



**CONNECT AND PROTECT**

# Solutions for Railway Signaling and Onboard Systems





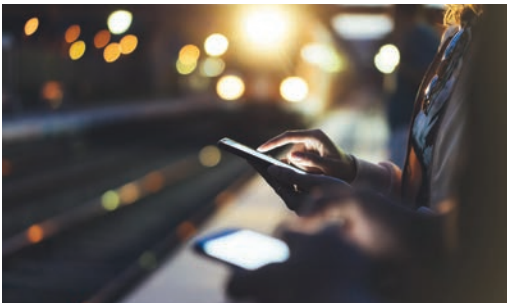
From automated traffic control systems to on-board passenger WiFi services, rail networks are implementing powerful new systems to achieve greater safety, reliability, and improve the experience of riders and operators. As railways implement next-generation transportation technology, nVent stands ready with innovative solutions that connect and protect these critical systems.



### **NEXT GENERATION SYSTEMS**

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Implementing next generation railway systems, such as communication based train control (CBTC) and 5G (fifth generation wireless network), require integrating advanced hardware and systems into new and existing infrastructure. With many products specifically designed and certified for the rail and transit industry, nVent offers solutions that support next generation rail technology, offering cabinets for on-board, indoor and outdoor trackside signaling and communications equipment as well as range of systems and cases that improve the form, fit and function of electrical panels.



### **DIGITALIZATION AND IOT**

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IoT (Internet of Things) technology connects infrastructure and on-board systems providing real-time data that improves operational efficiency for safer, more reliable networks. Railways also use advanced network connectivity to improve user experience, from on-board passenger WiFi to apps that allow freight customers to track shipments. nVent supports digitalization and IoT by providing essential system platforms, including cases for small form factor computers and Embedded COM systems, as well as a range of solutions that connect and protect sensitive electronic infrastructure.



### **MISSION CRITICAL INFRASTRUCTURE**

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Railways rely on a network of mission critical electrical systems and electronics. Signaling and communication equipment include sensitive trackside infrastructure that is constantly exposed to the elements. On-board systems must withstand the rigorous shock and vibration generated as trains run on track. nVent helps railways protect critical electronics and electrical systems, with a range of solutions that include rugged cabinets and cases, surge and lightning protection, and grounding systems.



Global transportation companies, rolling stock OEMs and railway signaling and communication technology integrators rely on nVent for electrical solutions to connect and protect critical network systems. With products that have set industry standards, global railways trust

nVent ERICO, ERIFLEX, HOFFMAN, RAYCHEM, and SCHROFF.

## ENCLOSURES



nVent provides enclosures for railway signaling, communications and systems with its industry leading brands nVent HOFFMAN and nVent SCHROFF. Our expansive product portfolio includes; wall-mount / pole-mount enclosures, indoor / outdoor cabinets for on-board and trackside applications, subracks and 19" chassis, Embedded COM systems and small form factor case solutions, as well as enclosure cooling solutions.



## ELECTRICAL CONNECTIONS



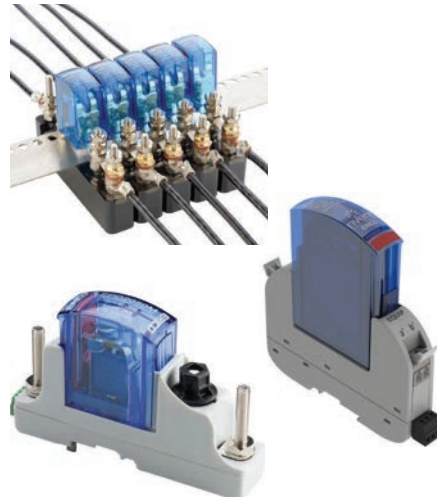
nVent ERIFLEX provides solutions for electrical conduction and low voltage power distribution. With a product line that includes flexible busbars, insulated braided conductors, earthing braids, distribution blocks and power terminals, nVent ERIFLEX products are uniquely suited for railway electrical equipment. nVent ERIFLEX products are characterized by innovative material composition that contribute to safety and reliability in railway electrical systems.



## SURGE PROTECTION



nVent ERICO specializes in both primary and secondary surge protection products for sophisticated railway signaling infrastructure and on-board systems, with solutions that protect track signals, equipment power as well as telecommunication systems data and equipment.





# Solutions throughout the railway network

## ON-BOARD SYSTEMS

### CABINET:

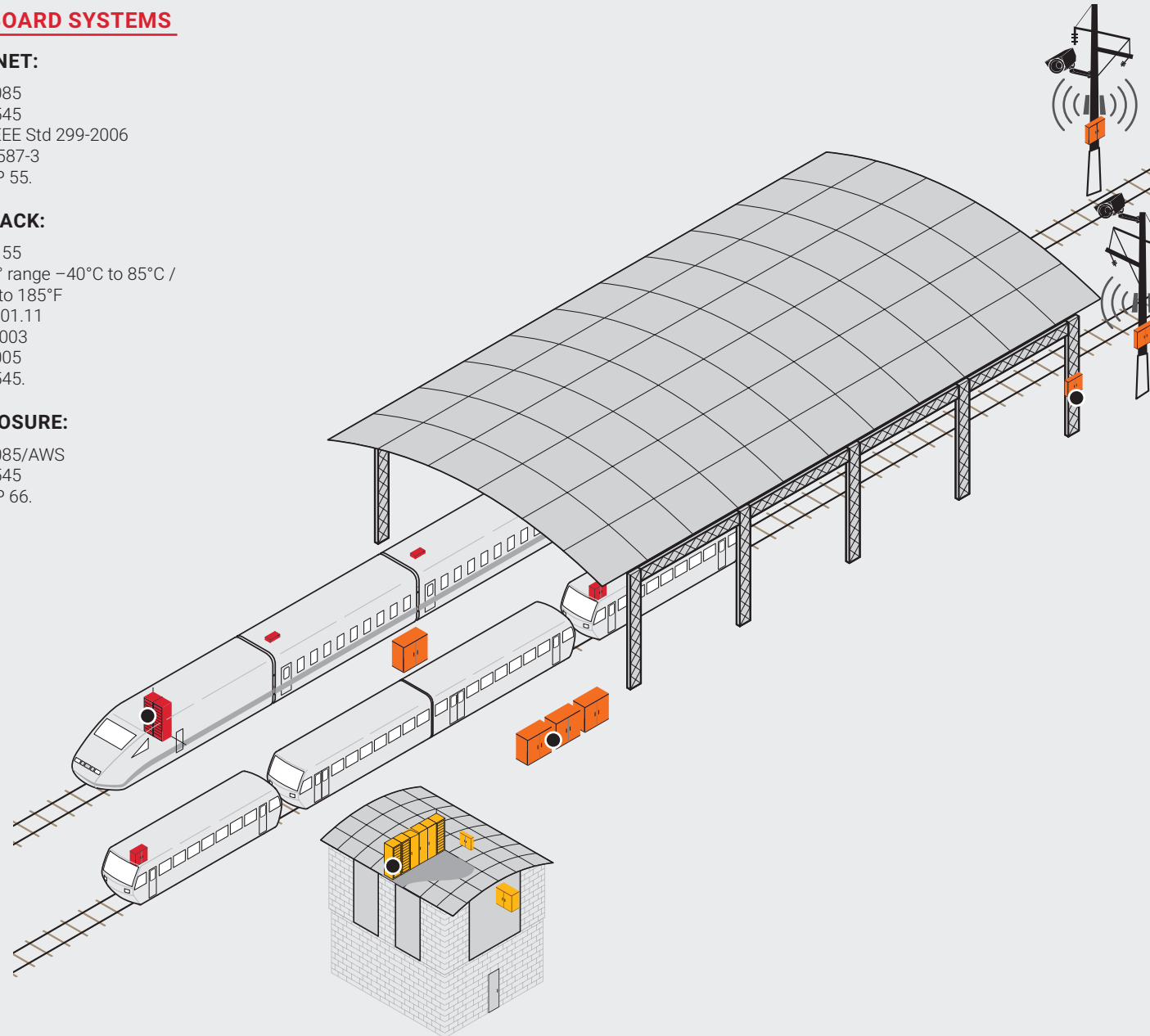
EN 15085  
EN 45545  
EMC IEEE Std 299-2006  
IEC 61587-3  
up to IP 55.

### SUBRACK:

EN 50155  
wide T° range -40°C to 85°C /  
-40°F to 185°F  
IEEE1101.11  
BN411003  
NF 61005  
EN 45545.

### ENCLOSURE:

EN 15085/AWS  
EN 45545  
up to IP 66.



nVent SCHROFF On-Board-Cabinet 10-40 U with a space-saving swing frame option.



nVent SCHROFF On-Board-Rack. Adapts for 19" technology in a secure frame.



nVent SCHROFF European Train Control System. Integrated enclosure.



nVent SCHROFF retrofit small form factor enclosure solutions with fanless cooling.

## INDOOR SUBSTATIONS AND CONTROL CENTERS

### CABINET:

CENELEC EN50125-3 & AREMA® 11.5.1 Class C for Shock and Vibration  
EN15085/AWS, LSZH (Tunnel). EMC IEEE Std 299-2006, IEC 61587-3,  
up to IP55. Cooling options include: passive and active cooling.

### WALLMOUNT:

EN15085/AWS, EN45545, Door Opening up to 180° with locking. Wall and Pole mount. Aluminum, Mild and Stainless Steel. Cooling options include: passive and active cooling.



nVent SCHROFF CompactPCI based redundant 19" signalling system within trackside cabinets.



nVent SCHROFF smart fan tray for remote monitoring and adaptive cooling within communication cabinets.



nVent SCHROFF cabinets for communication, signalling, passenger information system solutions and SCADA.



nVent integrated solution containing nVent HOFFMAN enclosure for wayside radio/fiber-optic management and nVent ERIFLEX low voltage power distribution products.

## ELECTRICAL SOLUTIONS

nVent provides electrical connectors and components that can be used in applications throughout the rail network, including on-board systems, indoor substations and control centers as well as outdoor trackside equipment.

## BUSBAR AND BRAIDED CONDUCTORS

EN 45545-2 with nVent ERIFLEX Advanced Technology insulation.

## SURGE PROTECTION DEVICES

AREMA® C&S Manual Parts 11.5.1, 11.3.2, 11.3.4, 14.1.2ANSI®/IEEE® C62.41.2-2002 Cat A, Cat B, Cat C



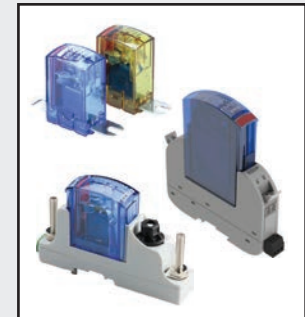
nVent ERIFLEX Flexibar Advanced Flexible Busbar (top), nVent ERIFLEX IBSB Advanced Braided Conductor (bottom).



nVent ERIFLEX stainless steel grounding braids.



nVent ERIFLEX Power Blocks (top), nVent ERIFLEX Distribution Blocks (bottom).



nVent ERICO surge protection devices for railway signaling, power, data and communication equipment.

## OUTDOOR TRACKSIDE

### CABINET:

IP55, Outdoor paint LSZH. Single or double walled construction. Solar load protection. Rain protection for maintenance. Cooling options include: passive and active cooling.

### WALLMOUNT:

EN 15085/AWS, EN 45545, Door Opening up to 180° with locking latch. Wall and Pole mount options available. Aluminium, Mild and Stainless Steel. Cooling options include: passive and active cooling.




Outdoor Modular Cabinet



Axle counter, zone controller, wheel T°, track maintenance, interlocking.



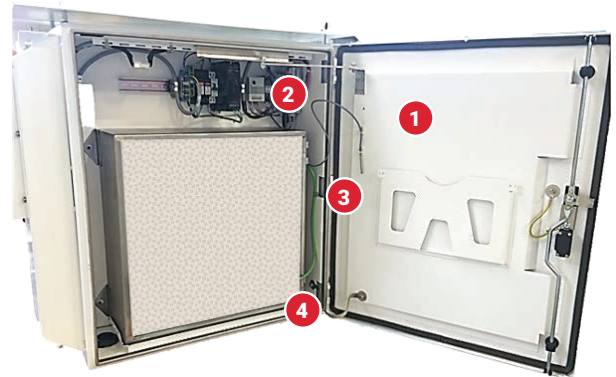
WiFi, Access point, Fiber splicing, Wall & Pole mount options, Full Integration Service.



A partner with advanced capabilities and expertise. nVent provides railway certified products with a range of advanced capabilities and peerless expertise, bringing the perfect solution to even the most complex or specialized applications.

## INTEGRATED NVENT SOLUTIONS

One of the ways that nVent is a value added supplier is by offering solutions that integrate components from a powerful portfolio of product brands, including nVent ERICO, HOFFMAN, RAYCHEM and SCHROFF. Integrated nVent solutions can include enclosures equipped with busbars and braids for low voltage power distribution and power conduction, surge protection devices and metallic braids for grounding. Integrated nVent solutions are well-suited for unique projects, especially when providing customer specific applications. Pictured right is a pole mount enclosure that integrates several nVent products, part of a customized solution for a trackside signaling application.

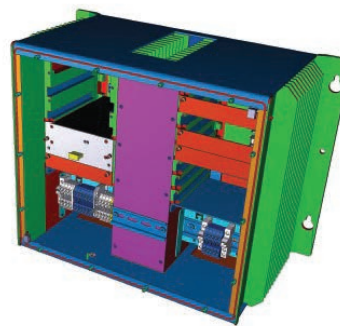


- 1 Outdoor pole mount enclosure from nVent HOFFMAN
- 2 Customized cooling from nVent SCHROFF
- 3 Cable management from nVent CADDY
- 4 Metallic braided cable for EMC protection from nVent ERIFLEX

## ADVANCED CAPABILITIES

With its extensive capabilities and expertise, nVent delivers innovative solutions to the rail and transit industry that help rolling stock OEMs and signaling and communication providers overcome complex challenges. Railways throughout the world operate in harsh conditions, from exposure to extreme environments to the everyday shock and vibration that occurs as trains travel over track. Railway networks are an especially demanding environment for sensitive electronic systems, which is why highly specialized, engineered designs are essential.

- nVent SCHROFF has extensive capabilities that include proto-typing and testing. With designs based on modular platforms and standard components, nVent SCHROFF meets specific customer requirements with solutions that are cost effective and scalable. nVent SCHROFF also provides customized cooling solutions.
- nVent ERIFLEX provides custom design and manufacturing of busbars and braided cables, delivering connectors cut to exact length and bent to the perfect shape.
- nVent ERICO is a global leader in railway surge protection and grounding. With expert application engineers and onsite test laboratories, nVent ERICO can configure the perfect solution for even the most unique applications.



The above images demonstrate the state-of-the-art nVent SCHROFF engineering and design resources. The enclosure rendering (pictured left) is a custom design, features and functionality are designed for specific applications. Pictured right is a graphic produced by thermal imaging software to analyze the thermal properties of an enclosure design. These services can be leveraged to solve thermal challenges before the first prototype is built, ultimately enabling a faster design cycle.



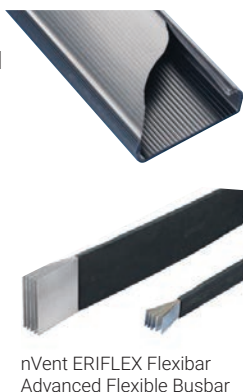


## ADVANCED MATERIALS

nVent connects and protects sensitive electrical and electronic equipment with innovative products that exceed the limitations of conventional materials. Many nVent products have proprietary material compositions, creating significant advantages that can improve system safety and reliability, lengthen service life longevity and create efficiencies that can lower costs.

### Advanced Technology Insulation

- nVent ERIFLEX Advanced Technology insulation is low smoke, halogen free and flame retardant (EN 45545-2), capable of operating at higher temperatures thus improving system safety and reliability
- Comprised of an advanced TPE material, Advanced Technology insulation of nVent ERIFLEX power conductors improves performance and service life, and provides the extreme flexibility to bend and shape busbars and braided cables to make any connection.



nVent ERIFLEX Flexibar  
Advanced Flexible Busbar

### Innovative Material Compositions

nVent ERICO provides groundconductor cables and rods with innovative material composition. In earthing systems, copper is typically the premier material with its superior conductivity and resistance to corrosion, but is a costly material, which also makes it susceptible to theft.

- The nVent ERICO Cu-Bond composite cable's surface is tinned copper plated steel, which protects and conceals the copper core.
- The nVent ERICO Copper Bonded Ground Conductor is an innovative, high-quality ground rod. The copper surface provides resistance to corrosion, and the steel core minimizes the overall cost of the conductor.

nVent ERICO  
Cu-Bond  
Composite  
Cable



nVent ERICO  
Copper  
Bonded Ground  
Conductor



## CERTIFICATIONS

As a trusted railway industry supplier, nVent ensures that products and solutions meet key industry requirements.



### Fire Safety Performance

- EN 45545-2
- UL2885
- IEC 60754-2
- IEC 61439-1



### Shock and Vibration Resistance

- EN 50125-1/-3
- IEC 61587-1: 2000-01



### Electrical Performance

- ANSI®
- IEEE® C62.41.2-2002
- Cat A, Cat B, Cat C



### Environmental Resistance

- EN 60529 up to IP 55
- NEMA 4X
- IEC 61969-3, EN 50125-3
- UL 2556
- UL 854



### Quality Manufacturing

- ISO 9001:2015



### Misc. Railway Standards

- AREMA
- CENELEC
- IRIS
- Indian Railway Standards

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Our powerful portfolio of brands:

**CADDY ERICO HOFFMAN RAYCHEM SCHROFF TRACER**



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