

January 5, 2023

NYK Line
Nihon Shipyard Co., Ltd.
IHI Corporation

**Parties Obtain World's First AiP for Ammonia Floating Storage and Regasification
Barge**

-- Contributing to the early introduction of fuel ammonia --

NYK Line, Nihon Shipyard Co., Ltd. (NSY), and IHI Corporation (IHI) (hereinafter “the parties”) received an Approval in Principle (AiP) on December 26, 2022 from ClassNK for an ammonia floating storage and regasification barge (A-FSRB).

Background of A-FSRB development

Since ammonia does not emit carbon dioxide (CO₂) when combusted, it is expected to be a next-generation fuel that contributes to global warming countermeasures. In Japan, technological development is underway for fuel ammonia mixed combustion power generation at coal-fired power plants as an innovative next-generation thermal power generation technology that contributes to the reduction of CO₂ emissions. On the other hand, when using ammonia in existing thermal power plants, there are issues such as the problem of securing land for new onshore facilities including storage tanks and regasification facilities, and the large initial investment cost.

An A-FSRB is an offshore floating facility that can receive and store ammonia that has been transported via ship as a liquid, warm and regasify ammonia according to demand, and then send it to a pipeline onshore. An A-FSRB offers the advantages of shorter construction time and lower costs in comparison to construction of onshore storage tanks and regasification plants. In fact, the A-FSRB is expected to speed up the adoption of fuel ammonia and contribute to its wider use as a lower-environmental-impact next-generation fuel.

Risk Identification

At this time, there are no international regulations for floating storage and regasification facilities when the cargo is ammonia, and it is expected that the unique requirements of ammonia will have

to be reflected in the design. Therefore, the parties and ClassNK conducted a comprehensive risk identification of various contingencies and worked to identify technical issues from the initial study stage. A risk identification was conducted using the gap analysis method, which identifies differences between conventional ships and offshore floating facilities (heavy oil, LNG, etc.) and evaluates the impact of such differences.

As a result, the parties extracted items for future technical studies of possible accidental incidents and differences between conventional ships and offshore floating facilities and obtained an AiP from ClassNK. This is the world's first acquisition of an AiP for an A-FSRB handling ammonia as cargo.

The parties will continue to study the arrangement and introduction of A-FSRBs with electric power companies, which are expected to be the main users of A-FSRBs, and to study legal compliance. Additionally, the parties will work on economic evaluation in parallel.



Image of A-FSRB

Tasks of parties in joint R&D

<p>NYK Line</p>	<ul style="list-style-type: none"> • Project management • Decision of base design • Consideration of legal compliance • Economic evaluation
<p>NSY</p>	<ul style="list-style-type: none"> • Hull design / Equipment layout study • Examination of utility equipment
<p>IHI</p>	<ul style="list-style-type: none"> • Discharging of ammonia / Creation of vaporization process • Providing equipment information required for the vaporization process • Providing information on necessary utility equipment

ClassNK

NIPPON KAIJI KYOKAI

Document No. KF-22HE07298

Date: 26 December 2022

APPROVAL IN PRINCIPLE

Ammonia Floating Storage and Regasification Barge
developed by
Nippon Yusen Kaisha
Nihon Shipyard Co., Ltd.
IHI Corporation

THIS IS TO CERTIFY THAT Approval in Principle is granted to Nippon Yusen Kaisha, Nihon Shipyard Co., Ltd., and IHI Corporation.

The AIP is for the design concept of the Ammonia Floating Storage and Regasification Barge, and it is based on the relevant requirements in "Part PS: FLOATING OFFSHORE FACILITIES FOR CRUDE OIL/PETROLEUM GAS PRODUCTION, STORAGE AND OFFLOADING" and "Guidelines for Floating Offshore Facilities for LNG/LPG Production, Storage, Offloading and Regasification (Fourth Edition)".

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.

Conditions on this approval are set out in the Annex to letter KF-22HE07298.
For the final approval of the system, a complete set of documentation is to be approved by the Society in accordance with relevant class rules and guidelines.


(Akio Usami)
General Manager of Hull Department
NIPPON KAIJI KYOKAI

Form CS (71.01)

AiP certificate

* Barge

A barge is a flat-bottomed vessel designed to carry heavy cargo mainly in inland waterways and ports. Almost all barges cannot navigate by themselves because they are not equipped with an engine; they must be towed or propelled by a tugboat.

Overview of each company

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< Nihon Shipyard Co., Ltd. >

Headquarters: Tokyo, Japan

President: Yoshinori Maeta

Website: <https://www.nsync.co.jp/en/>

< IHI Corporation >

Headquarters: Tokyo, Japan

President & CEO: Hiroshi Ide

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