

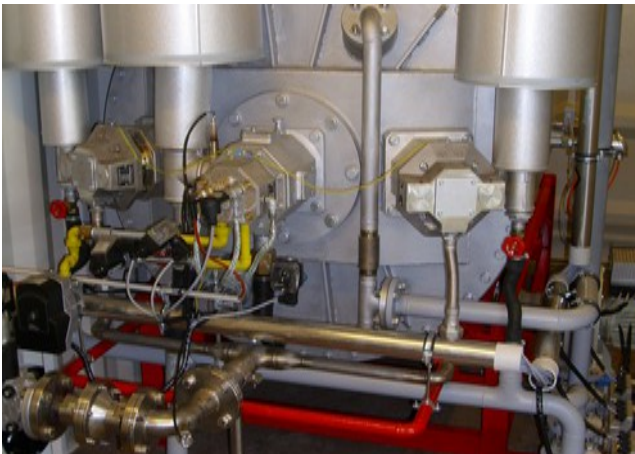
FLOX[®]- Thermal Oxidizer for Landfill Gas DGV

Reliable complete oxidation for landfill gas with very low methane concentrations

Field of Application:

Methane concentrations in landfill gases typically decline significantly when suction of gas in landfills is continued in due form after closure of the landfill. The desired or undesired aerobisation of the landfill is the reason for this decline. In practical operation this often leads to compromises in landfill gas management, as state of the art appliances (engines, flares) are limited to relatively high minimum CH₄ concentrations in the landfill gas. This leads to an incomplete gas collection and undesired emissions from the landfill body. This is no longer necessary with the e-flox DGV process. This process allows the save and complete extraction of landfill gases and the continuous transformation of the landfill to aerobic digestion until the end of the active landfill gas management.

DGV100 furnace with three burners:



Functional Description:

FLOX[®]-burners with ceramic recuperators for heat recovery are the core elements of the process, installed in a well insulated combustion chamber. After start-up of the system a central start-up burner heats up the furnace to minimum 850°C, typically using LPG. Reaching this temperature threshold, the plant switches from flame to FLOX[®]-mode. With landfill gas concentrations above 6 Vol% no supplementary fuel is required, this mode is characterised as autothermal operation. A complete oxidation of the gas, unaffected by issues like flame stability etc. is a major benefit of the Flameless Oxidation (FLOX[®]) technology. Landfill gas and air are preheated by means of the hot flue gas leaving the combustion chamber, using ceramic recuperators integrated in the burners. This allows to

maintain high combustion temperatures despite of decreasing methane concentrations.

Two limiting factors have to be taken into account for the layout of the plant: The maximum landfill gas flow is defined by the size and the number of the burners, the maximum thermal load is defined by the maximum amount of cooling air, which itself is subject to the plant layout. Thus, the major size definition is the flow of the landfill gas to be treated. The thermal load can be adapted to the specific needs of the project and has only a minor effect on investment costs.

The plant can be operated in a wide range of operating conditions. The minimum load is defined by the minimum CH₄-concentration in the landfill gas required to maintain the operating temperature of the furnace. This is the so called autothermal CH₄ concentration, which is typically at 6 Vol% CH₄ in CO₂. This value decreases when the N₂-concentration in the landfill gas rises with progressing aerobisation of the landfill.

C150 FLOX[®]-burner with ceramic recuperator:



The recuperators are made of corrosion and thermo-shock resistant high performance ceramic material SiSiC. This material is good for combustion temperatures of up to 1250°C and corrosion resistant against H₂S and halogens in the landfill gas. H₂S concentration is supposed to decline when the landfill is converted to aerobic digestion. This will allow at some point to use metallic recuperators which convert the system to autothermal operating conditions of down to 2 % CH₄.

Plant Control:

The plant is controlled with a modular PLC controller. The furnace controller ensures the optimum operating conditions, using the furnace temperature and the oxygen concentration in the flue gas as input values. Remote control of the plant from a supervising process control system is possible via digital input/output signals or the optional ProfiNet interface. A visualisa-



FLOX®-burners for energy technology

tion is either directly installed on the switch cabinet or performed on the customer supervising computer. The operation of the plant is completely automatic, the manual operation is limited to starting and stopping the plant.

Modular Set-up:

The DGV base unit consists of furnace and plant controller included in a 20 feet container. This unit is available in four standard sizes for 50, 100, 200 and 500 m³/h landfill gas. The bas unit might be extended by following units:

- Landfill gas compressor with flow or suction controller, included in a separated compressor room with LEL supervision.
- Landfill gas analyser for the save shut-down of the plant in case of an unsafe gas composition.
- Heat utilization from the hot flue gases via a heat recovery boiler or a hot air dryer.

Customer Tailored Design:

We are able to provide a flexible and site adapted plant, due to the modular approach of the plant set-up. If existing equipment shall be reused we are ready to prepare an individual quote. The connection of the plant to the site specific condensate removal system requires typically customer tailored adaptations. The plant interface (visualization, electronic interfaces and piping diameters) can be adapted to customer needs. Based on your data and if required an on-site visit we design a suitable plant and provide an individual quote. Get in touch with us or use the inquiry form on this sheet to get a first budgetary quote.

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Technical Data (DGV without landfill gas compressor)

| Plant type | DG 03 CC 50 | DG 03 CC 100 | DG 05 CC 200 | DG 15 CC 500 |
|---------------------------------------|---|---------------|--------------|--------------|
| Volume flow | 08-60 m³/h | 15-120 m³/h | 40-250 m³/h | 80-500 m³/h |
| Thermal load max. | 250 kW | 500 kW | 800 kW | 1500 kW |
| Electricity consumpt. max/autothermal | 3,5 kW / 1,5 kW | 5 kW / 2,2 kW | 6 kW /3,5 kW | 10 kW / 5 kW |
| Size | 20 feet container with switch cabinet, 30 feet container with landfill gas compressor | | | |
| Autothermal operation | > 6 Vol% CH ₄ (warranty 6,5 Vol%) with ceramic recuperators > 2 Vol% CH ₄ (warranty 2,5 Vol%) with metallic recuperators (H ₂ S < 20 mg/m³) | | | |

Inquiry form

Customer address and contact data:

Name: _____
e-mail: _____
Tel.: _____
Address: _____

Landfill gas: Volume flow (min/max m³/h): _____
 CH₄-content (min/max Vol.%): _____

Optional modules:

- landfill gas compressor gas analyser heat recovery boiler LPG storage vessel