Certificate No:
TAF00001S2

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Fire Extinguishing System for Heli-deck (Pop-up system)

with type designation(s)
Micro PUN nozzles

Issued to
Firenor AS
Kristiansand S, **Norway**

is found to comply with
DNV statutory interpretations DNV-SI-0364 – SOLAS interpretations, Edition July 2021
DNV rules for classification – Ships
DNV offshore standards

Application :

Approved as a fixed fire extinguishing system for helidecks and helicopter landing areas.

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV.

Issued at **Høvik** on **2023-01-06**
This Certificate is valid until **2028-01-05**.
DNV local station: **West Norway CMC**

Approval Engineer: **Helge Bjørnarå**

for **DNV**

Jowita Permoda
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.

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

"Micro PUN nozzle"
a fixed helicopter deck foam firefighting system composed of non-aspirating pop-up nozzles, pipes, valves, pump(s), strainer, foam proportioner, foam tank with foam concentrate and control system.

The nozzles are installed flush with the deck. When the system is released, the nozzles will be lifted by the water pressure and make an effective spray distribution of water/foam mixture to the entire landing area.

Only the nozzles are type approved by this certificate. Pipes, couplings, valves and other systems components are subject to case-by-case approval. The system is to be designed in accordance with the FSS Code Ch.17.

Application/Limitation

Approved as a fixed fire extinguishing system for helidecks and helicopter landing areas.

The nozzles are to be installed to the following specifications:

Helicopter deck area (D-value)	12–26.1 m
Number of nozzles (n)	4-19
Application rate (q) [1)]	6 lpm/m^2
Nozzle spacing:	Ref. layout drawings below
Nozzle working pressure:	4-7 bar
Nozzle orientation:	Pop-up
Foam mixture	1%, 3% or 6%
Notes: 1) The application rate shall be 6 lpm/m^2 as it is required by FSS Code Ch.17.3.2. If the flag Administration has specific requirements this will prevail.	

Nozzle information:

k-factor	50-110 lpm/bar$^{1/2}$
Working pressure	4-7 bar
Nozzle coverage (diameter)	7 m
Nozzle throw height	6-7 m
Flow (q)	100-249 lpm
The nozzles are made of stainless steel (SS316), Ni Al Bronze, 6MO, Super Duplex or Titanium	

The following additional applications/limitations apply:

A. Approved pressure range is 4-7 bar.
B. The pump unit is to be delivered with product certificate and foam proportioner is to be of approved type. Other system components are to be certified or inspected in accordance with relevant rules and regulations.
C. The foam concentrate is to be of approved type.
D. Pipes, couplings and other components are regarded as "Class III" piping.
E. The pump unit should 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 nozzle, release stations and control circuitry/arrangement.
b) Documentation of power supply and control system.
c) Specification of pipes, pressurised cylinder, generator, pump and associated components.
d) Pressure loss and flow calculations.
e) Design, installation, operation and maintenance manual.
f) Each batch of nozzles shall be flow capacity tested at intended working pressure and part of plan approval documentation.

Installation testing:

- System to be function tested.
- Pipe system to be pressure tested to least 1.5 times maximum working pressure.
- All distribution piping shall be blown through with air to ensure that the piping is free from obstructions.
- Function testing of each foam proportioner shall be performed for each installation. The mixing ratio shall be as specified in each application and within a range of -0% to +30% of this (if the specified mixing ratio is 3.0%, test results between 3.0 and 3.9% will be accepted).
- Other tests as required by relevant class rules (pressure testing of piping, etc.) or a similar standard acceptable to the Flag Administration and according to maker's manual shall be carried out.

Periodical testing:

- The periodical testing shall comply with instructions from flag administration, class requirements and maker's maintenance manual.

Each product is to be supplied with its manual for installation, use and maintenance.

Type Approval documentation

Test reports:

No. 000033-W-049, Rev.02, Area coverage test procedure, dated 19 August 2022 from manufacturer.
No. 000033-W-049, Rev.02, Area coverage test procedure, dated 19 October 2022 from manufacturer.
No. 000033-W-040, Rev.03, K-factor test, dated 01 February 2021 from manufacturer.

Layout drawings:

No. 000033-D-9040, Rev.03 dated 12 May 2022 (Layout for deck up to D=12)
No. 000033-D-9140, Rev.03 dated 12 May 2022 (Layout for deck up to D=13.5)
No. 000033-D-9340, Rev.03 dated 12 May 2022 (Layout for deck up to D=20.8)
No. 000033-D-9440, Rev.03 dated 12 May 2022 (Layout for deck up to D=22.2)
No. 000033-D-9540, Rev.03 dated 12 May 2022 (Layout for deck up to D=24.8)
No. 000033-D-9640, Rev.03 dated 12 May 2022 (Layout for deck up to D=26.1)

all from manufacturer.

Nozzles:

No. 000033-D-9021, Rev.02 dated 25 March 2020 (AISI 316 K=50)
No. 000033-D-9521, Rev.02 dated 25 March 2020 (AISI 316 K=70)
No. 000033-D-9121, Rev.02 dated 13 May 2022 (AISI 316 K=80)
No. 000033-D-9321, Rev.02 dated 25 March 2020 (AISI 316 K=110)

all from manufacturer.

Dwg No. 00033-D-9770, Rev. 03, Water tray placement, dated 12 May 2022 from manufacturer.
Doc. No. 000033-W-015, Rev.02, Inspection and Test Plan – Production, dated 1 February 2021 from manufacturer.
Doc. No. 000033-W-020, Rev.03, Data Sheet - Mechanical, dated 1 February 2021 from manufacturer.
Doc. No. 000033-W-052, Rev.03, Instruction, Installation, dated 1 February 2021 from manufacturer.
Doc. No. 000033-W-058, Rev.01, Instruction, Maintenance, dated 22 February 2020 from manufacturer.

Tests carried out

The nozzles are tested as sprayers according to EN 13565-1:2019.

Marking of product

The product or packing is to be marked according to EN 13565-1:2019 Section 7.

Periodical assessment

DNV'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 DNV-CP-0338, Section 4.