EC-TYPE EXAMINATION CERTIFICATE (MODULE B)

Certificate No:
MEDB000082U

Application of: Directive 2014/90/EU of 23 July 2014 on marine equipment (MED), issued as "Forskrift om Skipsutstyr" by the Norwegian Maritime Authority. This Certificate is issued by DNV AS under the authority of the Government of Norway.

This is to certify:

That the Equivalent fixed gas fire extinguishing systems components (extinguishing medium, head valves and nozzles) for machinery spaces and cargo pump rooms

with type designation(s)
HFC-227ea

Issued to
Marinefire S.r.l.
Viareggio, LU, Italy

is found to comply with the requirements in the following Regulations/Standards:
Regulation **(EU) 2023/1667,**
item No. MED/3.45. SOLAS 74 as amended Regulation II-2/10 & X/3, IMO MSC/Circ. 848, IMO MSC.1/Circ.1313, FSS Code 5, IGF Code 11 and 2000 HSC Code 7

Further details of the equipment and conditions for certification are given overleaf.

This Certificate is valid until **2029-01-25**.

Issued at **Høvik** on **2024-01-26**

DNV local unit:
Italy/Malta CMC

Approval Engineer:
Helge Bjørnarå

Notified Body
No.: **0575**

for **DNV AS**

Mydlak-Röder, Christine
Head of Notified Body

NORWEGIAN ACCREDITATION PROD 019

The mark of conformity may only be affixed to the above type approved equipment and a Manufacturer's Declaration of Conformity issued when the production-surveillance module (D, E or F) of Annex B of the MED is fully complied with and controlled by a written inspection agreement with a Notified Body. The product liability rests with the manufacturer or his representative in accordance with Directive 2014/90/EU.
This certificate is valid for equipment, which is conform to the approved type. The manufacturer shall inform DNV AS of any changes to the approved equipment. This certificate remains valid unless suspended, withdrawn, recalled or cancelled.
Should the specified regulations or standards be amended during the validity of this certificate, the product is to be re-approved before being placed on board a vessel to which the amended regulations or standards apply.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to 300,000 USD.

Product description

"HFC-227ea"
is a fixed gas fire extinguishing system composed of gas cylinders with associated cylinder valves, flexible hoses, manifold, section valves, alarms, time delay units, piping and discharge 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 system is to be designed in accordance with the "Principal Requirements" in IMO MSC/Circ.848 as amended by IMO MSC.1/Circ.1267.

The extinguishing agent HFC-227ea is produced by Chemours, Wilmington, DE, USA.

Physical properties of extinguishing agent

Trade name	HFC-227ea
Composition	CF_3CHFCF_3
Agent specific vapour volume (S) [1)]	0.1373 m^3/kg
Design concentration (C)	8.7%
Min. agent required (W/V) [2)]	0.6940 kg/m^3
Physiological Effects, No Effect Level [3)]	9.0%
Physiological Effects, Low Effect Level [3)]	10.5%

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

Approved for use as "total flooding" fire extinguishing system in machinery spaces and cargo pump rooms.

The design gas concentration (diesel) shall be minimum 8.7% (applied on a net volume) and the maximum agent discharge time shall be 10 seconds for 95% of the extinguishing 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 maker's manual.

The following additional limitations will apply:

A. HFC-227ea systems are not suitable for the ship's cargo holds. If HFC-227ea systems are installed inside cargo pump rooms, all components shall be certified for use in hazardous areas, the design gas concentration shall be increased, and the system is subjected to case-by-case approval.
B. If HFC-227ea is 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 HFC-227ea be used in concentrations above its LOAEL.
C. Steel storage cylinders of size 10 lb (4.5 kg) 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. All cylinders shall be of the same size.
D. Cylinders are topped up with nitrogen to 25 bars at 21 °C. The fill density shall be maximum 1.12 kg/L.
E. Cylinders are to be delivered with product certificate or equivalent certificates acceptable to the flag administration and class.
F. 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 min extinguishing concentration (after any single failure) shall be 6.7%.
G. Components in the system shall be of pressure class II with a maximum design pressure of 35 bar (at 54 °C). Consideration will though be made for piping and couplings inside the protected space.
H. The nozzles are to be located in accordance with the maker's manual. A basic rule is that one nozzle can as a maximum cover an area of 5 m x 10 m. A 360° nozzle shall be located centrally in this area, the 180° nozzles on the sides (as applicable). The maximum cover height is 5 m. The minimum nozzle pressure is 5.1 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 to the flag administration in each separate case:

a. Plans showing location of cylinders, piping, nozzles and release stations as well as the assembled system.
b. Capacity calculations, including hydraulic flow calculations.
c. Plans defining release lines and alarm system.
d. Material specification and dimensions for piping and specifications for all other components.
e. Ship specific release procedures and post discharge ventilation procedures.

f. Manual containing design, inspection, operation and maintenance procedures.
g. 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, flag administration and class requirements.
- The system is subject to biennial (every 2nd year) inspection 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 Examination documentation
Design, Installation, Operation and Maintenance Manual No. P/N CTF-FM200M-001 dated September 2006 from Marinefire S.r.l.

Report No. CG-D-24-97 dated October 1997 from USCG Research and Development Centre, Connecticut, USA.
Report No. CG-D-02-99 dated December 1998 from USCG Research and Development Centre, Connecticut, USA.

Tests carried out
Tested in accordance with IMO MSC/Circ.776 (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 and address of manufacturer, type designation and MED Mark of Conformity (see first page).