



DET NORSKE VERITAS

TYPE APPROVAL CERTIFICATE

CERTIFICATE NO. F-19117
This Certificate consists of 4 pages

This is to certify that the
Equivalent Fixed Gas Fire Extinguishing System

with type designation(s)
NOVEC 1230 Fire Protection System

Manufactured by
Tyco Safety Products
GREAT YARMOUTH, United Kingdom

is found to comply with
Det Norske Veritas' Interpretation of SOLAS 1974 Convention as Amended

Application
Approved for use as "total flooding" fire extinguishing system in Machinery Spaces, Cargo Pump Rooms and Cargo Compressor Rooms. See Application/Limitation on page 2 and 3.

Place and date
Høvik, 2009-10-12

This Certificate is valid until
2013-12-31

for DET NORSKE VERITAS AS

Petter Langnes
Head of Section

Local Office
DNV Great Yarmouth

Håkon Laskemoen
Surveyor

611

Notice: 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.

If any person suffers loss or damage which is proved to have been caused by any negligent act or omission of Det Norske Veritas, then Det Norske Veritas shall pay compensation to such person for his proved direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question, provided that the maximum compensation shall never exceed USD 2 million. In this provision "Det Norske Veritas" shall mean the Foundation Det Norske Veritas as well as all its subsidiaries, directors, officers, employees, agents and any other acting on behalf of Det Norske Veritas.



Cert. No.: F-19117
File No.: 474.81
Case No.: 262.1-001406-1

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. Other components submitted for this type approval are reviewed, but shall be submitted and approved for each project.

The gas is produced by 3M, Cordova, Illionis, USA

NOVEC 1230 Physical properties

| | |
|---|---|
| Chemical denomination: | CF ₃ CF ₂ C(O)CF(CF ₃) ₂ |
| Design concentration: | 5.85 % |
| Liquid density @ 25°C | 1600 kg/m ³ |
| Vapour density @25°C and 1 atm ⁽¹⁾ | 13.65 kg/m ³ |
| Specific mass ⁽²⁾ | 0.848 kg/m ³ |
| NOAEL | 10.0% |
| LOAEL | >10.0% |
| GWP (100-year time horizon, CO ₂ =1) | 1 |

1 Equivalent to '1/S' in IMO MSC/Circ.848 3.4.2.3.1

2 When calculated at 25°C. Ambient temperature to be determined case by case for each project

Applications/limitations:

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 NOVEC manual.

The following additional limitations will apply:

- A. NOVEC 1230 systems are not suitable for the ship's cargo holds. If NOVEC 1230 systems are installed inside cargo pump rooms 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.
- 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.



Cert. No.: F-19117
File No.: 474.81
Case No.: 262.1-001406-1

- 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.
- 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. Cylinders shall be certified by DNV, or by a recognised certification society according to national regulation and marked accordingly; π, UN, DOT (as instructed in DNV Rules for Ships Pt.4 Ch.7 Sec.1 E400).
- 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. Components in the system will be regarded under pressure class II with a maximum design pressure of 35 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 nozzles are to be located in accordance with Novec Marine Manual TSP (14A-06M-T Issue 02). 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.
- 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 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.



Cert. No.: F-19117
File No.: 474.81
Case No.: 262.1-001406-1

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 at installations and at periodical surveys, except that DNV 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 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, April 2009.

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. Novec Marine Manual TSP (14A-06M-T Issue 02) dated October 2009.

Certificate Retention Survey Report dated 6 July 2009 from DNV Great Yarmouth.

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

Marking of product

The product or packing is to be marked with name of manufacturer and type designation.

Certificate retention survey

Det Norske Veritas' surveyor is to be given permission to perform Certificate Retention Surveys at any time during the validity period 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 item 4.

END OF CERTIFICATE

2011