



Through its trade marks Smit Gas™ and Aalborg Industries™, the Aalborg Industries Group has over 40 years of experience of all types of inert gas system installations for the tanker industry.

Through continuous innovation and development, our inert gas systems have set the industry standard for many years.

# Engineering with a history



*Aalborg Industries has delivered over 3,700 maritime inert gas systems to all sorts of tankers since 1967. Over 250 new installations are delivered each year.*

*The name Smit Gas™ remains the trade mark of Aalborg Industries' inert gas products.*



## History

The origins of Aalborg Industries Inert Gas Systems B.V. in the Netherlands go back as far as 1913 when Mr. Willem Smit founded a wide range of industrial companies in Nijmegen, Holland. Smit Ovens was founded in 1927 and the company started to produce industrial inert gas systems (IGS) in 1962 and engineered the first marine inert gas system ever in 1967 on board M/V "Willem Barendsz", a fishmeal carrier. In 1995, the inert gas business became a separate business unit and continued in 1997 as an independent company.

In 2006, Smit Gas Systems was acquired by Aalborg Industries and renamed as Aalborg Industries Inert Gas Systems B.V. The inert gas business was combined with the IGS operation of Aalborg Industries KK (Japan) which has delivered over 700 of its own compact and efficient flue gas systems since 1970.

## What is inert gas?

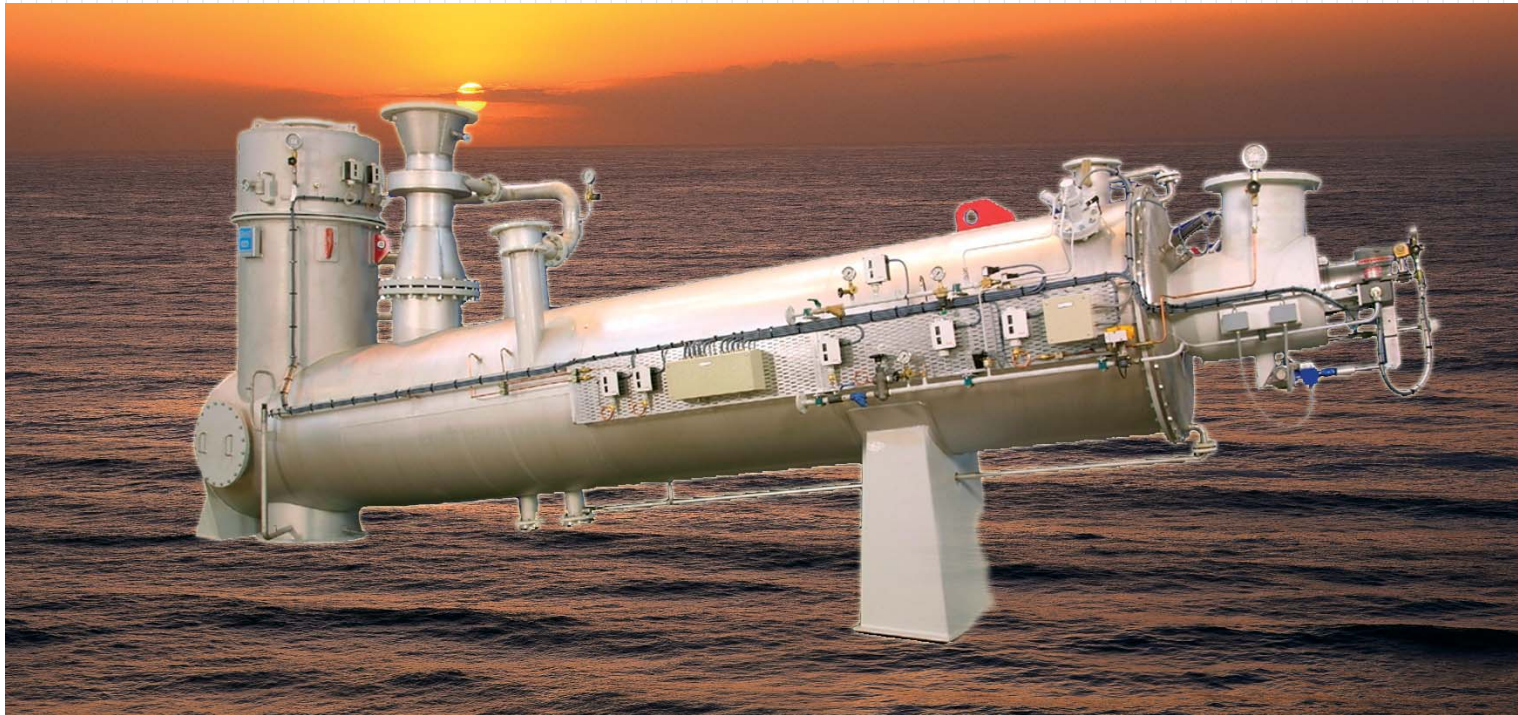
According to the International Maritime Organisation's (IMO) definitions, **inert gas** is a gas or a mixture of gases, such as flue gas, that contain insufficient oxygen to support the combustion of hydrocarbons.

An **inert condition** is defined as a condition in which the oxygen content throughout the atmosphere of the (cargo) tank has been reduced to 8% or less in volume by addition of inert gas.

A fire needs heat, fuel and oxygen to develop. Taking away one of these elements in **the fire triangle** will stop or prevent a fire. Thus, an oxygen content in a tank below 8% achieved by addition of inert gas is one of the options for preventing the fire.

As a measure to achieve **tanker safety**, the 1978 Protocol to the International Convention for the Safety of Life at Sea (SOLAS) include the requirement for inert gas systems on all new tankers over 20,000 dwt.

# Combustion preventing fire



## The Ultramizing® combustion system

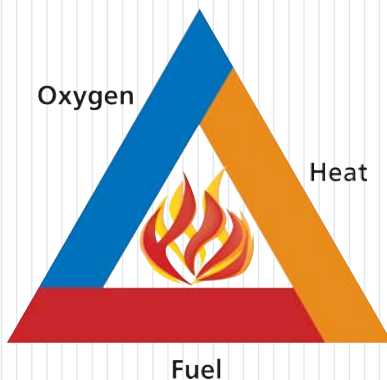
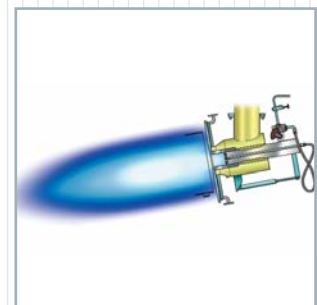
At the heart of almost every inert gas installation delivered is the unique Ultramizing® combustion system, assuring low oxygen level inert gas without any soot formation even at partial load conditions.

Oil is atomized in an ultra-fine dispersion pattern, using the combustion air for atomization. The system utilizes a highly-efficient, two-stage, oil/air mixing technique, which results in an oxygen depleted inert gas without any soot formation. The bluish, transparent oil flame is a characteristic of the Ultramizing® combustion system.

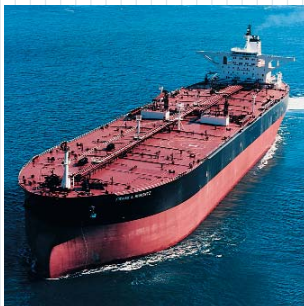
As the oil and air ratio are mechanically linked and optimised on each point of the operation curve, the low oxygen content is assured also during partial load, as well as the complete absence of soot.



*Mechanical linkage of fuel and oil ratio ensures sootfree operation also at part load conditions.*



# Inert gas systems for crude -, product and chemical carriers



## Oil tankers and crude oil tankers

Tankers carrying unrefined products are usually equipped with the flue gas type inert gas systems, whereby the exhaust gas of the boilers is used. When operating in conjunction with a flue gas inert gas systems, by necessity a high level of soot and sulphur removal is achieved from the boiler gases in order to prevent pollution of the cargo and corrosion in the tanks.

Since 1972, close to 1,000 flue gas type inert gas systems have been delivered of our designs.

Flue gas type inert gas installations are often delivered in combination with a topping-up inert gas generator. The small (500 m<sup>3</sup>/hr) inert gas generator can be used when boilers are not being operated.



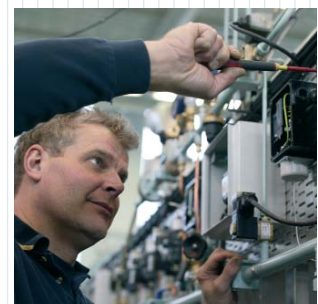
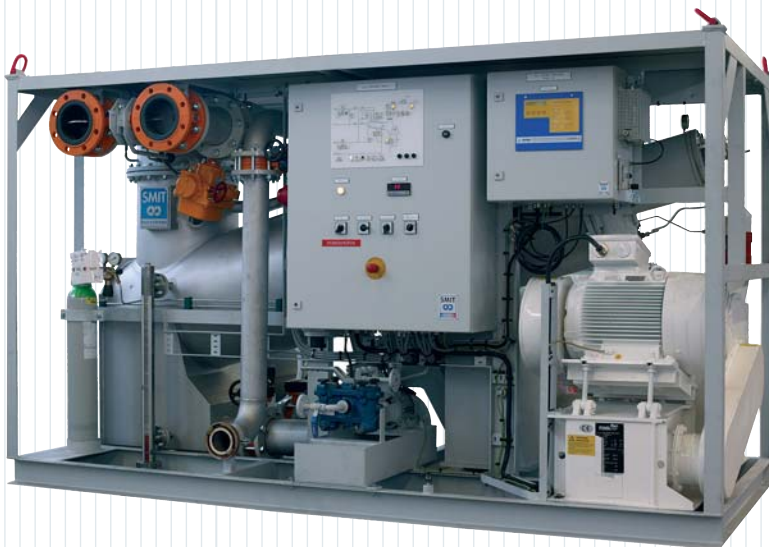
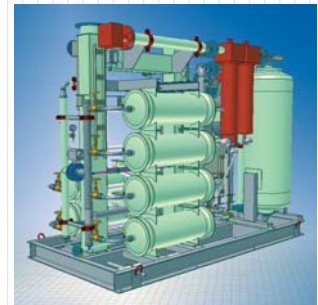
## Chemical carriers and product tankers

In most cases inert gas generators (IGG) are used on chemical carriers and product tankers. Our generators produce inert gas without any soot, even at partial load conditions, thus preventing pollution of the tanks and the cargo and making unnecessary cleaning of the tanks superfluous.

When very dry inert gas is required, nitrogen generators are installed. This is often done by means of use of membranes (by air separation). Alternatively a CO<sub>2</sub> stripper or a PSA (Pressure Swing Absorption) system (by air separation) can be used (see "Other products" on page 6).

Over 900 inert gas generator systems have been delivered by us since 1974 to chemical carriers and product tankers.

# Continuous innovation on the full range of inert gas systems



# IGG for Floating Production Systems (FPS), LNG and LPG carriers



## FPS (Floating Production Systems)

Since 1974, when we delivered our first inert gas generator (IGG) installation to an FPSO, we have delivered a wide variety of designs to meet our customers' requirements. With a dedicated specialised Offshore team, we can deliver any inert gas system requirement indoor or outdoor, in safe or hazardous areas.

## Gas carriers (LNG and LPG)

We delivered our first inert gas installation to a gas carrier in 1971; since then 650 have followed. We have built up a vast experience to serve this highly demanding segment.



Ease of installation and operation, a low level of required maintenance but most importantly reliability and a very high quality of inert gas under all circumstances have assured that our products set the industry standard.

## Other products

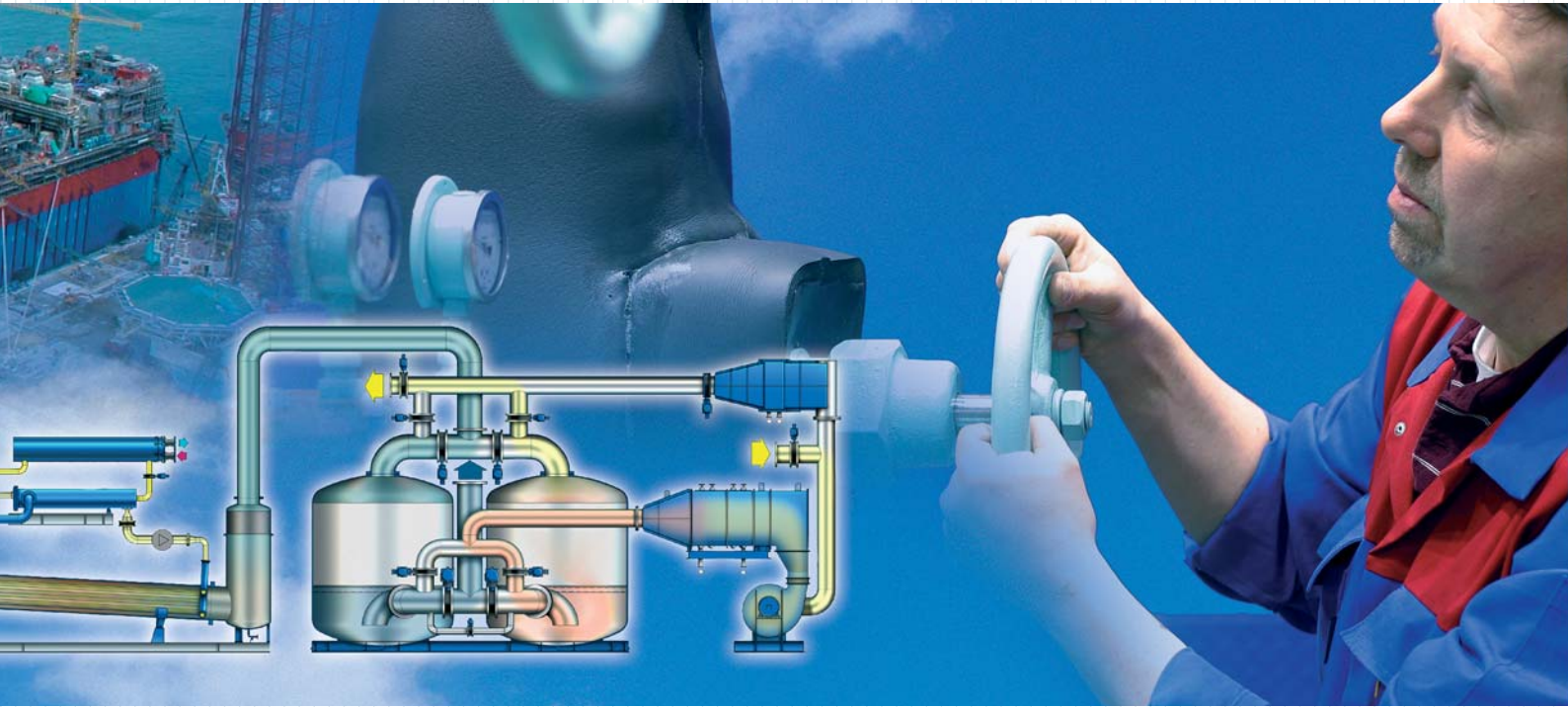
A wide range of other products is also delivered by us, often according to customer specification.

An excellent combination of a flue gas type inert gas system and an inert gas generator is our so-called Smit Gas™ FGIn generator. One operating mode is to use the boiler flue gases and clean them efficiently when for instance the cargo is crude oil. When refined products are then shipped (or when the boiler is not running), the generator mode can be used to obtain clean, soot-free inert gas.

Nitrogen can also be generated by using an inert gas generator in combination with a CO<sub>2</sub> stripper. We refer to it as the Smit Gas™ BUCS.

Another solution is PSA (Pressure Swing Absorption) which is most suitable for high purity nitrogen generation.

# Industry's best practice



## Worldwide technical support

Aalborg Industries operates a professional, world-wide After Sales organisation that takes care of commissioning, service, repair and spare parts supplies.

Furthermore, Aalborg Industries has an extensive group of service engineers operating from its bases in The Netherlands and Japan.

## Training

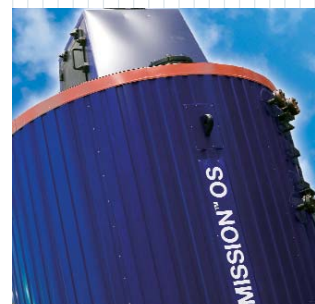
In Nijmegen, The Netherlands, we offer in-house training for groups of up to 12 people at a time. We can also provide training on-board or at other customer specified locations.

## Aalborg Industries A/S, Denmark

Aalborg Industries is the global market leader in marine boilers and inert gas systems. The company has its headquarters in Denmark and has subsidiaries in Finland, the Netherlands, Dubai, Singapore, Japan, China, Indonesia, Korea, Brazil, Vietnam, Australia and the USA.

Other products we deliver are:

- Steam boilers
- Thermal fluid heating systems
- Hot-water boilers
- Exhaust gas fired economizers
- Waste heat recovery boilers after gas turbines
- Composite boilers (oil - and exhaust gas fired)
- Heat exchangers (shell & tube type)
- Oil & gas burners





### Further information

Brochures are available on all our products and can be downloaded from our website.

### Website:

[www.aalborg-industries.com](http://www.aalborg-industries.com)

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