"From your needs... to our tailored solutions..."





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Thermoengineering ${\scriptstyle \text{SRL}}$ is the engineering company leading a group composed by:

THERMOLENGINEERING INTERNATIONAL SRL



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Thermoengineering is an International company offering a wide range of advanced combustion systems for all the applications required in the Oil & Gas industries and in the petrochemical fields.

On the basis of turn-key concept, Thermoengineering has the capability to supply design, engineering, manufacturing and quality control of the several types of systems. The expertise and the constantly improving know-how developed by Thermoengineering satisfy every specific request of Clients.

Thermoengineering was established in 1979 in Milano (Italy); since then the Company has constantly expanded based on the philosophy of sparing no effort to satisfy clients requirements and to provide the best efficient and effective solutions on international markets. The result has been the absolute confidence of all major firms operating worldwide in Oil & Gas and petrochemical industries.

Always aiming for high-technology Research and Innovation, Thermoengineering assures the utmost degree of reliability to its applications.

MAIN REFERENCE LIST





INDIRECT HEATERS

THERMOENGINEERING provides a wide range of advanced Indirect Heaters, having a long history of successful applications in the Oil & Gas industry



Indirect Heaters have a long history of successful applications in the oil and gas industry. They have been used in heating operations of several fluids, from natural gas to crude oil.

The main application of Indirect Heaters is heating gas prior to its pressure reduction and consequently preventing hydrate formation that can occur because of the temperature drop due to the Joule Thomson effect.

The natural gas can also be post-heated in order to adapt to the operation of gas turbines.

Indirect Heaters consist of three basic elements; the fire tube (firebox), the heather shell, and the process coil.













[1-7] Indirect Bath Heater // Client: Ansaldo // Place: Aprilia (Italy)
[2] Indirect Water Bath Heater // Client: Hyndai // Place: Doha (Quatar)
[3] Burner for Indirect Water - Glycol Bath Heather
[4-5-6] Indirect Bath Heater // Client: Ansaldo // Place: Rizziconi (Italy)

The fire tube is designed to transfer the heat, released by fuel combustion, into water bath.

The shell is designed to contain the heat transfer media which can be: Water, Water + Glycol or Glycol.

The process coil is designed to safely contain the process fluid and to transfer the required heat from the water bath into the process stream.

Indirect Heaters are commonly used in applications requiring maximum bath temperature of 203°F (95°C).

Some typical applications of Indirect Heaters are:

- > High pressure gas and/or oil field production
- > Turbine inlet gas heating in thermo power plants
- > Gas heating at city stations or at spill-offs from the main pipeline
- > High viscosity crude oil heating in order to reduce pumping pressure and increase pipeline capacity





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[8-9-11] Indirect Bath Heater // Client: Ansaldo // Place: Aprilia (Italy)
[10] Indirect Glycol Bath Heater // Client: Agip // Place: Sergnano (Italy)

INCINERATOR SYSTEMS

THERMOENGINEERING provides a wide range of advanced Incinerator Systems classified according

- to the waste fluid type:
- > Incinerator for waste gas flow only
- > Incinerator for waste liquid flow only
- > Combined Incinerator for waste gas and liquid flow



Incinerator is a device which uses combustion to convert waste to a less-bulky, less-toxic or less-noxious material.

Thermoengineering is specialized in the design of incinerators for liquid or gaseous waste, both for chemical and petrochemical fields, with or without heat recovery.

Each particular type of incinerator is equipped with one or more dedicated burners, designed by Thermoengineering to suit the specific application:

- > Natural Draft Burner
- > Forced Draft Burner
- > Low NO_X Burner

The most used burner type is a forced draft type which ensures better functionality and minimum NO_x emission.







Vertical Incinerator // Client: Agip // Place: Bronte (Italy)
 Thermal Oxidizer // Client: Aramco // Place: Khursaniyah (Saudi Arabia)
 Thermal Oxidizer // Client: TPL // Place: Maracaibo (Venezuela)

The combustion chamber and the vertical stack are thermally insulated by means of an internal layer, made of cement or bricks, in order to maintain the essential temperature inside the incinerator system.

Waste Gas Incinerator, in many applications, can be combined with an Emergency Elevated Flare that automatically can be switched in case of emergency.



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[5] Thermal Oxidizer (Vertical Incinerator) // Client: OMV // Place: Korneuburg (Austria)

- [6] Waste Gas Incinerator // Client: Pasargadoil Co. // Place: Arak (Iran)
- [7] Incinerator // Client: Nesteoil // Place: Finland
- [8] Incinerator // Client: Oiltanking // Place: Republic of Singapore

ELEVATED FLARES

THERMOENGINEERING provides a wide range of advanced Flare Systems, classified according to their structural support:

- > Self-Supporting
- > Guy wired
- > Derrick





The height of Flare Systems is determined according to the limit imposed on ground radiation when the system is in operation: the lower the imposed ground radiation value, the higher the flare system at a given mass flow rate.

Self-supporting Flare Systems are selected when the flare height is lower than 50 meters. This solution is economical, easy to erect and requires relatively less installation space.

Guy-wired Flare Systems are designed for applications in which the flare height is up to 150 meters. Investment for guy-wired flare systems is generally lower than the other types of structural support; however, their installation requires a wider area.

Derrick structure can be the optimum solution for Flare Systems installed inside plants, when higher elevation is required to limit ground radiation and available area is limited as a result of other present equipment. The height of this type of flare can be even more than 200 meters.





Elevated Flare Guy-Wired Type // Client: Midor // Place: Alessandria D'egitto (Egypt)
 Elevated Flare Derrick Guy-Wired Type// Client: Eni // Place: Sannazzaro (Italy)
 Elevated Flare Derrick Type // Client: IES-MOL // Place: Mantova (Italy)
 Elevated Flare Derrick Type // Client: Samir // Place: Marocco

FLARE TIPS

Flare tips are available in various solutions, both in smokeless and nonsmokless operations.

Flare Tips main characteristics are:

- > Manufactured with high temperature resistant materials
- > Equipped with high-efficiency ignition and flame detection devices
- > Equipped with a special flame retention ring suitable to assure the stability of the flame at high gas exit speed (up to 1 mach)
- > Equipped with a connection flange for easy substitution







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- [5] Burner Pit (Orizontal Flare) // Client: Aramco // Place: Hawiyah (Saudi Arabia)
- [6] Elevated Flare Derrick Type // Client: APC // Place: Alexandria (Egypt)
- [7] Off Shore Boom Flare // Client: Enppi // Place: Alexandria (Egypt)
- [8] Flare Tip SFT Type

[9] Elevate Flare Guy-Wired Type // Client: ABB Lummus // Place: Bhp Ohanet (Algeria)
[10] Air Smokeless Flare Tip

GROUND SYSTEM

THERMOENGINEERING offers a wide range of advanced Ground system: Open and Enclosed



Open Ground Flares are featured by the following main characteristics: > Suitable for elevated quantity of emergency gas discharge > Smokeless functionality at any instant flow rate > Versatile functions

The External Gas Distribution system relevant to each flare stage is composed of a set of automatic and manual valves completed with a safety system (burst disc or pin valves) and the relevant block valves. These components are located outside of the flare protection shield in a free access area.

The Internal Gas Distribution system is composed of a set of underground or protected gas header distributors.

Burners

Each stage is equipped with a set of burners including ignition and continuous pilots, strategically located in the center of a dedicated and protected area in order to optimize the system functionality.

Protection shield or embankment

The ground flare area is protected by a shield or embankment in order to completely surround the flame.









[1] Closed Ground Flare // Client: Sabic // Place: Riyad (Saudi Arabia) [2-3-4] Different Types of Open Ground Flare // Client: Wintershell // Place: As-Sarah (Libya)

Enclosed Ground Flares are suitable for managing low and medium gas flow rates and are developed as per specific residence time allowing to a very high combustion efficiency under any atmospheric conditions.

Enclosed Ground Flares are equipped with a vertical combustion chamber designed to operate by natural air draft which can be used for gas, liquid or combined emergency combustion.

Combustion chamber insulation materials are selected according to the flue gas velocity and operating conditions:

- > Ceramic fiber with different density, for medium flue gas exit velocity
- > Refractory cement, for high flue gas exit velocity
- > Refractory bricks, for high flue gas exit velocity and particular corrosive conditions

FPSO (ship for gas/oil extraction and treatment) represents a particular application of the Enclosed Ground Flare.







[5] Enclosed Ground Flare // Client: Hyundai // Place: Doha (Qatar)
[6] Burnes for Enclosed Ground Flare for FPSO // Client: Hyundai // Place: Doha (Qatar)
[7] Burnes for Enclosed Ground Flare for FPSO // Client: Hyundai // Place: Doha (Qatar)
[8] Burnes for Enclosed Ground Flare for old FPSO // Client: Saipem // Place: Brindisi offshore
[9 -10] Burnes for Enclosed Ground Flare for FPSO // Client: Saipem // Place: Brindisi offshore



