

The FirePro logo consists of the word "FirePro." in a white, bold, sans-serif font, centered within a solid red square.

Annex Marine Manual Marine Applications

Version : 09

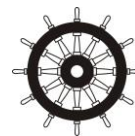
Date : 01-01-2022



FirePro Benelux

Laurens Janszn. Costerstraat 13b
3261LH, Oud-Beijerland, The Netherlands
+31 (0)186-699600 / info@firepro.nl / www.firepro.nl

Reinventing Safety
We Don't Imitate, We Innovate



This Marine Manual must be read and used in conjunction with FS4Y / FirePro Benelux and FirePro Information, Instruction & User Manual Version.

ANNEX NO 1

MARINE APPLICATIONS

DESIGN AND INSTALLATION GUIDELINES

This Marine Application Annex contains the specific engineering guidance for the installation of the FirePro extinguishing aerosol systems, in accordance to the MSC1/Circ.1270 and ESTRIN.

Marine Applications Codes of Reference:

- RS Rules for the Classification and Construction of Sea-Going Ships (2010)", "Rules for the Technical Supervision During Construction of Ships and Manufacture of materials and Products for Ships" (2009)", "Chapter II-2 SOLAS-74, International Code for Fire Safety System (IMO Resolution MSC.98 (73))" and "IMO MSC.1/Circ.1270: Revised Guide Lines for the Approval of Fixed Aerosol Fire- Extinguishing Systems equivalent to Fixed gas Fire- Extinguishing Systems, as referred to in SOLAS 74, for machinery spaces".

MSC 1/Circ. 1270, chapter 14.1.5

A MINIMUM SAFE DISTANCE IS REQUIRED BETWEEN GENERATORS AND ESCAPE ROUTES AND COMBUSTIBLE MATERIALS.

As per Information, Instruction and User Manual , version 6, 01-07-2015 , the aerosol temperatures are indicated in the tables at page 7, whereby the safe distances for escape routes are related to the L3 values (in meters) in the table and minimum clearance from persons (light orange colour).

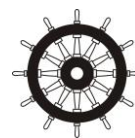
Safe distances for combustible materials are related to the L2 values (in meters) in the table and minimum clearance from combustible materials (dark orange colour).

MSC 1/Circ. 1270, chapter 14.7.3

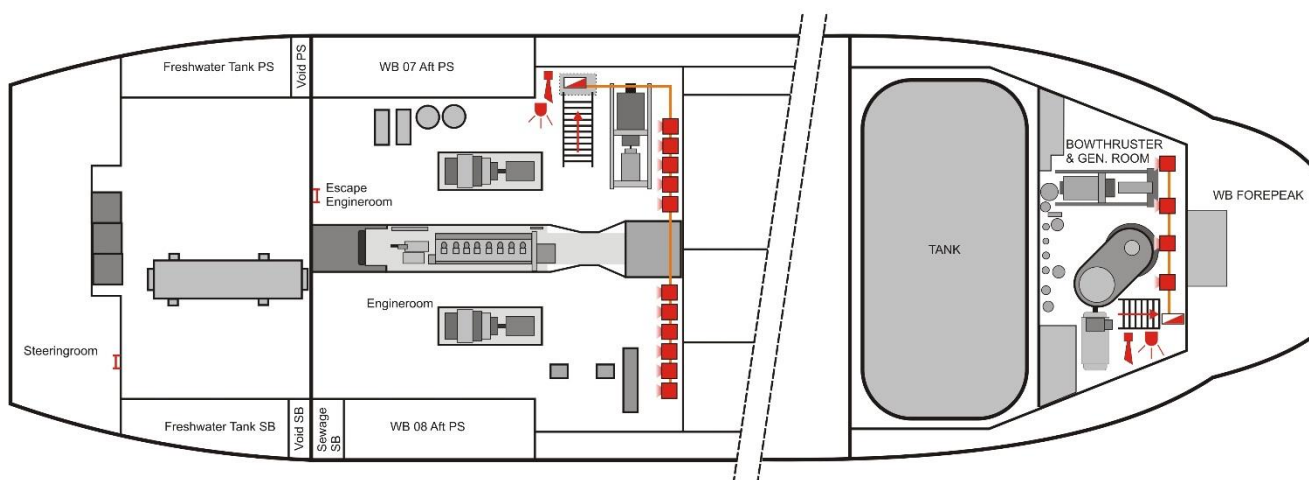
MOUNTING LOCATIONS REQUIREMENTS CONSIDERING SAFE DISTANCE TO ESCAPE ROUTES AND COMBUSTIBLE MATERIALS.

As per aerosol temperatures indicated in the table at page 7, safe distances for escape routes are related to the L3 values (in meters) in the table and minimum clearance from persons (light orange colour) in Figures A,B and C.

Safe distances for combustible materials are related to the L2 values (in meters) in the table and minimum clearance from combustible materials (dark orange colour).



Installation Guidelines



MSC 1/Circ. 1270, chapter 14.11.1

ELECTRICAL CIRCUITS FOR FIREPRO GENERATORS:

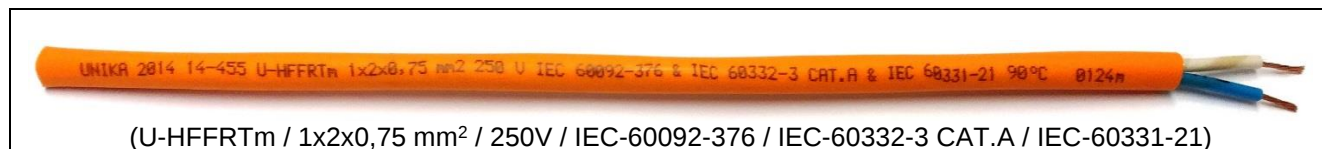
Requirements for mounting and protection of cables.

It is covered in the FirePro manual "AMAC (marine) Panel".

11.1 Cabling/Installation

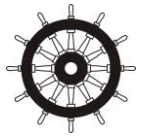
The cabling for the outgoing controls to the fire protection installation comes under the activities of the CATTAS certified installer.

Fixed cabling for main current (24 V) must have a minimum conductor cross section of 0,75 mm. The cabling must be of flame retardant construction (NEN-1010), provided that no function retention is required. All the cables that are part of the fire detection and fire alarm system and evacuation installation must be red or orange. Cables in a terminal box must be provided with a cable number.



Only lay cabling in a conduit or a compartmentalised cable duct:

- In cable ducts a division plate or 50 mm spacing is required between the fire detection and fire alarm system cabling and the power current cabling;
- In cable ducts control current cabling may be laid with fire detection and fire alarm cabling if no disruptive mutual interference is to be expected;
- Conduit must connect to the cable duct;
- Open bends, maximum 50 x 50 mm, are only permitted above suspended ceilings and beneath raised floors;



Where cabling is laid directly alongside power current cabling, for example next to motor cables of an air conditioning system, then use screened or twisted cabling, lay in separate compartments or keep a minimum of 50 mm spacing between power current cabling and fire detection and fire alarm cabling.

Where cabling is laid through fire-resistant partitions, suitable measures must be taken to ensure that the fire/smoke-resistance of the partition is not impaired.

The wiring, technology and tools used must be used according to the requirements of approved workmanship, with the aim of minimising the chance of failure. Do not include any conductors in the fire detection and fire alarm system cabling that are fed from other installations.

There may not be any joints in transmission paths, unless in consultation with the fire detection company and the local fire brigade. The joints must then be made in terminal boxes intended for the purpose. Any joints necessary must be housed in a completely sealed junction box. The conductors must be connected to the terminal strips with numbered screw terminals.

11.2 Function Retention Cabling

The installation and the route of the cabling must be chosen so that the chance of damage of the cabling by fire is prevented and/or is as small as possible.

This can be achieved by:

- Laying in a minimum of separate 30 minutes fire-resistant ducts.
- Between the fire alarm control unit (slow whoop and flashlight).

The cable support of cables for which function retention is required must also remain functional for 30 minutes in the event of fire.

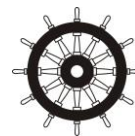
11.3 Cable Monitoring

There are several options for routing of the cables to activated the FirePro extinguishing units.

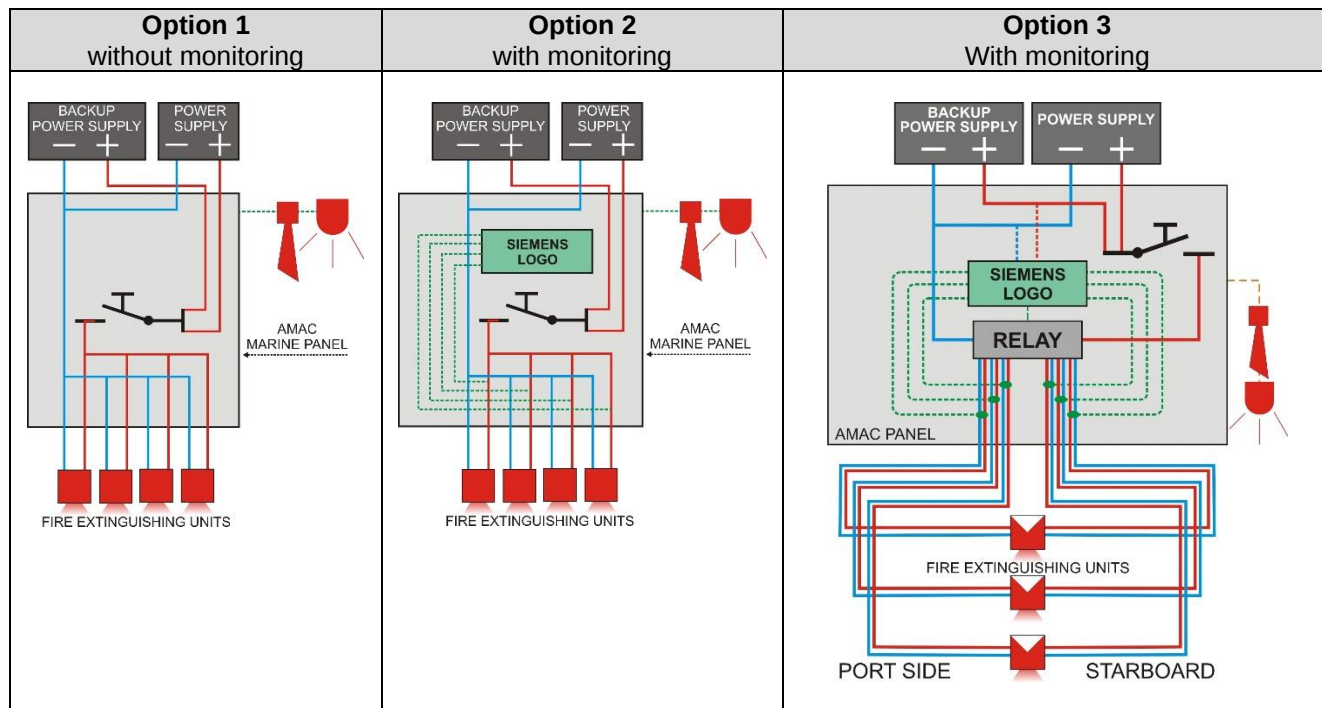
The experience teaches us that there is no consistency between classification-bureaus and different interpretations of wiring and monitoring. Therefore we develop several options so the classification-bureaus can make a choice before you start building the installation.

For monitoring there is a certified AMAC (marine) panel what constantly is monitoring the cables on short circuit and open circuit.

For a detailed explanation, please refer to the manual "FS4Y_AMAC_Panel-UK".



Below in a simple explanation the various options:



If you use the certified panel (option 2) there is no need for unnecessary extra cables over port side and starboard. This because the cables are monitored constantly.

MSC 1/Circ. 1270, chapter 14.14

INSPECTIONS, MAINTENANCE, SERVICE AND TESTING REQUIREMENTS

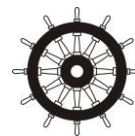
During the period that the FirePro fire extinguishing installation are in use the following inspections and maintenance procedures must be carried out every month:

- A periodic visual inspection of the aerosol fire extinguishers and fire extinguishing systems to check the following parts:
 - 1- electrical wiring
 - 2- alarm test on the AMAC (marine) Panel
 - 3- free outflow of the FirePro units
 - 4- fixing bolts of the FirePro units

At the time of the final inspection the following documents must be issued:

- Logbook of the fire extinguishing system;
- Calculation of used extinguishing aerosol per m³;
- Certificate of the CATTAS certified installer;
- Brief and concise operating instructions;
- Schematic drawings;
- A signed maintenance contract.

The authorised FirePro Benelux dealer must provide a separate quotation for inspection, management and maintenance of the FirePro fire extinguishing based installation. The installer of the fire detection company must alert the customer to its obligation to carry out limited functional installation tests and



maintenance, including a monthly functional test of the installation and transmission. The customer must ensure that this task is undertaken by a suitably trained officer.

The customer/user is obliged to conclude a maintenance contract with the authorised and certified dealer.

Inspection of the complete installation carried out by an authorised and certified dealer must take place every year or in a period in consultation with the classification-bureau

The suitably trained officer of the authorised FirePro Benelux dealer or the customer/user must keep a logbook, recording all the relevant events concerning the installation, such as false and nuisance alarms with any cause, maintenance, inspections and installation tests, adjustments, expansions and repairs.

Logbook

The logbook contains the items required that give a picture and provide for the recording of various things during the life of the installation. In the logbook you will find the following:

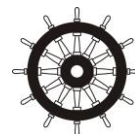
Content of logbook:

- Introduction
- Datasheets
- Manuals of used equipment
- Certificates
- Schematic installation drawings
- Schematic diagrams
- Inspection reports

MSC 1/Circ. 1270, chapter 17

WHERE THE AEROSOL GENERATORS ARE INSTALLED WITHIN THE PROTECTED SPACE, THE GENERATORS SHOULD BE EVENLY DISTRIBUTED THROUGHOUT THE SPACE AND MEET THE FOLLOWING PROVISIONS:

- A manually initiated power release, located outside the protected space, should be provided. Duplicate sources of power should be provided for this release and should be located outside the protected space and be immediately available.
- MSC 1/Circ. 1270, chapter 17.1
- Electric power circuits connecting the generators should be monitored for fault condition and loss of power. Visual and audible alarms should be provided to indicate this.
- MSC 1/Circ. 1270, chapter 17.2
- Electric power circuits connecting to the AMAC (marine) Panel should be in a main powers supply and a backup power supply.
- MSC 1/Circ. 1270, chapter 17.3
- Within the protected space, electrical circuits essential for the release of the system should be fire resistant according to standard IEC 60331 or equivalent standards.
- MSC 1/Circ. 1270, chapter 17.4
- The arrangement of generators and the electrical circuits essential for the release of any system should be such that in the event of damage to any one power release line or generator through mechanical damage, fire or explosion in a protected space, i.e. a single fault concept, at least the amount of agent needed to achieve the test density can still be discharged having regard to the requirement for uniform distribution of medium throughout the space.
- MSC 1/Circ. 1270, chapter 17.6



The installer shall comply with all the requirements of chapter 17.

The actuation system supplied shall comply with all the requirements of chapter 17.

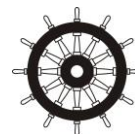
MSC 1/Circ. 1270, chapter 22

The casing temperature of condensed aerosol generators is indicated for each model.

Aerosol in length and time of stream					
Nr	Model unit	Discharge		Discharge Duration (sec)	
		opening	Length	Min.	Max.
1	FP-20 SE	2	0.5	3	6
2	FP-20 T & TH	1	0.5	3	6
3	FP-40 S	2	1.2	4	8
4	FP-40 T	1	1.2	4	8
5	FP-80 S	2	2.0	4	8
6	FP-80 T	1	2.0	4	8
7	FP-100	1	1.0	5	10
8	FP-200M	1	2.0	5	10
9	FP-200	1	2.0	5	10
10	FP-500	1	2.5	5	10
11	FP-1000M	2	3.0	20	25
12	FP-1200	1	3.5	15	20
13	FP-2000	1	3.5	15	20
14	FP-3000	1	4.0	15	20
15	FP-4200	1	7.0	15	20
16	FP-5700	1	8.0	15	20

Aerosol outflow temperature in length en wide (°C)									
Nr	Model unit	Discharge temperature length (°C)				Discharge temperature wide (°C)			
		L0-L1	L1-L2	L2-L3	L3-L4	B0-B1	B1-B2	B2-B3	B3-B4
		NA	300	200	75	NA	300	200	75
1	FP-20	0	0	0	0-0.1	0	0	0	0-0.005
2	FP-40	0	0	0	0-0.1	0	0	0	0-0.008
3	FP-80	0	0	0	0-0.1	0	0	0	0-0.008
4	FP-100	0	0	0	0-0.3	0	0	0	0-0.01
5	FP-200M	0	0	0-0.1	0.1-0.4	0	0	0-0.07	0.07-0.15
6	FP-200	0	0	0-0.1	0.1-0.4	0	0	0-0.07	0.07-0.15
7	FP-500	0	0	0-0.3	0.3-1.0	0	0	0-0.08	0.08-0.27
8	FP-1000M	0	0-1.0	1.0-1.5	1.5-2.5	0	0-0.35	0.35-0.55	0.55-0.95
9	FP-1200	0	0	0	0-1.5	0	0	0	0-0.22
10	FP-2000	0	0	0	0-1.5	0	0	0	0-0.24
11	FP-3000	0	0	0-0.6	0.6-2.0	0	0	0-0.16	0.16-0.53
12	FP-4200	0	0	0-0.9	0.6-2.3	0	0	0-0.22	0-0.64
13	FP-5700	0	0	0-0.6	0.6-2.0	0	0	0-0.22	0-0.64

- L0** = Distance in metres between the outlet and the point where the temperature is > NA °C is
L1 = Distance in metres between the outlet and the point where the temperature is > 300 °C is
L2 = Distance in metres between the outlet and the point where the temperature is < 200 °C is
L3 = Distance in metres between the outlet and the point where the temperature is < 75 °C is
B0 = Distance in metres between the outlet and the point where the temperature is > NA °C is
B1 = Distance in metres between the outlet and the point where the temperature is > 300 °C is
B2 = Distance in metres between the outlet and the point where the temperature is < 200 °C is
B3 = Distance in metres between the outlet and the point where the temperature is < 75 °C is



Important!

The distances shown under discharge length are those to be regarded as a maximum to obtain a rebound of discharge onto the surface (such as the floor) that then guarantees a good homogeneous spread of the aerosol in the protected compartment.

The temperatures shown under discharge temperature relate to the distances. In cases of storage of materials, cables, sensitive parts and/or the presence of persons, prevent them from coming into contact with discharges the heat of which is such that it can give rise to damage and/or injury.

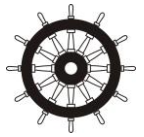
Technische information table								
Model unit	Activation	Weight in gr.		Size (mm)		Effectiveness		Type unit
		Unit tot.	SBC tot.	Height	diameter	%	grams	
FP-20 S	E / BA	290	20	165	32	60/70	12,0	Cold
FP-40 S	E / BA	610	40	140	51	61/62	24,4	Cold
FP-80 S	E / BA	870	80	185	51	59/60	47,2	Cold
FP-100 S	E / BA	1.370	100	155	84	61	61,0	Cold
FP-200M	M	1.800	200	180	84	59	118,0	Cold
FP-200 S	E / BA	1.840	200	185	84	59	118,0	Cold
FP-500 M	E / BA	2.670	500	260	84	66	330,0	Cold
FP-500 S	E / BA	2.670	500	260	84	66	330,0	Cold
FP-1000M	M	1.680	1000	200	84	95	950	Hot
FP-1200	E / BA	10.100	1200	216x300x167		63	756,0	Cold
FP-2000	E / BA	15.500	2000	300x300x185		60	1.200,0	Cold
FP-3000	E / BA	16.300	3000	300x300x185		61	1.830,0	Cold
FP-4200	E / BA	25.000	4200	300x300x300		60	3.363,0	Cold
FP-5700	E / BA	26.400	5700	300x300x300		59	3.363,0	Cold

BA	Bulb activator
E	electrical activation
M	manual (manual operation)



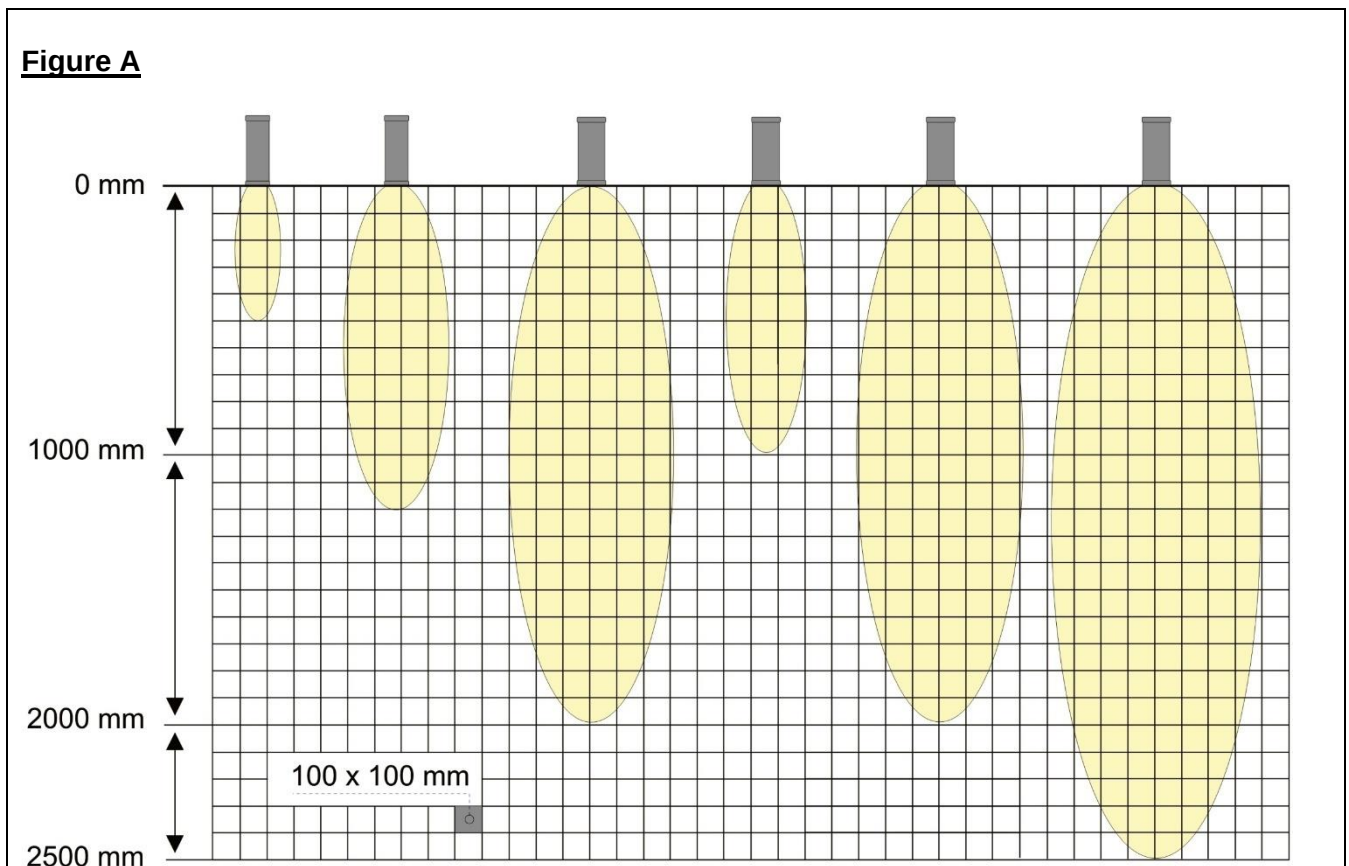
Important!

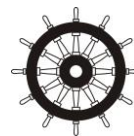
The overviews below give an indication of the minimal free discharge parabolas into account when installing. Positioning of the unit at the right angle can be very important in this regard.



Type	FP-20	FP-40	FP-80	FP-100	FP-200	FP-500
						

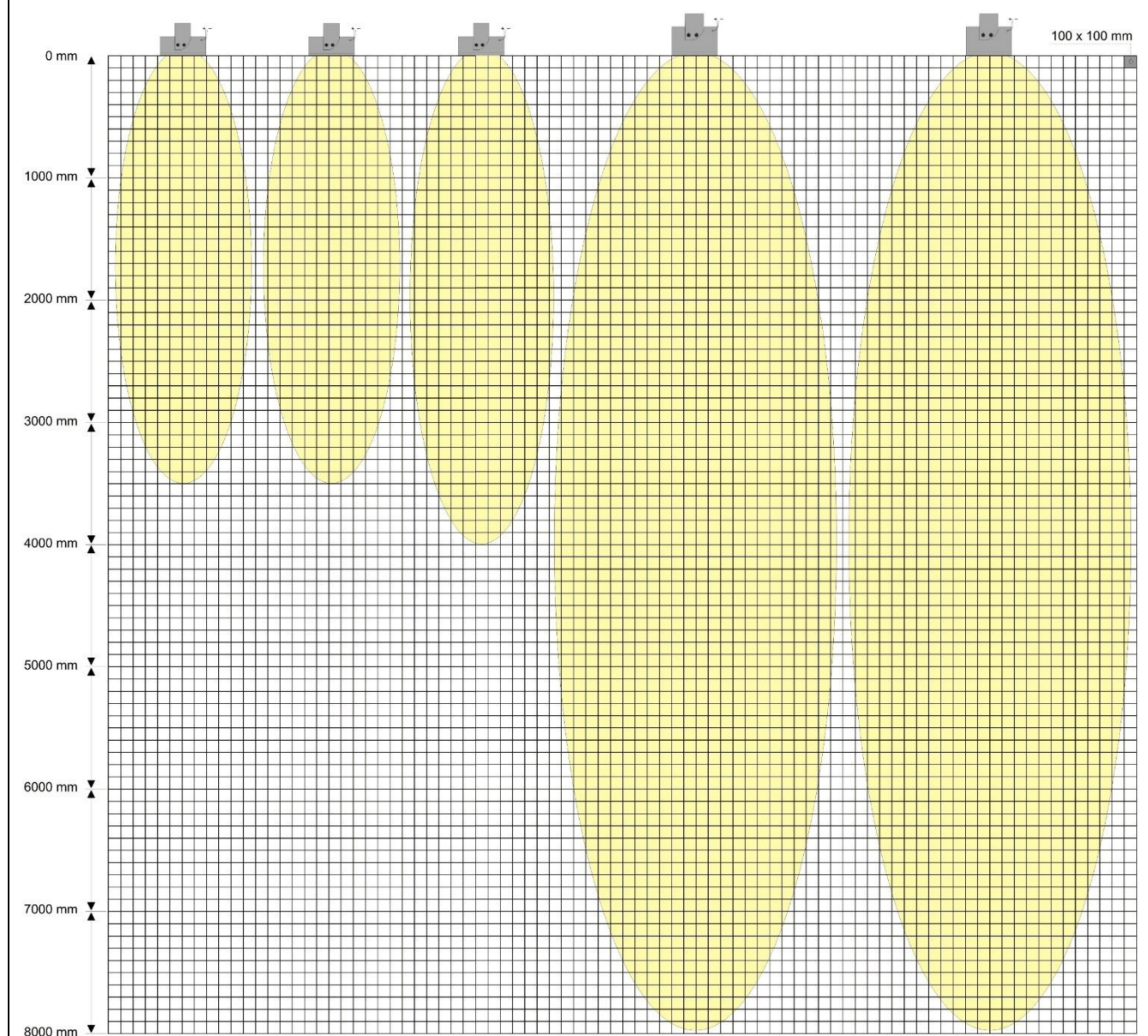
Figure A

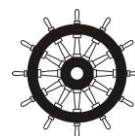




Type	FP-1200	FP-2000	FP-3000	FP-4200	FP-5700
					

Figure B.





MSC 1/Circ. 1270, chapter 3.4.2

DESIGN CALCULATION.

The quantity of aerosol agent to be used should be determined as follows:

$$W = \frac{V \times q}{f}$$

where

W = agent mass (g)

V = Volume of enclosure (m³)

q = Design application density (gr/m³)

f = Efficiency coefficient of generator's model (%)

q1 = 120 gr/m³

Calculation method in conformity to BSI / MED / IMO / ESTRIN

Date of calculation	01-01-2022
Certified supplier	FirePro Benelux
Address	Laurens Janszn. Costerstraat 13b
ZIP code	3261 LH
Place	Oud-Beijerland
Country	The Netherlands
Contact person	Jeroen van Essen
Telephone number	0186-699600 / 06-19193787
E-mail address	jroen@firepro.nl

Offer number	
Name client	Bedrijf putjeschepper
Address	Straet 123
ZIP code	1234AB
Place	Plaatsnaam
Country	Nederland
Contact person	Mi
Telephone number	
E-mail address	

Calculation effective amount per m³ in grams

Ship name/no.	
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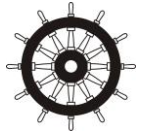
Safety factor MED (NOT REQUIRED)	1
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Room name/no.																	
To protect m³		Length						Width		Height		Bruto m³		0,00		% of filling	
Fire Class / m³																	
Total effect. per m³																	
		A & E						B		C		F		120		0	
Amount of grams																	
Type unit	FP-20E	FP-20T	FP-40E	FP-40T	FP-80E	FP-80T	A & E	0,00	B	0,00	C	0,00	F	0,00			Amount aerosol in gram
Effective ext. agent per unit	12,0	14,0	24,4	24,8	47,2	48,0	61,0	118,0	330,0	756,0	1.200,0	1.830,0	2.520,0	3.363,0			
Number of units, Class A&E	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Number of units, Class B	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Number of units, Class C	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Number of units, Class F	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Number of units Design																	

Room name/no.															
To protect m³		Length		Width		Height		Bruto m³		0,00		% of filling			
Fire Class / m³		A & E		B		C		F		120		0%			
Total effect. per m³										120		0			
Amount of grams															
Type unit	FP-20E	FP-20T	FP-40E	FP-40T	FP-80E	FP-80T	A & E	0,00	B	0,00	C	0,00	F	0,00	Amount aerosol in gram
Effective ext. agent per unit	12,0	14,0	24,4	24,8	47,2	48,0	61,0	118,0	330,0	756,0	1.200,0	1.830,0	2.520,0	3.363,0	
Number of units, Class A&E	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Number of units, Class B	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Number of units, Class C	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Number of units, Class F	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Number of units Design															

Room name/no.															
To protect m³		Length		Width		Height		Bruto m³		0,00		% of filling			
Fire Class / m³		120		120		120		120		120		0%			
Total effect. per m³		A & E		B		C		F		120		0			
Amount of grams															
Type unit	FP-20E	FP-20T	FP-40E	FP-40T	FP-80E	FP-80T	A & E	0,00	B	0,00	C	0,00	F	0,00	Amount aerosol in gram
Effective ext. agent per unit	12,0	14,0	24,4	24,8	47,2	48,0	61,0	118,0	330,0	756,0	1.200,0	1.830,0	2.520,0	3.363,0	
Number of units, Class A&E	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,
Number of units, Class B	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,
Number of units, Class C	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,
Number of units, Class F	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,
Number of units, Design															

Type unit	FP-20E	FP-20T	FP-40E	FP-40T	FP-80E	FP-80T	FP-100	FP-200	FP-500	FP-1200	FP-2000	FP-3000	FP-4200	FP-5700	Total units
Total Number of units	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



MSC 1/Circ. 1270, chapter 11.

The quantity of extinguishing agent for the protected space should be calculated at the minimum expected ambient temperature using the design density based on the net volume of the protected space, including the casing.

MSC 1/Circ. 1270, chapter 11.2.

When calculating the net volume of a protected space, the net volume should include the volume of the bilge, the volume of the casing and the volume of free air contained in air receivers that in the event of a fire may be released into the protected space.

MSC 1/Circ. 1270, chapter 11.3.

The objects that occupy volume in the protected space should be subtracted from the gross volume of the space. They include, but are not necessarily limited to:

1. auxiliary machinery
2. boilers
3. condensers
4. evaporators
5. main engines
6. reduction gears
7. tanks
8. trunks

MSC 1/Circ. 1270, chapter 11.3.

Subsequent modifications to the protected space that alter the net volume of the space should require the quantity of extinguishing agent to be adjusted to meet the requirements of this paragraph and paragraphs 10.1, 10.2, 10.3, 10.4, 12.2, 12.3, 12.4 and 12.5.



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Laurens Janszn. Costerstraat 13b
3261LH, Oud-Beijerland, The Netherlands
+31 (0)186-699600 / info@firepro.nl / www.firepro.nl