

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Equivalent Fixed Gas Fire Extinguishing System**with type designation(s)
NOVEC 1230 Fire Protection System

Issued to

Tyco Fire Protection Products
Great Yarmouth Norfolk, United Kingdomis found to comply with
DNV GL rules for classification – Ships
DNV GL offshore standards
DNV GL statutory interpretations DNVGL-SI-0364 – SOLAS interpretations**Application :****Approved for use as "total flooding" fire extinguishing system in Machinery Spaces, Cargo Pump Rooms and Cargo Compressor Rooms.****Minimum design gas concentration: 5.85%.****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.**Issued at **Høvik** on **2017-12-11**This Certificate is valid until **2022-12-10**.for **DNV GL**DNV GL local station: **Great Yarmouth**Approval Engineer: **Marius Mørner**

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.



Product description

"NOVEC 1230 Fire Protection System"

Is a fixed gas fire extinguishing system using fire extinguishing agent Novec 1230 stored in steel cylinders and distributed through steel pipes and nozzles.

The extinguishing concentration and the 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/Circ.1267.

The gas is produced by 3M, Cordova, Illinois, USA.

Novec 1230 Physical properties:

Other trade name:	FK-5-1-12
Molecular formula:	$\text{CF}_3\text{CF}_2\text{C}(\text{O})\text{CF}(\text{CF}_3)_2$
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/m ³
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 (based on 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 maker's manual.

The following additional limitations will apply:

- A. Novec 1230 is approved for use in engine rooms, cargo pump rooms (hydrocarbon only) and similar spaces. If Novec 1230 systems are installed inside cargo pump or cargo compressor rooms, all components shall be certified for use in hazardous areas and the design gas concentration shall be suitable for the cargoes carried (for instance, increased to 7.2% for LNG carriers or 6.5% for LPG carriers).
- B. If Novec 1230 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 are available with sizes of 6.5 l to 180 l. 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. All cylinders shall be of the same size.
- D. Cylinders are topped up with nitrogen to 24.8 bar at 20 °C (increasing 1 bar per 10 °C). The fill density shall be maximum 1.2 kg/l.
- 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 4.5%.
- F. Gas cylinders shall be delivered on board with a product certificate of the Society or with a certificate issued by a recognized certification authority according to national regulations based on the requirements of the design standard and marked accordingly π , UN or DOT.
- G. Components in the system shall be of pressure class II with a maximum design pressure of 35 bar (at 55 °C). 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.
- H. The nozzles are to be located in accordance with maker's manual TSP (14A-06M/T Issue 06). A basic rule is that one nozzle can as a maximum cover an area of 10m 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 nozzles under discharge is 4.2 bar.

- I. 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. Gas 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 as amended by IMO MSC.1/Circ.1267, item 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 at installations and at periodical surveys, except that DNV GL do not require monthly content check of cylinders. The minimum 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 biennial (every 2nd year) inspections by a DNV GL approved service supplier. The attending surveyor will also apply the DNV GL Instructions to Surveyors on new building and ship in operation surveys.

Type Approval documentation

Certification in accordance with Class Programme DNVGL-CP-0338, October 2015.

Test report No. HAI Project #5087 Dated 3 July 2002 from U.S. Coast Guard's Fire & Safety Test Detachment in Mobile, AL, issued by Hughes Associates, Inc, Baltimore, USA.

File Ex6263; Project 02NK02492 dated 23 September 2002 from UL, Northbrook, USA.

File Ex6263; Project 02NK02492 dated 22 October 2002 from UL, Northbrook, USA.

Test report No. PI 3026502 dated 24 March 2006 from FM Approvals, Norwood, USA.

Sapphire Marine Manual TSP (14A-06M/T Issue 06) dated July 2013.

Tests carried out

The system is tested according to IMO MSC/Circ.848 as amended by IMO MSC.1/Circ.1267.

Marking of product

Main components in the system is 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.