



CONNECT AND PROTECT

Trackside Heating Systems

Proven solutions for melting snow and ice on track, switches and catenary lines







Innovative heating solutions from nVent allow for safe, reliable railway operations in harsh winter conditions.

Snow and ice buildup on track and catenary wires pose a major safety risk and can cause serious disruptions to rail service. nVent offers a diverse range of solutions that improve railway safety and reliability, including a line of track infrastructure heating systems that help trains go in the snow. Our comprehensive portfolio of thermal solutions features advanced heating cable technology from nVent RAYCHEM, as well as fastening and cable management solutions from nVent ERICO to form a comprehensive heating system. nVent provides full engineering support and customized solutions for every project, ensuring proper fit and function in even the most unique track locations. Our comprehensive rail infrastructure heating portfolio includes:

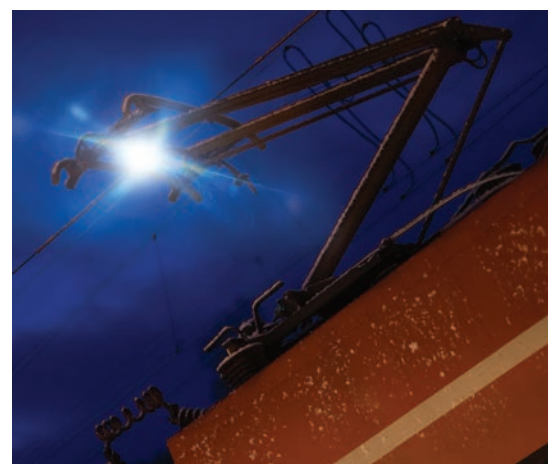
SWITCH HEATING



CONTACT RAIL HEATING



CATENARY HEATING



Switch Heating



Railway switches are mission critical to railway safety.

Railway switches are a critical part of safe, reliable railway operations. During the winter months, snow and ice build-up on track can prevent switches from properly aligning, posing a major challenge to rail networks throughout the world. nVent offers solutions for melting snow and ice on track switches, helping railways operate safely in harsh winter conditions. nVent switch heating solutions incorporate innovative nVent RAYCHEM heating cable technology with the rail infrastructure expertise and high quality components of nVent ERICO, to provide high quality heating systems that can meet the needs of almost any turnout and crossing application.

Railways throughout the world face different types of operating conditions, especially during the winter months. nVent offers two switch heating product lines that feature different heating technologies.

- The **nVent Self-Regulating Switch Heating System**, is an innovative solution that automatically adjusts power output to compensate for temperature changes, delivering the exact output of power required to keep tracks clear.
- The **nVent Flat MI Constant Wattage Switch Heating System**, a service proven solution featuring an energy efficient flat MI (mineral insulated) heating element that heats more rail surface area with greater efficiency and longer life than conventional tubular heating rods.



nVent Self-Regulating heating system

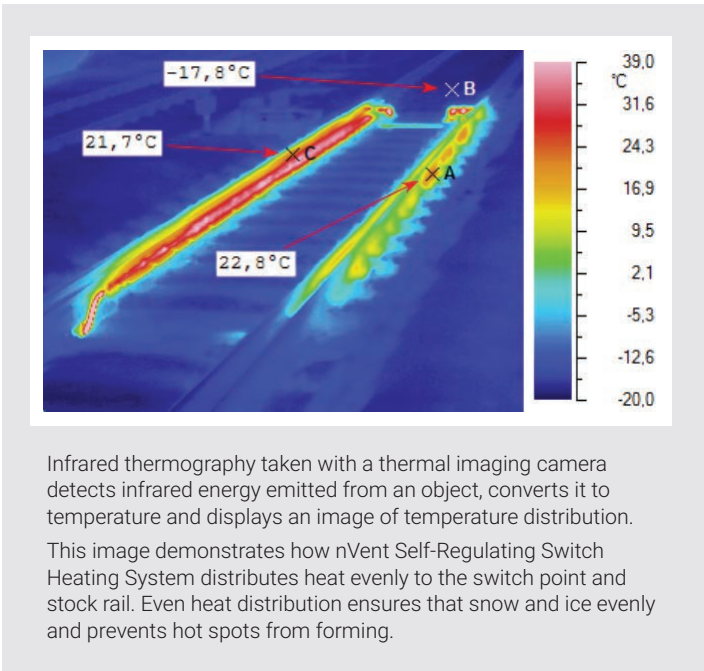
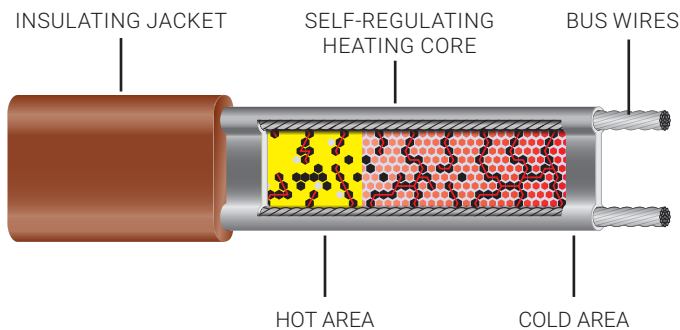
nVent Self-Regulating Switch Heating System

SELF-REGULATING HEATING CABLE TECHNOLOGY

Self-Regulating heating cables were pioneered by the Raychem Corporation (nVent RAYCHEM) more than 30 years ago. This innovation led to heating applications for many industries, including railway switch heating applications.

Today, nVent provides switch heating systems with self-regulating cables to provide a solution that delivers robust heat to the stock rail and switch point blade, and is up to 30% more energy efficient than conventional alternatives. Self-Regulating cables automatically vary power output in response to sensed changes in ambient temperature at every point along the length of the cables. As the surrounding temperature changes, the nVent Self-Regulating Switch Heating System provides heat where and when it is needed, virtually eliminating unnecessary energy consumption. This innovative nVent solution offers many advantages, including:

- **Safe to Operate** – system temperature maxes out at 176°F/80° C / 25V, which makes it safe to the touch for personnel.
- **Energy Efficient** – system eliminates wasted wattage consumption, significantly lowering energy costs, and thus total cost of ownership.
- **Durable** – featuring a simple design with rugged construction that is secured in place with high quality, corrosion resistant nVent ERICO rail clips, which allow the system to withstand the rigorous vibration of heavy rail traffic.
- **Flexible** – systems are customized to the exact requirements of each application, with heating cables cut to the specific lengths. nVent also provides ongoing support and a host of value-added options, including state-of-the-art connection kits and accessories.



Specification	nVent Self-Regulating System
Voltages	24 VAC–24 VDC
Output	Nominal 25-30 W/ft (82–98 W/m) @ 32° F (0° C)
Total number of cable runs	4 -24 runs depending the application and customer preference
Heating element	Polymeric self-regulating core
Sheath material	Fluoropolymer
Attachment method	nVent ERICO Rail Clips & Accessories & Stainless Steel Channel
Heater location	Stock rail and moving rail
Heater dimensions	12 mm (0.47") x 4 mm (0.16")
Lengths available	3 ft (.91 m) to 36 ft (10.97 m)
Custom length	Yes
Heating technology	Self-Regulating
Controller required?	Not required by can be implemented per the customer's preference
Control options	– Snow Sensor – Advanced control systems with remote monitoring and telemetry

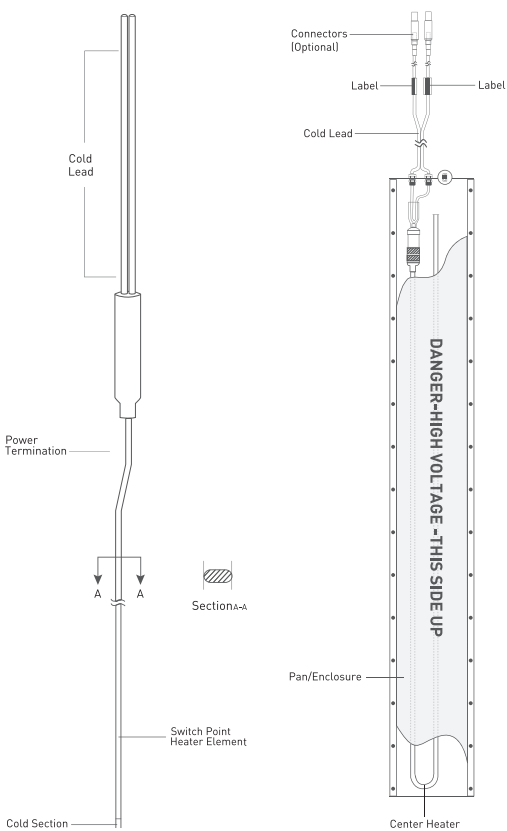
nVent Flat MI Constant Wattage Switch Heating System

CONSTANT WATTAGE TECHNOLOGY

The nVent **Flat MI Constant Wattage** Switch Heating System is a service-proven solution that keeps turnouts and crossing operation in harsh winter conditions. This system includes a flat mineral insulated (MI) heating element capable of covering more track surface area than conventional tubular heaters, melting snow and ice on a greater portion of the rail web. The nVent Flat MI Constant Wattage Switch Heating System provides numerous advantages, including:

- **Energy Efficiency** – while known for its powerful heating performance, constant wattage heating elements are also energy efficient, operating at a relatively flat temperature curve with lower start-up temperatures to limit energy consumption.
- **Ease of Use and Value Added Options** – nVent makes it easy, with simple installation that requires no loosening or removal of the braces, virtually no system maintenance and no need to remove system for switch maintenance, and a value added option that include integrated nVent system control and communication systems solutions (further described on p.9).

nVent Flat MI Constant Wattage Switch Heating Systems include heating elements for both switch points and switch rods. System heating element available in stainless steel or Inconel™ sheath material to handle corrosive/high-moisture environments. Like all nVent trackside heating solutions, this system is secured in place by high-quality nVent ERICO rail clips and can include additional products from the nVent portfolio, including enclosures, surge protection and other components.



Specification	Switch Point Heating System	Switch Rod Heating System
Voltages	120–480 VAC, 600–750 VDC	120–480 VAC, 600–750 VDC
Output	75 - 250 W/ft / (246 –820 W/m)	75-300 W/ft (246–984 W/m)
Total number of cable heater runs per switch	2	Up to 3
Heating element	Nichrome constant wattage element	Nichrome constant wattage element
Sheath material	Inconel™/Stainless steel	Galvanized or stainless steel enclosure; stainless steel heater sheath
Attachment method	Clips or Bolt-on	Clips
Heater location	Field or gauge side of stock rail	Under the switch rods between ties
Heater dimensions	Width: 0.63" (16 mm) Thickness: 0.22" (5.5 mm)	0.67" (17 mm) x 0.24" (6 mm)
Lengths available	8 ft (2.4 m) to 36 ft (10.97 m)	Enclosure lengths: 4 ft (1.2 m) to 12 ft (3.7 m)
Custom length	Yes	
Heating technology	Constant Wattage	
Control options	- Snow Sensor - Advanced control systems with remote monitoring and telemetry	

Contact Rail Heating

A contact rail, or third rail, provides power to rolling stock via an additional rail that acts as an electrical conductor. Typical in passenger transit systems, **the contact rail is a critical** part of track infrastructure that **must be protected from snow and ice** to avoid serious disruptions to service. nVent helps transit systems maintain safe, reliable train service in harsh winter conditions with proprietary heating solutions for contact rails. We offer two types of contact rail heating systems, nVent RAYCHEM CRH-SL and nVent RAYCHEM PTC-Z.

NVENT RAYCHEM CRH-SL

The CRH-SL Self-Regulating heating cables feature a polymeric, semi-conductive core extruded between the two parallel bus wires. This parallel construction allows the cable to be cut to length. The power output of heating cables decreases with increasing temperature due to the self-regulating behavior of the semi-conductive core. This ensures no overheating of the cables at high power outputs. The cables have rugged aluminum lamination that ensures efficient heat transfer to the rail as well as reduced risk of in-service or installation damage.

NVENT RAYCHEM PTC-Z

- Service-proven system capable of high wattage output to melt snow and ice in the most demanding winter conditions.
- Utilizes an energy-efficient, power-limiting technology that reduces total cost of ownership.
- Features a rugged heating cable, durable enough to resist in-service damage to provide long-lasting performance on track.
- Efficient system is easy to install with included proprietary spring clips and fiberglass channel attachment hardware. It arrives at the job site pre-terminated for simple field connections.



Specification	nVent RAYCHEM CRH-SL	nVent RAYCHEM PTC - Z
Power output	27- 35 W/ft (88–115 W/m) at 32° F (0° C)	30, 40, 50 W/ft (98, 131, 164 W/m) at 32° F (0° C)
Voltage	600, 625, 650, 750 VDC	480 VAC, 600, 625, 650, 750 VDC
Minimum installation temperature	0° F (-18° C)	0° F (-18° C)
Maximum intermittent exposure temperature	230° F (110° C)	392° F (200° C)
Sheath material	Fluoropolymer with aluminum lamination	Thermally conductive silicone rubber

APPROVALS

nVent RAYCHEM PTC-Z contact rail heating cables meet the requirements of the U.S. National Electrical Code and the Canadian Electrical Code. The contact rail heaters are typically offered as a part of an integrated system with optimized energy-efficient design for each rail type and operating conditions. The system includes heater terminations, attachment hardware (spring clips, fiberglass channel and abrasion pad), fuse boxes, telemetry and controls. For additional information, contact your thermal representative, or call (800) 545-6258.

Catenary Heating

Catenary systems are common in passenger trains, providing electrical power for train propulsion via wires situated over the track. In cold-weather regions, ice will often pose a challenge to rail operators throughout the winter months. Even in warmer climates, ice buildup from freezing rain can cause serious problems for railroads – especially the accumulation of ice on overhead lines. Ice buildup on contact wires will interrupt the electrical energy transmission to the train and add weight that increases tension on the wires, placing the entire infrastructure at risk for failure. Besides the obvious risks ice poses to safety, fixing damage caused by ice on catenary systems can be extremely costly. This is why protecting overhead lines from ice buildup is necessary in any region where temperatures are cold enough to produce freezing rain. In addition to proven solutions for melting snow and ice on tracks, nVent provides a state-of-the-art system for keeping overhead contact wires free from ice.



nVent RAYCHEM CATHeat system features a high-temperature fluoropolymer jacket, thermally-conductive silicone outer jacket, and phos-bronze mounting clips



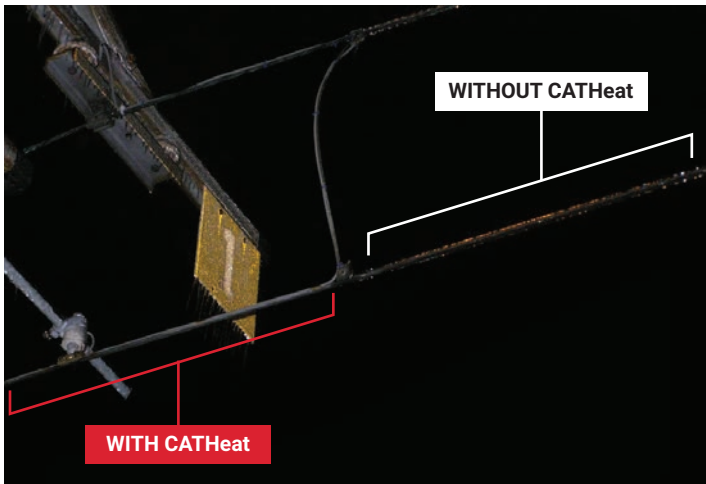
CATHeat installed on METRA Highliner, Chicago IL

CATHEAT ADVANTAGES

- **Service-proven** CATHeat is a unique, superior alternative to ice cutters and mechanical ice removal methods.
- **Efficient system** quickly transfers energy to the contact wire, providing ice-melting heat to the overhead line in a short period of time.
- **Easy-to-operate** system is simple to install and will not interfere with network infrastructure or vehicle operations.
- **Energy-efficient** constant wattage heating technology provides reliable performance with a low cost of operation.
- **Value-added** nVent control and communication modules offer numerous configurations for system operation, including via remote dispatch center.

APPROVALS

The CAT Heat cables meet all applicable requirements of IEEE 515 and IEEE 515.1 standards.



Specification	nVent RAYCHEM CAT Heat
Power output	10 W/ft. (33 W/m)
Voltage	600, 750, 1500, 3000 VDC
Circuit lengths	250–3000 ft (75–900 m)
Maximum intermittent exposure temperature	392° F (200° C)
Heating technology	Constant wattage
Sheath material	Thermally conductive silicone rubber

Controls & Telemetry

nVent trackside heating solutions include control and telemetry products, forming systems that can be controlled from on-site and remote locations. We offer control systems for contact rail, catenary, and switch-heating applications. nVent trackside heating control panels contain standard industry PLCs, electronics and hardware, and SCADA system components that link on-site controllers to off-site operator interfaces via wireless data transmission. The control panels utilize well-established nVent products, such as nVent Hoffman enclosures, nVent ERICO surge protection and nVent ERIFLEX electrical connection solutions. Because every trackside heating requirement is unique, we provide custom control panel configurations for each project to ensure proper fit and function. Offering this comprehensive line of control and telemetry products is one of the many ways that nVent connects and protects critical systems that improve rail safety and reliability.

FUNCTIONALITY

Adding control and telemetry modules to nVent trackside heating systems allows for numerous operational configurations and functional advantages, including:

- **Real-time control and monitoring capability**, allowing for operations on site or at a remote dispatch center.
- **Data communication**, providing real-time power consumption data and retaining historical records for analysis.
- **Operational simplicity**, allowing most troubleshooting to be performed remotely.
- **Industry standard components** that easily integrate into, and interface with, existing sub-systems (e.g., power distribution centers and safety equipment), which are easy to replace when necessary.
- **Cost savings** through strategic system utilization of heating system, especially with features like automatic on/off functionality that can be preprogrammed based on certain criteria.

TECHNICAL SPECIFICATIONS

Trackside Control Panels

- 600–750 VDC capabilities
- 250A switching capability
- Available surge/lightning protection
- Fuse boxes

Control Communication Systems

- Wireless, fiber optic, RS-485
- Telemetry to and from OCS SCADA interface
- Touchscreen user interface (HMI)
- Data recording and analytics

Hardware Requirements

- Control panel
- 2.4GHz/900MHz wireless radio
- Programmable logic controller (PLC)
- Industrial PCs
- SCADA software



About nVent



At nVent, we believe that safer systems ensure a more secure world. We improve the safety and reliability of assets across a wide range of industries through inventive electrical solutions that securely connect and protect mission-critical systems. Maximize your productivity. Minimize downtime. Reduce operating costs. Trust nVent to connect and protect your electrical infrastructure.

We serve global railway markets with trusted solutions from nVent ERICO, ERIFLEX, HOFFMAN, RAYCHEM and SCHROFF. Our customers include major freight and transit railroads as well as global transportation companies that build rail vehicles and operate railway networks. We are well versed in the design criteria of rail networks, from railway engineering standards like AREMA (American Railway Engineering and Maintenance-of-Way Association) and CENELEC (European Committee for Electrotechnical Standardization).

nVent products meet and exceed global electrical and electronic engineering standards set forth by the IEEE (Institute of Electrical and Electronics Engineers) and UL electrical product safety standards. nVent produces railway products at over 15 locations, part of a manufacturing footprint that includes a total of 23 sites spread over a dozen countries. nVent facilities maintain the highest standards for production quality, with certifications that include ISO 9000, ISO 9001 and IRIS REV 02.

nVent Worldwide Presence



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Our powerful portfolio of brands:

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