DNV·GL

Certificate No:
TAF000005Y

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Equivalent Fixed Gas Fire Extinguishing System

with type designation(s)
UNITOR 1230 Clean Agent System

Issued to
SEVO Systems Fire Fluid Technologies (FFT)
Lenexa KS, United States

is found to comply with
DNV GL rules for classification – Ships
DNV GL offshore standards

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 **2017-12-31**.

Issued at **Høvik** on **2016-01-22**

for **DNV GL**

DNV GL local station: **Houston**

Approval Engineer: **Helge Bjørnarå**

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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Job Id: **262.1-006609-6**
Certificate No: **TAF000005Y**

Product description

"UNITOR™ 1230 Clean Agent System",
is a fixed gas fire extinguishing system using fire extinguishing agent 3M™ Novec™ 1230 Fire Protection Fluid stored in steel cylinders and pressurized with nitrogen and distributed through steel pipes and brass nozzles.

The extinguishing concentration (agent) and UNITOR 1230 nozzles are covered by this type approval certificate. Documentation for the other system components shall be submitted and approved for each project.

The UNITOR 1230 System is manufactured by SEVO Systems/FFT, Lenexa, Kansas, USA and adapted for use in marine applications by **Wilhelmsen Technical Solutions AS**. The extinguishing agent, Novec 1230 fluid, is produced by 3M, Cordova, Illinois, USA and supplied through the 3M OEM (Original Equipment Manufacturer), SEVO Systems/FFT. The UNITOR 1230 nozzles are produced by SEVO Systems/FFT, Lenexa, Kansas 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/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 (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 UNITOR 1230 Design/Installation Manual.

The following additional limitations will apply:

A. UNITOR 1230 systems are not suitable for the ship's cargo holds. If UNITOR 1230 systems are installed inside cargo pump rooms, all components shall be certified for use in hazardous areas and the design gas concentration shall 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.
C. Steel storage cylinders are available with sizes of 14 L to 345 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 34.5 bar at 21 °C (increasing 1 bar per 7.5 °C). The fill density shall be maximum 1.2 kg/L except the 345 L cylinders which shall have 1.12 kg/L. Lower nitrogen cylinder pressure (down to 25 bar) may be permitted if flow calculations show that minimum nozzle pressure specified under point G is obtained.
Cylinders are to be delivered with product 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, 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 39 bar (at 55 °C). Consideration will though be made for piping and couplings inside the protected space.

G. The nozzles are to be located in accordance with the Design, Installation, Operation and Maintenance Manual. A basic rule is that one 2.5" nozzle can as a maximum cover an area of 10 m x 10 m. 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 7 bar for a maximum coverage area of 100 m^2. For the smaller nozzles ranging from 2" to ½", the coverage area and height will be reduced accordingly. Reduced nozzle pressure down to minimum 5 bar can be accepted with reduced coverage area as applicable (ref doc. No. 52-D14-04-09 Rev.4).
The sides of the coverage area described above shall not exceed 10 mtr.

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. UNITOR 1230 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 DNV 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 an approved service supplier. The attending surveyor will also apply requirement relevant for flag administration and / or class on newbuilding 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, issued by Hughes Associates, Inc, Baltimore, USA (tested on U.S. Coast Guard's Fire & Safety Test Detachment in Mobile, AL)

Test report no. NBL F08119 dated 15 October 2008 from SINTEF NBL as, Trondheim, Norway
Test report no. NBL F14101 dated 16 January 2014 from SINTEF NBL as, Trondheim, Norway

Statement No. 15001/01 dated 21 May 2015 from SP Fire Research AS, Trondheim, Norway

Design, Installation Manual No. 52-D14-01-01 dated 8 November 2008 with revised document 52-D14-04-09 Rev.4 dated 5 March 2014 from Wilhelmsen Technical Solutions, Norway

UNITOR 1230 Maintenance Instruction doc. No. 52-00-990-6-E Rev.01 dated 1 February 2013 and Operation Instruction doc. No. 52-00-001-7-E Rev.00 dated 29. October 2008

UNITOR 1230 Component sheets

Tests carried out

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