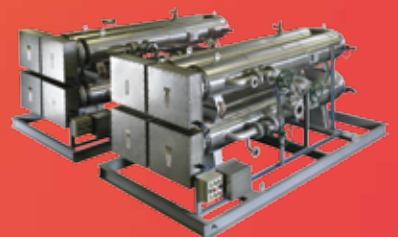




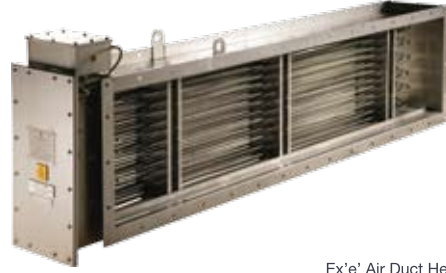
**Engineered Heating Systems**



# Hazardous Area Process Heat & Control Solutions



300kW Ex'd' Fuel Gas Heaters



Ex'e' Air Duct Heaters



400kW Ex'e' Heater Bundle



250kW Ex'd'  
Removable Core Heater



350kW Ex'd'  
Fuel Gas Heater Bundle



1000kW Ex'e' Start  
Up Crude Oil Heater

## Industries Served

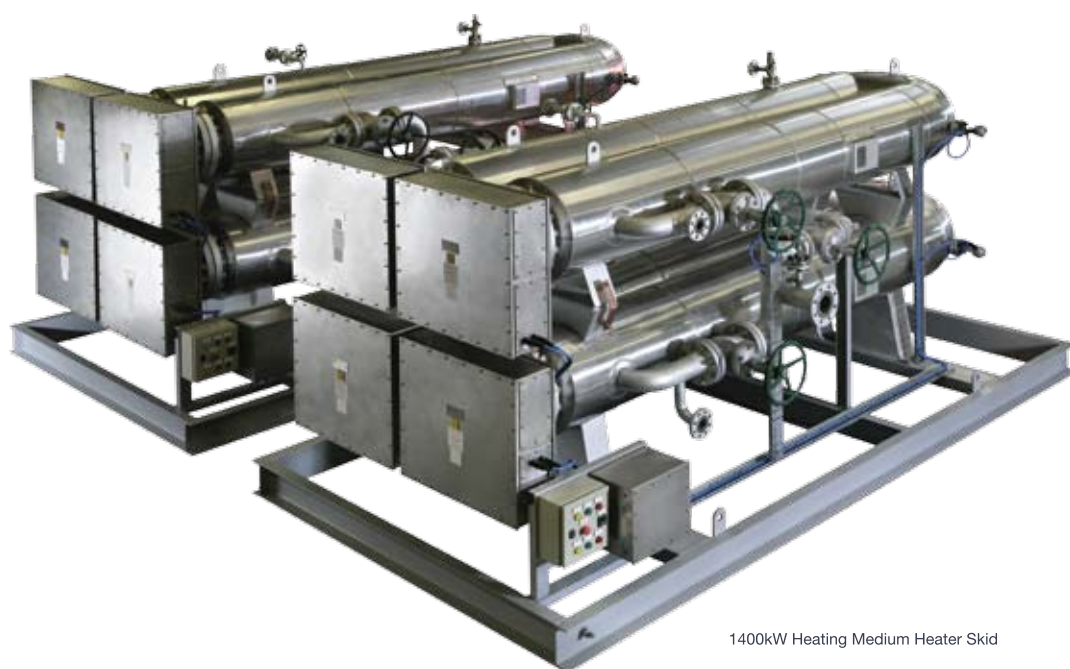
Oil & Gas  
Processing Plants  
Chemical  
Marine  
Power Generation  
Medical  
Utilities  
Petrochemical  
Refineries  
Pharmaceutical  
Food Processing  
Construction  
General Manufacturers



Ex'p' Control Panel



Thyristor Control Panel



1400kW Heating Medium Heater Skid

## Product Applications

EXHEAT is a world leader in the design and manufacture of engineered electric process heaters for Hazardous Areas.

Typical applications include:

Fuel Gas

Oxygen

Glycol Regeneration (TEG)

Process Gas

Crude Oil

Heat Transfer Liquids

Hydrocarbon Liquids

Water

Sea Water

Hot Water Calorifiers

Nitrogen/Air

HVAC



Ex'd' Control Panel



Hazardous Area Submerged 'L' Heater



Ex'd' Cast Line Heater

# Design & Manufacturing Capabilities

EXHEAT utilises modern design and manufacturing techniques, the result is a cost effective, high quality heating system that meets the exacting requirements of onshore/offshore applications.

## DESIGN

Our unique design approach and extensive range of certification offers simple solutions to complex requirements. EXHEAT design teams support customers from the FEED study and conceptual design throughout the life cycle of the equipment.

Our inhouse design capabilities include:

- Single heaters up to 5MW
- Thermal design
- Electrical design
- Process design verification
- Mechanical design
- Instrumentation requirements



Ex'd' design with segmental baffles for optimal heat transfer

## CERTIFICATION

EXHEAT specialise in the manufacture of electric heaters for use in Hazardous Areas:

- ATEX
- IECEx
- CSA
- Zone 1, Gas Group II
- Class I, Division 1, Gas Group A,B,C,D
- ASME 'U'
- PED
- NEMA
- UL
- GOST
- CCOE



Ex'e' design with rod-type full flow baffles for minimal pressure drop



## COMPLETE PACKAGED SYSTEM

EXHEAT design and manufacture complete process heating systems

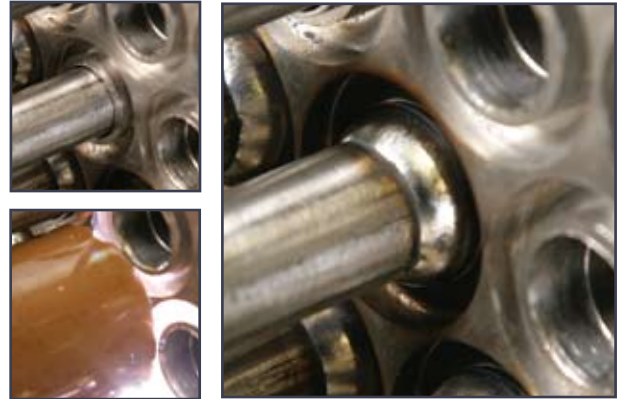
- Complete design and supply of skid mounted or packaged equipment
- Responsibility for all stages of project execution, including;
  - Initial study
  - Mechanical, electrical and process design
  - Skid assembly for mechanical, electrical and instrumentation
  - In house manufacturing and testing
  - Site supervision, commissioning and training



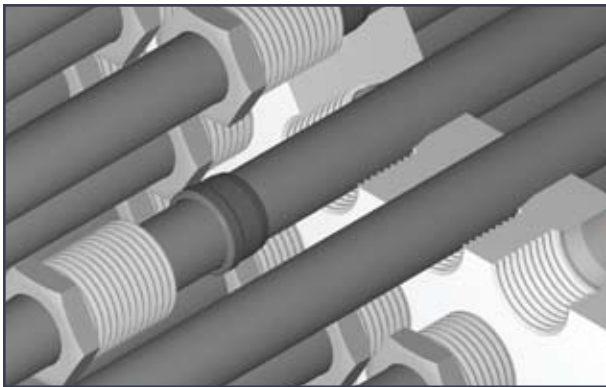
## MANUFACTURING TECHNIQUES

EXHEAT meets the stringent requirements of design codes, international standards and client specifications. Our design features allow us to provide heating solutions for extreme processes from cryogenic service to gas regeneration and for pressures in excess of 500bar.

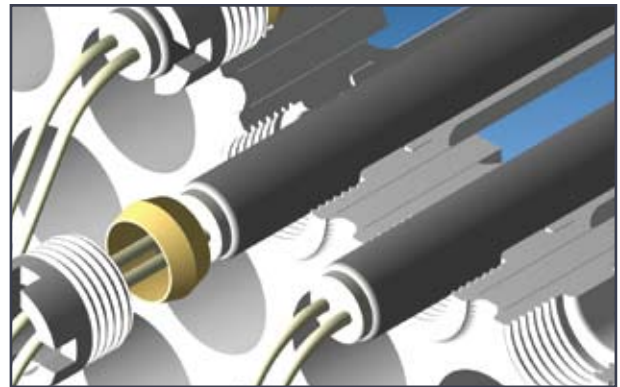
Element to tubesheet sealing using bite coupling design, automated orbital welding or cartridge elements inserted in pockets to facilitate withdrawal of the elements without the need to drain the system.



Orbital welding of element to tubesheet



Elements sealed using bite couplings



Cartridge elements inserted in pockets

## QUALITY ASSURANCE

EXHEAT is a total quality environment committed to continuous improvement and ensuring customer expectations are met.

- ISO 9001 and EN 13980 Quality Management System
- ATEX Quality Assurance Notification holder
- Approved to design and manufacture in accordance with the European Pressure Equipment Directive (PED)
- Approved manufacturer under the International IECEx Scheme
- CSA listed manufacturer
- Qualified in Achilles® Joint Qualification System

## AFTER SALES SERVICE

Specialists in installing, commissioning, servicing, maintaining and providing spare parts for heaters and control systems.

- Service available offshore and onshore
- Multi discipline engineering personnel
- 24 hour call-out where location allows
- Preventative and remedial maintenance undertaken
- Site supervision and commissioning of electrical heating and control systems
- Full spares provisioning
- Annual and long term service agreements available





# ISES Hazardous Area Process Heaters

The ISES type electric heaters comprise a large range of process flow heaters, certified for use in a Zone 1 or Class I, Div 2 Hazardous Area, custom built to meet client specifications.



## FEATURES

Up to 5000kW

ATEX approved  II 2 G

Certified Ex'e', Zone 1, Gas Group II

Certified Class I, Div 2, Gas Group A, B, C, D

CENELEC, IECEx, CSA

Terminal box is certified weatherproof to IP67 or NEMA 4X

Temperature Classes T1-T6

Elements are specially sealed to prevent moisture ingress

Elements are individually replaceable on site without the need for special tools

Lightweight stainless steel construction terminal box

Suitable and certified for use in ambient temperatures of -60°C to +60°C

Anti-condensation heaters fitted if required

## VESSEL MATERIALS

Carbon steel

Low temperature steel

Stainless steel

Duplex

Titanium

Super austenitic

Monel

Nickel alloys

## VESSEL DESIGN CODES

PED compliant

PD 5500: Cat 1

ASME VIII Div 1 or 2

Stoomwezen

CODAP

AD Merkblätter

AS 1210

## TYPICAL APPLICATIONS

- Fuel gas
- Natural gas
- Molecular sieve regeneration
- Industrial gases
- Heat transfer oils
- Fuel oils
- Water
- Crude oil
- Hydrocarbon liquids
- Heating medium

# FP/BFP Hazardous Area Process Heaters

The FP/BFP type Flameproof electric heaters comprise a large range of process flow heaters, certified for use in a Zone 1 or Class I, Div 1 Hazardous Area, custom built to meet client specifications.



## FEATURES

Up to 1000kW (larger ratings achieved by a combination of enclosures)

ATEX approved  II 2 G/D

Certified Ex/AEx'd', Zone 1, Gas Group II A, B, C

Certified Class I, Div 1, Gas Group A, B, C, D

ATEX, IECEx, CSA

Terminal box is certified weatherproof to IP66/67 or NEMA Type 4

Temperature Classes T1-T6  
(T450°C – T85°C)

Elements are specially sealed to prevent moisture ingress

Elements are individually replaceable on site without the need for special tools

Suitable and certified for use in high ambient temperatures e.g. Middle East

Anti-condensation heaters fitted if required

## VESSEL MATERIALS

Carbon steel

Low temperature steel

Stainless steel

Duplex

Titanium

Super austenitic

Monel

Nickel alloys

## VESSEL DESIGN CODES

PED compliant

PD 5500: Cat 1

ASME VIII Div 1 or 2

Stoomwezen

CODAP

AD Merkblätter

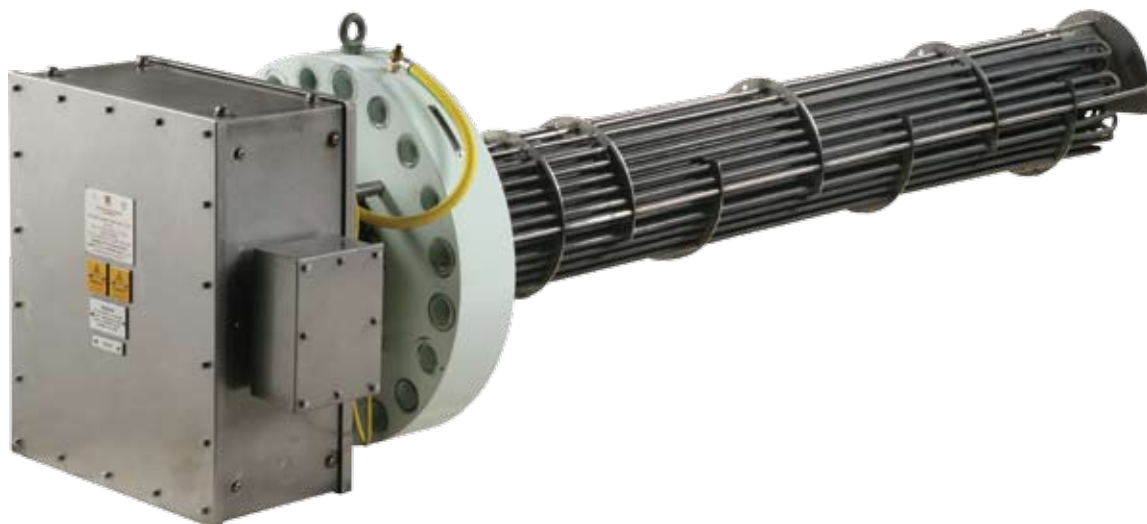
AS 1210

## TYPICAL APPLICATIONS

- Fuel gas
- Natural gas
- Molecular sieve regeneration
- Industrial gases
- Heat transfer oils
- Fuel oils
- Water
- Crude oil
- Hydrocarbon liquids
- Heating medium

# ISES Hazardous Area Immersion Heaters

The ISES electric heaters comprise a large range of process immersion heaters, certified for use in a Zone 1 or Class I, Div 2 Hazardous Area, custom built to meet client specifications.



## FEATURES

Up to 5000kW

ATEX approved  II 2 G

Certified Ex'e', Zone 1, Gas Group II

Certified Class I, Div 2, Gas Group A, B, C, D

ATEX, IECEx, CSA

Terminal box is certified weatherproof to IP67 or NEMA 4X

Temperature classes T1-T6

Elements are specially sealed to prevent moisture ingress

Elements are individually replaceable on site without the need for special tools

Withdrawable type elements available to facilitate replacement without draining the vessel

Lightweight stainless steel construction terminal box

Suitable and certified for use in ambient temperatures of -60°C to +60°C

Anti-condensation heaters fitted if required

Elements are manufactured from 80/20 nickel chrome resistance wire with high purity compacted magnesium oxide powder sheathed within corrosion/erosion resistant tube, e.g.

- Incoloy 800/825
- Inconel 600/625
- Titanium
- Stainless steel 316/316L
- Stainless steel 321
- Monel

## TYPICAL APPLICATIONS

- Butane / propane vaporisers
- Crude oil
- Glycol (TEG & MEG) reboilers
- Molecular sieve regeneration
- Synthetic oils
- Fuel oils
- Fresh water
- Sea water
- Heating medium
- Tank heating
- KO drums



# FP/BFP Hazardous Area Immersion Heaters

The FP/BFP type Flameproof electric heaters comprise a large range of process immersion heaters, certified for use in a Zone 1 or Class I, Div 1 Hazardous Area, custom built to meet client specifications.



## FEATURES

Up to 1000kW (larger ratings achieved by a combination of enclosures)

ATEX approved  II 2 G/D

Certified Ex'd', Zone 1, Gas Group II A, B, C

Certified Class I, Div 1, Gas Group A, B, C, D

ATEX, IECEx, CSA

Terminal box is certified weatherproof to IP66/67 or NEMA 7

Temperature classes T1-T6  
(T450°C – T85°C)

Elements are specially sealed to prevent moisture ingress

Elements are individually replaceable on site without the need for special tools

Withdrawable type elements available to facilitate replacement without draining the vessel

Suitable and certified for use in high ambient temperatures e.g. Middle East

Anti-condensation heaters fitted if required

Elements are manufactured from 80/20 nickel chrome resistance wire with high purity compacted magnesium oxide powder sheathed within corrosion/erosion resistant tube, e.g.

- Incoloy 800/825
- Inconel 600/625
- Titanium
- Stainless steel 316/316L
- Stainless steel 321
- Monel

## TYPICAL APPLICATIONS

- Crude oil
- Hydrocarbon liquids
- Glycol (TEG & MEG) reboilers
- Molecular sieve regeneration
- Heat transfer oils
- Heating medium
- Industrial gases
- Tank heating
- KO drums
- Fuel gas
- Fuel oils
- Water


# Flameproof Removable Core Heaters

The FP/BFP removable core type Flameproof electric heaters comprise a large range of process immersion heaters, certified for use in a Zone 1 Hazardous Area, that allow elements to be replaced without draining the process vessel.



## FEATURES

Up to 1000kw (larger ratings achieved by a combination of enclosures)

Certified  II 2 G or G and D to the ATEX Directive 94/9/EC

Certified Ex'd', Zone 1, Gas Groups IIB or IIC

CENELEC or IECEx certified

Terminal box is certified weatherproof to IP66/IP67

Temperature classifications T1-T6

Ceramic core type elements are not subject to problems with moisture ingress

Removable core type elements to facilitate replacement without draining the vessel (simply open the terminal box)

Elements are individually replaceable on site without the need for special tools

Anti-condensation heaters fitted if required

Suitable and certified for use in high and low ambient temperatures e.g. Middle East and Arctic regions

## TYPICAL APPLICATIONS

- Butane / propane vaporisers
- Fuel oils
- Crude oil
- Fresh water
- Glycol (TEG & MEG) reboilers
- Sea water
- Hydrocarbon liquids
- Heating medium
- Synthetic oils

The range of cast aluminium line heaters provide an effective heating solution for constant flow liquids or gases, eliminating the requirement for a costly pressure vessel. Particularly in high pressure applications or when exotic process materials are required the FP cast range can provide significant commercial advantage. The design incorporates electric heating elements and an indirect process heating coil imbedded within marine grade cast aluminium. This provides excellent heat transfer properties combined with low surface temperatures. It should be noted that this design is not suitable for constantly varying flow applications where precise outlet temperature control is required.

## FEATURES

Certified to meet the requirements of the ATEX Directive 94/9/EC and IECEx

Thermally insulated aluminium or stainless steel cladding

Flameproof IP65 rated terminal enclosure

Maximum working pressure and temperature rating of 300bar.g at 100°C

Internal control thermostats and over-temperature thermostats (PT 100 or thermocouple type K available)

Wall or floor, vertical or horizontal mounting

Multiple heating elements allow for step control or alternatively thyristor control can be employed

Standard stainless steel process path (other materials upon request)

Various process connections including industry standard flange or compression joints



## TYPICAL APPLICATIONS

- Natural gas
- Air, CO<sub>2</sub> and nitrogen
- Instrument air
- Solvent
- Steam generation
- Paint heating
- Pasteurisation

# Air Duct Heaters



## FEATURES

A range of Ex'e' Gas Group II, increased safety duct heaters

ATEX approved  II 2 G

IECEx certified

Certified to CENELEC or IEC standards

Temperature classes T2-T6

Elements are certified Ex'e' for use in Zone 1 Hazardous Areas

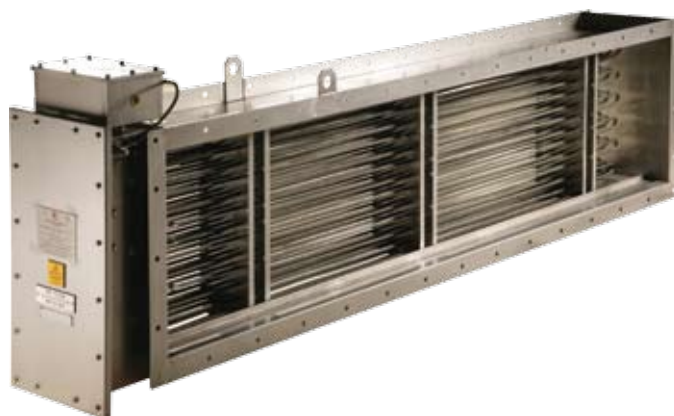
Elements are individually replaceable on site without the need for special tools

Termination box is certified weatherproof to IP66 and IP67

Anti-condensation heater fitted if required

Various types of over-temperature cut-outs available. e.g. certified thermostats, RTD's or thermocouples

The ISE type electric heaters comprise a range of Ex'e' air duct heaters, custom built to meet client specification and suitable for use in Zone 1 or Zone 2 Hazardous Areas.



## TYPICAL APPLICATIONS

- Air handling units
- Space heating
- HVAC heating
- Drying ovens
- Furnace heating
- Anti-icing heaters
- Reheats

# Hazardous Area L Immersion Heaters

The ISES-L and FP-L series of Hazardous Area immersion heaters are ideally suited for installation within process tanks, sited in Zone 1 or Zone 2 Hazardous Areas. The design of the heater provides horizontal mounting of the elements, beneficial for low liquid level applications but allowing vertical installation which facilitates withdrawal from the vessel top. This type of heater design is particularly suited to heating the contents of underground storage tanks.

## FEATURES

Up to 300 kW

ATEX approved  II 2 G

Certified Ex'e', Zone 1, Gas Group II

Certified Ex'd', Zone 1, Gas Group II A, B, C

CENELEC or IECEx certified

Terminal box is certified weatherproof to IP66 and 67

Temperature classes T1-T6

Enclosure manufactured from durable stainless steel with removable cable entry glands

Cable entries cut to suit incoming cable requirements

External and internal earth stud

Elements are manufactured from 80/20 nickel chrome resistance wire with high purity compacted magnesium oxide powder sheathed within corrosion/erosion resistant tube e.g.

- Incoloy 800/825
- Inconel 600/625
- Titanium
- Stainless steel 316/316L
- Stainless steel 321
- Monel



## TYPICAL APPLICATIONS

- Heating liquids in large tanks or vessels where low levels are commonly experienced
- Heating liquids in underground tanks
- Hydrocarbon liquids
- KO drums
- Water storage
- Crude oil storage



# Heating Medium Skids

EXHEAT design and manufacture electric process heater skid packages which can be engineered to meet specific requirements and include:

- Electric process heaters
- Simplex or Duplex Filter
- Flow measurement
- Isolation/bypass valves
- Flow control valves
- Thyristor/contactor control system
- Temperature measurement instrumentation
- Pressure measurement instrumentation



## TYPICAL APPLICATIONS

- Heating medium, heat transfer oil
- Heating medium, heat transfer salt
- Seal gas
- Fuel gas
- Crude oil forwarding

## FEATURES

Certified for use in Hazardous Areas if required

Single point piping interface

Single point terminations for field power and instrumentation cabling

Optional stainless steel terminal box and control panel

Fully pre-wired for ease of installation

Ingress protection rating up to IP55 (IEC) or NEMA 4X (NEC) suitable for outdoor installation (IP66 can be supplied where equipment is located outdoors)

Thermal insulation

## VESSEL MATERIALS

Carbon steel	Low temperature steel
Stainless steel	Duplex
Titanium	Super austenitic
Monel	High nickel alloys

## VESSEL DESIGN CODES

PED Compliant	PD 5500 Cat 1
Stoomwezen	ASME VIII Div 1 or 2
CODAP	AD Merkblätter
AS1210	

## SYSTEM CONTROL

PID thyristor or step contactor control can be offered dependent on outlet temperature accuracy and flow turn-down requirements

Various types of over-temperature cut-outs are available, including a range of thermostats, thermocouples and RTD's

Control and measurement instrumentation for process temperature, flow and pressure can be supplied as EXHEAT standard or client preferred manufacturer

# High Temperature Applications

Electric process heaters for high temperature applications in excess of 500°C. EXHEAT have extensive experience in material selection, thermal design and construction techniques to meet the exacting standards of various process licensors.

## DESIGN TECHNIQUES

Heaters connected in series of vessels for optimal heat transfer

Multiple heaters allow for varying heat input across the required load

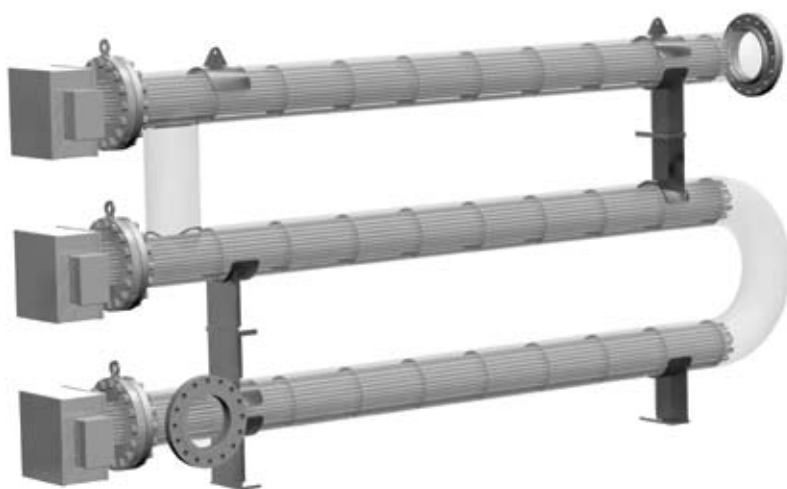
Process simulation for optimum design

Stand off construction to meet the specification and certification requirements for terminal box temperatures

Heat shield and insulation discs for terminal box temperature protection

Use of rod-type baffles to meet heat transfer requirements whilst ensuring a very low system pressure drop

Direct welding of element sheath to tubeheet utilising automated orbital welding process



## DESIGN CAPABILITIES

Up to 5000kW in a single heater bundle

Process temperatures up to 800°C

Process guarantees for confirmed temperatures and pressure drops

## VESSEL MATERIALS

Stainless steel 321/321H

Stainless steel 316Ti

Chromoly steel

## INTERNAL MATERIALS

Alloy 600

Alloy 800

Alloy 825

## TYPICAL APPLICATIONS

- Gas regeneration
- Catalyst reduction
- Catalyst hot H<sub>2</sub> stripping
- Catalyst oxidation
- Catalyst reactivation
- Reactivation burning
- Continuous catalyst regeneration

# Control Systems

Control systems are manufactured at our factory in the United Kingdom to comply with each and every standard demanded by our clients. The operation of an electric heater is only as good as the system which controls it. EXHEAT specialise in the control of electric heaters and heating systems. The systems can range from the simple on/off control, to the most sophisticated burst fire/single cycle thyristor control.

EXHEAT has extensive experience in the design of large heater control systems and requirements for 'load splitting'. Loads can also be divided into stages to give multi-thyristor control and in addition combinations of thyristor and contractor control can be supplied to provide a fully synchronised system and limit impact on power generation system.



## CONTROL SYSTEM SERVICES

- Thyristor control system design
- Step contactor sequence control
- PLC programming
- Engineering planning
- Manufacture
- Factory testing and quality control
- On-site commissioning
- Spares and after sales service

## IN-HOUSE TESTING

- Full load/heat soak testing
- Harmonic analysis
- R F interference testing
- Oscilloscope photometry



# Hazardous Area Purged and Flameproof Control Panels

## HAZARDOUS AREA PURGED PANELS

EXHEAT can provide Hazardous Area purged Ex'p' control panels to IEC/EN60079-2.

### FEATURES

Ex'p' control panels are ideal for heating systems where the heater is controlled locally via a skid mounted control system

ATEX certified Ex'px' suitable for Zones 1 and 21  
CSA certified Class I and II, Div 1

ATEX certified Ex'py' and Ex'pz' suitable for Zones 2 and 22  
CSA certified Class I and II, Div 2

Where thyristor control is deployed, the forced fan cooling system is replaced by vortex coolers

EXHEAT has range of purge kits suitable for pressurizing enclosures with volume up to 12.7m<sup>3</sup>

Stainless steel 316, IP66 (Type 4X) enclosures are available



## FLAMEPROOF CONTROL PANELS

Heater control and instrument display panels can be engineered and supplied to enable local control of EXHEAT Hazardous Area heating products and the local visual display of process temperatures; these control panels provide an effective solution.

For applications with large electrical power requirements we would always advise that the control system is installed in a safe area. However, for small step or thyristor controlled loads the use of a Flameproof control system can reduce installation costs.



### FEATURES

ATEX approved Ⓔ II 2 G

CENELEC

Ex'd' IIB T1 to T6

Suitable for Zones 1 and 2

Certified weatherproof to IP65

Ambient temperatures from -20°C to +40°C

Marine grade aluminium cast alloy

# EXHEAT Standard Products

EXHEAT Industrial Division offers fast track solutions to industry's wide and varied requirements for electrical heating systems. All heaters manufactured by EXHEAT for use in Hazardous Areas are supplied fully certified to meet the latest requirements of the IECEx Scheme, CSA, or the European ATEX Directive as appropriate.

All heaters are manufactured and stocked in the UK, a selection of stock is also kept at our regional office in Singapore to facilitate faster delivery time.

## AIR HEATERS



## LINE HEATERS



## IMMERSION HEATERS



## THERMOSTATS/TRANSMITTER ENCLOSURES





- 
- ABB LUMMUS GLOBAL
  - ADNOC
  - AGIP
  - AIR LIQUIDE
  - AIR PRODUCTS
  - AKER KVAERNER
  - ALFA LAVAL
  - ALSTOM
  - AMEC
  - AMERADA HESS
  - ARCO
  - AXENS
  - BASF
  - BAYER
  - BECHTEL
  - BHP
  - BLUEWATER
  - BOC
  - BOUYGUES
  - BP
  - BRITISH GAS
  - BW OFFSHORE
  - CB & I
  - CHEVRON
  - CHIYODA
  - CLOUGH
  - CNOOC
  - CONOCO
  - COSTAIN ENGINEERING
  - CPCL
  - CPECC
  - CREST
  - CUEL
  - CUULONG
  - DAELIM
  - DAEWOO
  - EIL
  - ENCANA
  - ENI
  - ENPPI
  - ESSO
  - EXXON MOBIL
  - FLUOR
  - FORMOSA PLASTIC
  - FOSTER WHEELER
  - GE INTERNATIONAL
  - HALLIBURTON
  - HYUNDAI
  - IKPT
  - INDIAN OIL CORP
  - J RAY MCDERMOTT
  - JACOBS COMPRIMO
  - JGC
  - KBR
  - KENCANA HL
  - LARSEN & TOUBRO (L&T)
  - LINDE
  - LPEC
  - LUKOIL
  - MAERSK OIL & GAS
  - METKA
  - MITSUBISHI
  - MITSUI
  - MMHE
  - MODEC
  - MOSS GAS
  - MURPHY OIL
  - MW KELLOGG
  - NAM
  - NEWFIELD
  - NIGC
  - NORSK HYDRO
  - OCCIDENTAL
  - ODEBRECHT
  - ONGC
  - ORIGIN
  - PARSONS
  - PDO
  - PERTAMINA
  - PETRECO
  - PETROBRAS
  - PETROCHINA
  - PETROFAC
  - PETROJET
  - PETROKEMYA
  - PETRONAS
  - PHILLIPS PETROLEUM
  - POSCO
  - PRAXAIR
  - PROSAFE
  - PTSC
  - PTT
  - PTTEP
  - QATAR PETROLEUM
  - RAMUNIA
  - REKAYASA
  - RELIANCE
  - REPSOL
  - S.M.O.E
  - SABIC
  - SAIPEM
  - SAMSUNG ENGINEERING
  - SAUDI ARAMCO
  - SBM
  - SDE
  - SEI
  - SHAW STONE & WEBSTER
  - SHELL
  - SINOPEC
  - SK ENGINEERING
  - SNAMPROGETTI
  - SNC LAVLIN
  - SOLAR TURBINES
  - STATOIL
  - TALISMAN
  - TANKER PACIFIC
  - TECHNIP
  - TECNICAS REUNIDAS
  - TEXACO
  - TOTAL
  - TOYO
  - TRANSCO
  - UHDE SHEDDEN
  - UOP
  - VEDANTA
  - WINTERSHALL
  - WOODSIDE
  - WORLEY PARSONS