DNV·GL

Certificate No:
TAF000007C

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Fixed Water Based Local Application System

with type designation(s)
PLUSFOG

Issued to
Seaplus Co., Ltd.
Busan 11, Republic of Korea

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

Application :

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

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

This Certificate is valid until **2020-12-31**.

Issued at **Høvik** on **2016-02-04**

for **DNV GL**

DNV GL local station: **Pusan**

Approval Engineer: **Piotr Orzechowski**

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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Product description

"PLUSFOG",
is a water spray system, composed of SPF-3 spray heads, steel piping, section valves (released by manual or automatic activation), test valves, filter, control system and water supply pump(s).

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

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

Application/Limitation

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

Spray head type SPF-3 **Alternative 1: downward installation**	
Maximum horizontal spacing:	4.0 m
Approved height above protected object	0.5 m – 17.0 m
Minimum pressure at spray head:	7.5 bar
Spray head type and flow rate:	SPF-3 with 13.0 lpm at 7.5 bar
Spray heads are to be installed out to a position being at the periphery of the protected object (see 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. Special considerations shall be made with respect to ventilation when the height above protected object exceeds 8.0 m (to avoid that the water is dispersed by the air flow).	

Alternative 2: inclined installation (30° or 60°)	
Maximum horizontal spacing:	4.0 m
Approved height above protected object	0.5 m – 17.0 m
Minimum pressure at spray head:	7.5 bar
Spray head type and flow rate:	SPF-3 with 13.0 lpm at 7.5 bar
Outer row spray heads are to be installed outside of the protected area of a distance of 300 mm (see IMO MSC.1/Circ.1387, annex 3.4.2.2). The spray heads are to be installed in a pendant (downward) position and outer rows spray heads are to be installed with inclined 30° and 60° towards the test fire. The test was carried out with 9 spray heads. Special considerations shall be made with respect to ventilation when the height above protected object exceeds 8.0 m (to avoid that the water is dispersed by the air flow).	

Alternative 3: sideway installation (90°)	
A system with a 6 spray head configuration (two rows with 3 spray head each) with spray heads in angled position towards a test area measuring 4.0 m by 6.0 m has also passed the tests. The following specifications are defined:	
Minimum height above protected object: Maximum height above protected object:	0.5 m 5.0 m
Horizontal distance between rows: Horizontal distance to protected object:	6.0 m (spray head to spray head) 1.0 m (spray head to engine, each side)
Maximum spacing between spray heads:	4.0 m (along row)
Spray head, spacing and water pressure were identical to the test with downward installation. The number of spray heads per row shall be determined according to length of protected object and spacing between spray heads. Further, the outmost spray heads on each row shall be installed out to a position being at the periphery of the protected object.	

Spray head specification			
Spray head	k-factor ($Q = k \times p^{1/2}$)	Rated flow	Drawing no.
SPF-3	4.76 lpm/bar$^{1/2}$	13.0 lpm at 7.5 bar	SFP-3
Spray heads are to be made of stainless steel. Maximum operating pressure is 16 bar.			

For all systems:

A. The pump(s) or the pump unit is to be delivered with a DNV GL product certificate. Other system components are to be inspected in accordance with the DNV GL Rules. The piping is to be regarded as class III.
B. Turbo machinery equipment, air intakes and preferably also essential electrical equipment shall not be directly exposed to the water discharge. Electrical equipment as per DNV GL rules (Pt.4 Ch.8 Sec.10, Table B1) shall be applied for newbuildings.
C. Ambient room temperature for pump unit should be between +4 °C and +45 °C

The following items are to be submitted for approval for each project:

i. System arrangement plans including location of spray heads, sections valves, release stations and pump-unit (including water supply);
ii. Documentation of power supply and control system;
iii. Specification of pipes, electrical motor, valves, pumps and associated components;
iv. Pressure drop calculations and water mist capacity calculations;
v. Arrangement of interface to fire detection and alarm system (where applicable);
vi. Manual with design, installation, operation, test and maintenance instructions .

Installation testing:

- At least one section should be tested with full flow through the spray heads;
- 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);
- Testing of automatic start of system (in case of unattended machinery spaces);
- Pressure testing of water pipe system to at least 1.5 times maximum working pressure;
- System to be cleaned in accordance with routines outlined in makers installation manual;
- Other tests as required by DNV GL Rules (pressure testing of piping, etc.) and according to maker's manual shall be carried out.

Periodical testing:

- Periodical control and inspection to be in accordance with type approval manual.

Type Approval documentation

Certification in accordance with Class Programme DNVGL-CP-0338, October 2015.

Fire Performance and Component Testing:

- FILK Report No. R1-2005-12-2 dated April 2006
- FILK Report No. R1-2007-0380 dated June 2007

Drawing SPF-3, Water Mist Nozzle.

Seaplus Type Approval Documentation - Technical Manual, 2006

Tests carried out

Tested according to IMO Circ. IMO MSC/Circ.913 (fire tests) and IMO MSC/Circ. 1165 (component tests of spray heads)

Marking of product

The spray head is to be marked with type designation whereas pump / control unit 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.