Mitsubishi Shipbuilding Receives Order for Ammonia Fuel Supply System for Ammonia-Powered Marine Engine 8

Delivery Scheduled in 2025, Together with Ammonia Gas Abatement System

Tokyo, April 10, 2024 - Mitsubishi Shipbuilding Co., Ltd., a part of Mitsubishi Heavy Industries (MHI) Group, has received an order from Japan Engine Corporation (J-ENG) for an ammonia fuel supply system (AFSS) and ammonia gas abatement system (AGAS).

The AFSS will supply ammonia fuel to ammonia-powered marine engines developed by J-ENG, and the AGAS will safely treat any surplus ammonia. The newly ordered AFSS and AGAS are remotely controlled automatically by an integrated control system. Mitsubishi Shipbuilding will deliver the modules to J-ENG in 2025.

Conversion from fossil fuels to environmentally sustainable fuels is indispensable for achieving net zero greenhouse gas (GHG) emissions by the global maritime industry by or around 2050, the goal set by the International Maritime Organization (IMO). Because ammonia emits no CO_2 when combusted, adoption of ammonia fuel is expected to contribute to the development of decarbonized infrastructure in the maritime industry.

Going forward, Mitsubishi Shipbuilding, aligning with MHI Group's strategy of advancement of the energy transition, will bring together its technologies and expertise in ammonia handling accumulated through its history of building transport carriers, and as a shipboard ammonia handling systems manufacturer the company will supply products of maximum safety and reliability. Additionally, as a maritime system integrator, through provision of shipbuilding engineering services for ammonia-fueled vessels, plus construction support and other services meeting customer needs, Mitsubishi Shipbuilding will continue contributing to the further development of marine logistics and to reducing the maritime industry's environmental impact on a global scale.

Ammonia Fuel Supply System (High-pressure and Low-pressure AFSS module)

URL：https://www.mhi.com/news/24041002.html

Mitsubishi Shipbuilding Acquired Approval in Principle (AiP) from Classification Society for the Basic Design of an Onboard Carbon Capture and Storage System 9

Tokyo, April 10, 2025 - Mitsubishi Shipbuilding Co., Ltd., a part of Mitsubishi Heavy Industries (MHI) Group, has acquired Approval in Principle (AiP)(Note) from Nippon Kaiji Kyokai (ClassNK) for its Onboard Carbon Capture and Storage system (OCCS) developed to capture and store CO_2 emitted from ships.

The OCCS subject to the AiP captures, liquefies, and stores CO_2 after pretreatment of the exhaust gas emitted from ships. It is attracting attention as a solution to promote decarbonization of ships.

Mitsubishi Shipbuilding has developed the system by utilizing CO_2 capture technologies of MHI, which has a wealth of experience with onshore facilities, as core technology, and combining it with exhaust gas pretreatment, CO_2 liquefaction, storage, and handling technologies in order to establish as onboard system. Going forward, Mitsubishi Shipbuilding will accelerate the development of this system to bring it into market.

MHI Group is currently pursuing strategic measures to strengthen its business for the energy transition. In conjunction with this initiative, Mitsubishi Shipbuilding is making efforts to contribute to the advancement of the maritime industries in Japan and around the world by utilizing its shipbuilding-based marine engineering technologies in addition to the conventional shipbuilding.

Mitsubishi Shipbuilding will actively contribute to the decarbonization of ships continuing their effort to reduce greenhouse gas (GHG) emissions from ships, which faces an increasingly urgent priority around the world.

AiP Presentation Ceremony Held at Nippon Kaiji Kyokai

(Note)

Approval in Principle (AiP) indicates that a certification body has reviewed the basic design of the subject equipment and confirmed that it meets technical requirements and relevant safety standards.

The inspection of the basic design for the OCCS system was conducted in accordance with ClassNK's "Guidelines for Shipboard CO_2 Capture and Storage Systems."

About MHI Group's CO_2 capture technologies

MHI Group has been developing the "KM CDR Process™" (Kansai Mitsubishi Carbon Dioxide Recovery Process) and the "Advanced KM CDR Process™" in collaboration with the Kansai Electric Power Co., Inc. since 1990. As of April 2025, the Company has delivered 18 plants adopting these processes. The "Advanced KM CDR Process™" adopts the "KS-21™" solvent, which incorporates technological improvements over the amine-based "KS-1™" and offers superior regeneration efficiency and lower deterioration than the "KS-1™", and it has been verified to provide excellent energy saving performance, reduce operation costs, and result in low amine emissions.

Further information on MHI Group's CO_2 capture plants:
https://www.mhi.com/products/engineering/co2plants.html


ClassNK
NIPPON KAIJI KYOKAI

Document No. KF25MC0135SH
Date: 09 April 2025

APPROVAL IN PRINCIPLE

Onboard Carbon Capture and Storage system
developed by
MITSUBISHI SHIPBUILDING CO., LTD.

THIS IS TO CERTIFY THAT Approval in Principle is granted to MITSUBISHI SHIPBUILDING CO., LTD.

The AIP is for the design concept of Onboard Carbon Capture and Storage system, and it is based on "Guidelines for Shipboard CO_2 Capture and Storage Systems (Edition 1.1)".

The documents/drawings specified in the annex to this letter have been reviewed and it is verified that the conceptual design of the system is feasible for the intended application.

Details of this approval are described in the Annex to cert KF25MC0135SH.
For final approval of the system, a complete set of documentation is to be approved by the Society in accordance with relevant class rule.

(Shinya Oishi
General Manager of Machinery Department
NIPPON KAIJI KYOKAI

AiP Certificate

URL：https://www.mhi.com/news/25041001.html

Mitsubishi Shipbuilding Receives Additional Order for 2 Units of LNG Fuel Gas Supply System (FGSS) 10

To be Delivered continuously with LNG Fuel Tanks from Summer 2025 for LNG-fueled Bulk Carriers to be Built by Imabari Shipbuilding

FGSS modules

LNG fuel tank

Tokyo, June 5, 2024 - Mitsubishi Shipbuilding Co., Ltd., a Mitsubishi Heavy Industries (MHI) Group company based in Yokohama, has received an order from Imabari Shipbuilding Co., Ltd. for 2 additional units of its Fuel Gas Supply System (FGSS) (Note), a liquefied natural gas (LNG) fuel gas supply system for high-pressure dual-fuel marine engines. The FGSS units for 2 LNG-fueled bulk carriers to be built by Imabari Shipbuilding will be continuously delivered with LNG fuel tanks from summer 2025.

The FGSS ordered by Imabari Shipbuilding feature an optimized cargo space layout utilizing a modular design for exceptional space-saving and maintenance access, shortened construction schedule at shipyards, and a proprietary control system that can be customized according to customer needs, contributing to both excellent operability and safety. Mitsubishi Shipbuilding previously received orders for a total of 18 high-pressure FGSS units, including units for "SWEET PEA LEADER" and "DAISY LEADER", both of which are LNG-fueled car carriers built by Imabari Shipbuilding Group and have already entered into service respectively in October 2023 and in March 2024. With this additional order, Mitsubishi Shipbuilding will supply a total 20 units (15 car carriers and 5 bulk carriers) to Imabari Shipbuilding Group. Mitsubishi Shipbuilding, as part of MHI Group's strategic initiatives for energy transition, will provide FGSS units to a broad range of customers involved in the construction of LNG-fueled vessels, enhancing the added value and competitiveness of ships. Further, by helping to reduce greenhouse gas (GHG) emissions through the widespread adoption of LNG-fueled vessels, Mitsubishi Shipbuilding, as a maritime system integrator, aims to further the decarbonization of the marine industry, support the realization of a carbon neutral world, and reduce environmental impacts on a global scale.

URL：https://www.mhi.com/news/24060501.html

Approval in Principle (AiP) Acquired from Two Classification Societies for Low-Pressure Type Liquefied CO_2 Carriers undergoing Pursuit of Standardization toward Realization of Large-Scale International Transportation from 2028 onwards

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Mitsubishi Shipbuilding Co., Ltd., a part of Mitsubishi Heavy Industries (MHI) Group; Kawasaki Kisen Kaisha, Ltd. ("K" LINE); Mitsui O.S.K. Lines, Ltd. (MOL); Nihon Shipyard Co., Ltd., a joint venture for ship design and sales between Imabari Shipbuilding Co., Ltd. and Japan Marine United Corporation; Nippon Yusen Kabushiki Kaisha (NYK Line); Mitsui & Co., Ltd.; and Mitsubishi Corporation have jointly acquired Approval in Principle (AiP)(Note1) from the American Bureau of Shipping (ABS) and Nippon Kaiji Kyokai (ClassNK) for two types of low-pressure type liquefied CO_2 (LCO_2) carriers under their joint development. A presentation ceremony took place on September 17 at the George R. Brown Convention Center, the venue of Gastech 2024, a major international conference on global energy and environmental issues, including natural gas, liquefied natural gas (LNG), and hydrogen, held in Houston, Texas.

Demand for LCO_2 carriers is expected to grow in tandem with various CCS (Carbon dioxide Capture and Storage) projects involving the transportation of CO_2 captured in Japan to storage sites located oversea. Recently, Mitsubishi Shipbuilding, Nihon Shipyard, Mitsui & Co. and Mitsubishi Corporation have collaborated to achieve standardization of LCO_2 carriers suited for use by multiple projects, and to establish a supply chain in order to build and supply LCO_2 carriers consistently within Japan, which would contribute towards the realization and improvement of economic efficiency of CCS value chains. These initiatives have led to the acquisitions of two AiPs in collaboration with three major Japanese shipping companies: "K" LINE, MOL and NYK Line.

Low-pressure Type Liquefied CO_2 Carriers

The two LCO_2 carriers that received AiP certifications are low-pressure type 50,000m^3-class and 23,000m^3-class vessels developed for long-distance ocean voyages. The AiP certifications assume the use of appropriate cargo tank material as a replacement for the nickel steel previously considered. Additionally, post welding heat treatment (PWHT)(Note3), one of critical issues in establishing the cargo tank manufacturing, may be omitted by the Engineering Critical Assessment (ECA) (Note4) approach is included.

MHI Group is pursuing strategic measures to strengthen its business for the energy transition. Mitsubishi Shipbuilding, for its role in this initiative, efforts to contribute to the advance of the maritime industry in Japan and around the world by utiliz-

Approval in Principle (AiP) Acquired from Two Classification Societies for Low-Pressure Type Liquefied CO_2 Carriers undergoing Pursuit of Standardization toward Realization of Large-Scale International Transportation from 2028 onwards 11

AiP presentation ceremony held at Gastech 2024 (ClassNK)

AiP presentation ceremony held at Gastech 2024 (ABS)

ing its shipbuilding-based marine engineering technologies in addition to conventional shipbuilding. Mitsubishi Shipbuilding will actively promote the development of LCO_2 carriers and establishment of CCS value chain through collaboration with various domestic/overseas companies.

(Note1)
Approval in Principle (AiP) indicates that the certification body has reviewed the basic design and approved it as satisfying the technical requirements and safety criteria. The assessment was conducted in accordance with the IGC Code (Note2) and the American Bureau of Shipping (ABS) and Nippon Kaiji Kyokai (ClassNK) classification rules applicable to vessels transporting liquefied gas in bulk.
(Note2)
IGC Code (The International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk) is an international regulation stipulating conditions to ensure the safety of vessels that transport liquefied gases (LCO_2, LNG, etc.) in bulk.
(Note3)
In post welding heat treatment (PWHT), structural materials are reheated to a set temperature after welding and held at that temperature for a specified amount of time. This process aims to lower residual stresses generated during welding and improve the quality of welding joints. PWHT is generally performed by placing structural products into a dedicated furnace. When the products are of large size, furnace size may cause bottlenecks in the manufacturing process.
(Note4)
Engineering Critical Assessment (ECA) is a method for evaluating the safety of welded structural components. Using micro initial defects in the welding joints and the estimated stress history together with characteristics of the material, the ECA confirms that no major quality issues will occur during the product's service life.

URL：https://www.mhi.com/news/24091801.html

TRANS HARMONY GREEN 3,000 Cars LNG-Fueled Ro/Ro Cargo Ship 84

TRANS HARMONY GREEN 3,000 Cars LNG-Fueled Ro/Ro Cargo Ship 84

"TRANS HARMONY GREEN" is a 3,000-Cars LNG-Fueled Roll On/Off type Cargo ship designed and built at Shimonoseki Shipyard & Machinery Works of Mitsubishi Shipbuilding Co., Ltd. and delivered to TOYOFUJI SHIPPING CO., LTD. on 31st January 2025. The ship is equipped with a dual-fuel engine which is capable of operating by LNG and light oil.
Compared with heavy-oil-fueled ships of the same size, the ship will reduce CO2 emissions by 25%, including the effects of hull form improvements.
Additionally, Sox emissions are expected to decrease by 99%, thereby contributing to reduce the ship's environmental footprint. The ship is also designed to improve working and residential environment for crews with some cabins taken infection-control measures, an onboard network environment, skylights in mess room, and other improvements. The ship serves as a RO/RO cargo ship Southeast Asian shipping route.

PRINCIPAL PARTICULARS

Length (o.a.)	195.00 m
Length (b.p.)	185.00 m
Breadth (mld.)	30.60 m
Depth (mld.)	30.56 m
Draft (mld.)	8.50 m
Gross tonnage	49,264
Deadweight	14,016 t
Main engine	Mitsui E&S 6S60ME-C10.5-GI x 1set
Speed (service)	Abt. 19.5 knots
Complement	33 p
Classification	NK
Loading capacity	Toyota crown 3,000 units
Builder	Mitsubishi Shipbuilding Co., Ltd.