



## Gas Combustion Unit – for safe LNG transport

*SAACKE's 100% free-flow process  
prompts GCU order*

Transporting liquefied natural gas by sea is always a question of safety. Gas Combustion Units (GCUs) ensure safe transportation by fully burning of excess boil-off gas with maximum availability. For this reason, Hudong-Zhonghua Shipbuilding (Group) Co., Ltd. commissioned Bremen-based SAACKE GmbH with the manufacture and delivery of GCUs for six new LNG tankers. The ship owner, China Shipping LNG Investment Co., Ltd., intends to use them for trips between northern Australia and China from the end of 2015. The GCUs, with a plant capacity of 5.2 tons of gas per hour, were delivered in the summer of 2014.

### Safe combustion at low pressure

This is the second time that Hudong-Zhonghua has relied on SAACKE's know-how, but it is the first order for a GCU for operation under 100% free-flow conditions. Excess boil-off gas is normally supplied to consumers via a compressor, at 3 to 4 bar pressure. Gas no longer needed for the ship's engines is burnt off via the GCU. But this involves a risk of compressor failure and safety risks due to rising pressure in the tank. In SAACKE's 100% free-flow solution the boil-off gas is completely burnt off without a compressor at a pressure of 0.15 bar – much lower gas pressure and safer than other systems. This was the customer's main reason for deciding on the SAACKE GCUs.



*„The safe transportation  
of LNG by sea is the top  
priority for our customer.  
The SAACKE solution  
with 100% free-flow won  
them over immediately.“*

*Andreas von Minden, SAACKE Sales Manager Offshore Application*

**Hudong-Zhonghua Shipbuilding**

**LNG tanker**

**GCU 550**

## Task

Installation of Gas Combustion Units on six LNG tankers for the complete and safe burn-off of excess boil-off gases.

## Solution

Combination of low NO<sub>x</sub> burners and compact GCUs, including 100% free-flow.

### The SAACKE solution in detail

The GCU combines the SAACKE SSB 500 low emission rotating flame burner with an air-cooled steel combustion chamber. All of the components have been so compactly designed that the 15 meter high, 36-ton plant can be accommodated in the area of the funnel and saves valuable construction space in the ship. The fore- and after-combustors as well as the burner and the gas fittings were manufactured in Bremen, while the outer shell was manufactured at SAACKE's factory in Qingdao. This is where the individual GCU components were also brought together and assembled before ultimately being installed in the ship on-site at the shipyard in Shanghai.

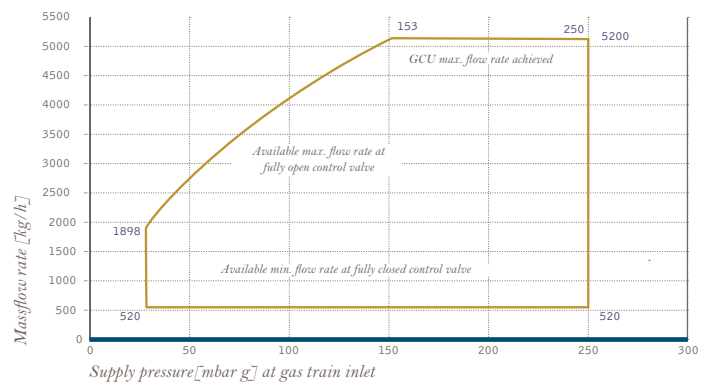
### All benefits at a glance

- ✎ Rain-proof design to avoid corrosion and wearing of the GCU components, especially the burner and the combustion chamber bottom
- ✎ The inner lining in the combustion chamber provides a cold and therefore strong structure of the GCU
- ✎ High air excess provides low flame temperature for low heat radiation and low NO<sub>x</sub> emissions
- ✎ No flame touching of the combustion chamber wall if the ship is rolling in heavy sea and therefore no wearing or damaging of the combustion chamber
- ✎ No belt driven fans for low maintenance cost
- ✎ Oil pilot burner for unlimited continuous operation if required during special circumstances
- ✎ Controlled fuel air ratio for safe combustion and low emissions
- ✎ For maintenance it is possible to remove or replace inner parts like combustion chamber and burner via funnel
- ✎ Gap between combustion chamber and outer shell is accessible and allows for easy inspections
- ✎ All gases are completely burnt-off
- ✎ 100% free-flow possible

### Conclusion

One thing is clear: LNG transport will increase considerably in the next few years. This makes it even more important to ensure that boil-off gases are burnt off at sea in a safe and environmentally friendly manner. SAACKE introduced the Gas Combustion Unit to the market, as a completely new development, as early as 2002. Since then, this core competence has constantly been expanded – most recent example: the 100% free-flow solution. This success shows that the company is on the right track: to date 80 SAACKE GCUs have been installed in ships worldwide.

### Burner performance map: Massflow over pressure



### Technical data: GCU

Plant capacity	5.2 t/h gas
Flue gas outlet temperature	< 450 °C
Control range	1:10
Fuel	Boil-off gas, marine gas oil (support fuel)

