DNV·GL

Certificate No:
TAF000012M

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Equivalent Fixed Gas Fire Extinguishing System

with type designation(s)
IG-541 (inert gas) Fire-Extinguishing System

Issued to
NK Co., Ltd.
Busan, Republic of Korea

is found to comply with
DNV GL statutory interpretations DNVGL-SI-0364 – SOLAS interpretations
DNV GL rules for classification – Ships
DNV GL offshore standards

Application :

Approved for use as a "total flooding" fire extinguishing system in machinery spaces and cargo pump-rooms. Minimum design concentration: 46.9%.

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.

Issued at **Høvik** on **2018-12-17**
This Certificate is valid until **2023-12-16**.
DNV GL local station: **Busan**

Approval Engineer: **Nanna Martine Jacobsen**

for **DNV GL**

Mårten Schei-Nilsson
Head of Section

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.
The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

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Job Id: **262.1-017354-3**
Certificate No: **TAF000012M**

Product description

"IG-541 (inert gas) Fire Extinguishing System"
is a fixed gas fire-extinguishing system using fire-extinguishing agent IG-541 stored in cylinders and distributed through pipes and nozzles.

The extinguishing concentration and nozzles are covered by this type approval certificate.
Documentation for the other system components shall be submitted and approved for each project.

The system is to be designed in accordance with IMO MSC/Circ. 848 as amended by IMO MSC.1/1267, and the gas is to be produced by a maker endorsed by NK. The nozzles are made by NK, Korea.

Physical properties:

Type designation	IG-541
Composition	Nitrogen (N_2): 52 % Argon (Ar): 40 % Carbon Dioxide (CO_2): 8 %
Gaseous agent concentration (C) 1)	46.9%
Volume requirements of agent per unit volume of hazard ($V_{agent}/V_{enclosure}$) at 21 °C 2)	0.635
NOAEL 2)	43%
LOAEL 2)	52%

1) To be applied in conjunction with IMO MSC/Circ.848 as amended by IMO MSC/Circ. 1267, item 3.4.2.3.2
2) NFPA 2001 (2012 Edition)

Application/Limitation

The design concentration (based on oil fuel) shall be minimum 46.9 % (applied on a net volume) and the maximum agent discharge time shall be 120 seconds for 85 % of design concentration. The extinguishing system shall be designed and installed according to SOLAS Ch. II-2, IMO MSC/Circ.848 as amended by IMO MSC.1/Circ.1267 and the NK manual.

The following additional limitations will apply:

A. IG-541 is approved for use in engine rooms, cargo pump rooms (hydrocarbon only) and similar spaces. This certificate does not address use of the system for protection of cargo holds and cargo handling spaces for other cargoes than oil (alcohol, LPG, LNG). This will have to be considered by the applicable Administration on a case by case basis.
B. Evacuation time and warning procedures as per IMO MSC.1/Circ. 1267, 6 should be considered for each project. In no case should the design concentration exceed its LOAEL (calculated on net volume at maximum expected ambient temperature)
C. Steel storage cylinders are available with size of 83 litres at 300 bars at 20 °C. Cylinders being 81 litre or larger is only accepted when arrangements are provided on board to ensure that cylinders can be easily moved (even to shore) for service and recharging.
D. Cylinders are to be delivered with DNV GL product certificate, or equivalent certificates acceptable to the flag administration and class in question.
E. Cylinders to be located in a separate room in accordance with SOLAS Ch. II-2 Reg. 10.4.3, or distributed throughout the protected space in accordance with the requirements in IMO MSC/Circ.848 item 11 as amended by IMO MSC.1/Circ.1267. When distributed within the protected space, the minimum extinguishing concentration (after any single failure) shall be 31 %.
F. Components in the system will be regarded as pressure class I with a maximum design pressure as per the hydraulic calculations for each project. To be certified according to DNVGL-RU-SHIP Pt.4 Ch.6. Sec.2. Consideration will though be made for piping and couplings inside the protected space.
G. Nozzles type "IGN3" or "IGN5" shall be used. These nozzles are made of brass and the nozzle design pressure is 50 bar. Maximum coverage area for each nozzle is 25 m^2.
H. Bilges (except open bilges in small volume engine rooms) are to be protected with a dedicated nozzle network.

The following documentation is to be submitted to the flag administration in each case:

1. Plans showing location of cylinders, piping, nozzles and release stations as well as the assembled system
2. IG-541 capacity calculations, including hydraulic flow calculations.
3. Plans defining release lines and alarm system.
4. Specification for piping, valves and other components in the system.
5. Ship specific release procedures and post discharge ventilation procedures.
6. The manual containing design, inspection, operation and maintenance procedures.
7. Control arrangements for closure of openings and stop of fans and any pressure relief devices as per IMO MSC/Circ. 848 as amended by IMO MSC/Circ. 1267, item 13. These plans can also be supplied by yard.

Installation testing:

- Tests as required by DNV GL Rules, DNVGL-SI-0364 - SOLAS Interpretations for SOLAS Ch.II-2 (pressure and tightness testing of piping, etc.) and maker's manual.

Periodical testing:

- Testing shall comply with instructions from Flag Administration, DNVGL-SI-0364 - SOLAS Interpretations and maker's maintenance manual.
- The system is subject to inspections every 2nd year by an approved service supplier.

Type Approval documentation

Certification in accordance with Class Programme DNVGL-CP-0338, September 2018.

Test report no. KIMM-14-0348 dated 26th May 2014 by Korean Institute of Machinery and Materials.

Test report no. KIMM-14-1162 dated 26th December 2014 by Korean Institute of Machinery and Materials.

NK Co., Ltd's manual "IG-541 (inert gas) Fire Extinguishing System" Type Approval Documents" (372 pages).

Drawing (IG-541 nozzle) no. 250-233-200 rev. 0 dated 4th September 2014, from NK.

Tests carried out

Tested according to IMO MSC/Circ.848 as amended by IMO MSC.1/Circ.1267.

Marking of product

Main components in the system are to be marked with name of manufacturer and type designation.

Periodical assessment

DNV GL's surveyor is to be given permission to perform Periodical Assessments at any time during the validity of this certificate and at least every second year. The arrangement is to be in accordance with procedure described in Class Programme DNVGL-CP-0338, Section 4.