

DFINITI's Electric Heaters

With over 15 years of expertise in Electric Process Heating, our professional team has been designing and manufacturing reliable and certified electric heaters for application in various industries.

Whether you need a custom-engineered or an industrial standard electric heater, our team has you covered.

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CERTIFICATIONS AND STANDARDS



Our Electric Process Heaters are ATEX and IECEx certified for application in hazardous areas, suitable for Zone 1 and Zone 2 area classification. They meet the temperature class, gas group and ingress protection for most applications in the industries.

Besides products certifications, our facilities are also certified to manufacture ATEX and IECEx products under the QAN and QAR systems respectively. They are also certified to ASME U Stamp and registered with the National Board.

We manufacture pressure vessels that meet other design standards such as PED, GB and as required.

For Marine Classification, we certify the products on project basis to ABS, DNV, BV standards and alike.



ELECTRIC HEATING SYSTEM



PROCESS HEATER

The Electric Process Heater is usually used to provide direct heating to the process. The heating elements are in direct contact with the process to heat up the cold inlet fluids, maximise the heat transfer by optimising baffle design while limiting pressure drop to the outlet nozzle.

With our proprietary software CALCPEX and other professional design software such as ASPEN and HTRI, we can customise the design of the process heater and system to meet the process demand with duty regulated by Thyristor and/or Contactor using hardwired or PLC controlled.



APPLICATIONS

- Fuel Gas Heater
- Reboiler Heater in TEG Dehydration System
- Molecular Sieve Regeneration Heater
- Natural Gas in Gas Transmission Pipeline
- Seal Gas Heater
- CO2 Heater

- Nitrogen Heater
- Steam Super-heater
- Process Gases in Continuous Catalyst Reforming Unit (CCR)
- Industrial gases in Air Separation Unit

TANK IMMERSION HEATER



Immersion heating is used to heat up and/or maintain the medium in the tank to reduce viscosity at desired temperature for ease of flowing or pumping out of the medium.

The medium can be in the form of condensate, bitumen, chemical or any sludge collected in the sump tank.

Withdrawable Heater (Cartridge Type)

Besides the conventional design, the heater can be designed with withdrawable elements which allow replacement of heating elements without draining the tank to offer quicker turnaround time.

L-Shape and other shapes of Heaters

For underground tank design where the only access is from the top, an L-shape or a dog-leg shape heater can be provided.

This is also known as online replacement.







APPLICATIONS

- **Condensate Heater**
- Separator Tank Heating
- **Crude Oil Heater**
- Produced Water Heater

- **Caustic Water in CIP Tank**
- **Bitumen Heating in Storage Tank**
- **Thermal Liquids Heating**

TECHNICAL DATA

Supply Voltage

Max 690VAC 50/60Hz

Power Up to 5000KW in a single unit

Certifications

ATEX and IECEx

Туре	Increased Safety (Exe)	Flameproof (Exd)
Standard	EN IEC 60079-7, 60079-0	EN IEC 60079-1, 60079-0 EN IEC 60079-31
Code	🔂 II 2 G, Ex eb Gb	€ II 2 G/D, Ex db Gb Ex tb Db
T-class	T1-T16	T1-T6 T85-T450°C
Gas Group	IIA/IIB/IIC	IIA/IIB/IIC IIIC
IP Rating	IP66	IP66

HEATER CONSTRUCTION



Heating Element

Heater Flange

- Tubular Heating element with NiCr 80/20 resistive heating wire compacted with MgO
- Element diameter: 12.5mm, 16mm

Also known as EIH Support Plate

Design to ASME Appendix 41

 Element sheath material: Incoloy 800, 825, SS321, SS304, SS316, Titanium and others

Pressure Sealing

Bite-coupling, strength weld or bracing

Terminal Box

- Exe Standard SS316 or painted mild steel
- Exd Standard Carbon Steel or SS on request

Over-temperature Protection

- Element over-temperature protection
- T-class protection
- Terminal Box over-temperature protection (optional)

HEATING ELEMENT SELECTION

Items	Considerations	Typical
Heat Flux	Process medium	TEG: 2.2w/cm2,
	Client Specifications (e.g. DEP, PTS)	Fuel Gas: 2-7w/cm2
Element Material	Temperature exposure NACE	Incoloy 800, SS304, SS321 Incoloy 825

ELEMENT TUBE CONSTRUCTION

Pressure Rating	<150 Deg. C	150-300 Deg. C	>300 Deg. C
150lbs	Welded	Welded	Seamless
300lbs	Welded	Welded	Seamless
600lbs	Welded	Seamless	Seamless
900lbs and above	Seamless	Seamless	Seamless

Tube Wall thickness recommendation

Welded tube: min 1.0mm, Seamless tube: min 1.25mm

Disclaimer: Above table is derived based on DFINITI's past experience in dealing with various processes, applications and clients' specifications and requirements, and it is merely for reference. Specific clients or process licensors may specify seamless tube regardless of pressure and temperature rating. Seamless tube is recommended for lethal services application. DFINITI shall not be responsible or held liable for any losses and damages resulting from adopting the above recommendations without further review of the actual and specific requirement or agreement

CONTROL PANEL



A Control Panel is installed to the Electric Process Heater to operate the heater throughout the lifespan of the system.

It is therefore important and critical that the Control Panel is designed not only to achieve functional purposes and protection but also smooth operations to prevent disruption to the process and any other undesirable incidents.

There are two main factors in designing the Control System:

Types of Control

- On/Off or 0-100% load control
- Single stage or multiple stages

Areas of Installation

- Safe area
- Hazardous area

Heaters used in process heating are usually designed to Thyristor controlled which is capable of modulating load from 0-100% on heater output. Due to high heat dissipation from Thyristor switching, the panel is normally housed indoor to avoid excess heating of heat duty within the panel.

Forced fan ventilation is included as a standard for the Thyristor panel. For outdoor installations where the heater duty is big and with high ambient temperature, air-conditioner may be used if forced fan ventilation is insufficient.

TYPICAL THYRISTOR CONTROL PANEL

Load Control	Thyristor (aka SCR)			
Stage Control	Single stage or multiple stages control			
Control Logic	Hardwired or PLC			
Functions	 Heater On/Off Duty Control Local (manual) or Remote Duty Selector Trip Reset 	e (auto)		
Type of Protection	 Over-current Earth fault Panel over-temperature Heating element over-temperature Thyristor over-temperature ESD T-class (by design or sensor) Terminal Box over-temperature (optional) Shell temperature (optional) 			
Installation	Indoor	Outdoor		
IP Rating	IP42 or IP44	IP54		
Cooling	Forced Fan	Forced Fan or Air-conditioner		
MOC	Painted Mild Steel	Painted Mild Steel or SS		





For installation in hazardous areas, the Control Panel is designed with Exd Ex-proof enclosure for small heater load and/or Contactor controlled where heat dissipation is minimum. These are usually for local Control Panel use in tank immersion heaters.



MODES OF THYRISTOR FIRING

Subject to switching duty and the overall electrical system, there are basically three types of firing modes:

- Zero Cross-over, Single Cycle Firing
- Zero Cross-over, Burst Firing
- Phase Angle Firing

	Control Mode			
Output Level/ Control Signal	Zero Cross (Cycle Sampling)	Zero Cross (Burst Firing/ Time Sampling)	Phase Angle	
20% Output/7.2mA	1 cycle ON and 4 cycle OFF		$\mathcal{A} \mathcal{A} \mathcal{A} \mathcal{A} \mathcal{A} \mathcal{A} \mathcal{A} \mathcal{A} $	
50% Output/12mA	1 cycle ON and 1 cycle OFF			
90% Output/18.4mA	9 cycle ON and 1 cycle OFF	9 cycle ON and 1 cycle OFF		

Notes:

- 1. Phase angle control is not preferred as it generates harmonic. If phase angle is used, Active Harmonic Filter (AHF) shall be used to filter the unwanted harmonic.
- 2. As the control mode may affect the entire electric system especially a large heater duty, it is advisable to consult DFINITI for the more suitable control mode to suit specific design.

VAPORISER

This relates to cryogenic applications where the heater will heat the very low temperature liquid and vaporise it. The vaporised gas can then be further heated by a gas heater in the second stage of heating to the desired temperature.

Due to exposure to a very low temperature process, the heating element is designed to low heat flux for direct heating. Alternatively, indirect heating solutions such as a Bath Heater can be used.

Please refer to our Bath Heater brochure for more details about indirect heating.

Applications LPG/LNG, Liquid Hydrocarbon, etc.



HEATER SKID PACKAGE

For remote or standalone heating systems, we can offer a Heater Skid Package which is an independent unit with mobility on a skid frame.

Type of Heating

Hot Oil or Steam

Control Skid Mounted Panel or BMS

OTHER SKID MOUNTED PARTS

- Pumps, Valves, Expansion Tank and Storage Tank
- Sensors & Transmitter
- E&I Components, Cable Tray
- Piping, Skid Frame and Structure

Heat Source Electric Heater or Fired (burner)



HOT WATER CALORIFIER

A Hot Water Calorifier is akin to the hot water heater at home. It is used for hot water supplies to the living quarters mainly in offshore applications. Our advantage is being able to supply complete products with an in-built heater.

Design Code

ASME VIII Div 1 PED, AS1210 or other relevant codes

Element Material

SS316L, Incoloy, etc.

Tank Material SS316/316L



AUXILIARY STEAM GENERATOR (ELECTRIC)



An Auxiliary Steam Generator is also called the Auxiliary Steam Boiler. Given the term 'auxiliary', it is not meant to be the main boiler. Instead, it usually provides steam for the start-up of the power plant.

DFINITI can design and supply the Auxiliary Steam Generator with Superheater to super heat the steam over 200 deg C for propulsion application.

AIR DUCT HEATER

Besides process heat, Air Duct Heating can be used for comfort during winter. An Air Duct Heater supplies hot air through the ducting. It can also be used for processing in food industries where it acts as a dryer to keep moisture out.

Duct Heaters can be designed with finned type elements for high thermal efficiency and housed in a robust enclosure to reduce vibration and noise.

ATEX/IECEx certified Duct Heaters are available.





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Contact DFINITI today for reliable and highly efficient electric heaters for your organisation.