston, Massachusetts with operations in Asia, Australia, Europe and North America.



## Talk to us about

- Solving your most complex power challenges
- Enhancing competitive advantage
- Improving your system's performance, reliability and profitability

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Whether you wish to make new advances in renewable technology, optimize power generation or delivery, or simply gain a better understanding of the issues you face, please get in touch. We're here to help.



smarter, cleaner  
... better energy

