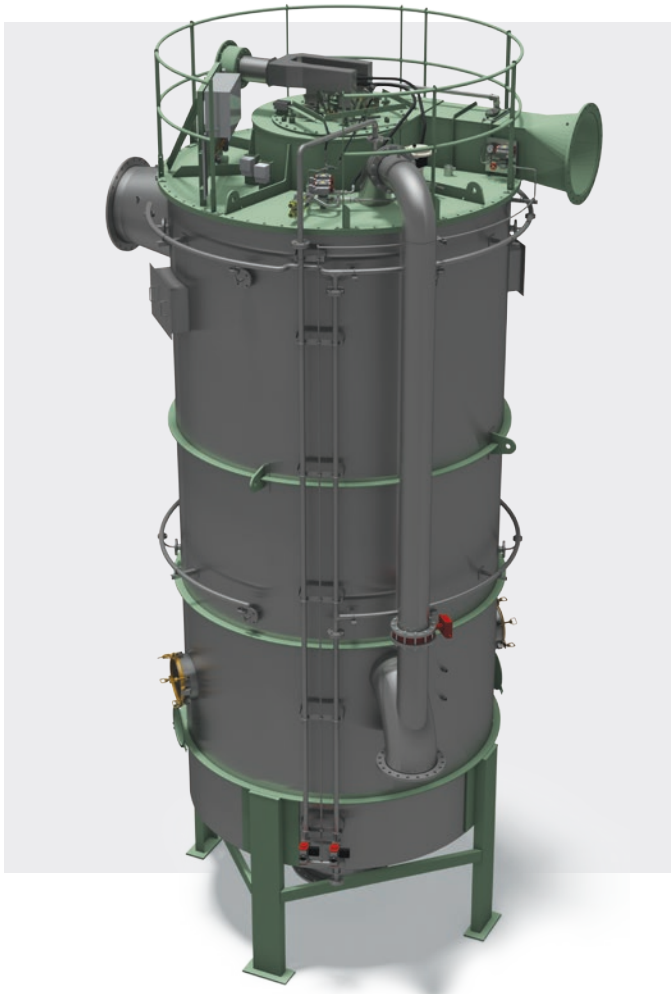


Moss inert gas generator system for gas carriers (LNG)

PRODUCT LEAFLET



Wärtsilä is a market leader in the development, design, manufacture and servicing of advanced inert gas and nitrogen solutions for marine and offshore oil and gas applications. Our leading-edge, customised solutions ensure high quality and advanced levels of safety for vessels operating in regulated areas. We are certified by ISO 9001:2000, ISO 14001:2004 and OHSAS 18001:2007. Our strong reputation in inert gas solutions is based on over 50 years of experience and include over 2500 vessels installed with our inert gas equipment.



Wärtsilä Moss inert gas systems are vital systems to ensure a high level of safety for vessels to prevent the atmosphere in cargo tanks or bunkers from coming into the explosive range. Consequently, high quality and reliability is always our number one priority.

The systems are designed based on compact modules, offering important savings in space and installation cost both for newbuildings and for retrofit on existing vessels.

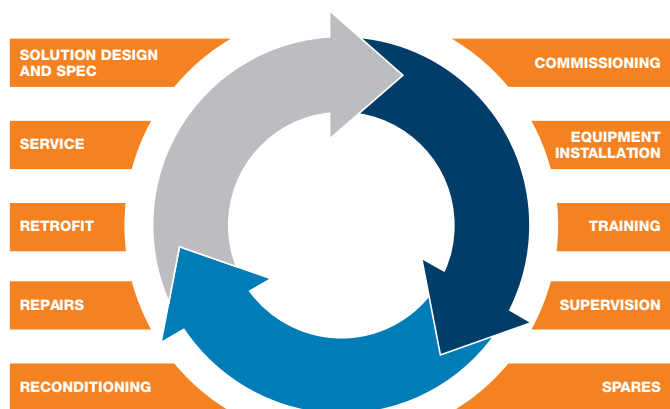
WÄRTSILÄ COMBINED INERT GAS SYSTEM AND GAS COMBUSTION UNIT (IGG/GCU)

Wärtsilä have supplied combined IGG-GCU systems since its introduction in 2013. IGG-GCU uses an existing Wärtsilä Moss inert gas generator to burn the boil-off gas, thereby eliminating the need for a conventional gas combustion unit. This results in considerable capital expenditure savings. At the same time, by using the boil-off gas as fuel for creating inert gas, the combined system also provides notable operating cost savings.

The combined IGG-GCU system has a minimal environmental footprint. This is achieved through the replacement of a separate onboard system, and by using the boil-off gas for inert gas generation, which together minimise the extra use of marine diesel oil (MDO) fuel.

PIONEERING INNOVATION A HISTORY OF FIRSTS

- First to manufacture and install an inert gas system.
- First compact vertical generator design.
- First to develop a dryer system for a gas carrier systems.
- First to pioneer bilge tank run-off.
- First to create a purpose-built testing and training facility.
- First use of higher grade steel with higher temperature tolerance.
- First to stage quiet centrifugal fans for gas carriers instead of roots blowers.
- First to offer the option of indirect cooling for gas carriers.
- First to provide 100% redundancy for the systems.
- First to develop cost-saving automatic gas capacity controls.
- First to develop an inert gas system in alloy 59.
- First all titanium inert system (for the offshore industry).
- First to develop/secure commercial orders for combined igg/gcu.



CUSTOMER BENEFITS

- Higher specification raw materials
- Complete understanding of the application
- Engineering focus on reliability
- Specification focus on lowest total cost of ownership
- Industry-leading full scale product testing, pre-installation
- No off-the-shelf technology: every wärtsilä system tailored to customer needs
- Smart adaptations of existing technology > clean sheet bespoke engineering

Purpose built training & testing facility



WÄRTSILÄ MOSS INERT GAS GENERATOR SYSTEM SPECIAL FEATURES:

BURNER/SCRUBBER UNIT

- High turbulent burner giving high quality inert gas.
- Compact, vertical design which can be installed at any direction inside the ship and inert gas quality is independent of ships motion.
- Reliable ignition burner with new type of nozzle.
- High grade stainless steel with high heat and corrosion resistance.
- Automatic fresh water cleaning system after use of inert gas generator.

BLOWER UNITS

- The blower units supplying combustion air are either of two stage centrifugal fan type or of the roots blower type with electric motors.
- Blower units are arranged on a rigid steel base frame equipped with resilient mountings.

INERT GAS DRYING

- First stage is an inert gas cooler unit which cools down the inert gas to 5°C removing most of the water by condensation. Indirect cooling using low amount of refrigerant.
- Second stage adsorption dryer deliver inert gas with dew point of -45°C.
- Continuous operation.
- For smaller systems the drying may be of the heatless type.
- Using environment friendly refrigerant which complies with all class societies environmental regulations.

CONTROL SYSTEM

- The control system is fully automatic.
- All control panel of touch screen type.
- Flow diagrams and controls for safe and easy operation with a minimum of operator supervision.

PERFORMANCE DATA

Wärtsilä Moss inert gas cooling unit



Wärtsilä Moss inert gas dryer unit



INERT GAS SYSTEM

Capacity: Up to 25.000 Nm³/h

Normal outlet dryer pressure:
0.25 bar g. (Other pressures upon request).

Inert gas composition at 1-2% by volume of oxygen (based on marine distillate fuel):

- CO = Max. 100 ppm
- NO_x = Max. 100 ppm
- SO₂ = Max. 10 ppm
- CO₂ = Approx. 14%
- N₂ + Ar = Balance

Oxygen content adjustable down to 0.5 vol% O₂.

Gas outlet temperature:
Typical 10-20°C.

Dewpoint after dryer:
Normally down to -45°C or below. (Average at atm. press).

Fuel:
Marine distillate according to ISO 8217 DMA or DMZ.

Nominal fuel consumption:
0.084 kg/Nm³ gas.

Nominal sea water consumption:
0.065 m³/Nm³ gas
(sea water temp. max. 32°C).

Nominal el. power consumption excluding seawater pumps:
0.04 kW/Nm³/h gas (0.06 kW/Nm³/h gas if el. heater in operation).

GAS COMBUSTION UNIT

Capacity: Up to 5.000 kg/h BOG

Normal outlet GCU pressure:
0.10 bar g.

Inert gas composition at 1-8% by volume of oxygen (based on marine distillate fuel):

- CO = Max. 100 ppm
- NO_x = Max. 100 ppm
- SO₂ = Max. 10 ppm
- CO₂ = Approx. 14%
- N₂ + Ar = Balance

Oxygen content adjustable down to 3.0-8.0 vol% O₂.

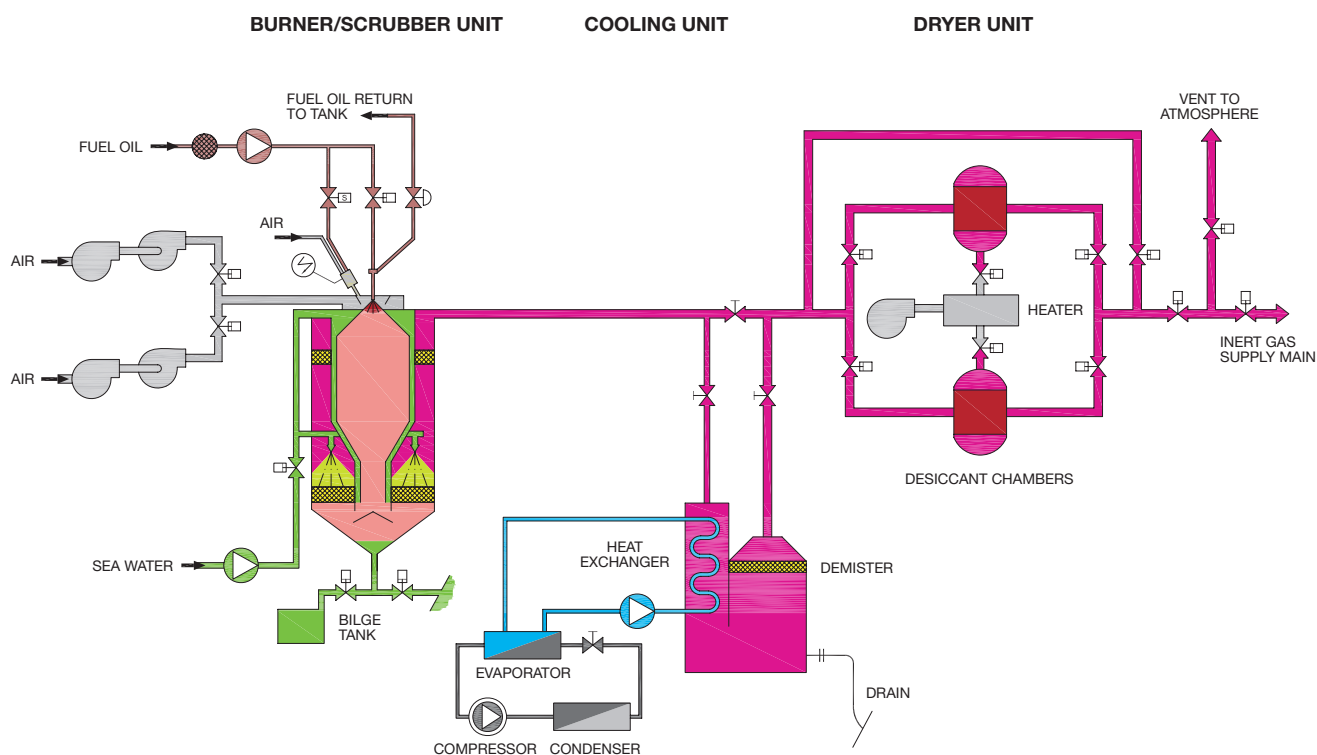
Gas outlet temperature:
Typical 12-44°C.

Fuel:
Marine distillate according to ISO 8217 DMA or DMZ in IGG mode and startup of GCU.

Nominal sea water consumption:
0.76 kg/h BOG (sea water temp. max. 32°C).

Nominal el. power consumption excluding seawater pumps:
0.26 kW/kg/h BOG.

Typical schematic of a Wärtsilä Moss inert gas generator system



EXPERIENCE & RECENT SUCCESSES

CREOLE SPIRIT



SCOPE OF SUPPLY

Wärtsilä Moss supplied a combined inert gas generator and gas combustion unit for 9 x 173,400m³ LNG carriers. The combined IGG-GCU system has a minimal environmental footprint.

Shipowner..... Teekay Corporation, Canada
Shipyard..... DSME, South Korea

BW SINGAPORE



SCOPE OF SUPPLY

Wärtsilä Moss supplied an inert gas generator for a 14,500m³ LNG FSRU.

Shipowner..... BW Offshore, Norway
Shipyard..... Samsung Heavy Industries, South Korea



SUPPORT THROUGHOUT THE ENTIRE LIFECYCLE

WÄRTSILÄ SPARES & SERVICE - UNRIVALLED GLOBAL SUPPORT

- 100k+ parts shipped worldwide every year
- 24 hour spares and components order response pledge - 96%
- Same day parts dispatch
- Smart delivery based on local knowledge
- Assured 80% spares availability
- Strength of Wärtsilä network across 200 locations in 70 countries
- No minimum order size
- 24/7 emergency contact number: +47 91796874

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