

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Waterbased Fixed Fire Extinguishing System

with type designation(s)

KJ FireOff MK-6 TF, KJ FireOff MK-6 TF-S, KJ FireOff MK-1 TF, KJ FireOff MF-1 TF

Issued to

Knaack & Jahn Schiffbau GmbH
HAMBURG, Germany

is found to comply with

DNV GL rules for classification – Ships

DNV GL rules for classification – High speed and light craft

DNV GL rules for classification – Yachts

DNV GL rules for classification – Naval vessels

DNV GL offshore standards

Application :

Approved for use as a fixed water-based fire-extinguishing system for protection of machinery spaces and cargo pump rooms.

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

This Certificate is valid until **2022-01-17**.

Issued at **Hamburg** on **2017-01-18**

DNV GL local station: **Hamburg**

for **DNV GL**

Approval Engineer: **Michael Kämpf**

Antje Fleischhauer
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.

Job Id:
Certificate No: **TAF00000JZ**

Product description

The system with nozzle designations "KJ FireOff MK-6 TF", "KJ FireOff MK-6 TF-S", "KJ FireOff MK-1 TF" and "KJ FireOff MF-1 TF" is a dry pipe water mist system which is composed of nozzles, stainless steel piping, section valves, control panel and pump unit.

The system is to be designed according to the principal requirements of IMO MSC/Circ. 1165, as amended by MSC.1/Circ.1237, MSC.1/Circ.1269 and MSC.1/Circ.1386.

Only the nozzles are type approved by this certificate.

Pumps, pipes, couplings, valves and other system components are subject to case by case approval.

The nozzles are manufactured by Vid Fire-Kill Aps, Svendborg, Denmark.

Application/Limitations

The nozzles are to be installed according to the following specifications:

Volume and height of protected spaces (nozzle type MK-6 TF)	
Maximum ceiling height of protected space ¹⁾ :	10.0 m
Maximum volume of protected space ²⁾ :	3842 m ³
The system is to be designed with one layer of ceiling mounted nozzles and one layer of bilge nozzles. Areas under platforms and other similar obstruction shall be protected by additional nozzles.	
Notes: 1) Standard casings need in general not to be considered when assessing this height limitation. 2) This will in general be accepted as the maximum net volume for any protected space (corresponding to a typical gross volume of 4520 m ³). This volume shall include bilges, casings, etc.	

Volume and height of protected spaces (nozzle type MK-6 TF-S)	
Maximum ceiling height of protected space ¹⁾ :	10.0 m
Maximum volume of protected space ²⁾ :	2862 m ³
The system is to be designed with one layer of ceiling mounted nozzles and one layer of bilge nozzles. Areas under platforms and other similar obstruction shall be protected by additional nozzles.	
Notes: 1) Standard casings need in general not to be considered when assessing this height limitation. 2) The max. net volume can be increased to 5036 m ³ based on MSC.1/Circ.1385 (the max. ceiling height remains at 10.0 m). This volume shall include bilges, casings, etc.	

Ceiling mounted nozzles (type MK-6 TF)	
Maximum horizontal nozzle spacing:	3.0 x 3.0 m
Maximum distance to bulkhead:	1.5 m
Maximum coverage area per nozzle (average):	9.0 m ²
Maximum ceiling height of nozzles:	10.0 m
Minimum operating pressure at nozzles:	8.0 bar
Maximum operating pressure at nozzles:	16.0 bar
Nozzle orientation:	Downwards
The spray nozzles shall normally be installed approximately 0.1 - 0.2 m below deck. Where the spray nozzles are located less than 3 m above the protected object, a narrower nozzle spacing than 3 x 3 m or the use of spray nozzles intended for lower installation height should be considered. Arrangement to be approved case-by-case.	

Ceiling mounted nozzles (type MK-6 TF-S)	
Maximum horizontal nozzle spacing:	3.0 x 3.0 m
Maximum distance to bulkhead:	1.5 m
Maximum coverage area per nozzle (average):	9.0 m ²

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Maximum ceiling height of nozzles:	10.0 m
Minimum operating pressure at nozzles:	9.0 bar
Maximum operating pressure at nozzles:	16.0 bar
Nozzle orientation:	Downwards
The spray nozzles shall normally be installed approximately 0.1 - 0.2 m below deck. Where the spray nozzles are located less than 3 m above the protected object, a narrower nozzle spacing than 3 x 3 m or the use of spray nozzles intended for lower installation height should be considered. Arrangement to be approved case-by-case.	

Bilge nozzles (type MK-1 TF)	
Maximum horizontal nozzle spacing:	1.7 x 0.5 m
Maximum distance to bulkhead:	0.85 m
Maximum coverage area per nozzle (average):	0.43 m ²
Height of nozzle above tank top/floor level:	0.37 – 0.65 m ¹⁾
Minimum operating pressure at nozzles:	11.0 bar
Maximum operating pressure at nozzles:	16.0 bar
Nozzle orientation:	Horizontal ²⁾

Notes:

- 1) The bilge plate was located at 0.75 m in the fire test. Installations on vessels with bilges and nozzles higher or lower than these figures will be considered case by case.
- 2) Spacing between nozzles pointing the same direction is 0.5 m along the distribution pipe and 1.7 m between distribution pipes. Nozzles of two adjacent rows shall be installed pointing against each other. The nozzles along a row (distribution pipe) are to be installed with alternating pointing directions, thus with half spacing between them (0.25 m). The manufacturer's prefabricated N-pipe should be used as distribution pipe (consisting of a PN16 stainless steel pipe with prefabricated holes and threading for mounting of the nozzles).

Bilge nozzles (type MF-1 TF)	
Maximum horizontal nozzle spacing:	1.75 x 0.75 m
Maximum distance to bulkhead:	0.85 m
Maximum coverage area per nozzle (average):	0.66 m ²
Height of nozzle above tank top/floor level:	0.35 – 0.37 m ¹⁾
Minimum operating pressure at nozzles:	11.0 bar
Maximum operating pressure at nozzles:	16.0 bar
Nozzle orientation:	Horizontal ²⁾

Notes:

- 1) The bilge plate was located at 1.1 m in the fire test. Installations on vessels with bilges and nozzles higher or lower than these figures will be considered case by case.
- 2) Spacing between nozzles pointing the same direction is 0.75 m along the distribution pipe and 1.75 m between distribution pipes. Nozzles of two adjacent rows shall be installed pointing against each other. The nozzles along a row (distribution pipe) are to be installed with alternating pointing directions, thus with half spacing between them (0.375 m). The manufacturer's prefabricated N-pipe should be used as distribution pipe (consisting of a PN16 stainless steel pipe with prefabricated holes and threading for mounting of the nozzles).

Nozzle information					
Nozzle	Application	k-factor [lpm/bar ^{1/2}]	Flow at operating pressure [lpm]	Operating pressure [bar]	Drawing no.
MK-6 TF *)	Ceiling	5.6	15.84	8.0	100714-836 Rev.C
MK-6 TF-S *)	Ceiling	5.6	16.80	9.0	100714-836 Rev.C
MK-1 TF **)	Bilge	0.9	2.98	11.0	100303-807 Rev.B
MF-1 TF **)	Bilge	1.1	3.65	11.0	120216-1043 dated 03.03.2010 120216-1044 dated 27.06.2011
*) The nozzle is made of naval brass and NiSn / AISI 316.					
**) The nozzle is made of naval brass and NiSn / AISI 316 and AISI 303 housing.					

For all applications

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- The pump unit shall be delivered with DNVGL product certificate, whereas other system components are to be inspected in accordance with DNVGL Rules (or equivalent standard as specified by the Flag Administration).
- The pump unit and section valves shall be installed in a room having ambient temperature between +4 degree C and +45 degree C.
- Piping and piping components shall be made of stainless steel or equivalent material.
- Pipes, couplings and other components are regarded as "Class III" piping.
- Only water complying with the maker's specification shall be used in the system. This includes testing and flushing operations.

The following items are to be approved and filed by the flag administration for each project:

- System arrangement plans including routing of pipes, location of nozzles, section valves, release stations, pump unit and water supply.
- Documentation of power supply and control system.
- Specification of pipes, section valves, pumps, electrical motors and associated components.
- Pressure drop calculations and water mist capacity calculations.
- Design, installation, operation and maintenance manual.

Installation testing:

- System to be cleaned in accordance with the maker's specification and system manual.
- All sections should be tested with full flow of water through the nozzles.
- Manual release of all section valves and start of pumps shall be carried out.
- Alarms inside protected spaces and at manned control station(s) and switchover to emergency power shall be tested.
- Other tests as required by Class Rules (pressure testing of piping, etc.) and according to maker's manual shall be conducted.

Periodical testing:

- The periodical testing shall comply with instructions from flag administration, DNVGL Statutory Interpretations and maker's maintenance manual. Reference is also made to DNVGL-CG-0058.

Type Approval documentation

Certification in accordance with Standard for Certification No. 1.2, Type Approval, April 2009.

Fire Performance Testing:

Test report No. 110315-52 dated 21 March 2011 from Danish Fire Laboratories (DFL), Svendborg, Denmark.

Test report No. 110630-55 dated 18 August 2011 from Danish Fire Laboratories (DFL), Svendborg, Denmark.

Test report No. 111025-59 dated 28 October 2011 from Danish Fire Laboratories (DFL), Svendborg, Denmark.

Test report No. 120308-65 dated 19 March 2012 from Danish Fire Laboratories (DFL), Svendborg, Denmark.

Component Testing:

Test report No. 110414-1 dated 15 April 2011 from Danish Fire Laboratories (DFL), Svendborg, Denmark.

Test report No. 110414-2 dated 24 August 2011 from Danish Fire Laboratories (DFL), Svendborg, Denmark.

Test report No. 111004-7 dated 28 October 2011 from Danish Fire Laboratories (DFL), Svendborg, Denmark.

Test report No. 120424-8 dated 30 April 2012 from Danish Fire Laboratories (DFL), Svendborg, Denmark.

Drawing No. 100714-836 Rev.C dated 20.04.2012 from manufacturer.

Drawing No.100303-807 Rev.B dated 03.03.2010 from manufacturer.

Drawings No.120216-1043 dated 03.03.2010 and No.120216-1044 dated 27.06.2011 from manufacturer.



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DNV TAC F-20183 dated 2012-07-16
GL TAC 3729412 HH dated 2012-03-26

Tests carried out

Fire performance testing according to IMO MSC/Circ.1165.
Component testing according to IMO MSC/Circ.1165, as amended by MSC.1/Circ.1269 Appendix A.

Marking of product

The nozzles are to be marked with the name of manufacturer and the type designation whereas the pump/control units are to be marked with the name of manufacturer.

Periodical assessment

The DNVGL'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 the procedure described in the Class Programme DNVGL-CP-0338, Section 4.