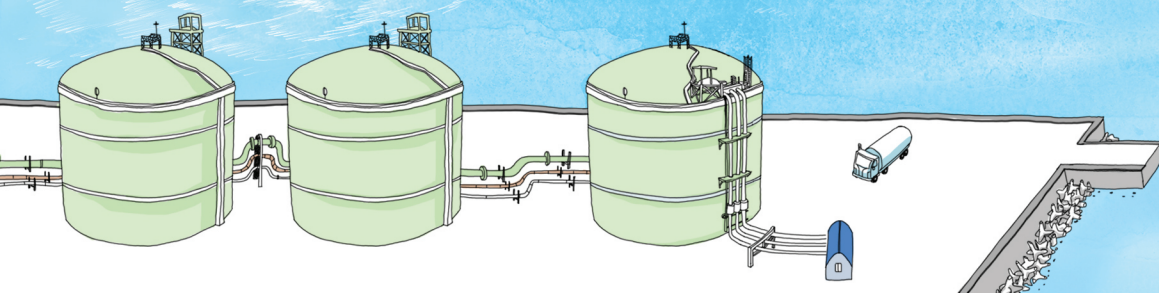
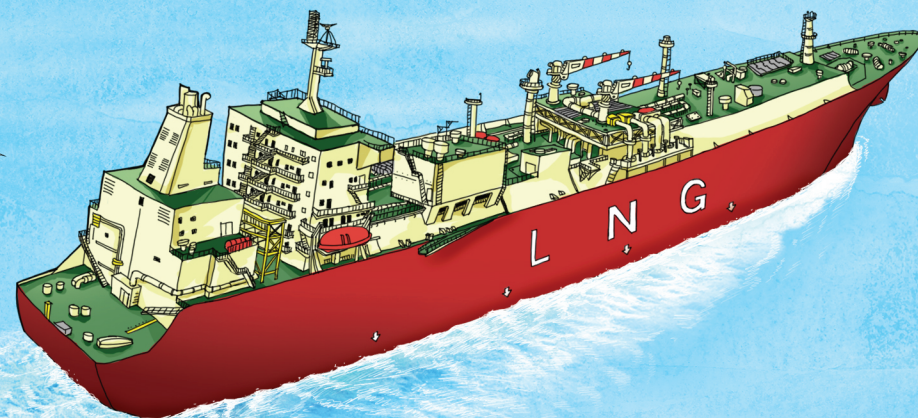
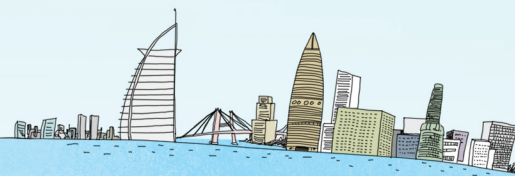




GOOD MAKES GOODS



Main Business

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Outstanding Safety, Durability

Removing Defects from Technology

The strength of the KC-1 cargo containment system is that it has two metal barriers. Both the primary and secondary membranes consist of the same stainless steel with 1.5 mm thickness, so the system is designed to withstand all forces and fatigue which may occur during ship operation.

In addition, KC-1 has an advantage when it comes to liquid and gas tightness. This ensures excellent safety and durability of the membrane storage tank.

The Best Technology

KC-1 is a membrane-type LNG cargo containment system originated from Korean proprietary KOGAS LNG storage tank technology.



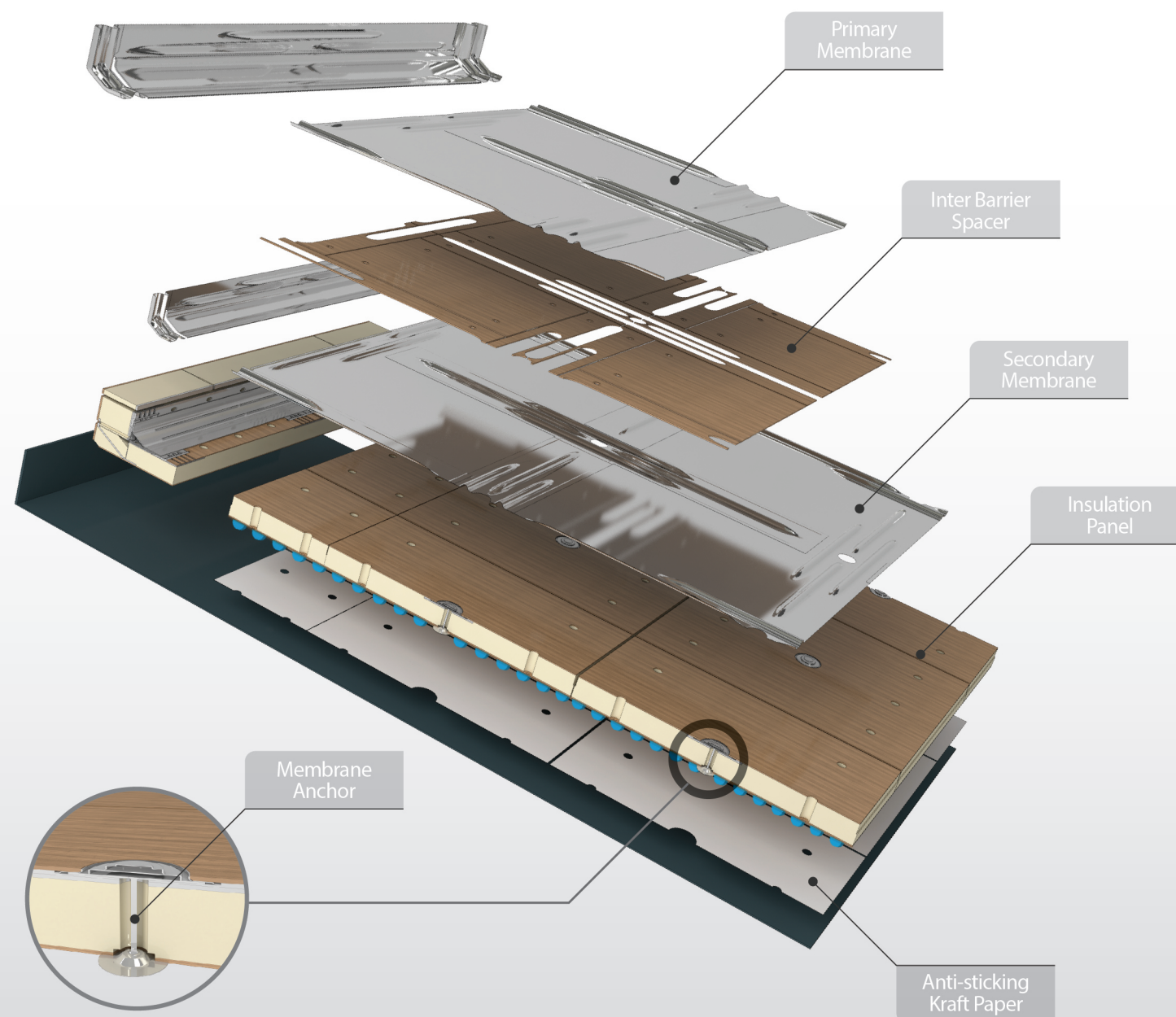
Best Technology
for the World

LNG Carrier / FLNG / FSRU

LNG Bunkering Vessel / Onshore Storage Tank / LNG Fuel Tank

Cargo Containment System KC-1

KC-1 cargo containment system has double metal barriers. These are welded to the membrane anchor which is specially designed to secure membrane panels safely and enhance fatigue life. They are also supported by the prefabricated single layered insulation panel.



Advantages of KC-1 Cargo Containment System

- Cargo containment system using double metal barriers fitted closely
 - : Enhanced gas tightness at primary and secondary barrier
- Improve productability with one layered insulation
 - : Less man-hour to manufacture insulation panel
- No thermal shock at the secondary barrier even in the case of LNG leakage
 - : No risk of increased pressure in IBS due to vaporization of LNG leakage

Primary Stainless Steel Membrane

The primary membrane is made of discontinuous, corrugated AISI 304L with 1.5 mm thickness. It has arch-shaped end corrugations with 3 lanes.

Secondary Stainless Steel Membrane

The secondary barrier is made of non-continuous, corrugated AISI 304L with 1.5 mm thickness- the same as the primary barrier. Secondary membrane has identical thickness and corrugation structure but a slightly different size and shape in order to ensure a certain amount of space between them.

Insulation System

The insulation system is a bonded sandwich structure with single layer including back plywood, rigid closed cell foam panel and top plywood. The insulation panels are made of polyurethane foam and fixed to the inner hull by means of stud bolts. Mastic attached to the inner hull serves only load bearing from cargo tanks because of anti-sticking paper between mastic and inner hull.

Safety

The insulation spaces and inter-barrier spaces are continuously flushed with nitrogen gas to create an inert environment. The integrity of membranes is permanently monitored by the detection of hydrocarbon in the nitrogen. The KC-1 system has an additional LNG leakage detection system based on the temperature sensors in insulation panels.

Reliability

The KC-1 system has been approved by all the major classification societies and US Coast Guard. The double metallic barrier of the KC-1 system has improved the gas tightness of LNG cargo containment system's barriers.

Development of Enhanced KC-2 Cargo Containment System

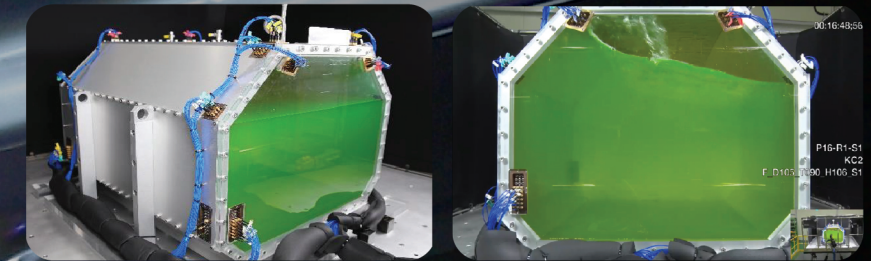
In order to enhance the price competitiveness, quality and performance of KC-1 cargo containment system, an upgraded KC-2 system has been developed and other types of KC-2 containment systems are also under development. KC LNG Tech aims to debut of KC-2 design in the market late 2022.

Reliability

Automatic welding, no welding along the corrugation and minimization of welding on site enables increased quality of welding and reduces human error.

Research and Development

Best Technology for the World



Sloshing Test for KC-2 Cargo Containment System with 174,000m³ Cargo Volume

Technology Development

- Strength and Fatigue Analysis (Membrane and Insulation System)
- Testing-based Structural Analysis and Fatigue Life Estimation Research
- Seakeeping and Hydrodynamic-force Research
- Sloshing and CFD-based Flow-Analysis Research
- Advanced Insulation Performance Design
- Membrane Securing System Improvement
- Pump Tower Design
- Cargo Handling System
- Gas and Safety Research



Jeju Project

7.5K LNG Carrier & LNG Bunkering Ready Vessel / Onshore LNG Terminal

- Operator

Korea Line Corporation (KLC)
- Shipbuilding

Samsung Heavy Industries (SHI)
- Ship Type

7,500 m³ LNG Carrier / LNG Bunkering Vessel
- Operator

KOGAS
- Construction

POSCOENC
- Type

Above Ground Type, 45,000 kℓ x 2 tanks

7,500m³ LBV with KC-2 CCS

A 7,500m³ LNG bunkering vessel is being built fitted with KC-2 CCS at Korean shipyard.



Picture of a similar LNG bunkering vessel JEJU-2 conducting a ship-to-ship LNG bunkering to a 174,000m³ LNG carrier.

Reference List

Ship In Operation /On Order

Ship name	Type of vessel	Delivery	Cargo volume
SK SERENITY	LNG carrier	09-02-2018	174,000m³
SK SPICA	LNG carrier	09-03-2018	174,000m³
SM JEJU 1	LNG carrier	18-09-2019	7,500m³
SM JEJU 2	LNG Bunkering Vessel	10-01-2020	7,500m³
LBV	LNG Bunkering Vessel	2023	7,500m³

Land Storage Tank

Project number	Type	Construction Completion	Cargo volume
K1002	Onshore LNG Storage Tank	31-08-2019	45,000 kℓ
K1002		31-08-2019	45,000 kℓ