



# ARTIC OFFSHORE AND MARITIME HEATING SOLUTIONS

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# TRACE HEATING SOLUTIONS FOR ARCTIC OFFSHORE AND MARITIME



Offshore Oil and Gas Platforms



Arctic Rigs



Oil Tankers



Support Vessels



FPSO's, FSO's, FLNG'S and FPU's



FLNG Carriers



Ice Breakers



Research Vessels



Supply Vessels

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## EXPLORATION AND PRODUCTION

Maritime activities in the northernmost regions face challenges such as harsh weather and variable sea conditions. To keep people, equipment and vessels moving safely through icy waters, Thermon offers solutions to meet these challenges in the harshest of climates.

The Arctic region contains a large part of world's undiscovered oil and gas resources. However, exploration and production in the Arctic, where companies and humans are faced with extreme temperatures down to  $-60^{\circ}\text{C}$ , is a difficult undertaking.

## HARSH ENVIRONMENT

In the high north Arctic and polar regions the extremely low ambient temperatures and high winds create snow and ice conditions that require unique operational considerations.

Thermon provides solutions for winterization, temperature maintenance anti-icing and de-icing systems on Arctic vessels and structures. These systems help provide a safe working environment to ensure the safety of personnel and the operation. With over 60 years in the trace heating industry, Thermon is a proven leader in providing heating solutions for offshore and maritime applications.





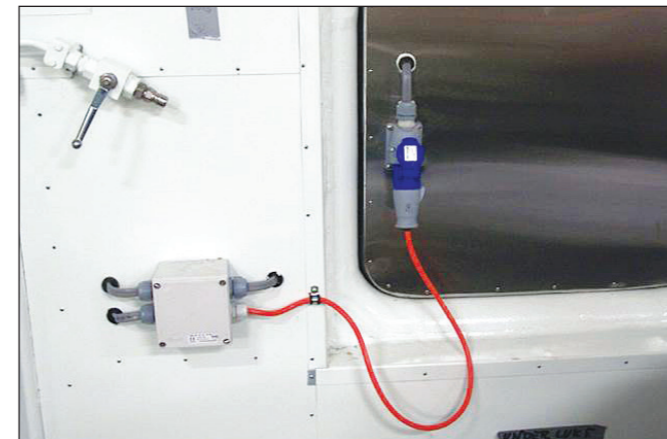
## THERMON SOLUTIONS

In polar and Arctic environments ice formation on exposed surfaces creates serious problems impacting the safety of personnel and operations. The ice formation can be caused by sea spray and/or snow, rain and fog with the low ambient temperature. Thermon has developed anti-icing and de-icing **SOLUTIONS** for offshore support and supply vessels, icebreakers, semi-submersible drill ships and platforms.

The trace heating systems are designed to ensure that all pipes, vessels, instruments and equipment are adequately protected for operations in low temperatures with cold sea water and high wind.

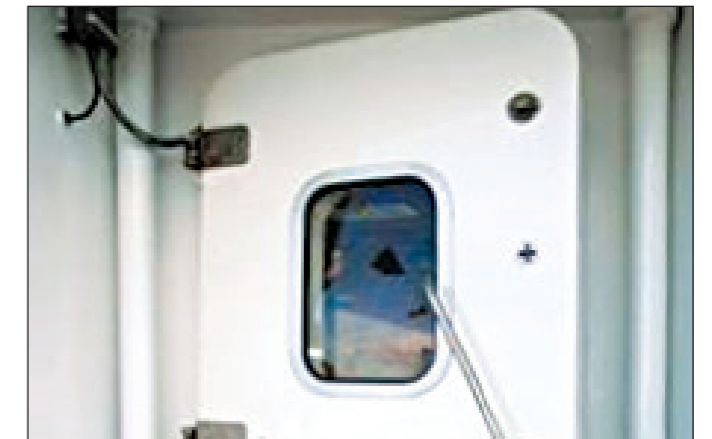
Four design philosophies apply:

- Anti-icing: ice and freeze prevention where surfaces will be maintained above freezing under the 'worst case' ambient design conditions.
- De-icing: removal of accreted ice in a reasonable and defined period of time.
- Winterization: anti-freeze for piping, valves, instruments and equipment containing fluids.
- Process temperature maintenance: temperature maintenance of piping, valves, instruments and equipment.



### HATCHES

Heat trace is required to prevent icing at seals to allow hatch to open as required.



### DOOR SEALS

Water tight doors require sufficient heat to prevent icing of the seals.



### STAIRS

Heat trace for anti-icing or de-icing of stairs is installed underneath each step.

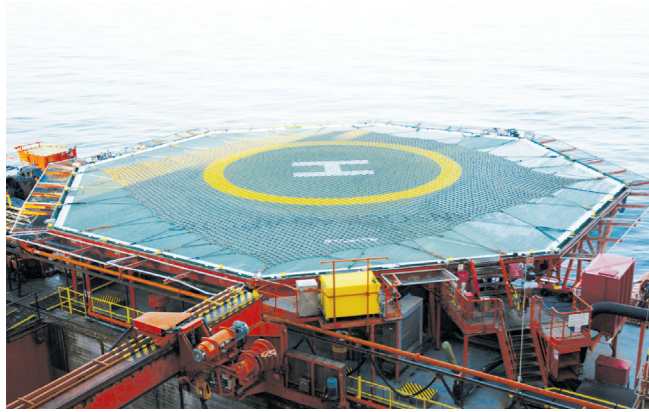


### HAND-RAILS

Heat trace for anti-icing or de-icing of hand-rails is installed to insure safe support for personnel.

# THERMON SOLUTIONS

Thermon trace heating **SOLUTIONS** are specifically designed to provide a safe work environment for platforms, escape ways and helidecks. With over 60 years experience in the heat tracing industry, Thermon will evaluate each design and provide a complete heating system.



## HELIDECKS

Anti-icing or de-icing of helicopter decks can also be required. Different deck designs and materials of construction can require Thermon to evaluate each design to ensure adequate heat and reliable performance.



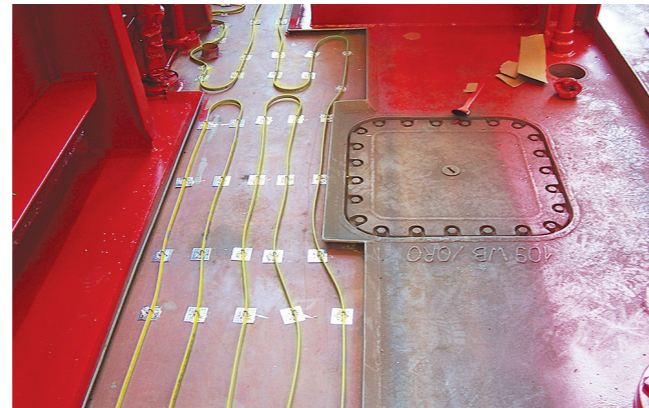
## PLATFORMS AND WALKWAYS

Heat trace can be required for anti-icing or de-icing for personnel safety.



## LIFEBOAT STATIONS

Heat trace is required to provide safety of personnel at muster stations.



Anti-icing and de-icing systems can be designed and installed "on deck" or "under deck" with thermal insulation. Thermon has experience with both types of systems.



# THERMON SOLUTIONS

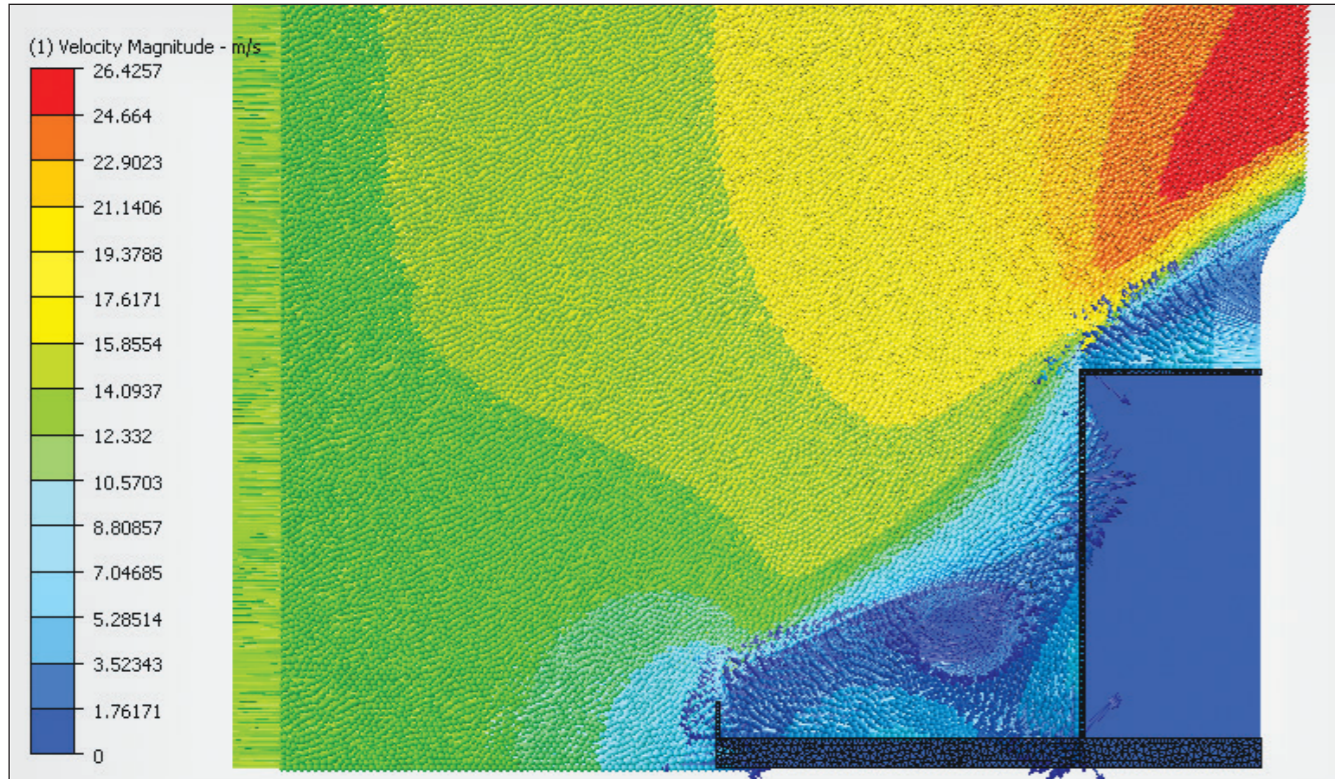
Typical needs for trace heating on FPSO's and FSO's are deck lines for oil, chemical products. Thermon has designed trace heating systems for freeze protection and temperature maintenance of:

- Loading and unloading lines
- Gas/vapour-return lines
- Strip and cleaning lines
- Fuel oil lines
- Storage tanks and vessels
- Deck and tank cleaning lines
- Fire protection lines
- Engine room fuel and drip lines
- Cross-over lines
- Manifolds
- Safety showers



# ENGINEERING AND PROJECT MANAGEMENT

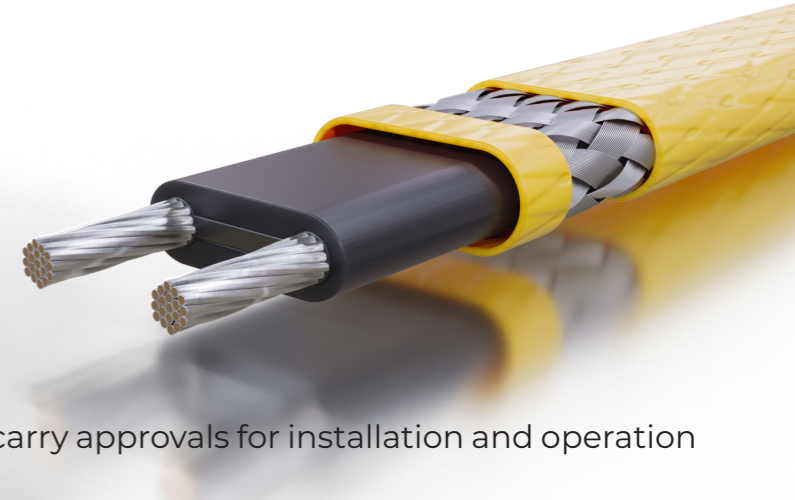
Thermon provides experienced engineering and project management services. Thermon Engineering evaluates heat loss predictions from heat transfer models to establish thermal loads via Finite Element Analysis (FEA) and Computational Fluid Dynamics (CFD) to confirm temperature distribution. Thermon provides an optimized thermal design with a suitable electrical load balance.



CFD is used to determine the impact of wind on heat loss from uninsulated surfaces to be kept free of snow and ice.

# THERMON PRODUCTS

Thermon has developed a sustainable and reliable comprehensive range of products for the extreme environmental conditions of offshore support and supply vessels, icebreakers, semi-submersible drill ships and platforms. All products are manufactured by Thermon in compliance with international industry standards and carry approvals for installation and operation in hazardous (classified) areas.



# CONTROLS AND MONITORING



Critical heat tracing applications warrant increased monitoring and surveillance. Controlling and monitoring the heat tracing system from a central location is particularly important for large scale EHT(electric heat tracing) systems and invites energy management.

Thermon control and monitoring systems are developed specifically for the lowest overall cost of ownership including maintenance and operations.

# CODE AND STANDARDS

Thermon is working with various classification societies to develop solutions that will comply with the upcoming IMO Polar Code.

Thermon Heat Tracing Systems are tested and listed with numerous approvals agencies and shipping comply with IEEE515, IEC60079-30 industrial trace heating standards.





# THERMON SUPPLIES HEAT TRACING PRODUCTS AND SERVICES FOR OFFSHORE OIL AND GAS PROJECTS WORLDWIDE



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For the Thermon office nearest you visit us on the web at [www.thermon.com](http://www.thermon.com)

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### EUROPEAN HEADQUARTERS

Boezemweg 25 • PO Box 205 • 2640 AE Pijnacker • The Netherlands • Phone: +31 (0) 15-36 15 370

### CORPORATE HEADQUARTERS

7171 Southwest Parkway • Building 300, Suite 200 • Austin, TX 78735 • Phone: +1 (512) 690-0600

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