



## HEAT SHRINK ELECTRICAL TERMINATIONS SAFEGUARD A CANADIAN CRUDE-OIL PIPELINE

**With its co-extruded, dual-layer construction and relative ease of installation in the field, TE Connectivity's (TE) Raychem HVT-Z heat shrink termination withstands extreme temperatures and exposure to hydrocarbons — key factors for this remote oil-and-gas application.**

### The Challenge

A leading Canadian energy-delivery company recently undertook a multibillion dollar program involving the replacement of more than a thousand miles of piping, and the installation or upgrade of a series of motors, pumps, and valves that are needed to keep oil and natural gas flowing throughout the pipeline. This capital-intensive project was the largest of its kind undertaken in the company's history.

The company operates a complex infrastructure involving tens of thousands of miles of active pipeline that transports crude oil and other hydrocarbon liquids across the U.S. and Canada. It moves a significant percentage of the crude oil produced in North America and the natural gas that is consumed in the United States. The project was needed to upgrade a portion of the aging infrastructure and to add the capacity needed to support steady growth in Canadian crude oil production.

### Featured:

**Country:**  
Canada

**Industry:**  
Oil and Gas

**Challenges:**  
Terminate MV cables and deliver protection against electrical discharge, hydrocarbons and extreme temperatures in remote location; provide inventory management, logistics and training support

**Solutions:**  
TE's Raychem HVT-Z heat shrink termination

### Key Figures:

- 10,000's miles of pipeline
- 18 month project
- 2,500 terminations in two sizes 8 kV and 15 kV

The new pipeline included eight new above ground pump stations which were built to operate reliably in harsh, remote locations across the Canadian prairies. The equipment is subject to harsh environmental conditions, as temperatures in this region can vary from -40°C to +40°C (-40° to +104°F) throughout the year and have the potential to be exposed to hydrocarbon vapors.

The reliability of any oil-and-gas pipeline depends directly on the reliability of the electrical connections used to power the machinery that keeps the inventory moving. To safeguard these critical assets and ensure reliable service, the company required an electrical medium-voltage termination for the power cables attached to the motors, pumps and valves. It would have to withstand the harsh ambient conditions and perform worry-free for years. Any failure would require costly and dangerous interventions.

Another particular challenge was the need to ensure that there would be adequate supply of terminations available to the contractors that were working concurrently on different segments of pipeline during this ambitious project.

## The Solution

After reviewing competing products, including TE's cold-applied terminations that do not require a heat source in the field to install them, the company selected **Raychem HVT-Z heat shrink terminations** from TE Connectivity. Raychem heat shrink terminations were determined to best meet the performance and reliability requirements to ensure that the power cables will remain electrically and mechanically protected from the common forms of failure the equipment would likely encounter in the field. These include tracking, moisture ingress, temperature extremes and exposure to hydrocarbons.

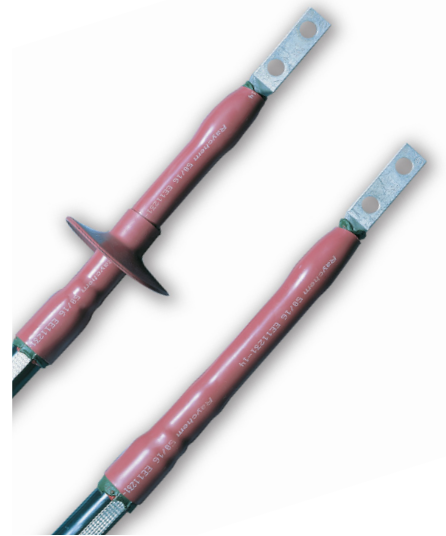
The project ultimately involved the installation of 2,500 Raychem HVT-Z terminations in two sizes (8 kV and 15 kV), over a span of 18 months.

Unlike other options, which would have required two separate tubes of protective polymer insulation to be heat shrunk onto existing electrical cables, the Raychem HVT-Z heat shrink product is manufactured as a co-extruded, dual-layer product. The dual-layer construction includes:

- A zinc oxide inner layer that helps to minimize stress damage and provide maximum impulse withstand performance
- A co-extruded outer layer made from a non-tracking Raychem material, which protects the cable from environmental elements such as chemicals, humidity, oxidation and UV radiations

This dual-layer construction allows the heat shrink termination to be installed as a single unit, thereby streamlining and simplifying the installation process in the field. Once the dual-layer tubing is heat shrunk, the inner layer softens and anneals to irregular surfaces, providing a moisture seal and maximizing electrical stress control. The Raychem medium voltage terminations for shielded cables are fully qualified per IEEE-48 as Class I terminations to provide a long, trouble-free service life.

The assembly kit includes heat shrink tubing and other components (such as the grounding kit). In the field, the trained and certified field technician prepares and cleans the surface of the cable, slides the dual-layer tube onto the cable and then uses open flame to heat shrink it to the surface.



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As proper installation of any heat shrink termination is critical to its long-term performance, TE worked closely with the company, providing extensive training and certification to the enlisted network of approved contractors for this expansive pipeline upgrade. The company also enlisted additional contractors throughout Western Canada that had already been trained and certified by TE.

Early planning helped ensure that there would be adequate supply of inventory available to the contractors that were working concurrently on different segments of pipeline during this ambitious project. TE's Canadian Sales Team made provisions for a dedicated product inventory to be stocked in its regional distribution center. Working closely with the company, TE established a minimum and maximum level of required inventory, with 5-10% extra inventory on hand, to avoid any delays in the project schedule. Also, maintaining that inventory in Western Canada allowed for faster delivery to its network of certified contractors.

## The Outcome

TE's Raychem HVT-Z heat shrink terminations provided the required mechanical and electrical performance, while meeting the reliability demands of this massive upgrade project. The terminations' dual layer construction helped to streamline the installation process while TE's training and certification collaboration with the contracted installers led to higher installation efficiency and accuracy. TE's customer service efforts ensured adequate product inventory and provided just-in-time delivery to fulfill the order requirements of approximately 2,500 Raychem HVT-Z heat shrink terminations throughout the duration of the project.

**“Our role comes with tremendous responsibility. That’s why safety and operational reliability is our number 1 priority,”**  
says President and CEO of the company.

This extensive upgrade project which required the installation of more than a thousand miles of pipeline, and a complex network of associated motors, pumps and valves, was completed on schedule over an 18-20 month period and the system is now in operational service.

Learn more at [TE.com/heatshrink](https://www.te-connectivity.com/heatshrink)

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