SMART FLARES

Low NOx combustion of landfill gas

The Organics SMART flare technology is intended for use in situations where there are concerns with emissions from landfill gas flares. The principal objective is to reduce exhaust gas concentrations of the oxides of nitrogen. The technology also ensures a thorough mixing of air and the fuel-gas in the combustion zone to minimise the formation of carbon monoxide.

When combined with extended retention times, SMART flare technology can deal with a wide array of toxic trace gases, producing Destruction and Removal Efficiencies in excess of 95% for most compounds.

A particular development of the techniques involved has led to thermal oxidisers that can destroy ammonia gas in large quantities without an increased NOx burden.

KEY FEATURES

ULTRA-LOW EMISSIONS OF CARBON MONOXIDE AND OXIDES OF NITROGEN (NOx)

PATENTED NATURAL-DRAFT DRIVEN EXHAUST GAS RECYCLE TO MINIMISE FREE OXYGEN IN COMBUSTION ZONE

OPTIONAL EXTENDED RETENTION TIMES WITH ADDITIONAL HEIGHT

FULLY STAINLESS STEEL SHROUD

LINED WITH CERAMIC BLANKET BRICK MODULES HAVING NO HOT-FACE SURFACE FIXINGS

OPTIONAL 10:1 TURN-DOWN RATIO

FLOW RANGE FROM 100 Nm3/hr TO 15,000 Nm3/hr

OPTIONAL ON-LINE MONITORING SYSTEMS

INTERNET CONNECTION AND LOGGING AVAILABLE

ISO 9001 REGISTERED FIRM

SPECIFICATION DATA

Flow rate in this standard range:
100 to 15,000 cubic metres per hour

Shroud materials:
304ss as standard; 316ss as an option

Combustion chamber lining:
100 mm of high-temperature ceramic blanket bricks with no hot-face fixings

Typical pressure rise across gas blower:
150 mbar

Flame temperatures:
760ºC to 1200ºC, subject to application

Retention time:
0.6 seconds minimum

Minimum methane concentration for combustion to be sustained:
20%

Number of inlets:
The standard unit is fitted with 2 flanged inlets

Flow rate is controlled by a chemical duty butterfly valves

Additional inlets available upon request

Pipework finish:
Hot dip galvanised to industry standard

Burner material:
High temperature stainless steel

Flame arrestors:
On gas booster inlet and outlet

Flame detection:
Self-checking UV sensor

SMART TECHNOLOGY

The basic technical principles involved in "SMART" flare technology are exhaust gas recycle and fuel-staging. These have the combined effect of reducing the intensity and heat of combustion, ensuring that air and fuel-gas are thoroughly mixed, and reducing free oxygen that may be taken up in the formation of NOx.

The separation of the combustion process into two zones permits the peak flame temperatures to be minimised. This, in turn, reduces the rate of formation of Thermal NOx, the primary source of nitrogen oxides in landfill gas flares.

The objective of exhaust gas recycle is to provide additional gas for combustion process cooling without the addition of free oxygen. Exhaust gas recirculation is driven by the natural draft of the combustion process, which itself is a function of height and temperature. The degree of recirculation may be controlled by use of flow control valves.

Organics personnel have been working on the development of this technology since the early 1990's and have accumulated a good deal of experience with its application and performance.

PERFORMANCE

NOx
When operating at its peak settings, the SMART flare will achieve emissions of less than 25 mg/Nm^3 (dry gas at 3% oxygen). At 50% methane this latter is approximately equivalent to a Mass Emission Rate of 0.025 lb NOx/ MMBtu.

Carbon monoxide
Levels of carbon monoxide will be below 40 mg/Nm^3 (dry gas at 3%^ oxygen), which is approximately equivalent to a Mass Emission Rate of 0.6 lb/MMBtu at 50% methane.

Trace gases
Vinyl chloride, benzene and non-methane organic carbons have all been measured by a NAMAS approved laboratory to be destroyed to greater that 98% efficiency.

Ammonia
When input to a thermal oxidiser equipped with SMART flare technology, an inlet concentration of 100,000 mg/Nm^3 (dry gas 3% oxygen) resulted in a 99.95% removal efficiency and a total NOx load of <100 mg/Nm^3. This latter is well within the requirements of the German TA Luft and the proposed UK Environment Agency landfill gas emission standards.

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