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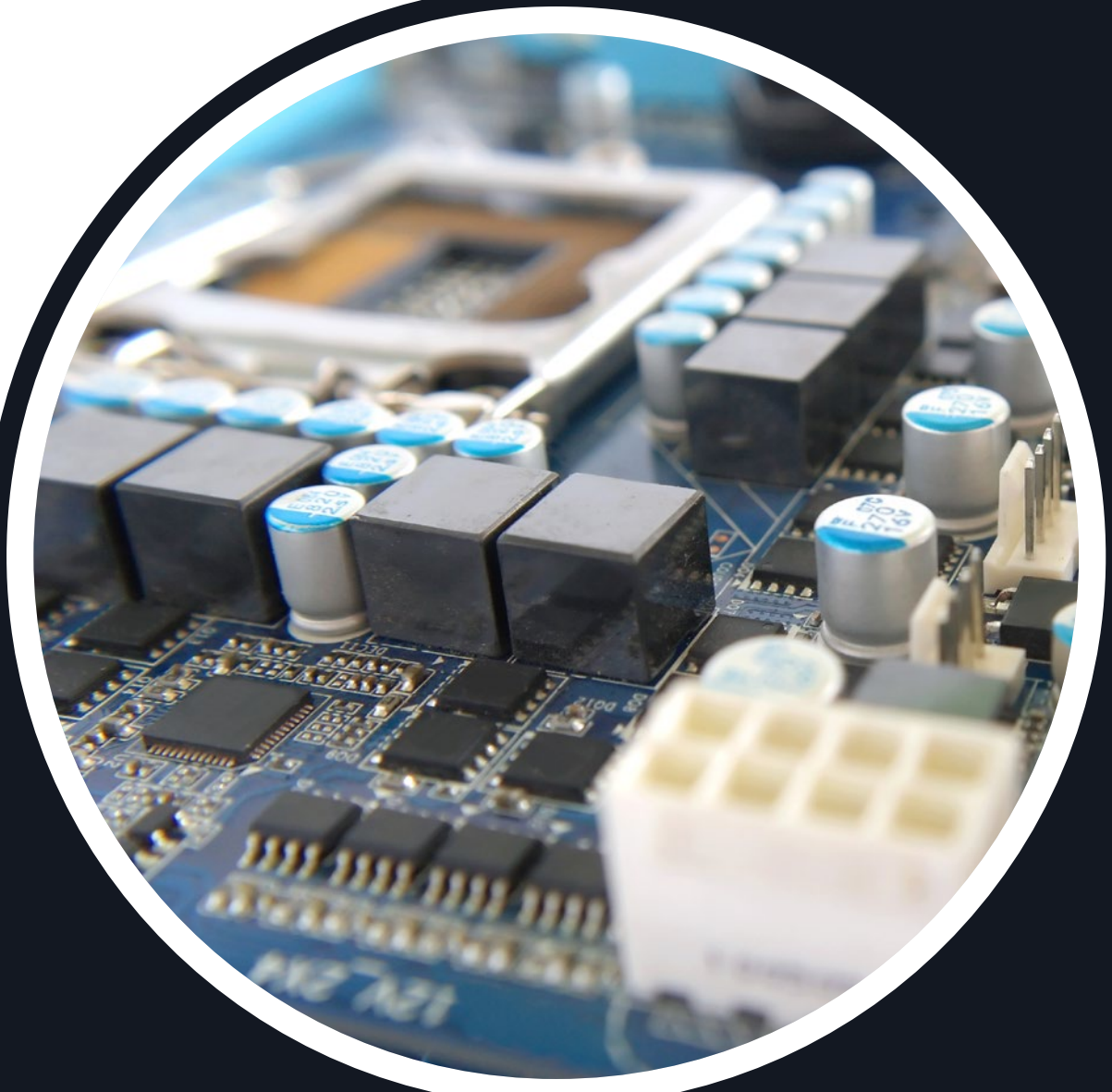
HEATING SOLUTIONS FOR THE **SEMICONDUCTOR INDUSTRY**

WORLD LEADER IN INDUSTRIAL
PROCESS HEATING SOLUTIONS

WWW.THERMON.COM

2022



Thermon provides the heating solutions that are essential to the semiconductor industry. With superior heating solutions including foreline, gas distribution and pump lines, freeze protection of water cooling and process lines, dew point control and emissions monitoring (CEM's)- Thermon is here to keep your business running smoothly and safely.

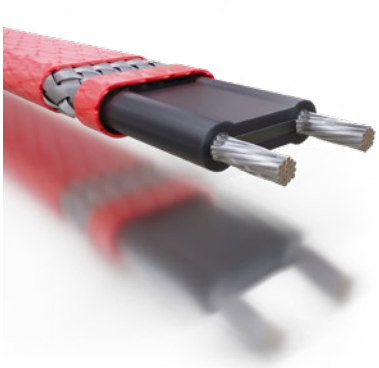
Thermon Heating Applications & Solutions for Semiconductors:

- **Foreline**
- **Pump**
- **Gas Distribution**
- **Abatement**
- **Freeze Protection**
- **CEM's**

World Leader in **Industrial Process Heating Solutions**

TRACE HEATERS

Thermon has been providing solutions that utilize heat tracing since the company's founding in 1954. In the semiconductor industry, trace heaters are used for temperature maintenance and freeze protection of tubes and pipes.



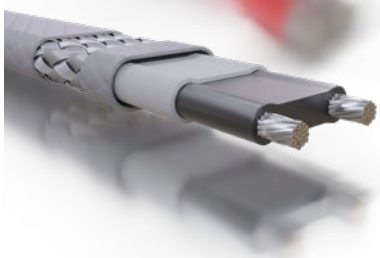
VSX-HT

A high performance self-regulating trace heater designed for process temperature maintenance applications where high maintain temperatures or high temperature exposures are required. Proven to provide decades of performance, VSX-HT is the product of choice for semiconductor plants worldwide.

VSX-HT self-regulating heater cable is designed to maintain 150°C on foreline heating offering extended circuit lengths with minimal power cable requirements, self-regulating control methods and the highest quality product to achieve extended product life and optimum reliability.

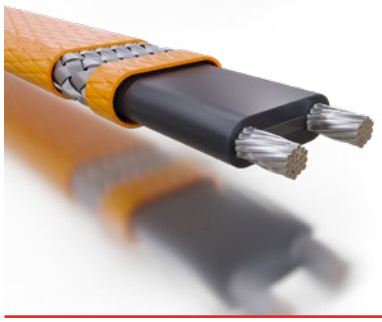
HPT

A high performance power-limiting trace heater designed for process up to 180°C temperature maintenance where high maintain temperatures or high temperature exposure is required.



BSX

A self-regulating trace heater designed for freeze protection and low process temperature maintenance for metallic and nonmetallic piping, tanks and equipment.



HTSX

A self-regulating trace heater used for process temperature maintenance and where high temperature exposure capability is required. Constructed using Thermon's unique and proven monolithic co-extrusion process, HTSX is the market leading self-regulating heat tracing technology.

Benefits of Thermon self-regulating heating technology for semiconductor pipe and tube heating applications:

- Long circuit lengths (more than 50 meters) resulting in significant saving in power distribution and control
- Cut-to-length and easily modified on site
- Fits and can be adapted to all pipe and tube sizes and inline equipment
- Predictable and proven thermal performance
- Highest quality product providing decades of reliability and productivity

CONTROLS & MONITORING

Thermon's industry-defining control and monitoring system is the Genesis Network™. The Genesis Network™ delivers full operational awareness and supervisory control over heat trace systems, with low total installed cost and maximum flexibility. Genesis Network ™ connects all heat trace controllers via wireless mesh communications to the control room. In the control room, alarms and performance history are logged and displayed to operators, maintenance teams, and management via a user-friendly browser-based interface accessible from any PC or tablet.

Benefits of Thermon Control & Monitoring Systems

- Increased up-time resulting from site-wide visibility of all heat trace operating conditions and alarms
- Optimized alarm settings tuned to accurately flag outlier behavior and avoid nuisance alarms

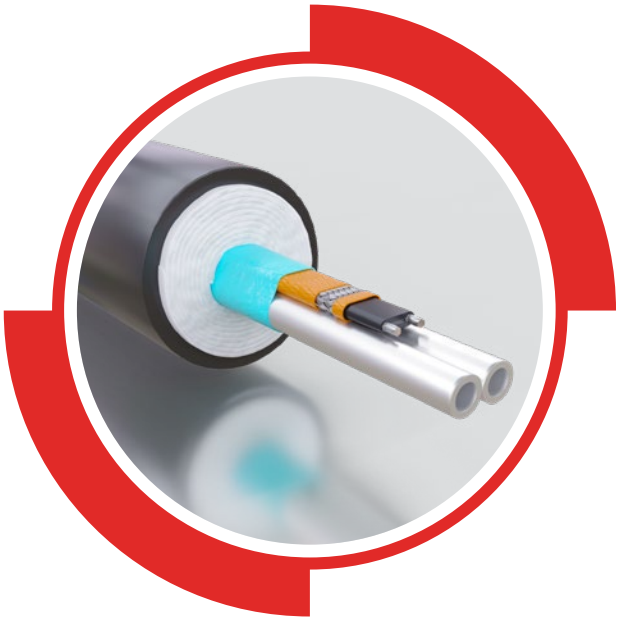
Fewer maintenance hours due to rapid diagnoses and troubleshooting of issues and sources of alarms

Streamlined maintenance and operations resulting from the accurate and timely analysis and presentation of data relating to the heat trace system

Improved response time to upgrades, expansions, and maintenance activities and the related configuration changes

HEATED TUBING BUNDLES
TUBETRACE

Thermon offers preinsulated tubing bundles for applications including freeze protection, process temperature maintenance and emissions monitoring. Heated and coiled preinsulated tubing bundle that incorporates tube, heater cable, thermal insulation and outer jackets is an ideal solution for process and dew point maintenance (gas distribution) on all standards of tubing. Thermon's TubeTrace is the perfect solution for this requirement.



TubeTrace

Standard TubeTrace Bundles are designed so the outer jacket will not exceed 60°C (140°F) when the process tube is 204°C (400°F) 2 and the ambient is 27°C (80°F), no wind.

"Cut-to-Length" Coils Long coils of TubeTrace are available in a variety of
configurations and tube sizes. With Thermon "cut-to-length" heat tracing, TubeTrace can be reeled off and cut to fit each specific application. Tube unions and heat trace splices can be completely eliminated. TubeTrace coils up to 152 m (500 feet) long minimize waste and ensure the lowest possible installed cost.

Straight Lengths
For single short length applications, with large tube sizes or where specifications demand small amounts of high alloy tubing, straight lengths (stick tubing) are available. Even in straight lengths, TubeTrace bundles provide reliability and consistency compared to field traced and insulated systems.

Benefits of Preinsulated Tubing Bundle Solutions:

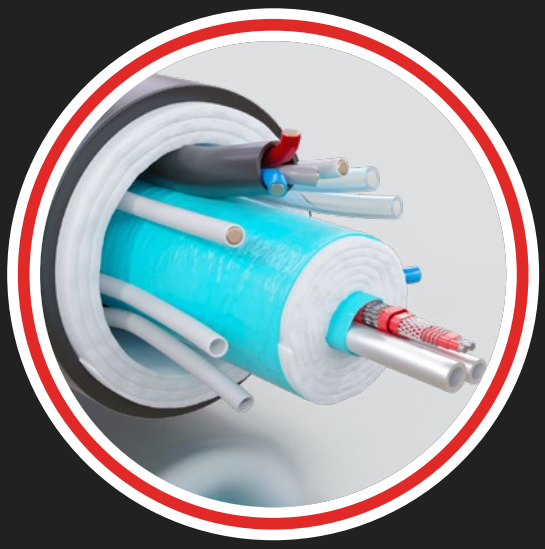
Combines tube, heater, insulation and outer jacket in one cut to length solution and provides:

- Fast installation
- Reduction in installed cost
- Long term reliability and safety of the entire system

Continuous Emissions Monitoring - CEM's

Environmental Controlled Pollution Monitoring

- Heated sample lines from sampling location to analyzer
- Custom made bundles - maintain up to 180°C
- Cut to legnth
- High quality consistent thermal performance



Custom CEMs and Analyzer Sample Lines

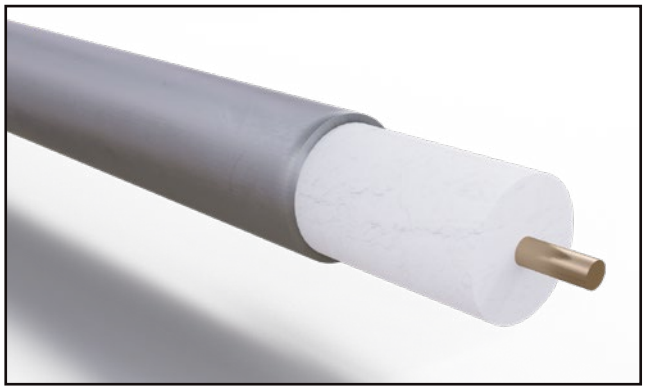
Electrically Heated Tubing Bundles

Increased regulatory requirements are stringent, real, and can be costly for emissions monitoring sampling. This is particularly true for high temperature extractive and mercury (Hg) CEM's applications.

PROCESS HEATING

Thermon Heating Systems provides a wide range of heating elements for semiconductor applications.

- Sheathed elements for CVD and PVD equipment
- Metal sheathed tubular elements
- Cartridge elements
- Gas delivery heaters
- Chuck heaters



MIQ mineral insulated cables are manufactured using Alloy 825, a high nickel/chromium alloy ideally suited for high temperature service up to a maintain of 500°C and exposure to 600°C

Thermon heating elements comply with the strictest temperature uniformity and radiographic imaging testing.

DESIGN AND ENGINEERING SUPPORT

Thermon's many years of experience in heating solutions provides our customers with the highest quality design and engineering support.

THERMON'S POWERBLANKET PRODUCTS

HEATED AND INSULATED COVERS

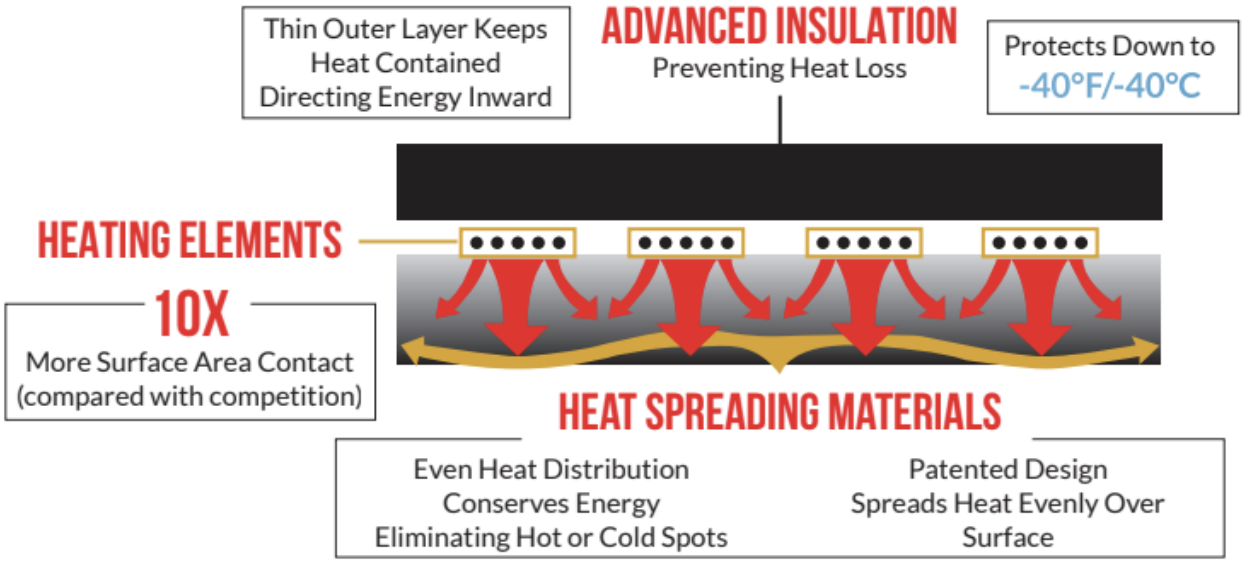
When there is a requirement to heat and maintain desired gas temperatures, provide process heating or freeze protection, gas cylinder and drum heaters provide a high quality and high performance product with fast availability.

ENGINEERING AND DESIGN EXPERTISE

Thermon's Powerblanket engineers solve every kind of temperature problem, from the simple to the very complex. Our expertise guarantees satisfied customers and a very short turnaround time.

PATENTED HEAT SPREADING TECHNOLOGY

Powerblanket patented heat technology ensures even heat distribution to your product.



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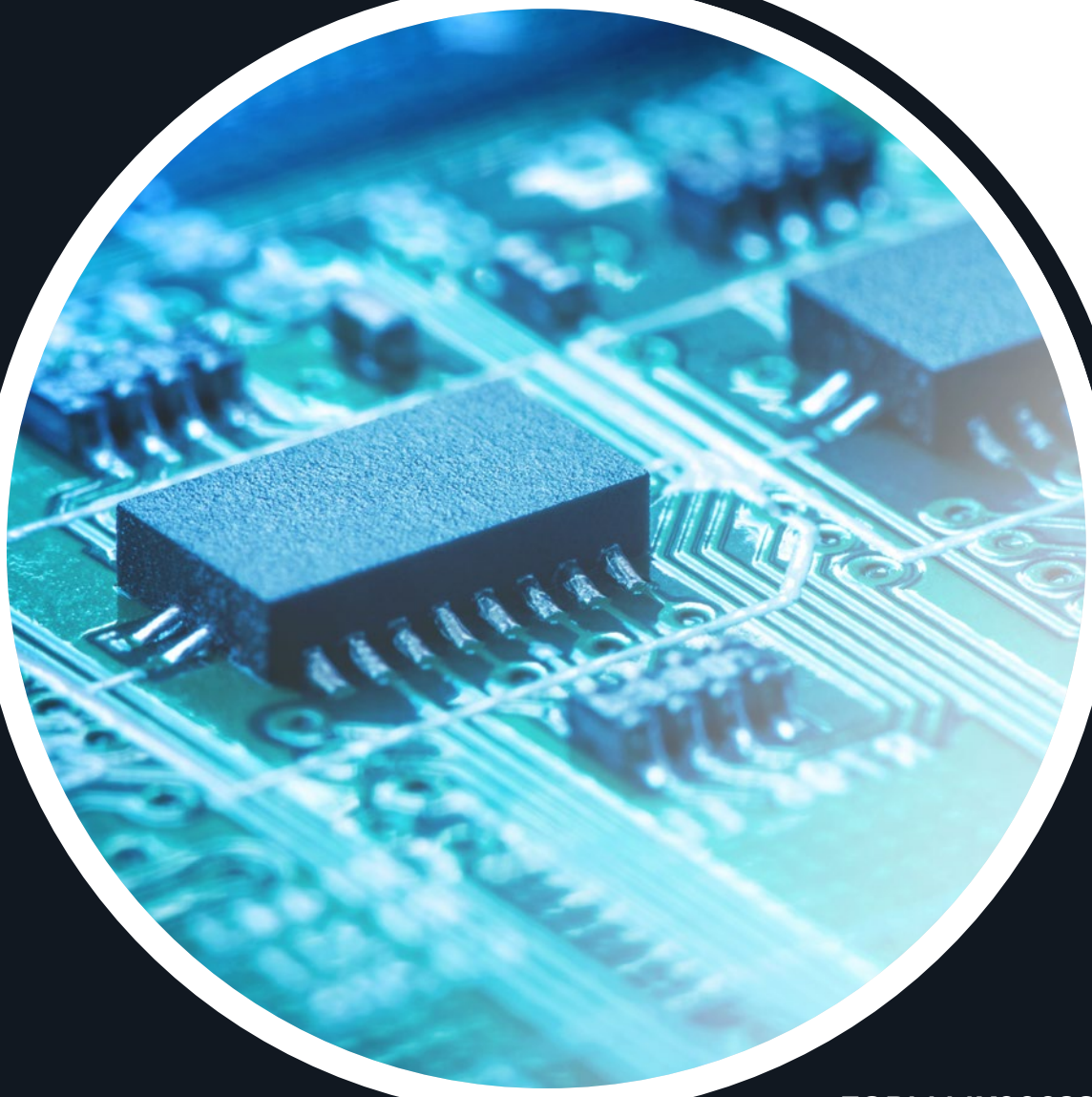
We have the solutions for the heating needs of the semiconductor industry. Visit us at www.thermon.com to find a Thermon representative near you.



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