New construction and system integration of turn-key thermal oil heater system

Burner	SAACKE swirl burner SSB-LCG
Burner capacity	13.3 MW (12 MW thermal capacity)
Fuel	Zone 0 vent gases
Lower heating value (LHV)	0 to 40 MJ/m³ at 600 to 3400 Nm³/h

Thermal Use of Vent Gases

Odfjell Terminals BV, Rotterdam (Netherlands)

Demanding solution: alternative fuel replaces up to 80 % of natural gas

Odfjell Terminals operates a major tank storage terminal in the port of Rotterdam. Chemicals are brought in by ship from around the world, stored and transshipped here. In the process "vents" form, meaning explosive exhaust air. The operator's objective was to make thermal use of these vents for distillation. But there was as yet no technological solution for combustion of gases in thermal oil heaters with a LHV that is not only extremely low but also fluctuates greatly – until SAACKE took on the challenge.
With a modified SSB swirl burner for gases with low heating value and a custom developed measuring and control system, reliable combustion of this explosive mixture is now possible. The SAACKE specialists' achievement also included consistently making a convincing case for the technical feasibility and implementation of a turn-key system that will serve as a model for future projects. Depending on the accumulated quantity, up to 80 % of the capacity of the thermal oil heater is now produced by the vents. As much as 8 MW of natural gas and the previous expense for disposal are now saved from the vents. The innovative air gradation also ensures extremely low emission values for NO_x and CO.

As a bonus, the SAACKE concept is especially impressive in its long service life. The quality of the components used and the simple maintenance ensure that the plant's capacity will be just as high even after many years as it was on the first day.

Facts

- Best technology and custom turn-key solution available
- Replacement up to 80 % of natural gas by vents with low calorific values
- Safe and reliable combustion of zone 0 gas without support fuel
- Highly efficient combustion technology with fuel gradation for the lowest emissions
- Convenient to operate, highest level of availability and longest service life
- Smooth project management and efficient system integration in the shortest possible time
- Back-up thermal oil system ensures wide control range

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The SAACKE solution in detail

SAACKE had previously set new standards for lean gases at the Bremen steel plant with the SSB-LCG (Low Calorific Gas) burner. This swirl burner combusts gaseous residues with a LHV of about 3 MJ/m³ without support fuel. Now it has become the core element of the Odfjell plant. The tangential supply and powerful swirling

Thermal oil heater plant with lean gas burner in Rotterdam

motion of the combustion air ensure an extremely stable flame. A special LCG muffle is used to draw in the vents with low pressure loss. Reliable combustion of the tank exhaust air (classified as zone 0) is now possible directly in the heater. An induced draft fan ensures constant pressure conditions and ex-protection. The muffle also allows for low-emission combustion by means of air graduation. There is then no need for secondary measures such as SCR or SNCR.

Another challenge lay in the differing composition of the vents, which accordingly resulted in greatly fluctuating LHV. The measuring and control system developed by SAACKE works with a Wobbe index system, which records LHV with measurement times about five seconds apart and is able to record values between 0 and 40 MJ/m³. It is positioned upstream from the burner so that the relevant air requirement is controlled before the gas reaches the burner.

The system integration concept was also developed by SAACKE: The old and new thermal oil heaters share a common oil circuit by means of a hydraulic switch. This resulted in a back-up system with a wide control range which makes the system extremely efficient and flexible.

Sophisticated SAACKE engineering and ideal communication with the customer also resulted in an extremely short implementation phase from order placement until commissioning. The flexibility of the system and the efficient combustion technology made it possible to achieve an optimum cost/benefit ratio. The operator's investment will pay for itself quickly and the environment also benefits.

Summary

The SAACKE team solves complex challenges in firing systems and incineration plants with high-end technologies and refined engineering. From reliable planning to smooth commissioning, SAACKE is an absolutely reliable partner.

Lean gas flame with a LHV of 3 MJ/m³: The combustion of a SAACKE lean gas burner is so clean and stable because of the intensive mixing of fuel and air with low pressure loss.

"SAACKE's solution has far surpassed our expectations. We're always happy to show the plant to our customers – and to SAACKE's customers." (Paul van Kooten Niekerk, Odfjell Project Manager)

Technical data

Application	Themal oil heater
Burner model	SSB-LCG
Burner output (max)	13.3 MW
Vent + natural gas	
Emission values	No_x: < 140 mg/m³; CO: < 50 mg/m³
Lower heating value (LHV)	0 – 40 MJ/m³
Design	Duoblock burner with LCG muffle, induced draft fan

For further information, please visit: **www.saacke.com**

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