EC-TYPE EXAMINATION CERTIFICATE (MODULE B)

Certificate No:
MEDB00007GX

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 Fixed water based local application fire fighting systems components for use in category "A" machinery spaces

with type designation(s)
HI-FOG (ML5-ML9)

Issued to
Marioff Corporation Oy
VANTAA, **Finland**

is found to comply with the requirements in the following Regulations/Standards:
Regulation **(EU) 2020/1170,**
item No. MED/3.48 and Annex B, Module B in Directive. SOLAS 74 as amended Regulation II-2/10 & X/3 and 2000 HSC Code 7, IMO MSC.1/Circ.1387

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

This Certificate is valid until **2026-08-16**.

Issued at **Høvik** on **2021-08-17**

DNV local station:
Finland CMC

Approval Engineer:
Helge Bjørnarå

Notified Body
No.: **0575**

for **DNV AS**

Sverre Olav Bergli
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 This certificate remains valid unless suspended, withdrawn, recalled or cancelled.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

"HI-FOG (ML5-ML9)"
is a water mist system, composed of spray heads, stainless steel piping, manual or automatic section valves, strainers, control system and water supply pump(s).

The system is to be designed according to principal requirements for the system, IMO MSC.1/Cir.1387 and SOLAS Ch. II-2, Reg.10.5.6.

Only the spray heads are type approved by this certificate. Pumps, pipes, valves, couplings and other systems components are subject to case by case approval.

The spray heads are produced by Marioff at Vantaa, Finland.

Application/Limitation

Approved for use as a fixed water based local application system for machinery spaces of category A.

The spray heads are to be installed above the protected objects according to one of the following specifications:

Alternative 1 (ML5):	
Maximum horizontal spacing:	4.0 m
Vertical distance from object:	1.5 - 5.5 m
Minimum operation pressure:	50 bar (at spray heads)
Spray head type:	4S 1MC 8MB 1000
Spray heads are to be installed out to a position being minimum 1.0 m outside at the periphery of the protected object (see IMO MSC/Circ.1387, annex 3.4.2.1). The spray heads are to be installed in a pendant (downward) position. Single spray heads or single rows are accepted when half spacing is used.	

Alternative 2 (ML9):	
Maximum horizontal spacing:	4.0 m
Vertical distance from object:	1.5 - 8.7 m
Minimum operation pressure:	50 bar (at spray heads)
Spray head type:	5S 1MC 8MC 1000
Spray heads are to be installed out to the periphery of the protected object (IMO MSC.1/Circ. 1387, annex 3.4.2.2). The spray heads are to be installed in a pendant (downward) position. Single spray heads or single rows are accepted when half spacing is used.	

Alternative 3 (ML9): inclined spray heads	
A system with a 6 spray heads configuration (two rows) with spray heads in angled position towards a test area measuring 3.0 m by 8.0 m has also passed the tests. The following specification is defined:	
Vertical distance from object:	0.5 - 8.7 m
Horizontal distance between rows: Horizontal distance to object: Maximum horizontal spacing:	3.0 - 12.0 m 0.5 - 8.7 m 4.0 m (along row)
Minimum spray head angle: Maximum spray head angle:	α_{min} [deg] = 62.7 - 5.5 x h [m] α_{max} [deg] = 90.9 - 1.8 x h [m]
Number of spray heads per row:	According to spacing of spray heads. Further, the outmost spray heads on the row shall be at the edge of the object
Minimum operation pressure:	50 bar (at spray heads)
Spray head type:	5S 1MC 8MC 1000
Tested according to IMO FR46/5/10. These results will thus only be subject to case by case considerations.	

Spray head information:

Spray head	**k-factor (Q = k x $p^{1/2}$)**	**Flow**	**Drawings**
4S 1MC 8MB 1000	1.9 lpm/$bar^{1/2}$	13.4 lpm (at 50 bar)	Technical Data Sheet TC0160
5S 1MC 8MC 1000	3.9 lpm/$bar^{1/2}$	27.6 lpm (at 50 bar)	Technical Data Sheet TC0320
Spray heads are to be made of stainless steel. Maximum operating pressure is 140 bar.			

For all systems:

A. Turbo machinery should also be covered by the system but with gentle application of water. Essential electrical equipment and air intakes should preferably not be directly exposed to the water discharge. Electrical equipment as per Class Rules (or equivalent standard as specified by the Flag Administration) shall be applied for new buildings.
B. The pumps (or pump unit) shall be delivered with product certificate, whereas other system components are to be certified or inspected in accordance with Class Rules (or equivalent standard as specified by the Flag Administration).
C. Only stainless steel piping, or equivalent corrosion resistant pipes, are to be applied (to avoid clogging of sprinklers). Primary water supply shall be fresh water of potable quality.
D. Pipes, couplings and other components are regarded as “Class I” piping.
E. The pump unit and section valves shall be installed in a room having ambient temperature between +4 °C and +45 °C.

The following items are to be submitted for approval for each project:
a. System arrangement plans including location of spray heads, sections valves, release stations and gas pump-unit, water supply, including any heating facilities for pump unit room.
b. Documentation of power supply and control system.
c. Specification of pipes, pressurised air cylinders, pump, valves and associated components.
d. Pressure drop calculations and water mist capacity calculations.
e. Specification of potable water supply (filter <100 µm and CL less than 50 PPM).
f. Arrangement of interface to fire detection and alarm system (if applicable).
g. Manual with design, installation, operation, test and maintenance instructions.

Other documents:
- Documentation for other components (according to DIN 3.1B and DIN 2.2, or equivalent), including qualification of welders and approval of welding procedures (if applicable) is to be submitted to the Flag Administration/Recognized organization in question.

Installation testing:
- At least one section of the local application systems shall be full scale tested when all engines are running.
- Test of manual and remote release of all section valves and start of pumps.
- Testing of alarms (SOLAS Ch. II-2, Reg.10.5.6.4).
- System to be cleaned in accordance with routines outlined in makers installation manual.
- Pressure testing of water pipe system to at least 1.5 times maximum working pressure.
- Testing of automatic release of system (in case of unattended machinery spaces).
- Other tests according to maker’s manual and any required by the authority having jurisdiction.

Periodical testing:
- The periodical testing shall comply with instructions from flag administration, statutory interpretations and maker’s maintenance manual.
- At least one section should each year be tested with full flow through the spray heads. The sections tested should be chosen so that all sections are tested within a five-year period.

Type Examination documentation

Design, Installation, Operation & Maintenance Manual No. MO/ES/16/DIOM/IMO/02, Rev.2.1, dated October 2016.

Fire performance test reports:
Test report No. RTE11164/99 dated October 1999 from VTT, Espoo, Finland.
Test report No. RTE2952/02 dated October 2002 from VTT, Espoo, Finland.
Test report No. RTE2953/02 dated October 2002 from VTT, Espoo, Finland.
Test report No. RTE2954/02 dated October 2002 from VTT, Espoo, Finland.

Component testing of water mist spray heads:
Test report No RTE11340/95 dated August 1995 from VTT, Espoo, Finland.
Project No. 95NK7266 (file No. EX4553) dated 30 November 1995 from UL, Illinois, USA.
Test report No. 98-1147, Rev. 01, dated 25 August 1998 from DNV, Høvik, Norway.
Test report No. RTE2025/02 dated June 2002 from VTT, Espoo, Finland.

Drawings, spray heads:
Technical Data Sheet TC0160, Rev.C, dated 21 September 2018 from maker.
Technical Data Sheet TC0320, Rev.C, dated 22 March 2021 from maker.

Type Approval Documentation: Marioff type approval documentation, October 2002.

Tests carried out

Tested according to IMO MSC/Circ. 913.

Marking of product

The spray heads are to be marked with type designation and MED Mark of Conformity (see first page) whereas pump/control unit is to be marked with name of manufacturer and type designation.