ClassNK

Annual Report 2019

[English]

Contents

Mission

The ClassNK Mission

ClassNK is dedicated to ensuring the safety of life and property as well as environmental protection and other related matters through various businesses related to classification, the establishment of various standards, inspection, registration, certification, and research and development, etc.

To achieve this mission ClassNK will:

- Deliver the highest quality services, by the highest quality personnel, while maintaining the fairness of our totally independent third party.
- Develop relevant rules, guidances, and procedures, and conduct technical research and development to positively contribute to the maritime industry.
- Maintain and develop our global operations in line with the needs of our clients.

Profile

Founded in 1899, Nippon Kaiji Kyokai, better known as ClassNK or simply NK, is a third-party organization that carries out ship classification and other services. Dedicated to safeguarding life and property and to protecting the environment, it has around 130 offices and is widely recognized as a member of the International Association of Classification Societies.

In its main classification business, based on its established technical rules on ship safety and prevention of marine pollution, ClassNK carries out drawing inspections and witness surveys for individual ships to ensure their hull structures, engine equipment, electrical and automation equipment, safety equipment, lifting equipment, and materials are in compliance with such rules, and assigns notation to ships meeting the standards. The Society is authorized to carry out surveys in accordance with international conventions on behalf of over 100 flag states.

Utilizing its many years of knowledge and experience accumulated as a third-party organization, ClassNK also provides certification services in the renewable energy field for ISO registration, wind power generation, and more.

Behavior Guidelines for Compliance

Basic Stance

In order to faithfully carry out the "Articles of Incorporation of ClassNK", "ClassNK Mid-Term Plan", and "Management Philosophy and Future Vision", each person who engages in work for ClassNK shall regard the "ethical decisions based upon one's conscience" as the root of compliance and the basis for all activities, and act accordingly to it during all business operations of ClassNK as well as in their private life. In this manual, "ethical decisions based upon one's conscience" means that the person examines the appropriateness of their own actions from the standpoint of an impartial third party by temporarily putting aside any personal, internal, or business interests.
"Each person who engages in work for ClassNK" refers to any person engaged in the business operations of ClassNK or any of its group companies.

Behavior Charter

ClassNK is constantly looking for ways to positively contribute to the safety of life and property as well as environmental protection and other related matters through its various business activities. This includes efforts to fulfill customer demand, provide high quality services, and support the global activities of its customers by providing various services such as classification, inspection, registration and certification as well as by establishing various technical standards and conducting various research and development projects, etc.
In order for ClassNK, an independent organization, to continuously and stably provide high quality, fair, transparent, and appropriate service, all executives and regular employees of ClassNK shall have a deep sense of ethics for gaining social trust and aim to practice fair and faithful behavior.

1. Vision (future image or goal)
- As a technical organization, we always pursue technical improvements and utilize our technical capabilities for sincere business, aiming to establish trust with our customers.
- We keep an organizational culture of openness with a free exchange of views and utilize various individual abilities to a maximum, aiming for an evolving organization.
- We open the way to the future with our technical capabilities, aiming to become a global leader.

2. Consistent fair and transparent activities
- We comply with laws and regulations for fair trade.
- We maintain healthy and normal relationships with political and governmental organizations both domestically and internationally.
- We are firmly opposed to any antisocial activities, forces, and bodies that threaten social order, security, and stability, and never have any connection with them.

3. Promotion of corporate governance
- The management endeavors to show its leadership by thoroughly ensuring this charter is known throughout the entire organization and its group companies.
- It establishes, operates, and maintains an effective internal control system.
- It proactively discloses information to society and practices a highly transparent organizational operation.
- It respects improvements and other propositions, aiming for an organization open to society.

4. Respect for individuality
- We respect the personality and individuality of each other, ensure a safe and pleasant working environment, and achieve an affluent and wealthy life.
- Each of us willingly and voluntarily acts to self-manage our own tasks.

5. Response to globalization
- We respect laws and international norms, including human rights as well as the cultures and customs of other countries and regions to carry out our work and contribute to the development and prosperity of local economies and societies.
- We establish a global organizational operation system which is understood and accepted in harmony with local societies.

6. Social contribution and commitment to global environment
- We are aware of our responsibilities as a member of the international community and willingly support social contribution activities through our business.
- As a member of the international community, we voluntarily act for global environment issues which are common to all humanity and contribute to the protection of a healthy global environmental.

Message
from President & CEO

Message from President & CEO

Welcome to the ClassNK Annual Report. My name is Sakashita, President and CEO of ClassNK as of April 2020. I would like to extend my deepest appreciation to all of our clients and stakeholders who supported our activities.

ClassNK celebrated its 120th anniversary on 15 November 2019. Thank you very much to everyone who helped make this possible over the years. All of our executive officers and employees will continue to do their best to serve you.

The role expected of classification societies has widely expanded due to environmental issues such as global climate change and the rapid progress of digital technology. The Society will address such social demands and provide appropriate solutions while continuing to evolve with the changing times.

In 2019, we continued to allocate the resources for appropriate business operations and necessary investments for maintaining a system that can respond flexibly and promptly to technological innovation and environmental changes, and provide high-quality services for the industry. To further strengthen the Society established a Digital Transformation Center responsible for promoting our digitalization and its integrated management from a medium- to long-term perspective, and set up a Government Ship Service Office based on the related industry needs.

Environmental regulations such as the tightened SOx emissions regulation that came into force in January 2020 and the installation of ballast water management system are increasing in response to the aggravation of environmental problems. Under these circumstances, in addition to providing thorough survey and audit services, the Society has continued to disseminate information by publishing guidances on the use of fuel oils that comply with the tightened SOx regulation, announcing precautions for switching to compliant fuel oils, and advising the industry to install BWMS in advance based on retrofit status analysis. Furthermore, as the GHG emission reduction target for ships agreed on by the IMO will bring major changes in the future for ships themselves and the way they operate, we further strengthened our activities as a classification society by developing guidelines for applying alternative fuels and wind power to ships and issuing Approvals in Principle (AIPs) for new concepts such as LNG fueled ships, and actively participated in efforts toward zero emissions through partnerships that transcend the boundaries of the industry.

Rapid advances in digital technology open up new possibilities for all industries, while also creating risks that have never been experienced. Making its surveys and audits more sophisticated through digital technology, the Society compiled its basic approach to ship cybersecurity in the ClassNK Cyber Security Approach, published guidelines that serve as specific standards, and began full-scale cyber security certification for ships and companies. In addition, the Digital Transformation Center mentioned above played a central role in formulating the Digital Grand Design which shows the future image of the Society for the future digital society. ClassNK continued to be actively involved in the IoS-OP Consortium launched to promote the digital transformation of the entire maritime industry, and worked to contribute to the operation of a platform that allows the entire industry to utilize data under common rules.

We are making steady progress with projects based on our R&D Roadmap developed in 2017. In 2019, based on research results, we released guidelines related to remote surveys using ICT and began publishing the ClassNK Technical Journal as part of our efforts to provide more information. In addition, we are in the process of completely revising our Rules and Guidance for the Survey and Construction of Steel Ships to address the accelerating technological innovation of the future.

We are aware that the role the Society should play as a third-party certification body is expanding beyond the maritime field considering the current situation where ESG (Environmental, Social, Governance) management is essential for the realization of a sustainable society. In 2019, we made a progress in developing our business, responding to requests in a wide range of fields by obtaining accreditation as a GHG emission verification body in the international aviation industry. The Society also clarified pursuit of the SDGs through its business activities.

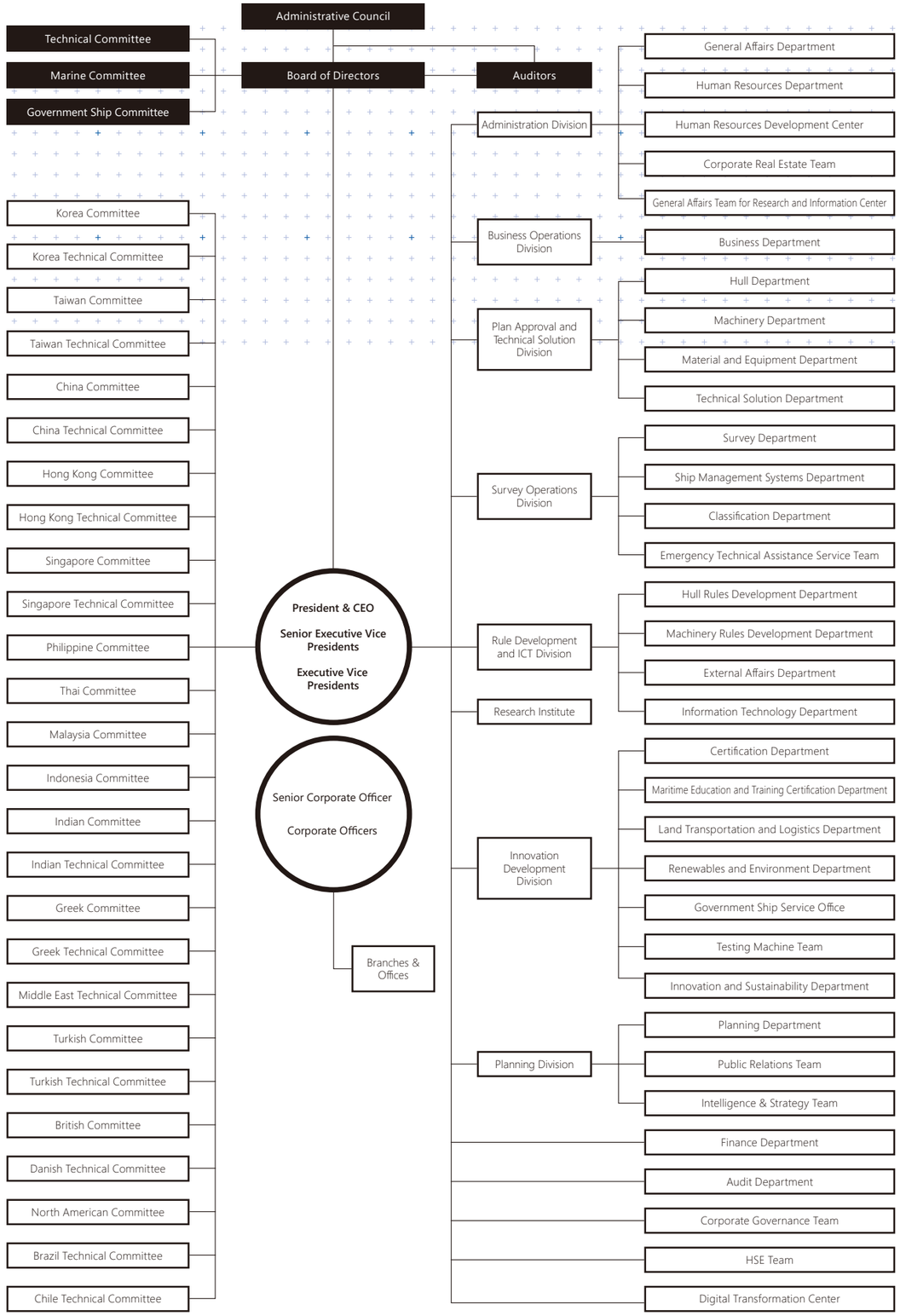
The environment surrounding the world economy and the maritime industry is still harsh, and we are unable to find an exit immediately. However, on the other hand, the various problems cannot be put off, so we would like to tackle them together with the industry and solve them.

ClassNK will continue to work on developing its advanced technology and sincere business to build an organization trusted by everyone in the industry. This annual report will introduce the efforts of the Society, and we look forward to receiving your valued support for our activities.

Hiroaki Sakashita

ClassNK
Representative Director,
President & CEO

ClassNK Organization Chart as of 1 April 2020



Establishment of Digital Transformation Center (January 2019)

We newly established a Digital Transformation Center to promote digitalization of the Society and manage it with a medium- to long-term perspective in order to provide new services utilizing digital technology, improve the value of existing services, and realize a productivity revolution.

Restructuring within the Innovation Development Division

Along with restructuring the Innovation Development Division, a Government Ship Service Office within the head office was established to contribute to ensure reasonable services for the quality of government ships based on the Society's knowledge cultivated through many years of classification.

Signed the United Nations Global Compact (UNGC) (June 2019)

The United Nations Global Compact is a global initiative advocated by the United Nations. The voluntary initiative incorporates responsible and creative leadership from each company/organization and invites members to perform as a member of society to realize sustainable growth.
ClassNK supports the ten principles of the United Nations Global Compact made up of "Human Rights", "Labour", "Environment", and "Anti-Corruption", and is dedicated to carrying out initiatives for standards establishment, surveys, registrations, certification, R&D in order to contribute to our mission of helping ensure the safety of life and property and protecting the environment.

Executives

as of 1 April 2020

Representative Director, President & CEO
Hiroaki Sakashita

Executive Director,
Senior Executive Vice President
Tetsuya Kinoshita

Executive Director,
Senior Executive Vice President
Junichiro Iida

Executive Director,
Senior Executive Vice President
Toshiyuki Shigemi

Executive Director, Executive Vice President,
Director of Innovation Development Division
Hirofumi Takano

Executive Director,
Executive Vice President
Taira Narisawa

Chairman of the Board of Directors
Koichi Fujiwara

Senior Corporate Officer, CFO
Masayuki Miyakura

Corporate Officer,
Director of Administration Division
Katsuhide Kuno

Corporate Officer, Director of Survey
Operations Division
Yoshinori Kozeki

Corporate Officer, Director of Plan Approval &
Technical Solution Division
Hayato Suga

Corporate Officer, Director of Rule
Developmentand ICT Division
Toshiro Arima

Corporate Officer, Director of Business
Operations Division
Toshio Kurashiki

Corporate Officer,
Director of Planning Division
Takeshi Okamoto

Corporate Officer, Regional Manager of Eastern
Mediterranean Sea and Northern Black Sea
Seiichi Gyobu

Executive Auditor
Michio Takagi

Environmental Regulations

Amid tightening environmental regulations, ClassNK provides a variety of services that meet the needs of stakeholders and carries out initiatives for the future to address the challenges in the industry.

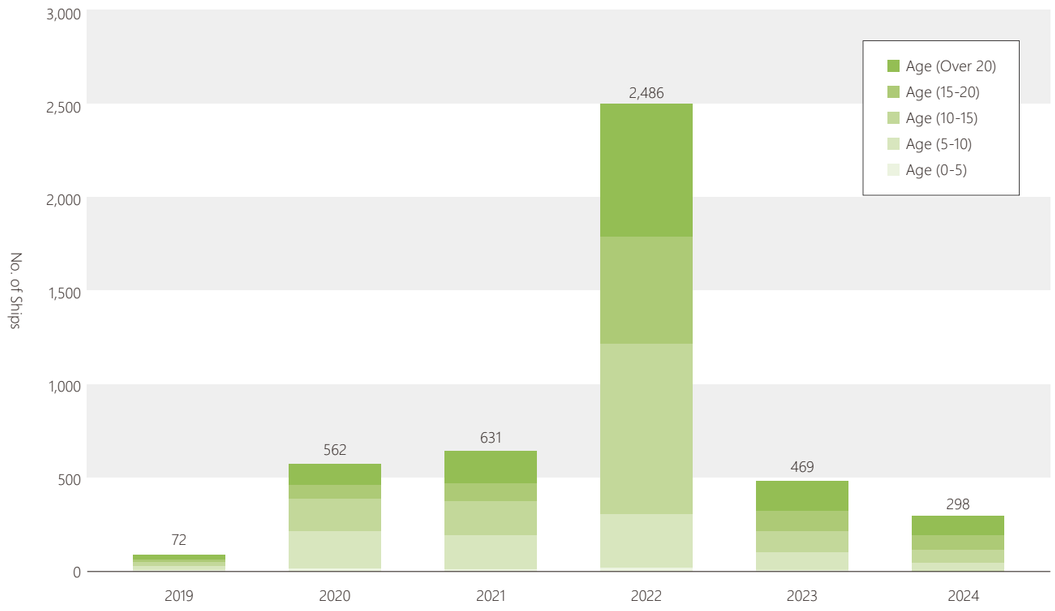
2020 SOx Regulation

The regulations limiting the sulphur content of marine fuels for ships are specified in Regulation 14 (Sulphur Oxides (SOx) and Particulate Matter (PM)) of Annex VI of MARPOL 73/78, in which the sulphur content limit has been gradually strengthened. The limit for open sea areas was tightened to 0.5% on 1 January 2020.
In light of the tightened regulations, the Society has promoted efforts to support customers who comply with regulations, in addition to carrying out appropriate drawing examinations and on-site surveys and providing information on the contents of international and regional regulations. Not only did we release our "Guidance for onboard use of Compliant Fuel Oil with SOx regulation from 2020" which outlines potential risks and safety precautions for compliant fuel oils, and our "Guidelines for Exhaust Gas Cleaning Systems" which outlines SOx scrubber requirements, but we also provided a sample of a Ship Implementation Plan (SIP) that the IMO recommends to prepare when switching to compliant oils, and appraisal services related to SIP and tank cleaning.
In addition, in October 2019, we released a "Booklet for ship crew members: Precautions concerning change-over to 0.50% sulphur compliant fuel oils" which outlines potential risks for ship crew members responsible for operations in the change-over from conventional fuel oils to compliant fuel oils. The booklet provides ship crew members onboard who bunker and actually use compliant fuel oils with information focusing on the "compatibility" and "cold flow properties" of such fuels as well as associated risks and measures to mitigate such risks.
During 2019, 230 statutory compliance appraisals related to SOx scrubbers (system as a whole: 225, exhaust gas monitoring equipment: 4, wastewater monitoring equipment: 1) were carried out, totaling 257 (system as a whole: 244, exhaust gas monitoring equipment: 8, wastewater monitoring equipment: 5) by the end of 2019.

Ballast Water Management Convention

The Ballast Water Management Convention, which aims to control the transfer of ballast water and sediments containing harmful aquatic organisms and pathogens, came into effect in 2017, requiring ships to be equipped with a ballast water management system by a specified deadline.
In 2018, the Society analyzed the retrofitting status of ballast water management systems on its registered ships, and received a great response from the industry. An updated analysis was released in 2019.
As of the end of August 2019, 63%, or 4,518 of the 7,124 ships registered with ClassNK required to be equipped with a ballast water management system did not have one installed yet. The number of ships without BWMS decreased by 882 since August 2018, but the installation deadline for these ships remains largely concentrated in 2022.
As difficulties are expected in the installation of BWMS if everyone around the world waits until 2022, ClassNK recommends installing well in advance.

Distribution of BWMS Installation Dates for ClassNK Existing Ships



GHG Reduction

At the MEPC held in April 2018, a goal was set to achieve zero GHG emissions in international shipping as early as possible within the century. Toward the long-term goal of zero GHG emissions, goals were also set to a reduction in carbon intensity by at least 40% by 2030, pursuing efforts towards 70% by 2050 compared to 2008, and total annual GHG emissions from international shipping should be reduced by at least 50% by 2050 compared to 2008. The Society recognizes that these goals are truly challenging issues for the maritime industry.

To achieve the goals, it is essential to accurately grasp the GHG emissions of ships, and regarding the current situation, it is necessary to comply with the framework for the fuel consumption reporting of ships. In 2019, in relation to IMO DCS, the Society carried out 720 approvals on the collection and reporting procedures of fuel consumption data (SEEMP Part II) of newbuilds and ships in service (due to changes in management company, etc.) and 165 data verifications on fuel consumption reporting for changes in flag state/management company which are required to be collected and reported from 1 January 2019.

ClassNK also participated and cooperated in a study group to realize the GHG reduction strategy established by the Japan's Ministry of Land, Infrastructure, Transport and Tourism in anticipation of the 2050 target. In addition, the Society has so far been involved in the development of various energy-saving technologies, and responding to the agreed IMO GHG reduction strategy, we are also considering technical scenarios for its realization and establishes a roadmap as a class society. Recognizing that the environment for using new technologies or the conditions for using them will play an even more important role in class, we will contribute to research and development from the standpoint of a third-party organization with the knowledge we have cultivated as a classification society.

Ship Recycling

To promote safe and environmentally sound ship recycling, the IMO adopted the Ship Recycling Convention(HKC) in 2009. In anticipation of the convention's entry into force, the Society contributed to the practice of sound ship recycling through initiatives such as compliance appraisals related to convention requirements.

In 2019, we issued the HKC statements of compliances for nine ship recycling facilities in India. By the end of 2019, we had conducted a total of 34 (32 in India and 2 in Turkey). In addition, based on the EU regulations on ship recycling that came into effect in 2013, we conducted compliance appraisals as an independent verifier of the EU regulations for 1 ship recycling facility in India, and 8 by the end of 2019 (5 in India, 2 in China, 1 in Turkey). In January 2020, the Society issued a Statement of Compliance to a facility in Bangladesh for the first time.

Regarding the Inventory of Hazardous Materials (IHM) required of ships, we conducted 711 appraisals based on the convention (new ships: 302, ships in service: 409) during 2019. The Society has revised its guidelines for not only the HKC, but also for comprehensively developing and maintaining IHM that complies with EU regulations and domestic laws.

Partnership Environmental Initiatives

As cross-organizational and industry-wide efforts are indispensable for solving environmental issues, the Society participates in various initiatives.

Participation in the TCFD Consortium

In June 2019, upon agreement with the recommendations of the "Task Force on Climate-related Financial Disclosures (TCFD)", the Society participated in the TCFD Consortium established by companies and financial institutions that support the initiative. The TCFD is a private-sector-led task force established by the Financial Stability Board (FSB) that encourages companies to disclose climate-related financial information to encourage investors to make appropriate investment decisions. In June 2017, the task force published recommendations (TCFD Recommendations) to understand the financial impact of climate-related risks and opportunities and to encourage voluntary disclosure of information.

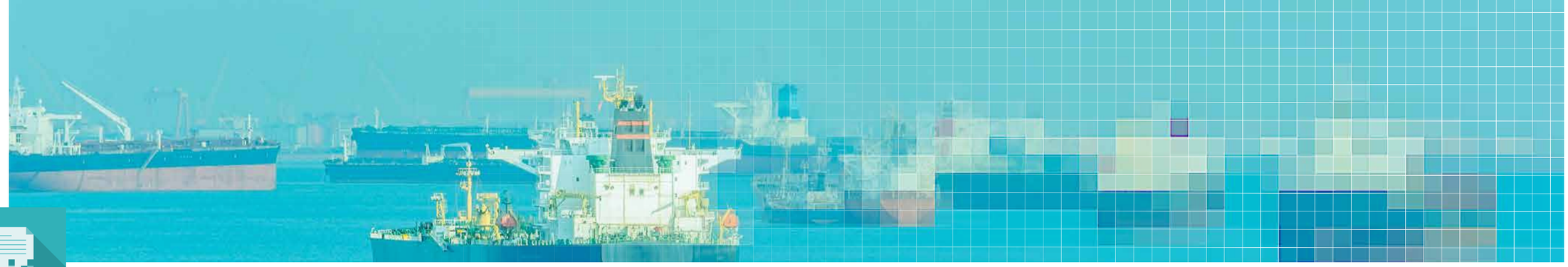
In response to the growing momentum for responding to TCFD recommendations, the TCFD Consortium was established as a forum for supporting discussions between companies and financial institutions in Japan. The consortium discusses effective information disclosure by companies and efforts to connect the disclosed information to appropriate investment decisions by financial institutions.

Participation in CCR Study Group Working Group for Zero Emission Alternative Fuels

In August 2019, the Society participated in the Cross-industrial Working Group Related to Zero Emission Alternative Ship Fuels established by the CCR Study Group. This working group which ClassNK acts as secretariat to aims to reduce CO2 emissions in the international value chain by use of methane synthesized through methanation technology which combines CO2 and hydrogen produced from renewable energy sources. The working group aims to implement fuel methanation for ships which is attracting attention from European countries, electric power companies, and gas companies, and construct its supply chain by collaborating with other industries, companies, and administrations, and it holds discussions/deploy initiatives for the widespread use of methanation.

Participate in the "Getting to Zero Coalition", an international corporate coalition that promotes de-carbonization

In October 2019, the Society participated in the "Getting to Zero Coalition", an international corporate coalition that promotes the decarbonization of the maritime industry. The Getting to Zero Coalition is an alliance that aims to have commercially viable zero emission vessels powered by zero emission fuels operating along international trade routes by 2030 in order to accomplish the IMO's goal of reducing GHG emissions from international shipping in half by 2050 compared to 2008.



Digital Transformation

As digital transformation is changing society as a whole, ClassNK is working to improve its services and lay the groundwork for the maritime industry to make the most of its outcomes.

Digital Transformation Center

Our Digital Transformation Center, established to promote digitalization of the Society and manage it with a medium- to long-term perspective, worked on and announced the “Digital Grand Design” in February 2020, which shows our future vision for the digital society.
ClassNK Digital Grand Design 2030 shows the future vision of the Society for the digital society of 2030. ClassNK aims to support the evolution of ocean-related business by meeting new needs from smarter logistics brought about by digital technology and data distribution, and by contributing to the further improvement of safety. With the grand design’s concept of "Creating innovation for a blue economy", ClassNK expands its cultivated technology and knowledge to ocean-related business and aims to bring innovation to the maritime industry and its related industries.

Data Platform

We continued to participate as a platinum member in the IoS-Open Platform (IoS-OP) Consortium, whose secretariat is Ship Data Center Co., Ltd. (ShipDC), a subsidiary of the Society, and provided support to working groups and other initiatives.

Cyber Security

As digital transformation progresses, response to cyber threats is an urgent matter. In February 2019, the Society announced the "ClassNK Cyber Security Approach," which outlines its basic approach to ensuring onboard cyber security for ships.
In the ClassNK Cyber Security Approach, ensuring navigational safety is regarded the most important goal of onboard cyber security. To achieve it, it is of high priority to ensure availability of systems in terms of operation technology (OT) as well as information technology (IT) systems, which support operation of ships. To mitigate cyber risks in both IT and OT, the Society proposes measures based on a balanced combination of physical, technical, and organizational approaches, such as designing ships and onboard equipment with security by design, constructing management systems during service, etc. Based on this ClassNK Cyber Security Approach, we released three guidelines in 2019.

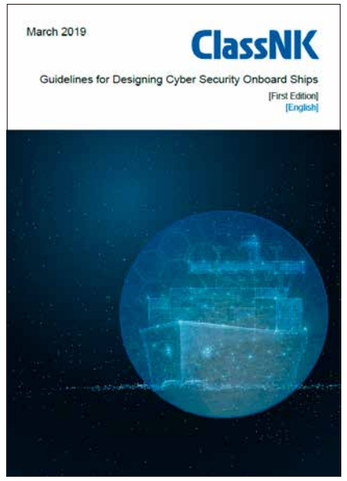
ClassNK Cyber Security Approach

Layers of Cyber Security Controls

1. Controls with software and hardware equipment
2. Operational controls for ensuring the health of “equipment controls”
3. Controls for ensuring the health of “operational Controls”
4. Organizational controls designed for information security management
5. Development of shipboard products with reduced cyber risks

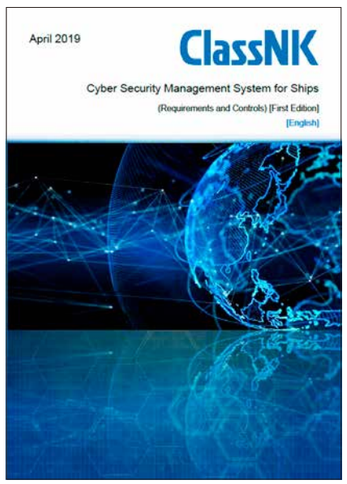
Guidelines for Designing Cyber Security Onboard Ships

The guidelines, which target shipyards and ship-building owners, include security measures from the NIST SP800-53(*) compiled for the US Government that can apply to ships, and the latest IACS recommendations.



Cyber Security Management System for Ships

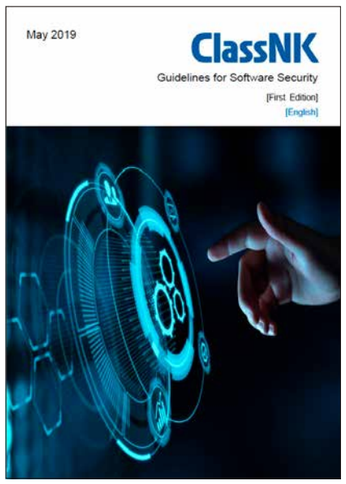
The system provides guidance on ensuring, implementing, maintaining, and continuously improving the cyber security management system of companies and ships with the goal of safe navigation. It includes management measures regarding protection against cyber risks in not only the navigation stage, but also in the construction/design stage of ships.



Guidelines for Software Security

These outline the recommended security measures to take throughout the development, integration, and operation stages of software used onboard.

The guidelines were developed in collaboration with ClassNK's partner TÜV Rheinland. TÜV Rheinland is a global leader in testing, inspection and certification services providing digital services for safety, cyber security and privacy.



Certified NYK Group Ship Management Company's Cyber Security Management System

In December 2019, ClassNK certified the Cyber Security Management System (CSMS) of NYK Group subsidiary NYK LNG Shipmanagement Ltd. and its managed LNG carrier "PACIFIC MIMOSA" based on the Society's Cyber Security Management System for Ships. This was the first CSMS certified by the Society.

The CSMS certification inspection confirms information about the CSMS developed for both the company and the ship, and assesses cyber security policies, risk assessment, and more in line with the standards established by the Society. In this specific inspection, the CSMS of NYK LNG Shipmanagement Ltd. and "PACIFIC MIMOSA" were confirmed to be in line with ClassNK's standards, allowing for the Society to issue certification.

Development of Structural Strength Evaluation Software

In recent ship structural rules, as evaluation is based on actual sea conditions, the latest analysis technology is being introduced and strength evaluation methods are becoming more sophisticated, creating a need for dedicated software that can efficiently examine these during the design stage of a ship. Based on its experience in drawing approval work and the latest information technology, the Society develops and provides the "PrimeShip-HULL" series of structural strength evaluation software that complies with these rules.

In addition to addressing rule revisions, we are continuously updating the software in consideration of user requests in ways such as by improving the GUI and effectively utilizing existing CAD data to contribute to the reduction of design man-hours.

In 2019, in anticipation of the release of the partially revised Harmonised CSR, we released software Ver.6.0.0 in February, which addressed the revision and improved software functions. In May and August, we released improved versions with better usability. In February 2020, we released Ver.7.0.0, which enhances speed and functions related to calculation.

R&D

In line with ClassNK's mission regarding safety and the environment, we promote R&D directly linked to classification and carry out activities based on the role we should play as a member of maritime society.

Promotion of R&D based on the R&D Roadmap

The "ClassNK R&D Roadmap 2017", which was established in July 2017, aims to bring about the innovation of maritime technology using the latest IT as well as help ensure the safety of life and property at sea, with specific focus on development in the following four areas:

- Rule DevelopmentA
- Survey Technology Innovation
- Marine Environmental Protection
- Revolutionary Technology DevelopmentThe R&D activities of the above are based on the following two major elements.
- Foundational R&D geared towards Core Technologies* and Integrated HR Development through R&D
- Utilization of Damage Information for Major Damage Prevention

* The five Core Technologies are: Structure; Motion, load; Material, welding; Information, control, communications, electronics; and Energy, environment.

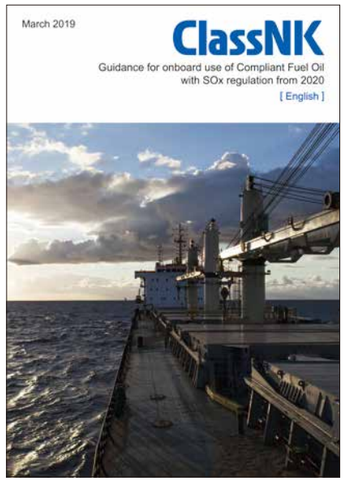
Initiatives in 2019

1. R&D directly linked to classification

As part of our research and development findings, we established and released the following two guidelines.

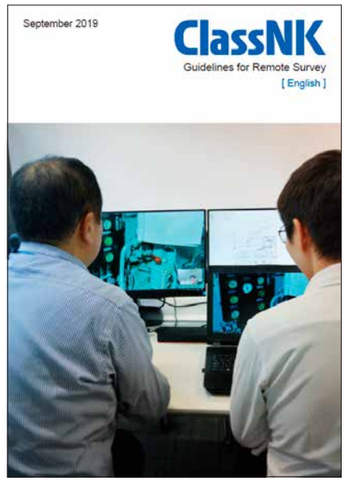
● Guidance for onboard use of Compliant Fuel Oil with SOx regulation from 2020

From a stable supply viewpoint, compliant fuel oil is anticipated to include more low-sulpfur blendstocks other than light distillates. The guidance assesses the needs for further implications for the safe use of compliant fuel oil from the perspectives of five properties: Compatibility, Low viscosity, Cold flow properties, Cat-fines, and Ignition/Combustion quality. It outlines the basic characteristics of each property, and the potential safety implications associated with them.



Guidelines for Remote Surveys

For remote surveys using ICT, ClassNK has investigated and examined the types of surveys that can be applied, the types and amounts of information required for remote surveys, and the requirements for the use of ICT, ensuring reliability equivalent to conventional witness surveys with transparency in the application of remote surveys. The guidelines are outcomes of these results and will be reviewed as necessary in accordance with the progress of related technology development.



2. Initiatives as a member of maritime society

● Joint research project on performance evaluation of actual vesselsin actual sea areas

The "Joint research project on performance evaluation of actual vessels in actual sea areas" is being carried out as a joint research and development project on common issues in the maritime society, with participation from 25 companies and organizations. This project aims to develop methods to accurately evaluate the speed and fuel consumption etc. of ships in actual sea conditions with waves and wind. To promote the project, ClassNK acts as secretariat together with National Institute of Maritime, Port and Aviation Technology National Maritime Research Institute.

● Participation in endowed courses

We participated in the following endowed courses and promoted joint research to support basic research institutes.

University	Endowed course name
University of Tokyo Graduate School Graduate School of Frontier Sciences	Marine development system
University of Tokyo Graduate School Graduate School of Engineering	Research and Development of Next-generation Floating Wind Turbine System

● Signed joint research agreement on condition-based maintenance

In November 2019, we concluded a joint research agreement for developing advanced condition-based maintenance (CBM), a new maintenance and management process for engine machinery plants, and establishing a new classification survey scheme based on CBM. In the joint research project, engine conditions will be continuously monitored and involve the real-time sharing of detailed data acquired from sources including SIMS2 developed by NYK Group and the newly installed sensors of large main engines. Utilizing the knowhow of engine manufactures, the projects will work to make failure predictions and remaining useful life (RUL) predictions for the engine by taking advantage of manufacturer expertise to create optimal CBM guidelines and then verify them on actual ships. ClassNK hopes to apply the outcomes of the joint research to establish a new classification survey scheme based on CBM.

Research content	Partners
Joint research for realizing CBM for main diesel engines	Nippon Yusen Kabushiki Kaisha (NYK) MTI Co. Ltd. Japan Engine Corporation
Joint research for realizing CBM for main steam turbines	Nippon Yusen Kabushiki Kaisha (NYK) MTI Co. Ltd. Mitsubishi Heavy Industries Marine Machinery & Equipment Co. Ltd.

3. Strengthened R&D and planning functions, and human resource development

We reviewed the R&D Roadmap established in 2017.
As part of the training of professional engineers (researchers) engaged in R&D, we conducted a system study to strengthen research positions. In addition, regarding basic analysis technology (CFD, FEM, etc.), we carried out comprehensive staff training and dispatched researchers to improve the basic technologies required for research and development.

4. Release of R&D outcomes

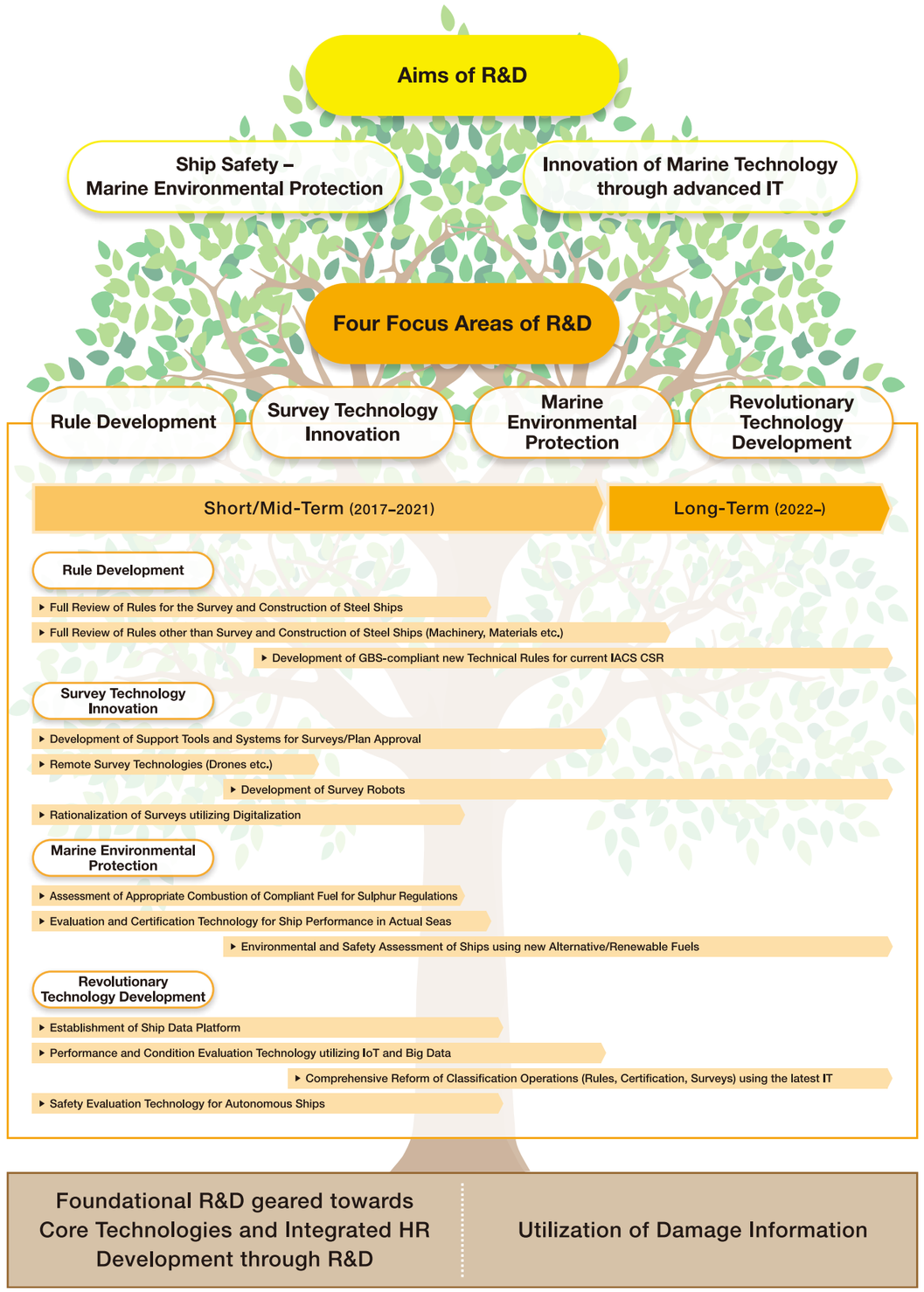
R&D outcomes were announced through lectures and thesis presentations. The main contents announced are as follows.
- Quantitative evaluation of the impact of maneuvering on ship encounters in actual sea areas
- Initiatives on innovation of survey technologies
- ClassNK's initiatives on the SOx regulation from 2020
- Initiatives related to advanced surveys and development of innovative technologies
- Introduction of basic research related to class rule development

5. Began publication of ClassNK Technical Journal

ClassNK Technical Journal is a comprehensive technical publication that supersedes "ClassNK Technical Bulletin", a publication that was formerly being published by the Society, to better provide its technical knowledge to the maritime industry where innovative R&D and technical development are in demand.
The first issue, released in December 2019, focuses on digitalization, one of the challenges the maritime industry is facing, and includes articles containing the basic ideas of the writers from both inside and outside the Society regarding digitalization, cyber security, artificial intelligence, autonomous ships and more. It also highlights ClassNK's general technical initiatives on the use of ROV in underwater surveys etc.

ClassNK R&D Roadmap

2017



Rules

ClassNK is constantly amending its Rules and Guidance in order to reflect the latest results from relevant research and development projects, feedback from damage investigations, requests from the industry, as well as changes made to relevant international conventions, IACS unified requirements, national regulations, etc.

Amendment of Technical Rules

A total of 73 amendments were approved in 2019. The major amendments are as follows.

Propeller shaft and stern tube shaft surveys

The ClassNK Rules stipulate that propeller shafts and stern tube shafts with oil lubricated stern tube bearings (Kinds 1B and 1C) are to be subjected to open-up surveys every five years. These surveys include the drawing out and non-destructive examination of propeller connections. IACS Unified Requirement (UR) Z21(Rev.4) allows the extension of the due dates of such open-up surveys for up to five years regardless of the installation of bearing temperature measuring instruments in cases where partial surveys are carried out to verify the condition of the lubricating oil five years after either the above-mentioned drawing out of the shaft or after the delivery date of the ship itself in which the shaft condition is confirmed to be satisfactory through verification of the results of lubricating oil analysis regularly carried out by the shipowner.
The ClassNK Rules allow extensions of due dates of such open-up surveys for up to five years subject to a partial survey equivalent to the above-mentioned one while alternative means were allowed for ships which do not regularly carry out lubricating oil analysis. In the latter case, the maximum extensions of due dates allowed were five years for shafts with bearing temperature measuring instruments and three years for shafts without bearing temperature measuring instruments.
Accordingly, relevant requirements were amended so that the partial survey requirements for extensions of open-up survey due dates are in accordance with the those set out in IACS UR Z21(Rev.4). In addition, requirements related to propeller shaft and stern tube shaft surveys were amended for harmonization reasons throughout the ClassNK Rules, including the Rules for High Speed Craft and the Rules for the Survey and Construction of Inland Waterway Ships, so that all relevant requirements in the ClassNK Rules would also be in line with IACS UR Z21(Rev.4). This was being done as part of a comprehensive review of ClassNK Rules.

Application of Requirements for the Structural Strength of Bow Flares

For ships, which have large bow flares and which operate at high speeds, such as car carriers and container carriers, requirements for the structural strength of bow flares are specified in order to prevent damage due to bow flare slamming. Although the current guidance mentions car carriers and container carriers simply as representative examples of the ships subject to the aforementioned requirements, there is some concern that the requirements might be misinterpreted as applying to only those two ship types because the application to other ship types having similar characteristics was not clear. Accordingly, relevant requirements were amended to clarify the application to other ship types having similar characteristics (roll-on/roll-off vessels, LNG carriers, low-temperature LPG carriers, etc.).


ClassNK

CERTIFICATE OF CLASSIFICATION

Name of Ship :
Classification No. :
Distinctive number or letters :
Flag / Port of Registry :
IMO No. :
Registered Gross Tonnage :

THIS IS TO CERTIFY THAT the above ship having been surveyed for classification on [redacted] and found to be in compliance with the Society's Rules and Regulations, has been assigned a class and entered in the Classification and Installations Register with the undermentioned Character(s).

Classification Character(s) and Descriptive Note(s):

Installations Character(s) and Descriptive Note(s):

This Certificate is valid until [redacted] subject to continued compliance with the Society's Rules and Regulations.
Issued at [redacted] on [redacted]

General Manager of Classification Department

Incorporation of Installation Certificate into Class Certificate

Ships which comply with relevant Society requirements related to ship classification, and which have been registered as ClassNK ships are issued a Class Certificate by the Society; in the same manner, equipment, etc. to be installed onboard ships which complies with relevant Society requirements, and which has been registered as such is issued an Installation Certificate by the Society. The installation certification program referred to above is unique to the Society and the provisions related to treatment of such certificates and some members of relevant industries have requested that Installation Certificates be incorporated into Class Certificates. Therefore, for the purpose of simplifying the usage and management of certificates, the relevant requirements were amended accordingly.

Welding for Cross-joints subject to High Stress

Current requirements for the size of fillet welds take into account that the tensile stress acting upon cross-joints is transmitted through fillet welding so that the size of the weld is, in principle, sufficient to withstand hull girder longitudinal bending stress. This, however, is based upon the types of ship structures common at the time the requirement was originally developed, and new structural designs have been introduced over the years which makes this approach less effective because some cross-joints may in some cases, depending upon the type of structure, actually be subject to stresses larger than hull girder longitudinal bending stress due to transverse deformation, etc. Accordingly, relevant requirements were amended to give special consideration to the welding of such high stressed cross-joints.

Steels Subject to Special Requirements for Ammonia Carriers

Special requirements in Part N of the Rules for the Survey and Construction of Steel Ships related to the use of carbon manganese steels for the cargo tanks, process pressure vessels and cargo pipes of ammonia carriers state that only steels with specified minimum yield strengths not exceeding 355N/mm2 and with actual yield strengths not exceeding 440N/mm2 are to be used. However, requirements about such steel materials specified in Part K of the Rules for the Survey and Construction Steel Ships do not distinguish between the above steels and steels not acceptable for use on ammonia carriers, which means there is a possibility that problems may occur in onsite handling which lead to the wrong steel being used. Accordingly, relevant requirements were amended so as to clearly distinguish the above steels from other steels not acceptable for use on ammonia carriers.

Clarification of the Application of the Requirements for Fire Protection and Extinction

Chapter 11 of Part N and Chapter 11 of Part S of the Rules for the Survey and Construction of Steel Ships respectively specify requirements related to fire protection and fire extinction for ships carrying liquefied gases in bulk and ships carrying dangerous chemicals in bulk. In addition, the application of Part R of the Rules for the Survey and Construction of Steel Ships is stipulated in both chapters. The ClassNK requirements are stipulated based upon the IGC Code and the IBC Code respectively. However, the applicable relationship between the ClassNK Rules and the two codes is unclear. Therefore, as part of a comprehensive review of the Rules for the Survey and Construction of Steel Ships, the relevant requirements were reviewed in order to clarify the aforementioned relationship. Accordingly, relevant requirements were amended based upon results of this review.

Alarms, etc. of Drip Trays Provided for Exhaust Gas Cleaning Systems

The ClassNK Rules require ships with exhaust gas cleaning systems (EGCS) that use liquids containing sodium hydroxide solutions be provided with drip trays to contain any leakage from equipment which either uses or handles such liquids, such as storage tanks and pumps. Furthermore, such drip trays are to either themselves be fitted with alarms for leak detection or be fitted with drain pipes leading to tanks fitted with high-level alarms. The above-mentioned requirements have also been correspondingly applied to the EGCS which do not use chemicals such as sodium hydroxide; however, since the difference in the risk of liquid that might leak was not evaluated properly, there was an inconsistency in the treatment of the alarm devices, etc. fitted in the drip trays provided for equipment handling other fluids such as urea solutions. Accordingly, relevant requirements were amended to ensure consistency in the treatment of alarm devices, etc. provided for drip trays.

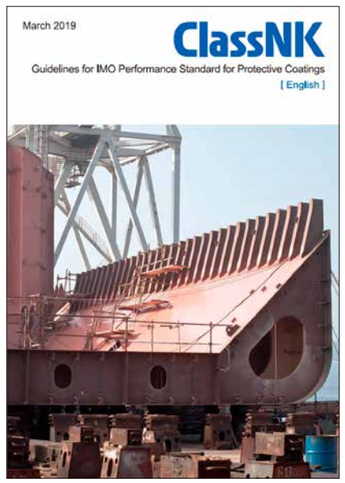
Establishment of "Rules for the Survey and Construction of Governmental and Naval Ships"

During the overseas transfer of defense equipment including governmental ships and their onboard machinery, the equipment may be subject to third-party quality inspections requested by foreign authorities. Under these circumstances, in March 2020, ClassNK established standards for conducting third-party certification of governmental and naval ships and their onboard equipment as their Rules for the Survey and Construction of Governmental and Naval Ships to contribute to the progress of the overseas transfer of defense equipment. The Rules for the Survey and Construction of Governmental and Naval Ships incorporate the knowledge and the latest technology that the Society has cultivated over many years through its classification business, and enable risk-based safety assessment and condition-based maintenance, making them effective for not only ensuring reasonable quality, but also reducing ship life cycle costs.

Guidelines Released in 2019

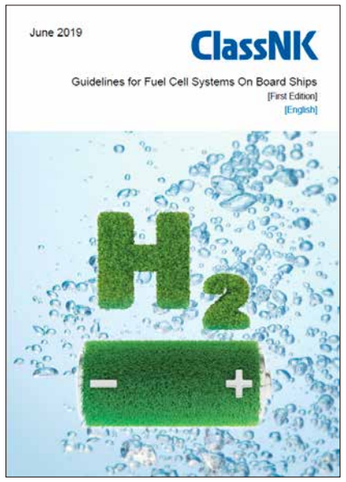
Guidelines for IMO Performance Standard for Protective Coatings

In order to contribute to the shared understanding of the minimum required level and quality of anticorrosion coating, we have compiled guidelines for conducting coating surveys in accordance with the IMO Performance Standard for Protective Coatings.



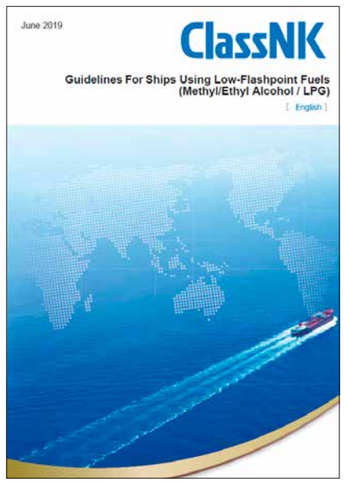
Guidelines for Fuel Cell Systems Onboard Ships

In order to be of some help for designing fuel cell systems onboard ships, we have compiled guidelines that summarize information related to fuel cells and the interim guidelines of the IMO that are under discussion. Our guidelines describe general information related to fuel cells, the comparison of the physical properties of hydrogen and conventional fuel gases from the standpoint of safety, and the safety provisions currently under review by the IMO with added comments by ClassNK as design requirements for ships powered by fuel cells.



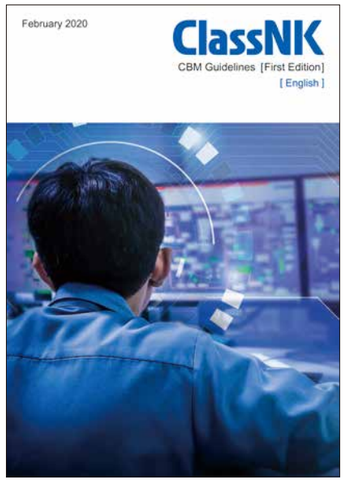
Guidelines for Ships Using Low-Flashpoint Fuels (Methyl/Ethyl Alcohol/LPG)

These guidelines divide targeted vessels into three categories: ships using methyl/ethyl alcohol as fuel, ships fuelled by LPG, and liquid gas carriers fuelled by LPG, and they take into consideration the properties of each fuel type and ship regulations and indicate safety requirements for the arrangement and installation of the low-flashpoint fuel related systems for minimizing risks to vessels, crew, and the environment.



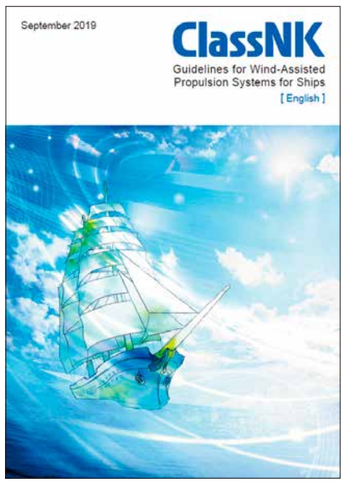
CBM Guidelines (First Edition, 1.1)

ClassNK reviewed the structure of its requirements for planned machinery surveys, revised its rules as needed to provide more detailed requirements for the adoption of Condition Based Maintenance (CBM) in class maintenance surveys, and released its CBM guidelines. The CBM guidelines contain not only explanations of the revised rules and how to apply to use CBM in class surveys, but also general explanations and future outlooks on CBM.



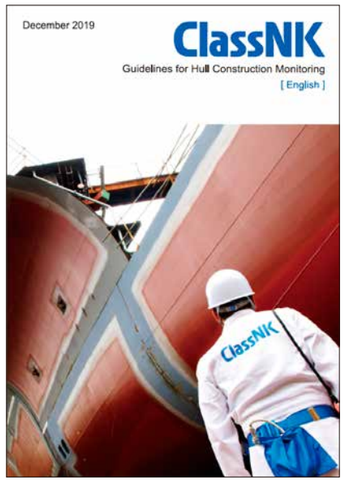
Guidelines for Wind-Assisted Propulsion Systems for Ships

ClassNK has developed its Guidelines for Wind-Assisted Propulsion Systems for Ships in order to contribute to the safe integrity and design of this technology and the ships that are installed with it. In addition to verifying structural strength, outlining methods for proving structural integrity of strength members, and utilizing calculation methods for load amounts, the guidelines provide class notations treatment for ships whose equipment is designed and installed in line with the guidelines.



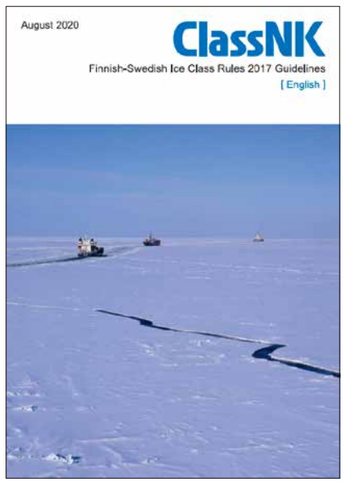
Guidelines for Hull Construction Monitoring

In view of the fact that the entry into force of IMO-GBS* requires controlled and transparent quality production standards for the construction of new ships, the guidelines summarize the procedures for monitoring the critical areas of ships during their construction based on our many years of experience and achievements in hull inspection of new ships.



2017 Finnish-Swedish Ice Class Rules Guidelines

Under development since the early 1930s, the FSICR stipulates the basic requirements for the hull structure, equipment and machinery of water-resistant ships and the technical requirements for propulsion devices, etc. for each water-resistant ship class. Our guidelines summarize the explanation of FSICR2017, which came into effect in 2017, and the specific requirements and methods that the Society deems necessary to satisfy those requirements.



Guidance for onboard use of Compliant Fuel Oil with SOx regulation from 2020

Precautions concerning change-over to 0.50% sulphur compliant fuel oils

Guidelines for the Inventory of Hazardous Materials (Ver.4.00)

For these guidelines, please refer to "Environmental Regulations (P. 11-14)".

Guidelines for Designing Cyber Security Onboard Ships

Cyber Security Management System for Ships

Guidelines for Software Security

For these guidelines, please refer to "Digital Transformation (P. 15-16)".

Guidelines for Remote Surveys

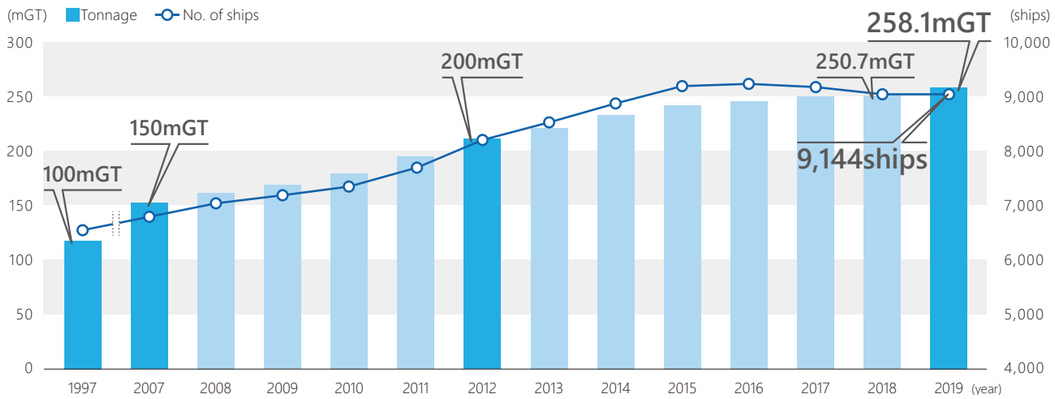
For these guidelines please refer to “R&D (p. 19-20)”.

Class & Statutory Service

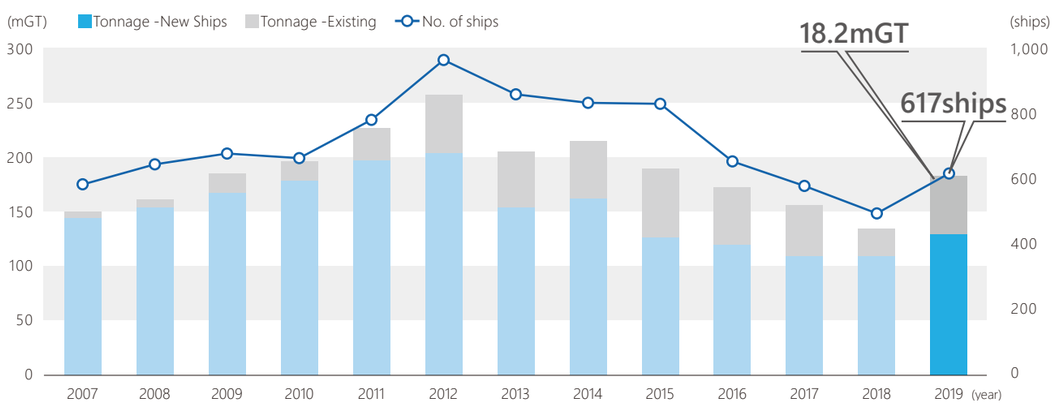
Surveys and examinations conducted based on class rules and international conventions are ClassNK's core business, and we strive to provide high-quality and prompt technical services. Following 2018, exceeding 250 million gross tons, and the number also increased in 2019.

Ships classed by ClassNK

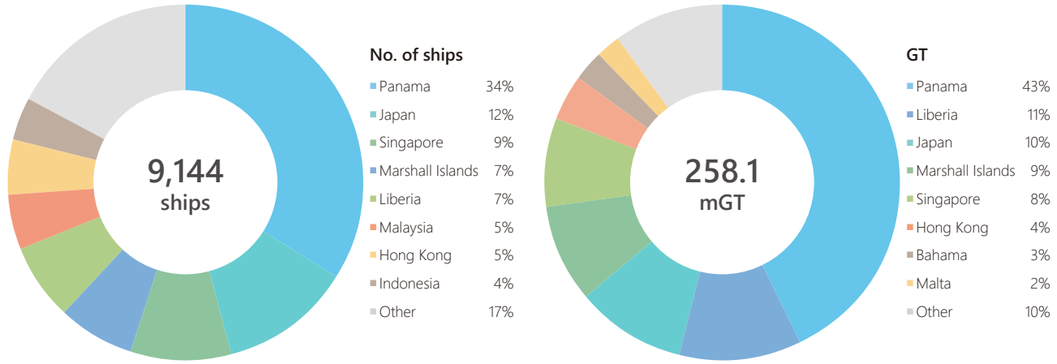
Growth in total amount of classed ships



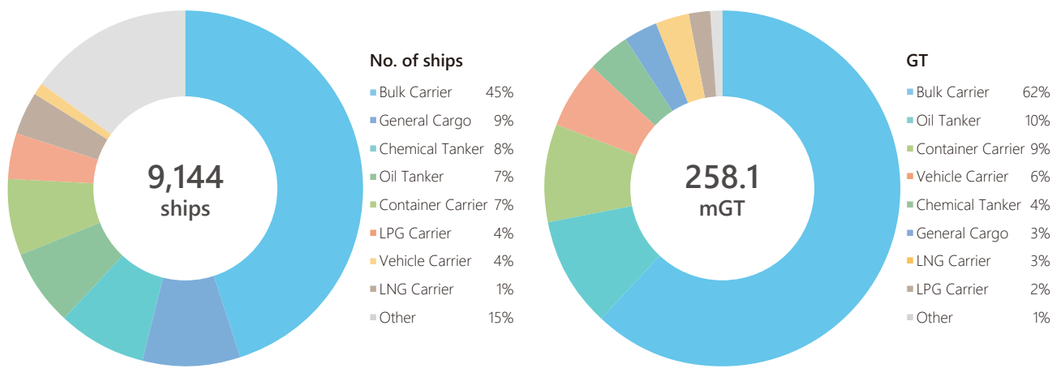
Growth in newly classed ships



Classed Ships by Flag



Classed Ships by Ship Type



Class Surveys

ClassNK carried out 617 classification surveys and 15,372 class maintenance surveys around the world.

Statutory Surveys, ISM/ISPS Audits and MLC Inspections

As of the end of 2019, ClassNK is authorized to carry out surveys and statutory services in accordance with the International Convention for the Safety of Life at Sea and the International Convention for the Prevention of Pollution from Ships by more than 100 flag administrations around the world.

Safety Management Systems - ISM code
In accordance with ISM Code requirements, 52 companies and 774 ships were newly registered in 2019, and at the end of 2019 there were 739 companies and 5,970 companies registered.

Ship Security Management Systems - ISPS Code
In accordance with ISPS Code requirements, 791 ships were newly registered in 2019, and at the end of 2019 there were 5,480 ships registered.

Maritime Labor Systems - MLC
In accordance with MLC requirements, 795 ships were newly registered in 2019, and at the end of 2019 there were 5,386 ships registered.

Statutory Certificates
Authorized by various flag states, ClassNK issued the following certificates (excluding interim and short-term certificates) in 2019.

Certificate name		Number issued	
International Load Line certificates	LL		3,587
SOLAS related certificates	SC	2,673	19,934
	SE	7,286	
	SR	4,601	
	DOC	443	
	SMC	2,374	
	ISSC	1,134	
	Other	1,423	
MARPOL related certificates	OPP	4,778	13,428
	NLS	73	
	CHM Code	479	
	SPP	2,203	
	APP	4,532	
	EE	1,133	
	GAS Code	230	

Certificate name		Number issued	
International Ballast Water Management certificates	BWM		1,327
Anti-fouling system certificates	AFS		1,541
Maritime Labor Certificates	MLC		2,120
International Tonnage certificates	TM69	1,010	2,149
	Suez Canal	577	
	Panama Canal	562	
Total			44,086

Approval of Manufacturers and Service Suppliers

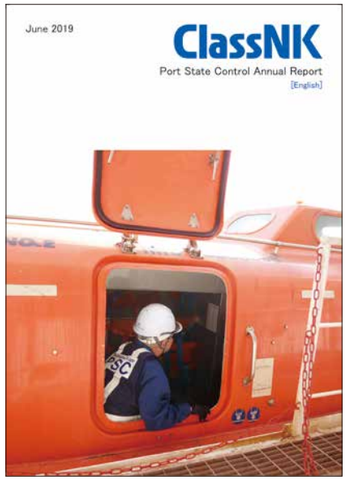
ClassNK carries out audits and certifications for companies who provide testing and measurement services related to class and equipment maintenance surveys. ClassNK certified the following types of firms in 2019:

Thickness measurements on ships	24 (267)
In-water survey of ships	36 (316)
Radio inspection services	26 (407)
Voyage Data Recorders (VDR)	23 (318)
Maintenance of firefighting systems and equipment	52 (388)
Maintenance of life saving equipment and appliances	25 (175)
Tightness testing of hatches with ultrasonic equipment	1 (23)
Testing of coating systems	2 (9)
Services of lifeboats, launching appliances and on-load release gear	51 (293)
Measurements of noise level	0 (2)
Survey using remote inspection techniques	12 (12)

* ( )Indicates total number of certifications at year end.

Port State Control (PSC)

ClassNK has continued working with the ship management companies related to detained vessels to help improve ship conditions and increase safety awareness. We also published our "Port State Control Annual Report 2019", a compilation and analysis of PSC related statistics.
To exchange opinions on the current situation and future efforts regarding PSC, ClassNK staff visited PSC authorities including those in China, Australian Maritime Safety Authority (AMSA), United State Coast Guard (USCG), Indonesia, and Russia during the course of the year.
Based on Port State Control (PSC) report data, we improved the features of our "PrimeShip-PSC Intelligence" software that aids with ship management in response to customer feedback.



Other Technical Services

Condition Assessment Program (CAP)
During 2018, ClassNK issued statements to 69 vessels under its Condition Assessment Program (CAP) service. As of the end of 2019, the total number of the statements issued by the Society for CAP stood at 537.

Emergency Technical Assistance Service (ETAS)
ClassNK's Emergency Technical Assistance Service (ETAS) is on call 24/7 to support the owners and operators of ships registered for this service in ensuring the safety of their vessels and minimizing the environmental impact if disaster should strike. In 2019, 141 vessels were newly registered for the ETAS service, bringing the total number of vessels registered for the service to 1,516. In 2019, this team was called into action for 4 incidents related to maritime casualties to provide technical support.

Kawasaki Heavy Industries' LNG-fuelled 200K DWT bulk carrier

In January 2019, ClassNK granted an Approval in Principle (AIP) based on its Rule Part GF which adopts IGF Code (regulation for ships using low-flashpoint fuels) to Kawasaki Heavy Industries (KHI) for their project on the concept design of an LNG-fuelled 200K DWT bulk carrier.
The main features of this ship announced by Kawasaki Heavy Industries are as follows.

1. The new LNG-fueled bulk carrier keeps its cargo space as large as that of conventional oil-fueled ships by configuring the LNG fuel tank behind the accommodation in the stern.
2. Powered by low-speed, dual-fuel diesel engine, the ship achieves significantly reduced emissions of CO2, NOx, SOx, and particulate matter when using LNG as fuel, meeting Energy Efficiency Design Index (EEDI) Phase 3 requirements.

Sanoyas Shipbuilding's LNG-fuelled wood chip carrier

In May 2019, ClassNK granted an Approval in Principle (AIP) based on its Rule Part GF which adopts IGF Code (regulation for ships using low-flashpoint fuels) to Sanoyas Shipbuilding for their project on the concept design of an LNG-fuelled wood chip carrier.
The main features of the ship announced by Sanoyas Shipbuilding are as follows.

1. Using LNG as its main fuel, the ship reduces greenhouse gas (GHG) emissions by over 40%, in line with the Energy Efficiency Design Index (EEDI) in order to achieve the IMO's GHG reduction strategy goal of improving average fuel consumption by 40% by 2030. The design is also expected to contribute to achieving the GHG reduction strategy goal of improving total emissions by 50% by 2050.
2. It features a sufficient cargo size (4.3 million cft) that is crucial for wood chip carriers by configuring the LNG fuel tank behind the accommodation in the stern. In addition, the LNG fuel supply system is kept near the engine room by effectively utilizing the space in the depth direction unique to wood chip carriers.

LPG Reformer for marine engines

In September 2019, ClassNK granted an Approval in Principle (AIP) to Osaka Gas for their joint project with Daihatsu Diesel on an LPG Reformer for marine engines. This was the first AIP granted in Japan for such equipment. The LPG Reformer is designed to convert LPG into synthetic methane gas equivalent to the kind found in LNG. Due to being mainly composed of propane and butane, LPG is susceptible to knocking (abnormal combustion), making it difficult to use as a fuel for lean burn gas engines and dual fuel engines. In contrast, by converting LPG into synthetic methane gas with the LPG Reformer prior to fueling the engine, the risks of knocking can be restrained, resulting in equivalent operational performance observed when using LNG. Additionally, by using LPG as fuel, the emission of environmentally harmful substances like SOx and NOx can be significantly reduced compared to when using conventional heavy oil fuels, allowing for compliance to the 2020 IMO SOx regulation and more by using marine engines themselves.

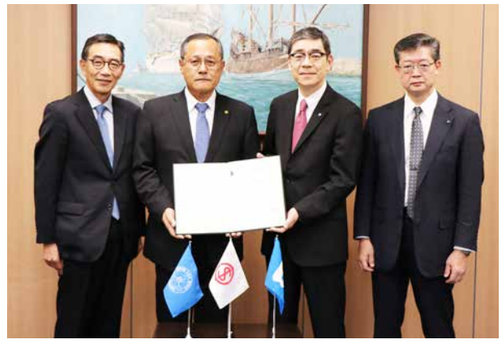
Wind Challenger Project

In October 2019, ClassNK granted an Approval in Principle (AIP) based on its "Guidelines for Wind-Assisted Propulsion Systems for Ships" and related regulations for the basic design of a hard sail system, which converts wind energy to propulsive force with a telescopic hard sail, and is a fundamental technology of the Wind Challenger Project (*1) that Mitsui O.S.K. Lines, Ltd.("MOL") and Oshima Shipbuilding Co., Ltd. are spearheading. Upon receiving the application from MOL and Oshima Shipbuilding, ClassNK reviewed the basic design of the hard sail system in line with relevant international conventions, ClassNK rules, and the Society's Guidelines for Wind-Assisted Propulsion Systems for Ships released in September 2019. Following its successful completion, ClassNK granted an AIP for the basic design of the hard sail system, which marks the world's first AIP based on the guidelines.

(*1) The Wind Challenger Project started in 2009 with the "Wind Challenger Plan," an industry-academia joint research project led by The University of Tokyo, and in 2013, the team was chosen to receive a "Subsidy for Next-generation marine environment-related technology research" by the Ministry of Land, Infrastructure, Transport and Tourism. In January 2018, MOL and Oshima Shipbuilding took charge of the plan and now play a central role in this project.

NS United Kaiun Kaisha and Imabari Shipbuilding's LNG-fueled capesize bulker

In December 2019, ClassNK granted an Approval in Principle (AiP) based on its Rule Part GF which adopts IGF Code (regulation for ships using low-flashpoint fuels) to NS United Kaiun Kaisha, Ltd. and Imabari Shipbuilding Co., Ltd. for their joint project on the concept design of an LNG-fueled capesize bulker. The main features of the design announced by Imabari Shipbuilding are as follows.
By installing two Type C LNG tanks at the stern, which are considered to be cost competitive and are comparatively easily to install, it is possible to build an LNG-fueled vessel without significant changes to the conventional vessel's basic design. The design adopts a low-pressure dual-fuel engine for the main engine, which enables the use of gas that has naturally vaporized (BOG: boil-off gas) from the LNG tanks in the main engine without any waste, thereby reducing the burden on the environment and lowering running costs.
This basic design can achieve CO2 emission volumes that are 30% less than the reference line as required under EEDI Phase 3 by the IMO.



Kawasaki Heavy Industries's LPG Fuel Supply System

In February 2020, ClassNK granted an Approval in Principle (AiP) based on its Rule Part N which adopts IGC Code and its Guidelines for Ships Using Low-Flashpoint Fuels to Kawasaki Heavy Industries, Ltd (KHI) for their LPG fuel supply system. ClassNK carried out the verification on the system from the viewpoint of minimizing risks to vessels, crew, and the environment. The main features of the design announced by KHI are as follows.

1. Cyclical system design that is compatible with propane and butane and circulates LPG in a pressurized state capable of usage at normal ambient temperature
2. Establishing a highly safe control system by implementing risk assessment based on the IGC code
3. System configuration applicable to merchant ships other than LPG carriers

AiP on LPG reformed gas fueled coastal LPG carrier

In March 2020, ClassNK granted an Approval in Principle (AiP) based on its Rule Part N which adopts IGC Code and its Guidelines for Ships Using Low-Flashpoint Fuels to Daihatsu Diesel for their concept design of an LPG reformed gas fueled coastal LPG carrier developed in cooperation with Iino Gas Transport, Osaka Gas, Izumi Steel Works, and Miura Shipbuilding in terms of safety assessments.
The Vessel is designed to be equipped with an LPG reformer developed jointly by Daihatsu Diesel and Osaka Gas, and a dual

fuel engine developed by Daihatsu Diesel. The LPG Reformer is designed to convert LPG into synthetic methane gas equivalent to the kind found in LNG. Due to being mainly composed of propane and butane, LPG is susceptible to knocking (abnormal combustion), making it difficult to use as a fuel for lean burn gas engines and dual fuel engines. In contrast, by converting LPG into synthetic methane gas with the LPG Reformer prior to fueling the engine, the risks of knocking can be restrained, which is expected to have an equivalent operational performance observed when using LNG.

Certification Service

Utilizing its accumulated knowledge as a classification society, ClassNK provides a broad range of third-party certification services for quality, environmental, occupational health & safety, energy management systems, and maritime crew training in addition to verification for greenhouse gas (GHG) emission inventories.

Quality Management Systems – ISO9001

In 2019, ClassNK certified a total of 15 organizations in line with ISO 9001, bringing the total number of organizations registered with the Society to 492.

Business field	Number registered
Fabric, textiles	4
Pulp, paper, paper products	1
Pharmaceuticals and textiles	4
Rubber products, plastic products	10
Concrete, cement, lime, gypsum etc	1
Basic metal, processed metal products	110
Machinery, equipment	97
Battery-powered/electrical equipment	35
Shipbuilding	73
Other transportation equipment	1
Construction	15
Wholesale, retail	17
Transportation, warehouse, communications	85
Financial, insurance, Real estate, cargo	2
Engineering, R&D	20
Other specialty services	108
Education	32
Medical and social work	14
Other social/individual services	1

* Some may fall under multiple fields.

Environmental Management Systems – ISO14001

In 2019, ClassNK certified a total of 3 organizations in line with ISO 14001, bringing the total number of organizations registered with the Society to 132.

Business field	Number registered
Pharmaceuticals and textiles	1
Basic metal, processed metal products	26
Machinery, equipment	32
Battery-powered/electrical equipment	6
Shipbuilding	28
Construction	6
Wholesale, retail	3
Transportation, warehouse, communications	61
Financial, insurance, Real estate, cargo	2
Other specialty services	2
Other social/individual services	2

* Some may fall under multiple fields.

Occupational Health & Safety Management Systems - OHSAS 18001/ISO45001

In 2019, ClassNK certified a total of 4 organizations in line with occupational health & safety management systems, bringing the total number of organizations registered with the Society to 37.

Business field	Number registered
Textiles, textile products	1
Basic metal, processed metal products	3
Machinery, equipment	3
Battery-powered/electrical equipment	31
Shipbuilding	15
Construction	1
Transportation, warehouse, communications	16
Other specialty services	1
Education	1

* Some may fall under multiple fields.

HSE (Health, Safety & Environment) Management Systems

In 2019, ClassNK certified a total of 2 organizations in line with HSE management systems, bringing the total number of organizations registered with the Society to 6.

Business field	Number registered
Shipbuilding	6

Energy Management Systems - ISO 50001

In 2019, ClassNK certified a total of 4 organizations in line with ISO 50001.

Business field	Number registered
Transportation, warehouse, communications	4

Maritime Education and Training

In 2019, ClassNK certified a total of 8 maritime education and training organizations and 22 courses, bringing the total number of organizations and courses registered with the Society to 49 and 157 respectively.

Maritime Labor Convention Certification for Manning Organizations

In 2019, ClassNK certified a total of 3 organizations in line with Maritime Labor Conventions for manning organizations, bringing the total number of organizations registered with the Society to 103.

Assessment and Verification based on EU MRV

ClassNK carried out the assessment of 563 EU MRV monitoring plans and the verification of 993 emission report based on the EU MRV Regulation for fuel consumption reports.

Other Certification Services

ClassNK also provides the following certification services:

- Clean Shipping Index verification
- Road Traffic Safety Management Systems (ISO 39001)
- Verification of GHG emissions
- Environmental performance verification
- Clean cargo working groups verification

Accreditation as a GHG emission verification body in the international aviation industry

In January 2020, ClassNK obtained accreditation from the Japan Accreditation Board (JAB) as a GHG emissions verification body based on the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) by the International Civil Aviation Organization (ICAO).

Although global warming countermeasures are being discussed at the United Nations Framework Convention on Climate Change (UNFCCC), GHG emissions control in the international aviation sector, which operates across borders, will not fit in to a country basis framework for reduction measures under the UNFCCC. In light of the situation, the matter has been left up to consideration by the ICAO. ICAO adopted CORSIA in 2016 as a CO_2 emission reduction scheme utilizing global offsetting mechanisms, with the goal of stabilizing net CO_2 emissions at 2020 levels with carbon-neutral growth.

Under CORSIA, aircraft operators are required to monitor fuel consumption data from international flights in 2019 and report annual CO_2 emissions. Emission Reports are required to be verified by an independent third-party verifier to ensure data accuracy. These third-party verifiers must obtain accreditation under ISO14065 and special requirements of CORSIA. ClassNK had already fulfilled ISO14065 requirements, but after undergoing an extended examination by JAB, it has been accredited as the first verification body in line with the CORSIA scheme in Japan. As an accredited certification body in the international aviation sector, ClassNK utilizes its abundant knowledge cultivated in a cross-sectional manner to support all land-sea-air transport modes in addressing global warming, and to contribute to the enhancement of social sustainability.

Renewable Energy

ClassNK provides certification and third party verification services to meet various client needs involving the increasing adoption of renewable energy. Through these services, ClassNK contributes to the formation of a sustainable, low-carbon society.

Wind Power Energy

ClassNK provides certification services for wind power generator manufacturers and owners in accordance with the IEC61400 series global standards for wind turbines. ClassNK's certifications are used in inspections based on Japan's "Electricity Business Act", "Ship Safety Act", "Act on Special Measures Concerning Procurement of Electricity from Renewable Energy Sources by Electricity Utilities," and other related regulations.

Wind turbine certification

ClassNK provides certification and classification for wind power generation systems such as large and small wind turbines.

System registered	Registered in 2019	Total
Large wind turbine	2	9
Small wind turbine	3	18

Wind Farm Certification

ClassNK certifies the safety of wind turbines and their supporting structures in addition to their construction sites onshore or offshore. This certification can be utilized for obtaining a license and approval as specified in the Electricity Business Act of Japan.

System registered	Registered in 2019	Total
Wind farm	29	84
Supporting structure (tower/foundation)	0	9

Floating offshore wind power generation system certification

While floating offshore wind power generation systems must comply with the Electricity Business Act of Japan, towers, floating structures, and mooring equipment must comply with the Ship Safety Law. ClassNK provides classification surveys as an organization that abides by the Ship Safety Law based on its "Guidelines for Floating Offshore Wind Power Generation Systems".

Periodical Safety Management Inspections in accordance with the Electricity Business Act

In Japan, installation personnel of wind power generation systems with an output of over 500kW must independently check the inspection status of such equipment every 3 or 6 years and get it inspected by a nationally approved safety management inspection body, as defined by the Electricity Business Law. ClassNK offers periodical safety management inspection services as a nationally approved safety management inspection body.

R&D

ClassNK is conducting research (2018-2020) to establish criteria regarding the use of drones in power generation system surveys for the smooth implementation of marine wind power technology. Experiments aimed at achieving maneuverability in strong wind and practical and efficient inspection methods with long flight times are being carried out.

Signed an agreement with the Nagasaki Marine Industry Cluster Promotion Association in the field of marine renewable energy

In May 2019, ClassNK signed the "Cooperative Agreement in the Field of Marine Renewable Energy" with the Nagasaki Marine Industry Cluster Promotion Association, a specified non-profit organization.
The agreement ensures the safety of marine renewable energy power generation facilities and related offshore construction, while fostering human resources related to marine renewable energy-related fields and effectively utilizing the resources and functions of both parties. Through this, it aims to contribute to the promotion of the introduction of marine renewable energy and the development of related industries.
In the waters of Nagasaki Prefecture, three demonstration fields of marine renewable energy have been designated by the government, and pioneering projects of floating offshore wind power generation demonstration projects and tidal current power generation technology practical application promotion projects are being implemented. In addition, a floating offshore wind farm and a large-scale landing offshore wind farm are planned, and in March 2019, as part of the Nippon Foundation Ocean Innovation Project, Nagasaki Prefecture, Nagasaki University, Nagasaki University of Science and Technology, the "Marine Development Human Resources Field Center (tentative name)" establishment project, promoted in collaboration with the Nagasaki Marine Industry Cluster Promotion Association, was launched.

Marine Renewable Energy Technologies

ClassNK provides a variety of certification services for marine renewable energy power generation systems that utilize wave, tidal, ocean current and ocean thermal energy including test platforms, prototype certification, project certification for verifying installation sites of power generation systems and their supporting structures, and component certification etc.

Marine Warranty Surveys

A Marine Warranty Survey (MWS) is the third party surveillance of marine operations which is often requested by re-insurance underwriters in order to ensure that offshore marine operations (such as the installation and transportation of offshore sea structures, and the laying of cables etc.) are being carried out safely and reliably. ClassNK is authorized by major re-insurance companies to carry out MWS.

Human Resource Development

As human resources form the base of ClassNK's business, we strive to provide sufficient education and training for high quality and prompt service. Sharing our accumulated knowledge and experience, we contribute to providing the entire industry with human resource training.

ClassNK Academy

ClassNK Academy was established in 2009 to provide the necessary basic knowledge to those involved in the shipbuilding, maintenance and transport industries. ClassNK Academy has been held actively since then and 1,273 participants in Japan and 925 overseas took part in courses in 2019.

Basic ship survey package

- Classification societies and statutory issues
- Classification surveys (hull)
- Classification surveys (machinery & electrical installations)
- Materials and welding
- Basics of painting/coating

Basic statutory package

- SOLAS (SE, SR)
- MARPOL etc.
- TM69, LL, SOLAS (SC)
- ISM, ISPS, and MLC

Ship management package

- Incident investigation & analysis
- Risk management
- Internal audits

Design engineer training package

- Structure design
- Outfitting (steel) design
- Outfitting (pipe) design
- Machinery design
- Electrical design

Worker course

- DP training course
- Coating surveyor assistant course

Maritime data scientist education lecture

- Equipment measurement data analysis
- Performance analysis based on ISO19030

Our maritime data scientist training course on "Analysis of equipment measurement data" is certified as part of Japan's Ministry of Health, Labor and Welfare's education and training benefit system (specialized practical education and training), and our course of "Operation performance analysis based on ISO19030" is certified as part of Japan's Ministry of Economy, Trade and Industry's fourth industrial revolution skill acquisition course.

ClassNK Seminar

An essential task of ClassNK is to provide the industry with technical information. To do so, we hold technical seminars around the world designed to provide the shipping/shipbuilding industry with the latest information.
The following are some of the main seminars held by ClassNK in 2019.

2019 ClassNK Technical Seminars

ClassNK initiatives with the 2020 SOx regulation
- Initiatives with sophistication of surveys and development of innovative technologies
- Introduction of basic research on development of class rules
- Latest trends on international conventions
- Explanation of revised rules
  - Outline of establishment, revision and abolition of rules
  - Amendments to Class Rules and Guidance for the Survey and Construction of Steel Ships
    - › Engine and Electrical Installations
    - › Equipment
    - › Hull and Materials
    - › Recent Topics on IACS Environmental issues/ Machinery/ Safety/Survey/Hull/Cyber systems panel
- Latest trends on environmental regulations
- Toward the digital transformation of the maritime industry

Overseas Technical Seminars

ClassNK holds regular technical seminars around the world to provide in-depth information on incoming regulations, and introduce the latest technologies and technical findings to its clients and maritime stakeholders. The seminars aim to deliver practical information on a wide range of topics in line with the needs of each country. In 2019, 23 seminars were held in countries including Hong Kong, Singapore, Taiwan, and Norway. The following are some of the presentations that were carried out.

- Certification of Ship Recycling Facilities by ClassNK
- Activities for Digital Innovation
- Cyber Security Approach
- Internet of Ships Open Platform (IoS-OP) - Initiative to Collect and Distribute Maritime Big Data

Training for Crew Education and Training Instructors

In line with crew education and training certification, ClassNK holds training for improving the abilities of instructors involved with crew education and training. In 2019, we held training for 43 participants based on the IMO model course and issued certificates of completion.

ClassNK Data Science Camp

The ClassNK Data Science Camp was held to contribute to the training of data scientists in the maritime industry. With a larger scope than the previous year, 40 graduates and undergraduates specializing in maritime issues were provided with the opportunity to participate in data science lectures and actual data analysis projects.

Training for ClassNK Surveyors/Inspectors

ClassNK implements a training program for ensuring that all surveyors and inspectors have sufficient knowledge and ability to carry out their work. In 2019, the following training sessions were held.

- Surveyor training
- Maritime Management Systems Auditor training
- Maritime Labor Inspector training
- ISO Auditor training

Service Network

128 Locations

Exclusive Survey Offices

ClassNK is providing a broad range of services via its extensive worldwide survey network, with the number of exclusive survey offices totaling 128 locations around the world at the end of 2019. In addition to these offices, ClassNK also maintains six Plan Approval Centers located in the major shipbuilding regions of the world.

Plan Approval Centers

Offices with Plan Approval Center ● Overseas Offices ● Offices in Japan

Japan	ClassNK Head Office, Tokyo, Administration Center Plan Approval and Technical Solution Division (Hull Department, Machinery Department, Material and Equipment Department, and Technical Solution Department)
Korea	Plan Approval Center, Busan
China	Plan Approval Center, Shanghai
Singapore	Plan Approval Center, Singapore
Turkey	Plan Approval Center, Istanbul
India	Plan Approval Center, Mumbai

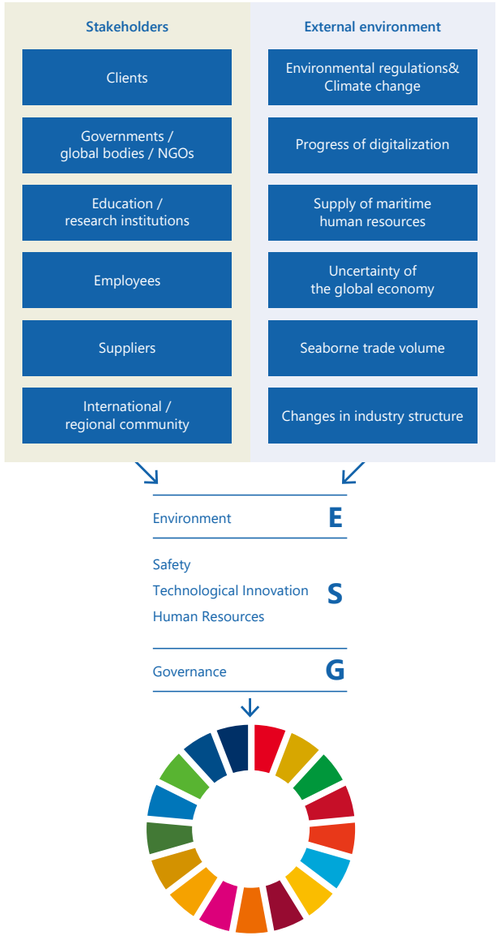
Environmental, Social, Governance

Founded with the goal of contributing to safety at sea and environmental protection, ClassNK carries out all of its business with consideration on environmental (E) and social (S) aspects for the sustainable development of society as a whole, and ensuring its sound governance (G). ClassNK also contributes to the accomplishment of SDGs through its business activities.

As efforts toward the realization of a sustainable society are being promoted worldwide, we clarified our ESG initiatives in 2019.

Materiality and Response to ESG

ClassNK selects its essential tasks based on a framework for sustainable development and with consideration towards ESG (environment/society/governance), analysis of the external environment including various societal challenges, and stakeholder needs.



SDGs Mapping of ClassNK Business Activities

ClassNK will contribute to the accomplishment of SDGs through its business activities.

Business activity	Related SDGs
Safety surveys/audits in line with ClassNK technical rules and regulations including Load Line and SOLAS	
Environmental surveys/audits in line with ClassNK technical rules and regulations including MARPOL (Oil/hazardous liquid substances /sewage / waste / air pollution), BWMS, AFS, and HKC	
Working condition inspections in line with regulations including MLC	
R&D (rule development/ survey technology innovation/marine environmental protection/revolutionary technology development)	
Certifications on renewable energy	
Certifications on management systems, HSE, seafarer training institutions, and GHG emission	
ClassNK Academy and other training services	
Provision of support on design/ construction/operation and regulatory requirement, software for optimization, and any solutions related to industry challenges	
Ensuring management base (human resources, governance)	

Corporate Governance

As a third-party organization, we carry out our services from a fair and just perspective in accordance with laws and without deviation from societal norms. Additionally, we strive to contribute to the development of society through our services and to establish a fair workplace with healthy business relations.

Establishment of an Internal Control System

The Society prepares an Internal Control System in order to ensure that the director carries out duties that conform to laws and Society's Articles of Incorporation and that all other conducted business practices are appropriate.
In 2019, to promote compliance, we further improved the consultation desk environment that accepts reports or consultations from staff. In addition, based on the results of the risk assessment conducted in 2018, we have streamlined operations associated with risk management, and confirmed that the risks identified in the year are being appropriately controlled with residual risks at an acceptable level.

Health, Safety and Environmental Policy (HSE)

As an international classification society providing services to ensure the safety of life and property at sea and to promote the protection of the marine environment, ClassNK considers health, safety and environment to be of the utmost importance. Through the implementation of our occupational health and safety policy based on the Occupational Safety and Health Manual, ClassNK strives to manage and continually improve our health and safety performance.

ClassNK

Health, Safety & Environmental Policy

General Policy

Nippon Kaiji Kyokai (ClassNK) is committed to placing utmost priority on ensuring the health and safety at work of all employees, and managing and continually improving our health and safety performance with the overall goal of no injury and ill health.
We also contribute to social development through the protection of the global environment as an international classification society.

Strategies

To fulfill this policy, we will

- give our consideration to health, safety and environment aspects in preference to our other activities,
- comply with all applicable legislation and any other requirements we subscribe to which relate to occupational health and safety (OHS), and its own rules, statutory, regulatory requirements and the requirements of the flag administration which relate to the protection of the environment,
- conduct surveys strictly and fairly to promote the protection of the marine environment,
- utilize a systematic approach to managing health and safety to achieve continual improvement of OHS performance by establishing OHS objectives and targets and, performing regular reviews,
- promote prevention of accidents and ill health through hazard identification and risk assessment of the work and workplace,
- give all employees the right and responsibility to refuse to conduct work they consider to present an unacceptable risk,
- increase awareness and improve knowledge of all employees related to health and safety by providing adequate OHS training and/or education,
- actively support industries to promote renewable energy use,
- contribute to Joint research and development (R&D) on environmental protection technologies with industries and academic partners.

H. Sakashita

Hiroaki Sakashita
President & CEO
NIPPON KAIJI KYOKAI
18 March 2020

ClassNK

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[English]

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