ENERGYEN

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ENHANCED SURFACE GAS COOLER AND HEAT EXCHANGER

Features and Advantages

Energyen's enhanced surface gas cooler has the maximum efficiency and various advantages for gas cooling in compressor, power generator and large motor application. Energyen has always taken the challenges to extend the application of gas cooler to serve our customer satisfaction.

- Small space required and compact
  maximize the heat transfer surface per unit volume
- Low energy consumption
  lowest gas side pressure drop and less coolant flow
- Less coolant flow required
  temperature cross of gas and coolant is possible
- High flexibility in nozzle location
  low pressure drop by simplifying external piping system
- Integrated moisture seperation
  suitable configuration for inside installation
- Vibration problem free
  all tube connected by plate fin
- Stainless steel and rubber seals
  suitable for high temerature operation
- Easy bundle removal
  roller adaption design

Enhanced surface and finned tube type

The suitable fin type is selected with consideration of operating circumstance.

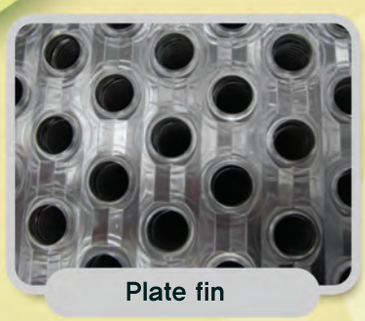


Plate fin

High/middie/low fin

- Plate fin
- Helical high fin
- Bi-metallic high fin
- Middle and low fin

Gas cooler and Heat exchanger product

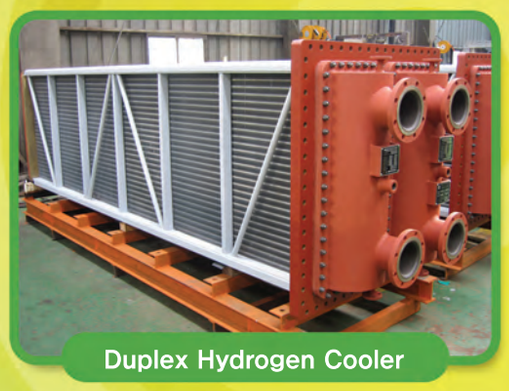
Energyen can supply the various products to use the enhanced surface and/or finned tube manufactured under our strict quality system.

Gas coolers are operated with wet air, dry air, nitrogen, oxygen, ammonia, carbon dioxide, carbon monoxide and methan etc.

- Intercooler - plate fin and high fin
- Aftercooler - plate fin and high fin
- Hydrogen cooler - plate fin and middle fin
- Air cooler - plate fin and middie fin
- Lube oil cooler - low fin
- Fuel gas heater - low fin

Tube and Fin Availability

- **Plate Fin**
  - tube OD 9.5mm, 12.7mm, 15.89mm
  - tube thickness shall be under 1.4mm for expanding tube to plate fin
  - maximum pitch : 20 Fin per inch
  - fin thickness : 0.12 - 0.3mm
- **High fin**
  - tube OD 19.05mm, 25.4mm
  - tube thickness shall be more than 0.7mm
  - maximum pitch : 12 Fin per inch
- **Middle and Low fin**
  - tube OD 19.05mm, 25.4mm
  - tube thickness shall be more than 0.7mm
  - maximum pitch : 36 Fin per inch



Duplex Hydrogen Cooler

Material Combination

The various combinations of tube and fin material are feasible and special materials are available to satisfy the specific condition.

- **Tube** Copper and copper alloy, stainless steel, duplex and Titanium
- **Fin** Aluminium, copper, stainless steel and carbon steel
- **Tubesheet** Muntz, Naval brass, Al-bronze, stainless steel and carbon steel w/coating
- **Shell** Cabon steel and stainless steel
- **Shell** Stainless steel and silicone rubber

Integrated Moisture Seperator

For wet gas application, the dew point can be reached by low coolant temperature and liquid fluid are produced by condensation. To prevent the damage of driver equipment by liquid carry-over, moisture seperator has been installed at downstream of gas. The type of moisture seperator is selected by seperation efficiency and application field and seperator can be designed to be removed the droplets larger than 8 microns up to 99.99 percents.

- Muti-holes plate
- Kintted wire mesh pad
- Single or double pocket vane

Fixing Plate Fin to Tube

Fixing plate fin to tube could be accomplished by expanding with ball pushing by hydraulic pressure or pneumatic cylinder Energyen perform this expanding work by hydraulic means for long tube and by pneumatic cylinder for short tube.

Double pocket vane

Natural Frequency Measurement

To prevent and verify the resonance of gas cooler with turbo machinery, natural frequency measurement is performed for gas cooler by impulse or electro-magnetic method if required.

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