



# LNG CARRIER CARGO TANK **TIGHTNESS TEST**

## LEAK DETECTION AND INTEGRITY EVALUATION FOR THE MEMBRANE

LNG carrier cargo tanks have been developed to high end material engineered assets. Materials used and concepts applied are completely safeguarded by the in-line monitoring of possible leakages of the gas. To ensure safe and reliable operation, SGS offers pre-services leak testing of newly installed tanks. Also SGS can introduce in-service leak testing and localisation, when the safety system indicates possible unsafe operations.

Our services are compacted and highly specialised to make the turn around time as short as possible and will both locate leaks and follow up on any subsequent

repairs. Specifically for membrane type tankers, localisation is very difficult due to its volume and limited access to the concerned area.

Regardless of type and size of leak, pin holes, arc strikes, micro cracking and damage breakage should be repaired once localised and SGS has developed a proven and efficient concept for this.

### MEMBRANE TYPE LNG CARRIER STRUCTURE

In this containment system, developed by Gaz Transport & Technigaz of France, the cargo tanks are protected by a complete double side/bottom, cofferdam between each tank and trunk at topside.

Cargo is carried at  $-163\text{ }^{\circ}\text{C}$  at near atmospheric pressure, with the tanks featuring a 250 mm insulation and a membrane of 1.2 mm thick corrugated stainless steel sheet.

Leakages detected during operation can occur due to surface cracks growing by ship movement and operation, or as the result of physical damages of the bottom of the tanks, due to impact stress.

To locate leakages, multiple technologies can be applied. Based on a suitable time frame, expected damage and history, SGS will select and apply the most suitable technology.

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## LEAK TEST METHODS

### ■ Ammonia (NH<sub>3</sub>) Leak Testing

This test is performed by introducing an inert gas mixed with ammonia to the internal space of the test material and then over-pressurising. After ammonia sensitive paint is spread over the welding seams to be tested, the inert nitrogen/ammonia mixture gas is fed internally through the test material. The leak site and size can be detected by the location and diameter of the discoloration of the sensitive paint. This method is specifically used for application on welding seams.



### ■ Helium (He) Leak Testing

This test is performed by introducing helium gas into the internal space of the test material and over-pressurising. The helium gas will flow through any welding seam flaws, cracks or pin holes. Any leaking helium gas will be sucked into a probe connected to a helium mass spectrometer. The gas will then be ionised in the ion chamber by an electronic beam generated by a filament. A helium ion collector

gathers only helium ions and will send an amplified signal to the indicator. The leakage can be measured by the signal strength. This method is specifically used for application on welding seams.



### ■ Pressure Change Measurement Testing

The total leakage can be measured by evaluating the inside pressure change related to the time passed in a decompressed or pressurised test object. This test is performed in addition to other technologies, in order to quickly locate easy detectable leaks that can be repaired in an early stage.

## MAIN APPLICATIONS

- LNG carrier (Mark III type & NO 96 type as latest version)
- All kinds of storage tanks
- Pressure chambers
- Heat exchangers

SGS understands like no other the importance of safe investment and cargo. Our network covers all important ports around the globe and we will be at your service anywhere and anytime.



Since the teams are specifically skilled and have a huge track record in these advanced inspections, expertise is not always available locally. Coordination takes place via our Korean expert office. We will make your docking time as short as possible and will give clear and reliable results.

## THE SGS EXPERTS

SGS Industrial Services has the knowledge, expertise and experience to perform conventional and advanced NDT inspections around the world using our unique network. Our services offer variations from Guided Wave and the conventional NDT techniques to Risk Based Inspection (RBI/AIM), Time of Flight Diffraction (TOFD), Corroscan, Positive Material Identification (PMI), Magnetic Flux Leakage (MFL), ACFM, Thermography, Electromagnetic Testing (ET), RFEC, IRIS, Digital Radiography, Radiation Detection, RVI and Endoscopy Inspections.

We are pleased to provide services to any location around the world, pertaining as to how SGS can help you in improving the reliability of your processes and assets.

## CONTACT US

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