Incineration of waste

Process control under the high temperature, corrosive and abrasive conditions

Energy from waste facilities utilise incineration as a method for both disposing of waste (municipal or biological) and generating heat energy by directly controlling the burning of waste in the presence of oxygen at temperatures in excess of 800°C. The net energy produced depends on several factors, including but not limited to the density and composition of the waste, the relative percentage of the moisture and inert materials within the waste (which add to heat loss), the ignition temperature, the size and shape of the constituents and the design of the combustion system amongst others. In practice, about 65 to 80% of the energy content of the organic matter burnt can be recovered as heat energy, which can then be utilised for either direct thermal applications or for producing power with the help of steam turbine-generators.

Energy from waste plant

The combustion temperature of conventional incinerators fuelled only by wastes is about 760°C in the furnace and in excess of 870°C in the secondary combustion chamber. These high temperatures are needed to avoid harmful and odorous gasses which can be a byproduct of incomplete combustion. However, these high temperatures are still not hot enough to burn or even melt some inorganic contents such as glass. To avoid this, some modern operations utilise higher heat, achieving temperatures of up to 1650°C through the addition of auxiliary fuel. This reduces waste volume by nearly 97% and converts some of the inorganic content such as metal and glass to inert ash.

While incineration is extensively used as an important method of waste disposal, it is associated with some polluting discharges which are understandably of environmental concern. Fortunately, these pollutants can be effectively controlled by installing pollution control devices, ensuring suitable furnace construction and the correct control of the combustion process.

An important part of the control of that combustion process is the critical measurement of temperature within the furnace. In order to successfully measure this temperature, three or more temperature probes are inserted into the furnace directly above the flame.

Due to the high temperatures, corrosive gasses and abrasive ash found within the furnace, the operational lifespan of these temperature instruments can be as little as four weeks creating a regular need to fit replacements. As changing the probes isn't always straight forward due to their elevated position, an increase in resource time can be added to the cost of buying replacement probes, resulting in a complicated and sometimes expensive procedure.

However, the correct application of appropriate thermowell materials can help elongate the life of temperature probes in this measurement. This not only saves the need to regularly exchange the probes in operation but also controls costs by reducing consumption of the instruments without over engineering a costly solution.

High temperature probes such as the Endress+Hauser TAF16, which are available with a wide selection of thermowell materials such as Kanthal, Incoloy, Siliciumnitrid and other specially sourced materials, offer extended life cycles within the harsh conditions found in an energy from waste combustion chamber, without failure and are installed in over 30 energy from waste sites across the UK.

Visit our website for more information on our high temperature probes www.uk.endress.com

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