

Fire detection and fire fighting equipment



Fire detection and fire fighting systems in regenerative heaters protect availability of the power station.

Air preheaters can be vulnerable to fires when operated under adverse conditions. Fire in regenerative heaters could dramatically affect the availability of the power station.

Introduction

Air preheaters can be vulnerable to fires when operated under adverse conditions. Such problems are generally caused by periods of firing heavy fuel oil in combination with poor combustion this often leads to soot and oil residue being deposited on the heater elements.

The risk of fire is even higher in coal-fired units during subsequent transient operating conditions, when the coals mills are brought on line. At that time, the carryover of incandescent particles from incomplete combustion provides a potential ignition source of oily deposits formed during start up with lighter fuels (gasoil or natural gas firing).

Given the risk of severe damage to the air preheater, it is important to detect any fires as soon as possible. Therefore, on the basis of many years of design and operating experience with earlier versions of fire detection equipment, Howden has developed a Fire Detection System for rotary regenerative air preheaters using the most up-to-date technology.

Our solution

Howden's Fire Detection System consists of three main components specially designed for regenerative heaters.

Howden fire detection and firefighting equipment consist of:

Fast response fire detection probes

Fire detection monitoring equipment

Fire extinguishing system

Fast response fire detection probes

The air preheater is installed with a set of fire detection probes that are independently wired back to the Fire Detection Panel. One probe is used for each ring of elements in the heater. The probes fit into tubes, which pass through the heater wall into the air outlet duct immediately after the elements baskets rotate from the hot gas side to the air side of the preheater.



Basket damaged by fire in an Air Preheater.



Rotor damaged by fire in an Air Preheater.



For further information contact:

Howden

Ctra. F-40, km. 1 a Los Camachos
30360 La Union

Murcia, Spain

Tel: +34 968 320 064

Fax: +34 968 506 077

Email: sales.hs@howden.com

Each probe tip is positioned close to the rotor, where it responds to the air temperature exiting from each basket as it passes underneath. Indeed, the response time of both the fire detection probes and the associated Fire Detection Monitoring Equipment has been designed to be fast enough to identify fires occurring in single baskets before they develop far enough to produce a large enough fire that can be detected by bulk gas temperature measurements.

The probes consist basically of open-ended thermowells with type-K thermocouples. These have a reduced diameter tip to give a fast response to changes in temperature. This light tip is protected against mechanical damage by a perforated stainless steel shroud that allows the passage of gas.

Fire detection monitoring equipment

The thermocouple signals are wired back to Modular Fire Detection Monitoring Equipment designed to detect both high temperature and high rate of change of temperature at each probe. The 'high temperature' setting is configured to suit the operating temperature of the heater.

The 'rate of change' feature is considered essential to early detection of fires in the heater. A fire in a single basket will produce a rise in temperature of both the gas and air passing through it. The column of hot air will rotate with the element baskets concerned. The monitoring points are usually in the secondary air duct so the hot air passing over the probe tip will subject the probe to this temperature transient once per revolution.

If the fire detection system is to generate an alarm, it must be able to pick up the rapid change in temperature as the fire sweeps quickly under the probe. The Fire Detection System is designed to generate alarms on each channel if a predetermined rate of change of temperature is exceeded.

Fire extinguishing system

A set of curved manifolds with multiple nozzles will be installed to cover the entire area of the rotor from gas, primary air and secondary air sides of the air preheater. A very thin titanium protective disc prevents each nozzle from being plugged by flying ashes. In case of a fire, this disc is ruptured by the water ensuring full availability of the system.



Fire detection monitoring equipment.



Rotor damaged by fire in an Air Preheater.