Technology and Rule Development

R & D

Advanced Technology
With the rapid advancement of gas carrier and gas related floating system technology, ClassNK works in cooperation with international partners to carry out cutting-edge R&D to provide services with the latest technology.

Rule Development

Rules and Guidelines
ClassNK develops rules and guidelines based on knowledge obtained from R&D and damage investigations to help support the safer, greener design and construction of gas carriers, while allowing designers and operators to smoothly implement the latest technology.

Contributions to International Standards Development
With major amendments made to the IGC Code and the introduction of the IGF Code among others, the framework for gas related technology is expanding. As part of the International Association of Classification Societies (IACS), ClassNK contributes its knowledge and experience to develop new rational standards for the industry.

Services for Individual Projects

AIP/General Approval
When applying new technologies, the concept and basic design may require third party approval at the request of stakeholders. To fulfill these needs, ClassNK offers design approval services such as Approval In Principle and General Approval to support the realization of new projects.

Planning

Risk Assessment and
Depending on factors such as specifications using the latest technology and complex provided by a third party and various other experience, ClassNK offers a diverse range

Construction

Engineering Analysis
from the ordering party, gas carrier design systems may be subject to risk assessment engineering analyses. Based on a wealth of services necessary for each project.

Design

On-site Surveys
Expert knowledge of gas carrier designs is essential for carrying out site surveys for gas carriers. ClassNK’s newbuilding surveyors with a wealth of plan approval experience are at the field.

ClassNK gas experts are stationed at exclusive survey offices strategically located along the main gas routes to enable smooth operations after a ship enters into service.

Contraction

CAP/Residual Life Assessment
In some cases, gas carriers will stay in service beyond the assumed lifespan that was planned at the time of construction. ClassNK provides Condition Assessment Program and longevity or residual life study (TLA) services to meet the needs of each project.
A Gas Carrier Milestone

1961
World’s First Type A LPG Vessel
Gosu Maru

1969
World’s First Semi-membrane Type LPG Vessel
Bridgestone Maru No.5

1980
World’s First Type B LPG Vessel
Genkai Maru

1981
World’s First Semi-membrane Type LEG Vessel
Shokaku Maru No.2

1983
ClassNK’s First MOSS LNG Vessel
Bishu Maru, Banshu Maru, Echigo Maru

1988
World’s First Type B LEG Vessel
Kayo Maru

1993
World’s First Technigaz Mark III
Membrane LNG Vessel
Aman Bintulu

2003
ClassNK’s First Small Scale Type C LNG Vessel
Shinju Maru

2012
ClassNK’s First Sayaendo Type MOSS LNG Vessel
LNG Venus

2015
ClassNK’s First SPB LNG Vessel (Under Construction)

Worldwide

1958
World’s First Successful Transport of LNG by Oceangoing Vessel
Methane Pioneer
(Independent Prismatic Tank)

1964
World’s First Membrane LNG Vessel
Pythagore

1973
World’s First MOSS LNG Vessel
NORMAN LADY

1993
World’s First SPB LNG Vessel
Polar Eagle

2016
ClassNK Membrane New System Mark V / NO 96 Max

1965
World’s First Cylindrical Tank LNG Merchant Vessel
Jules Verne
R&D for Cutting-edge Solutions

Safety Assessment for New LNG Tank Designs

With LNG trade and transportation patterns changing, the need for partial filling of LNG tanks has expanded. LNG cargo tank technology is constantly advancing in an effort to achieve even greater transport efficiency and capabilities. Safety assessments for shoving effects are crucial in such cases. ClassNK carries out a wide range of safety assessment study for sloshing and other loads related to cargo containment system of LNG carriers.

CO₂ Shuttle Vessel

ClassNK carries out investigations into the implementation of CO₂ Capture and Storage (CCS) using vessels.

LNG Carrier and Bunkering Vessel

With the growing number of LNG fueled vessels on the horizon, ClassNK is supporting the development of the related technologies, including the provision of Approval Principle for a Small Scale LNG carrier/bunkering ship design developed by the Cooperative Association of Japan Shipbuilders and other companies.

Analysis and Risk Assessment Services for LH₂ Carriers

As the world turns towards clean energy, the use of hydrogen has the potential to provide a low carbon society. ClassNK has been involved in the development of LH₂ carrier since its early research stage, providing risk and safety assessments for the transport of cryogenic liquid hydrogen. As one of its outcomes, ClassNK published the world’s first guidelines for the LH₂ carriers.

Rule and Guideline Development for New Technologies

Guidelines for Liquefied Gas Carrier Hull Structures - Independent Spherical Tanks of Type B -

These guidelines were developed for hull structure strength evaluations of liquefied gas carriers designed with independent spherical tank type B such as Moss tank systems, which include the latest expertise from the IACS Common Structural Rules.

Guidelines for Compressed Natural Gas Carriers

While the IGC Code plays a central regulatory role for LNG carriers, there are currently no international standards for the carriage of CNG. These guidelines are specific to CNG, taking into account the unique hazards of carriage of CNG associated with handling high pressure gas to provide requirements for the safe design and construction of equipment and systems.

Guidelines for Floating Offshore Facilities for LNG/LPG Production, Storage, and Offloading (Fourth Edition)

Since the release of the first edition in 2011, ClassNK has regularly updated the guidelines for FNLNG/FLPS, FSU and FRSU technical requirements in line with the advancement of technology and the introduction of new rule amendments. These guidelines also contain requirements for the conversion of older LNG vessels, LPG vessels into FSU and FRSU.

Guidelines for Liquefied Hydrogen Carriers

In realizing the anticipated hydrogen powered society, the establishment of safe and reliable bulk transport infrastructure is crucial. Liquefied hydrogen carrier is considered one of the most prospective elements of this infrastructure. ClassNK developed guidelines to ensure the safety of liquefied hydrogen carriers based on the interim recommendations developed by IMO, as well as requirements from other recognized standards used for the design of hydrogen facilities onshore.

Guidelines for Gas Fuelled Ships (Ver. 4)

These guidelines contain safety regulations for the construction of LNG fuelled vessels. Based on IGC Code regulations developed by the IMO to safeguard gas fuelled vessels, these guidelines have been regularly updated since their first publication in 2009.
Third Party Technical Services

**Hull/Cargo Tank Structural Analysis**
ClassNK offers structural analysis services required to verify that hull/cargo tanks have sufficient strength during the design period for specified sea environments.

**Mooring Analysis**
Mooring analysis is required for offshore facilities such as when liquefied gas carriers are converted into FSU or FSRU, or even for LNG carriers when they are used as LNG-RV (regasification vessel).
ClassNK provides a series of mooring strength analysis services to cater to these customer needs.

**Hull Heat Transmission Analysis**
Heat transmission calculations need to be carried out for the design of hull material grade when carrying low temperature cargoes such as most liquefied gases.
ClassNK provides hull heat transmission calculation services using well-proven in-house software based on the common heat transfer theory.

**Condition Assessment Program (CAP)/Total Life Assessment (TLA) Service**
LNG carriers and other vessels will sometimes be in service longer than the assumed lifespan that was planned at the time of construction. This extended service life requires third-party condition assessment and total life assessment.
ClassNK offers CAP based on fatigue analysis and in-depth condition surveys, as well as TLA which analyzes the remaining life of a vessel based on the results of further detailed fatigue analysis and in-depth condition surveys.
These third-party appraisal results carried out by our experts can be used when vetting vessels for further use.