AALBORG
INDUSTRIES

INERT GAS SYSTEMS

The Aalborg Industries Group has over 40 years of experience with all types of inert gas system installations for the tanker industry. Inert gas is also known as inactive gas.
Below: *Inert gas system from the Netherlands delivered in 1982 for a LNG tanker built at Mitsubishi Heavy Industries, Japan.*

Introduction

Aalborg Industries are the world's market leader in supplying maritime inert gas systems (IGS). Through continuous innovation and development, Aalborg Industries have set the industry standard for inert gas generators and systems for the tanker industry for decades and have supplied more than 3,700 inert gas systems.

The inert gas systems product centre of the Aalborg Industries Group is located in Nijmegen, the Netherlands. Due to Aalborg Industries' engineering know-how together with a wide product range and services, we can combine various systems and services into a complete, integrated turnkey package with the best environmental solution.

History

As a consequence of developing some of the world's first inert gas systems on oil tankers, Aalborg Industries have the practical and technological background to advise customers on the most suitable, efficient inert gas system / inert gas generator configuration for each particular ship type. We have at our disposal a dedicated inert gas systems engineering & sales team delivering custom-built systems for Floating Production Systems in the offshore market segment as well.

Lifetime commitment

Buying from Aalborg Industries secures our lifetime commitment to the products delivered. After delivery, our customers enjoy the security of our professional Global After Sales service support for spare parts supplies and in case operational problems or refurbishment needs occur.

With Aalborg Industries companies located in 14 countries around the world, we are always close to our customers in order to ensure maximum up-time and After Sales support to their equipment.

Aalborg Industries have a large dedicated service squad in The Netherlands, Japan, Korea, Singapore, China and Brazil who commission new installations and provide support to the large installed base of AALBORG INDUSTRIES™ and SMIT GAS™ inert gas systems with service/engineering support and spare parts supply.

1967

Smit Ovens, The Netherlands, delivered its first maritime inert gas system to the fishmeal ship M/V "Willem Barentsz". Willem Smit established the Smit companies in 1913.

1970s

Aalborg Industries KK (formerly Gadelius), Japan, became inert gas generator representatives for Smit Ovens in Japan, Taiwan and Korea.

1971

First inert gas system delivered for a LNG tanker.

1974

First inert gas system delivered for the offshore market (FPSO).

1984

The first Combinert® (combined inert gas generator and flue gas inert gas system) developed.

1988

Own design of refrigerant cooling and adsorption drying system for LNG/LPG.

Tanker shipping safety with inert gas systems

Top: SMIT GAS™ inert gas generator installation on the chemical/oil product tanker "British Courtesy".
Left: Inert gas generator for offshore vessel (FPSO).
Below: In 2006, Aalborg Industries introduced its upgraded inert gas system for crude oil tankers. Scrubber for FIN inert gas system.

Why Aalborg Industries' IGS?

By applying trendsetting technologies, Aalborg Industries offers our customers a very high quality of inert gas. Also, within the Aalborg Industries Group, the combination of our boilers' low-oxygen flue gas as input for our flue gas type inert gas systems guarantees the best possible solutions for our customers.

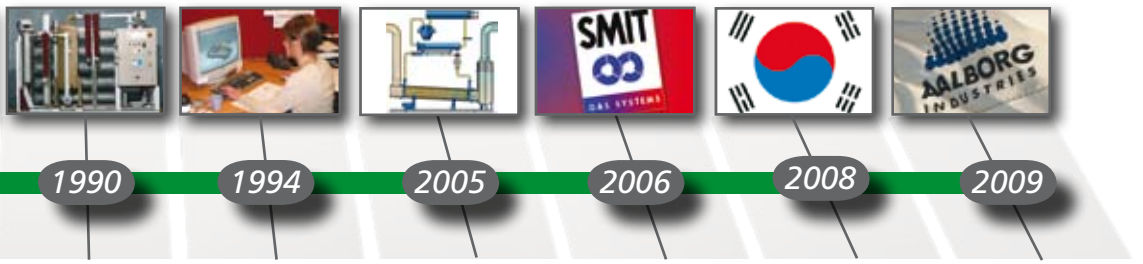
A fire needs heat, fuel and oxygen to develop. Eliminating one of the three elements will stop or prevent a fire. Thus, adding inert gas with an oxygen content below 8% to the atmosphere in the ships' (cargo) tanks prevents fires. One of the international laws to secure tanker safety is the 1978 Protocol to the "International Convention for the Safety of Life at Sea" (SOLAS) which stipulates that inert gas systems be installed on all new tankers over 20,000 dwt.

Advantages for shipyards

- Fast and accurate configuration engineering
- Short delivery times of approval drawings
- Reduced commissioning time
- Local commissioning support

Advantages for shipowners

- High quality soot free inert gas
- User-friendly operation
- Easy inspection and maintenance
- Low total life cycle cost
- Worldwide network for service & spares
- 24-hour customer assistance
- In-house training center
- Over 40 years experience in inert gas systems
- Reliability and durability
- Global After Sales support network



First nitrogen generator delivered.

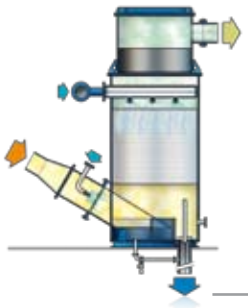
Own design of inert gas compressor launched.

Introduction of own design of water chiller.

Smit Gas Systems BV acquired by Aalborg Industries A/S, Denmark. New company name: Aalborg Industries Inert Gas Systems B.V.

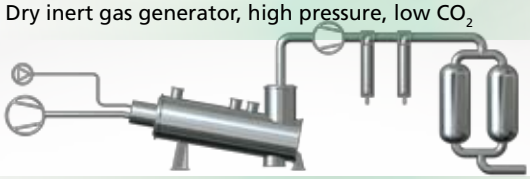
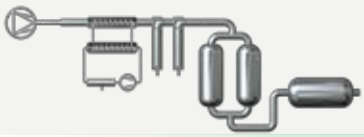
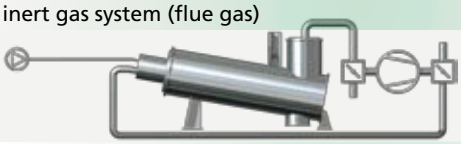
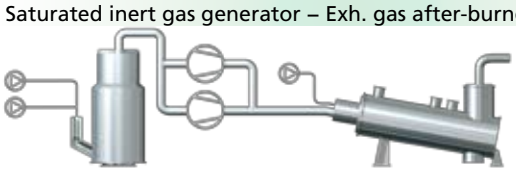
Dedicated inert gas systems service team established in South Korea.

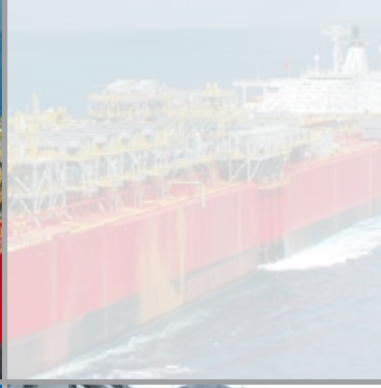
Development of SMIT GAS™ DGIN type inert gas generator using diesel exhaust gas after-treatment to generate saturated inert gas in a fuel saving manner.



Product range

Aalborg Industries' inert gas system engineers in The Netherlands and Japan manage the process from product design until shop testing and commissioning.
Below: *Portinert® (FU type), a containerized inert gas generator unit designed for temporary inert gas supply.*

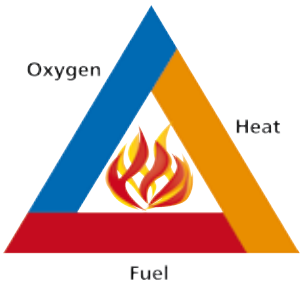
Type	SMIT GAS™ and AALBORG INDUSTRIES™ inert gas systems	Capacity	Design	Pressure	Typical ox con
FU	Saturated inert gas generator, low pressure	■ 1,000 - 20,000 m³	■ Combustion	■ 0.15 bar(g)	■ 2 - 4%
BUFD	Dry inert gas generator, low pressure	■ 1,500 - 25,000 m³	■ Combustion + drying	■ 0.3 - 0.4 bar(g)	■ 0.5 - 1%
BUCD /S	Dry inert gas generator, high pressure, low CO_2 	■ 300 - 3,000 m³	■ Combustion + drying	■ 6 bar(g)	■ 0.1 - 0.5%
TU	Topping-up saturated inert gas generator	■ 500 m³	■ Combustion	■ 0.15 bar(g)	■ 2 - 4%
MEM	Dry nitrogen (N_2) generator (membrane)	■ 200 - 10,000 m³	■ Air separation (membrane) ■ Unfired	■ 10 bar(g)	■ 0.1 - 5%
PSA	Dry nitrogen (N_2) generator (pressure swing adsorption) 	■ 200 - 2,500 m³	■ Air separation (PSA) ■ Unfired	■ 8 bar(g)	■ 0.1 - 5%
FIN	Saturated inert gas system, low pressure, flue gas type	■ 3,000 - 30,000 m³	■ Flue gas cleaning	■ 0.1 bar(g)	■ N.A.
FGIN	Combinert™ - combined inert gas generator & inert gas system (flue gas) 	■ 1,000 - 20,000 m³	■ Combustion + flue gas cleaning	■ 0.12 bar(g)	■ 2 - 4%
DGIN	Saturated inert gas generator – Exh. gas after-burner 	■ 2,000 - 12,500 m³	■ Diesel exhaust gas cleaning + combustion	■ 0.12 bar(g)	■ 2 - 4%



ygen tent	Fuel type	Fuel atomizing	Dew point	Recommended for installation on (tanker) ship types: Gas: LNG	Gas: LPG	Gas: Other	Crude oil	Product	Chemical	FPS
	■ DMB ■ DMC ■ Fuel gas	■ Air	■ Saturated					●	●	●
	■ DMX ■ DMA ■ DMB	■ Air/steam	■ Dry -45/-65˚C	●	●	●				
	■ DMX ■ DMA	■ Air	■ Dry -40/-50˚C		●	●			●	
	■ DMB ■ DMC	■ Air	■ Saturated				●	●		
	■ N.A.	■ N.A.	■ Dry -65˚C					●	●	●
	■ N.A.	■ N.A.	■ Dry -40˚C					●	●	●
	■ Boiler (HFO)	■ N.A.	■ Saturated				●	●		●
	■ Boiler (HFO) ■ DMB ■ DMC	■ Air	■ Saturated				●	●		●
	■ Diesel engine (HFO) ■ DMB ■ DMC	■ Exhaust gas + Air	■ Saturated				●	●		●

Above: Scrubber for Aalborg Industries™ FIN flue gas type inert gas system.
← The products and systems shown on pages 4-5 are a selection from our comprehensive inert gas systems' product range. Customized solutions are available on request.
***Below:** Washing tower of a BUFD inert gas generator for LNG carrier.*

Top: At Aalborg Industries' Nijmegen test centre, the inert gas systems are tested before delivery.
Above: Inert gas systems are safety equipment that prevent environmental disasters such as oil spills caused by explosions in tankers.
Below: The fire triangle. Taking away one of the three components (like for instance replacing oxygen with inert gas) will stop or prevent the risk of fire or explosion.



Protecting the environment

Trendsetting products & environmental concerns

Besides combustion systems, and the obvious safety aspects of inert gas systems, Aalborg Industries' product development policy is to develop new solutions with a minimum carbon footprint.

New refrigerant

Aalborg Industries recently developed a new cooling system for LNG carriers. The system uses a mere 10% of the usual quantity of Freon compared to our previous model, and we have introduced the new, environmentally friendly Freon type (R-407C) into our coolers.

Reduction of emissions

Aalborg Industries strives to reduce emissions when a burner is part of the inert gas system. An obvious solution is to ensure that the minimum amount of fuel is used during operation. Furthermore, we optimize the re-use of energy in fluids and gases in order to increase the overall thermal efficiency of the vessel.
Aalborg Industries constantly develop our product portfolio to comply with both present and future regulations and environmental legislation at large. When designing products, we emphasize reducing emissions and focus on obtaining the ultimate plant safety to achieve the lowest possible environmental impact.

Combustion preventing fire

At the heart of almost every inert gas generator installation delivered by Aalborg Industries 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 characteristic of the Ultramizing® combustion system.

Aside from safe combustion, the Ultramizing® burner design meets our strict requirement for low emissions, besides excellent operation during its entire lifecycle.

Global presence

Through continuous innovation and development, our inert gas systems have set the industry standard for many years. System safety is further secured by operators attending professional training at the Nijmegen training centre.

R & D efforts

The backbone of our company is our engineering and product development. We have in-house know-how and resources to meet the day-to-day requirements for quotations and order handling and a steady product portfolio development. For special development projects we have a mutually beneficial cooperation with universities, classification societies and other knowledge centres to supplement our own technological capabilities and cover all analytical aspects.

Quality and production

Inert gas systems are supplied as complete systems with optional auxiliaries like fans, fuel pump, deck water seal and P/V breaker. All components are engineered by Aalborg Industries and manufactured at either an Aalborg Industries production facility or an approved supplier that meets our strict QA/QC standards, thereby safeguarding our high product quality.

Global After Sales

From the time we carry out commissioning of new inert gas systems and train the future operators in daily maintenance and safety features, Aalborg Industries maintain close contact with shipowners and operators worldwide.

Our Global After Sales organization provides professional support and complete service wherever and whenever you need it. Aalborg Industries supply OEM spare parts and carry out inspections, service, repairs, retrofits and upgrades on our inert gas systems.

Maintenance contracts

Aalborg Industries have service and maintenance contracts with a number of customers. We have fully trained and licensed personnel and advanced testing equipment to go on board to help secure a safe and economical operation.

Training

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

AALBORG
INDUSTRIES

MARINE BOILERS & HEAT EXCHANGERS

THERMAL FLUID SYSTEMS

INERT GAS SYSTEMS

FLOATING PRODUCTION SYSTEMS

GLOBAL AFTER SALES

INDUSTRIAL BOILERS

Your Preferred Partner

Aalborg Industries' **mission** is, on the basis of world leading technology within our defined core business, to provide our customers with reliable, innovative and optimal steam, heat and safety solutions that are environmentally friendly and ensure the lowest life cycle cost.

Aalborg Industries' **vision** is to become the Preferred Partner to all our customers and business relations.

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