DNV·GL

Certificate No:
F-21043
File No:
474.81
Job Id:
262.1-019222-1

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Equivalent Fixed Gas Fire Extinguishing System

with type designation(s)
Novec 1230 ADS system

Issued to
Kidde-Fenwal
ASHLAND MA, United States

is found to comply with
Det Norske Veritas' Offshore Standards
Det Norske Veritas' Rules for Classification of Ships
Det Norske Veritas' Interpretation of SOLAS 1974 Convention as Amended

Application :

Approved for use as "total flooding" fire extinguishing system in machinery spaces and cargo pump rooms. Minimum design gas concentration: 5,85 %

This Certificate is valid until **2019-06-30**.
Issued at **Høvik** on **2015-04-28**

DNV GL local station: **New York**

Approval Engineer: **Ragnar Tonjer**

for **DNV GL**

Digitally Signed By: Langnes, Petter
Location: DNV GL Høvik, Norway
Signing Date: 2015-04-30

Petter Langnes
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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Product description

"Novec 1230 ADS system",
is a fixed gas fire extinguishing system using fire extinguishing agent Novec 1230 Fire Protection Fluid stored in steel cylinders connected to pressurized nitrogen cylinders. The fluid is distributed through steel pipes and stainless steel nozzles.

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

The NOVEC 1230 ADS System including nozzles is manufactured by Kidde-Fenwal, ASHLAND MA, USA. The extinguishing agent, Novec 1230 fluid, is produced by 3M, Cordova, Illinois, USA.

The system is to be designed in accordance with IMO MSC/Circ.848 as amended by IMO MSC.1/Circ. 1267.

Novec 1230 physical properties

Other trade name:	FK-5-1-12
Molecular formula:	$CF_3CF_2C(O)CF(CF_3)_2$
Agent specific vapour volume (S) at 20°C [1)]:	0,07188 m^3/kg
Design concentration (C):	5,85 %
Min. agent required (W/V) [2)]:	0,8644 kg/m3
NOAEL [3)]:	10,0 %
LOAEL [3)]:	>10,0 %

1) To be applied in conjunction with IMO MSC/Circ.848, 3.4.2.3.1
2) When calculated at 20°C. Ambient temperature to be determined case by case for each project
3) NFPA 2001 (2008 Edition)

Application/Limitation

The design gas concentration (oil fuel) shall be minimum 5.85% (applied on a net volume) and the maximum agent discharge time shall be 10 seconds. 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 Design, Installation, Operation and Maintenance Manual No. 06-237256-001.

The following additional limitations will apply:

A. Novec 1230 ADS systems are not suitable for the ship's cargo holds. If Novec 1230 ADS systems are installed inside cargo pump rooms, all components shall be certified for use in hazardous areas and the design gas concentration shall be suitable for the cargoes carried.
B. If Novec 1230 extinguishing agent is to be used above its NOAEL (calculated on net volume at max expected ambient temperature), means should be provided to limit exposure (IMO MSC.1/Circ.1267, 6). In no case should Novec 1230 be used in concentrations above its LOAEL.
C. Steel storage cylinders of sizes up to 900 lb (408 kg). Cylinders being 81 L 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. The Novec 1230 Cylinder is stored at 25 bar pressure at 0-21°C room temperature, maximum density 1,12 kg/L. N2 cylinders are stored at 124 bar pressure. Cylinders shall be certified by DNVGL, or by a recognised certification society according to national regulation and marked accordingly; ⊓, UN, DOT (as instructed in DNV Rules for Ships Pt.4 Ch.7 Sec.1 E).
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 11as amended by IMO MSC.1/Circ.1267. When distributed within the protected space, the minimum extinguishing concentration (after any single failure) shall be 4.5 %.
F. Components in the system will be regarded under pressure class II with a maximum design pressure of 39 bar (at 55 °C). To be certified according to DNV Rules for Classification of Ships

Pt.4 Ch.6 Sec.2. Consideration will though be made for piping and couplings inside the protected space.

G. The nozzle approved in this certificate is of type ADS, size 1,5". The nozzles are to be located in accordance with the Design, Installation, Operation and Maintenance Manual. A basic rule is that one 1,5" nozzle can as a maximum cover an area of 5m x 10m. A 360° nozzle shall be located centrally in this area, the 180° nozzles on the sides (as applicable). The maximum coverage height for a row of nozzles is 5 m. The average pressure at the nozzle during discharge is 4,3-5 bar for a maximum coverage area of 100m^2. The sides of the coverage area described above shall not exceed 10 meters.
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 in each separate case:

1. Plans showing location of cylinders, piping, nozzles and release stations as well as the assembled system.
2. Novec 1230 ADS system capacity calculations, including hydraulic flow calculations.
3. Plans defining release lines and alarm system.
4. Material specification and dimensions for piping and specifications for all other components.
5. Ship specific release 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, 13. These plans can also be supplied by yard.

Testing at installations and periodical surveys:

- The system shall be tested as per maker's manual both after installation and at periodical surveys, except that DNVGL do not require monthly content check of cylinders. The test pressure is minimum 59 bar for any closed sections, whereas open section shall be tightness tested at minimum 7 bar.
- The system is subject to biannual (every 2nd year) inspections by a DNV approved service supplier. The attending surveyor will also apply the DNV Instructions to Surveyors on new building and ship in operation surveys.

Type Approval documentation

Certification in accordance with Standard for Certification No. 1.2, Type Approval, January 2013.

Test Report No. 4786098741 file EX4674 dated 2013-11-27 from UL LLC, Northbrook, USA.
Report No. 3026502, dated 24 March 2006, from FM Approvals, Norwood, USA.
Report No. HAI Project #5087, dated 28 June 2002, from Hughes Associates, Inc., Baltimore, USA.
(tested on U.S. Coast Guard's Fire & Safety Test Detachment in Mobile, AL)

Design, Installation, Operation and Maintenance Manual No. 06-237256-001 dated July 2014.

Nozzle drawing No. 85-194423-2XX rev. AB (360° nozzle) and No. 85-194413-2XX rev. AB (180° nozzle).

Tests carried out

The system is tested according to IMO MSC/Circ.848 and IMO MSC/Circ.1267.

Marking of product

Main components in the system is to be marked with name of manufacturer, type designation and fire technical rating.

Periodical assessment

DNV'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 Standard for certification No. 1.2 Type Approval Item 4.