



## CERTIFICATE OF FIRE APPROVAL


This is to certify that

The product detailed below will be accepted for compliance with the applicable Lloyd's Register Rules and Regulations and with the International Convention for the Safety of Life at Sea, (SOLAS), 1974, as amended, for use on ships and offshore installations classed with Lloyd's Register, and for use on ships and offshore installations when authorised by contracting governments to issue the relevant certificates, licences, permits etc.

<b>Manufacturer</b>	Autronica Fire and Security AS		
<b>Address</b>	Stalsbergveien 9 3128 Nøtterøy Norway		
<b>Type</b>	AUTOMATIC SPRINKLER, FIRE DETECTION AND FIRE-ALARM SYSTEM		
<b>Description</b>	Fixed Fire Extinguishing System - Type: "FlexiFOG Micro Low Pressure Water Mist System" for Accomodation Spaces, Service Spaces and Control Stations Equivalent to SOLAS II-2/10.6.1 & IMO FSS Code Chapter 8		
<b>Specified Standard</b>	Resolution A800(19) as amended by Resolution MSC 265(84) and MSC 284(86)		

The attached Design Appraisal Document forms part of this certificate.

This certificate remains valid unless cancelled or revoked, provided the conditions in the attached Design Appraisal Document are complied with and the equipment remains satisfactory in service.

Date of issue	22 June 2016	Expiry date	21 June 2021
Certificate No.	SAS F160257	Signed	
Sheet No.	1 of 9	Name	S. Abraham Surveyor to Lloyd's Register EMEA A Member of the Lloyd's Register Group

**Note:**

**This certificate is not valid for equipment, the design or manufacture of which has been varied or modified from the specimen tested. The manufacturer should notify Lloyd's Register of any modification or changes to the equipment in order to obtain a valid Certificate.**

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Page	2 of 9
Document number	SAS F160257
Issue number	1

## DESIGN APPRAISAL DOCUMENT

Date	Quote this reference on all future communications
9 September 2016	SOUTSO/SFS/TA /SA/WP25872122

### ATTACHMENT TO CERTIFICATE OF TYPE APPROVAL No. SAS F160257

This Design Appraisal Document forms part of the Certificate.

#### APPROVAL DOCUMENTATION

DFL (Danish Fire Laboratories/Svendborg Denmark) Test Reports: 071004-15, dated 21 April 2008, 90701-37, dated 6 July 2009; 080912-22, dated 5 November 2008; 090320-35, dated 1 April 2009; 090226-34, dated 4 March 2009; 081013-03, dated 15 April 2011.

SP Sweden Test Report: F714873, dated 24 September 2007.

#### CONDITIONS OF CERTIFICATION

1. The system has been designed in accordance with IMO Resolution A800(19) as amended by Resolution MSC 265(84), Annex, section 3, "Principle Requirements for the System, " or IMO Resolution MSC.44(65), "Standards for Fixed Sprinkler Systems for High-Speed Craft."
2. For use in the Accommodation and Service Spaces with a ceiling height not exceeding 5 metres. The capacity and arrangement of the spray nozzles is to be justified having regard to all identified fire risks in the protected space(s) and shall be located as denoted in -
  - 2.1 Table 2-1 for Passenger Ships carrying more than 36 Passengers OR;
  - 2.2 Table 2-2 for Passenger Ships carrying not more than 36 Passengers, Cargo Ships and Yachts OR;
  - 2.3 Table 2-3 for High Speed Passenger Craft OR;
  - 2.4 When the system is provided on board LR Classed Inland Waterways Passenger Ships, the capacity and arrangement of the nozzles shall be specially considered in the design stage in all case
3. Production items are to be manufactured in accordance with a quality control system which shall be maintained to ensure that items are of the same standard as the approved prototype
4. See GENERAL NOTES



Page 3 of 9
Document number SAS F160257
Issue number 1

**DESIGN APPRAISAL DOCUMENT**

Date 9 September 2016	Quote this reference on all future communications SOUTSO/SFS/TA /SA/WP25872122
--------------------------	---

**ATTACHMENT TO CERTIFICATE OF TYPE APPROVAL No. SAS F160257**

**Table 2-1, Recommended Nozzle Arrangements for Passenger Ships carrying more than 36 Passengers**

Space Designation <sup>(1)</sup>	Fire Risk Category <sup>(1)</sup>	Maximum Area of Space m <sup>2</sup>	Nozzle Designation	Spacing m	Maximum Distance to Bulkheads m
Control Stations	1	Unlimited	PS-01 <sup>(2)</sup> or PS-02 <sup>(3)</sup>	3.5	1.5
Stairways or Corridors (Width ≤ 1.5m) <sup>(4)</sup>	2 or 3	Unlimited	CO-01	3.5	Centred across width
Stairways or Corridors (Width > 1.5m) <sup>(4)</sup>	2 or 3	Unlimited	PS-01 <sup>(2)</sup> or PS-02 <sup>(3)</sup>	3.5	1.5
Accommodation Spaces of Minor or Moderate Fire Risk and; Sanitary & Similar Spaces	6, 7 or 9	≤20	CA-01	Centred in Space	Centred in Space
Accommodation Spaces of Minor or Moderate Fire Risk and; Sanitary & Similar Spaces	6, 7 or 9	20 to 50, And >50	PS-01 <sup>(2)</sup> or PS-02 <sup>(3)</sup>	3.5	1.5
Accommodation Spaces of Greater Fire Risk	8	Unlimited	PS-01 <sup>(2)</sup> or PS-02 <sup>(3)</sup>	3.5	1.5
Refrigerated Chambers and; Main Galleys and annexes, Pantries containing cooking Appliances each >5kW	11, 12	Unlimited	PS-01 <sup>(2)</sup> or PS-02 <sup>(3)</sup>	3.5	1.5
Store Rooms, Workshops, Pantries containing cooking Appliances each <5kW etc; Other spaces in which flammable liquids are stored	13 or 14	Unlimited	ST-01	4	2.0

**NOTES**

- (1) Space Designations and Fire Risk Categories are in accordance with SOLAS II-2/Reg 9.2.2.3.
- (2) Space with a 2.5 m ceiling height.
- (3) Space with a ceiling height greater than 2.5m, but less than or equal to 5m.
- (4) Width of the Corridors or Stairways are to be measured between the bulkheads bounding the space.



DESIGN APPRAISAL DOCUMENT

Date 9 September 2016	Quote this reference on all future communications SOUTSO/SFS/TA /SA/WP25872122
--------------------------	---

**ATTACHMENT TO CERTIFICATE OF TYPE APPROVAL No. SAS F160257**

**Table 2-2, Recommended Nozzle Arrangements for Passenger Ships carrying not more than 36 Passengers, Cargo Ships and Yachts**

Space Designation <sup>(1)</sup>	Fire Risk Category <sup>(1)</sup>	Maximum Area of Space m <sup>2</sup>	Nozzle Designation	Spacing m	Maximum Distance to Bulkheads m
Control Stations	1	Unlimited	PS-01 <sup>(2)</sup> or PS-02 <sup>(3)</sup>	3.5	1.5
Stairways or Corridors (Width ≤ 1.5m) <sup>(4)</sup>	2 or 4	Unlimited	CO-01	3.5	Centred across width
Stairways or Corridors (Width > 1.5m) <sup>(4)</sup>	2 or 4	Unlimited	PS-01 <sup>(2)</sup> or PS-02 <sup>(3)</sup>	3.5	1.5
Accommodation Spaces and Service Spaces (Low Risk)	3 or 5	≤20	CA-01	Centred in Space	Centred in Space
Accommodation Spaces and Service Spaces (Low Risk)	3 or 5	>20	PS-01 <sup>(2)</sup> or PS-02 <sup>(3)</sup>	3.5	1.5
Service Spaces (High Risk) Galleys, Pantries containing cooking Appliances each >5kW	9 or 8 <sup>(5)</sup>	Unlimited	PS-01 <sup>(2)</sup> or PS-02 <sup>(3)</sup>	3.5	1.5
Service Spaces (High Risk) Store Rooms, Workshops, Pantries containing cooking Appliances each <5kW etc; Other spaces in which flammable liquids are stored	9 or 8 <sup>(5)</sup>	Unlimited	ST-01	4.0	2.0

**NOTES**

- (1) Space Designations and Fire Risk Categories are in accordance with SOLAS II-2/Reg 9.2.2.4, SOLAS II-2/Reg 9.2.3, and LR Rules and Regulations for the Classification of Special Service Craft, Part 17, Chapter 3, §3.6
- (2) Space with a 2.5 m ceiling height.
- (3) Space with a ceiling height greater than 2.5m, but less than or equal to 5m.
- (4) Width of the Corridors or Stairways are to be measured between the bulkheads bounding the space.
- (5) Service Spaces (High Risk) are Category (8) spaces for Yachts only.



Page 5 of 9
Document number SAS F160257
Issue number 1

DESIGN APPRAISAL DOCUMENT

Date 9 September 2016	Quote this reference on all future communications SOUTSO/SFS/TA /SA/WP25872122
--------------------------	---

**ATTACHMENT TO CERTIFICATE OF TYPE APPROVAL No. SAS F160257**

**Table 2-3, Recommended Nozzle Arrangements for High Speed Passenger Craft**

Space Designation <sup>(1)</sup>	Fire Risk Category <sup>(1)</sup>	Maximum Area of Space m <sup>2</sup>	Nozzle Designation	Spacing m	Maximum Distance to Bulkheads m
Public Spaces	C	Unlimited	PS-01 <sup>(2)</sup> or PS-02 <sup>(3)</sup>	3.5	1.5
Service Spaces and Bond Store Rooms	B	Unlimited	ST-01	4.0	2.0
Store-rooms containing flammable liquids	A	Unlimited	ST-01	4.0	2.0

**NOTES**

- (1) Space Designations and Fire Risk Categories are in accordance with IMO Resolution MSC.97(73), International Code of Safety for High Speed Craft, 7.3
- (2) Space with a 2.5 m ceiling height.
- (3) Space with a ceiling height greater than 2.5m, but less than or equal to 5m.

Spaces required to be covered by a watermist system are denoted in IMO Resolution MSC.97(73), International Code of Safety for High Speed Craft, 7.13.

**GENERAL NOTES**

1. The as tested nozzles have brass bodies, outside coated with chrome plate, with frangible glass bulbs with a nominal release temperature of 57°C of type JOB F2 (2.0 mm diameter). The nozzle characteristics are delineated in Table 1-1:

**Table 1-1, Nozzle Characteristics**

Nozzle Name	Nozzle Designation	Pressure Bar	K- factor l/min*bar <sup>1/2</sup>	Flow l/min
Cabin	CA-01	8.0	14.42	40.79
Corridor	CO-01	10.1	10.85	34.48
Public Space (2.5 m Ceiling Height)	PS-01	9.1	11.18	33.73
Public Space (5 m Ceiling Height)	PS-02	9.1	11.74	35.42
Shopping/Storage	ST-01	9.1	21.39	64.52



Page	6 of 9
Document number	SAS F160257
Issue number	1

**DESIGN APPRAISAL DOCUMENT**

Date	Quote this reference on all future communications
9 September 2016	SOUTSO/SFS/TA /SA/WP25872122

**ATTACHMENT TO CERTIFICATE OF TYPE APPROVAL No. SAS F160257**

2. The minimum nozzle pressure being 8 bar, 9.1 bar and 10.1 bar respectively, see Table 1-1
3. The system should be capable of continuously supplying the water-based extinguishing medium for a minimum of 30 min. A pressure tank or other means should be provided to meet the functional requirement stipulated in the FSS Code, Chapter 8, Paragraph 2.3.2.1. The design of the system should ensure that full system pressure is available at the most remote nozzle in each section within 60 seconds of system activation
4. There should be not less than two sources of power for the system. Where the sources of power for the pump are electrical, these should be a main generator and an emergency source of power. One supply should be taken from the main switchboard, and one from the emergency switchboard by separate feeders reserved solely for that purpose. The feeders should be so arranged as to avoid galleys, machinery spaces and other enclosed spaces of high fire risk except in so far as it is necessary to reach the appropriate switchboards, and should be run to an automatic changeover switch situated near the sprinkler pump. This switch should permit the supply of power from the main switchboard so long as a supply is available there from, and be so designed that on failure of that supply it will automatically change over to the supply from the emergency switchboard. The switches on the main switchboard and the emergency switchboard should be clearly labelled and normally kept closed. No other switch should be permitted in the feeders concerned. One of the sources of power supply for the system should be an emergency source
5. Where one of the sources of power for the pump is an internal combustion engine, it should, in addition to complying with the provisions of the FSS Code, chapter 8, paragraph 2.4.3, be so situated that a fire in any protected space will not affect the air supply to the machinery
6. Pump sets consisting of two diesel engines each supplying at least 50% of the required water capacity are considered acceptable if the fuel supply is adequate to operate the pumps at full capacity for a period of 36 h on passenger ships and 18 h on cargo ships
7. The system should be provided with a redundant means of pumping, including drivers, or otherwise supplying a water-based extinguishing medium to the sprinkler system. The capacity of the redundant means should be sufficient to compensate for the loss of any single supply pump or alternative source
8. Failure of any power and control system component should not reduce the automatic release capability or reduction of sprinkler pump capacity by more than 50%. Hydraulic calculations should be submitted to assure that sufficient flow and pressure are delivered to the hydraulically most remote 140 m<sup>2</sup> in the event of the failure of any one component
9. Each section of sprinklers should be capable of being isolated by one stop valve only. The stop-valve in each section should be readily accessible in a location outside of the associated section or in cabinets within stairway enclosures. The valve's location should be clearly and permanently indicated. Means should be provided to prevent the operation of the stop-valves by an unauthorised person. Isolation valves used for service, maintenance or for refilling of antifreeze solutions may be installed in the sprinkler piping in addition to the section stop valves, if provided with a means for giving a visual and audible alarm as required by Note 9 below. Valves on the pump unit may be accepted without such alarms if they are locked in the correct position
10. Each sprinkler section should be provided with a means for giving a visual and audible alarm at a continuously manned central control station within one minute of flow from one or more sprinklers, a check valve, pressure gauge, and a test connection with a means of drainage



Page 7 of 9
Document number SAS F160257
Issue number 1

DESIGN APPRAISAL DOCUMENT

Date 9 September 2016	Quote this reference on all future communications SOUTSO/SFS/TA /SA/WP25872122
--------------------------	---

**ATTACHMENT TO CERTIFICATE OF TYPE APPROVAL No. SAS F160257**

11. Piping and Reservoir tank material (where applicable) shall be made of stainless steel having a minimum grade of AISI 304L
12. The system should be fitted with a permanent sea inlet and be capable of continuous operation using seawater. The system water supply components should be outside category 'A' machinery spaces and should not be situated in any space required to be protected by the system. Arrangement drawings detailing the means of redundancy, the water supply arrangements and components, including their location, are to be submitted for approval in each case
13. The system pump unit and pressure tank shall not be situated in a Machinery Space of Category 'A' or in any space required to be protected by the water mist system
14. Pumps and alternative supply components should be capable of supplying the required flow rate and pressure for the space with the greatest hydraulic demand. For the purposes of this calculation, the design area used to calculate the required flow and pressure should be the deck area of the most hydraulically demanding space, separated from adjacent spaces by A-Class divisions. The design area need not exceed 280m<sup>2</sup>. For application to a small ship with a total protected area of less than 280m<sup>2</sup>, the Administration may specify the appropriate area for sizing of pumps and alternative supply components. Copies of calculations are to be submitted for acceptance in each case where it is proposed to install this system
15. The pump unit shall have on the pressure side a mess strainer (mesh size No. 50, 300µm)
16. The system storage containers and associated pressure components are to be designed and tested to codes of practice recognized by Lloyd's Register, indicating that they can withstand the pressure expected in service, giving regard to their installed location
17. The as tested nozzles have brass bodies and chrome plated bodies. Each individual water spray nozzle shall be fitted with a mesh strainer (mesh size No. 16, 1200µm)
18. The number of spare watermist nozzles which are to be specified for each application is to be in accordance with Table 8-1

**Table 8-1, Required Number of Spare Nozzles**

Number of Installed Nozzles	Spares Nozzles Required
≤300	6
300 to 1000	12
>1000	24

19. The use of the following system arrangements must be specially considered at the design stage in all cases:
  - 19.1 Nozzle types and arrangements for the protection of windows **AND**;
  - 19.2 Any dry pipe or pre-action system installations
  - 19.3 Protection of Public Spaces with a ceiling height greater than 5M
20. Arrangement drawings and calculations are to be submitted for acceptance in each case where it is proposed to install this system. Control panel schematics are also to be submitted. All principle components of the system are to be identified with their location in relation to the protected space(s) indicated. Additionally, the fire risk category of the protected spaces must be indicated on the plans





Page	8 of 9
Document number	SAS F160257
Issue number	1

## DESIGN APPRAISAL DOCUMENT

Date	Quote this reference on all future communications
9 September 2016	SOUTSO/SFS/TA /SA/WP25872122

### ATTACHMENT TO CERTIFICATE OF TYPE APPROVAL No. SAS F160257

21. The pumps are to be constructed under survey. Additionally, the system pipe work including; flexible hoses, pipes, valves and fittings are to be LR Approved, in accordance with Lloyd's Register Rules, Part 5, Chapter 12
22. Any fire detection and alarm system installed in conjunction with this system is outside of the scope of this Fire Approval Certificate and must have a currently valid LR Type Approval Certificate
23. The control system being surveyed at the manufacturers works prior to installation on board
24. Any flexible hoses in the distribution piping attached between a nozzle and the distribution piping is to comply with the following:-
  - A short length (1000 mm maximum length) of flexible hose connecting the distribution piping to the nozzle would be acceptable
  - The nozzle being suitably supported by structural elements which are independent of the ceiling, to prevent lateral and horizontal movement upon the system being activated
25. Installation plans and operating manuals should be supplied to the ship and be readily available on board. A list or plan should be displayed showing the spaces covered and the location of the zone in respect of each section. Instructions for testing and maintenance should also be available on board. The maintenance instructions should include provisions for a flow test of each section at least annually to check for possible clogging or deterioration in the discharge piping. Copies are to be submitted for acceptance in each case where it is proposed to install this system
26. Construction details and constituent components of the system are to be as given in the Design, Installation, Operation and Maintenance Manual, Version 4 dated 10 July 2009. It should be noted that the drawing numbers and manufacturers design and installation manual may vary for each individual project
27. **Installation onboard:** The on board arrangements and installation of this system are not part of this Design Appraisal or Certificate. All such arrangements are to be to the satisfaction of the Surveyors attending on board. On completion of the installation final acceptance of the system is dependent on satisfactory survey and testing in the accordance with the manufacturer's design, installation, operation and maintenance manual





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Page 9 of 9
Document number SAS F160257
Issue number 1

### DESIGN APPRAISAL DOCUMENT

Date 9 September 2016	Quote this reference on all future communications SOUTSO/SFS/TA /SA/WP25872122
--------------------------	---

#### ATTACHMENT TO CERTIFICATE OF TYPE APPROVAL No. SAS F160257

#### PLACE OF PRODUCTION

Autronica Fire and Security AS  
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Senior Specialist  
Statutory Fire & Safety  
Southampton Technical Support Office, Marine & Offshore  
Lloyd's Register EMEA

#### Supplementary Type Approval Terms and Conditions

*This certificate and Design Appraisal Document relates to type approval, it certifies that the prototype(s) of the product(s) referred to herein has/have been found to meet the applicable design criteria for the use specified herein, it does not mean or imply approval for any other use, nor approval of any products designed or manufactured otherwise than in strict conformity with the said prototype(s).*