



# CERTIFICATE

SC1273-13

## Fire suppression system for engine compartment

### Holder/Issued to/Manufacturer

Fogmaker International AB, Box 8005, SE-350 08 VÄXJÖ, Sweden

### Product and product name

Fire suppression system, Fogmaker

### Type

Water based fire suppression system

Extinguishing agents:

- Temper S and 3% AFFF
- H2O and 1% AFFF

### Technical data/Performance/Classification

See appendix to this certificate

### Certificate

The product described above fulfils the requirements in SP's Certification rules regarding Fire suppression systems in engine compartments of buses and coaches, SPCR 183. The certification is based on the manufacturer's technical file and type tests performed in accordance with standards specified in the appendix to this certificate.

### Marking

Marking shall show the number of this certificate, the name of the product, its serial number, the name of the manufacturer and SP's p-symbol. See appendix.

### Validity

This certificate is valid until not longer than 26<sup>th</sup> May 2019.

### Miscellaneous

The manufacturer's in-house inspection is under surveillance by SP in accordance with section 4 and 5 of SPCR 183. Other terms and conditions are set out in section 6 of SPCR 183.

This is the second, extended, issue of this certificate. The original certificate was issued on 26<sup>th</sup> May 2014.

### SP Technical Research Institute of Sweden Certification

Anders Sjelvgren

Lennart Aronsson



Certificate no SC1273-13, issue 2, 19<sup>th</sup> September 2016

### SP Technical Research Institute of Sweden

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## Appendix

### Product information

#### Technical data of the tested suppression system

Table 1a-1d shows technical data of the suppression systems tested for 4 m<sup>3</sup> engine compartment volume. The systems may be scaled to fit the size of a specific engine compartment according to the scaling rules in SPCR 183.

**Table 1a. Technical data of the tested Fogmaker fire suppression system with 13 nozzles and an agent container pressurized to 105 bar.**

<b>Suppression agent:</b>	Temper S and 3% AFFF
<b>Suppression agent volume and mass:</b>	10.5 litre / 12.2 kg
<b>Propellant gas:</b>	Nitrogen
<b>Mass of propellant gas:</b>	262 g
<b>Pressure in agent container:</b>	105 bar (at +20 ° C)
<b>Suppression agent delivery hoses:</b>	Two ¼" hoses of 2.3 m and 1.0 m
<b>Number of nozzles:</b>	13
<b>Type of nozzles:</b>	10 hollow cone nozzles (1.2 litre/min) 3 hollow cone nozzles (3.5 litre/min).
<b>Distance to the most remote nozzle</b>	3.75 meter

**Table 1b. Technical data of the tested Fogmaker fire suppression system with 14 nozzles and an agent container pressurized to 65 bar.**

<b>Suppression agent:</b>	Temper S and 3% AFFF
<b>Suppression agent volume and mass:</b>	9.3 litre / 11.3 kg
<b>Propellant gas:</b>	Nitrogen
<b>Mass of propellant gas:</b>	238 g
<b>Pressure in agent container:</b>	65 bar (at +20 ° C)
<b>Suppression agent delivery hoses:</b>	Two ¼" hoses of 2.3 m and 1.0 m
<b>Number of nozzles:</b>	14
<b>Type of nozzles:</b>	10 hollow cone nozzles (1.2 litre/min) 4 hollow cone nozzles (3.5 litre/min).
<b>Distance to the most remote nozzle</b>	3.75 meter

Certificate no SC1273-13, issue 2, 19<sup>th</sup> September 2016




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## Appendix

**Table 1c. Technical data of the tested Fogmaker fire suppression system with 13 nozzles and an agent container pressurized to 65 bar.**

<b>Suppression agent:</b>	Temper S and 3% AFFF
<b>Suppression agent volume and mass:</b>	9.3 litre / 11.3 kg
<b>Propellant gas:</b>	Nitrogen
<b>Mass of propellant gas:</b>	238 g
<b>Pressure in agent container:</b>	65 bar (at +20 ° C)
<b>Suppression agent delivery hoses:</b>	Two ¼" hoses of 2.3 m and 1.0 m
<b>Number of nozzles:</b>	13
<b>Type of nozzles:</b>	9 hollow cone nozzles (1.2 litre/min) 4 hollow cone nozzles (3.5 litre/min).
<b>Distance to the most remote nozzle</b>	3.75 meter

**Table 1d. Technical data of the tested fire suppression system with 15 nozzles and an agent container pressurized to 105 bar.**

<b>Suppression agent:</b>	H <sub>2</sub> O and 1% AFFF
<b>Suppression agent volume and mass:</b>	12.6 liter / 12.2 kg
<b>Propellant gas:</b>	Nitrogen
<b>Mass of propellant gas:</b>	262 g
<b>Pressure in agent container:</b>	105 bar (at +20 ° C)
<b>Suppression agent delivery hoses:</b>	Two ¼" hoses of 2 m each
<b>Number of nozzles:</b>	15
<b>Type of nozzles:</b>	9 hollow cone nozzles (1.2 litre/min) 6 hollow cone nozzles (3.5 litre/min).
<b>Distance to the most remote nozzle</b>	4.00 meter

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## Appendix

### Performance - Tested fire scenarios according to SP Method 4912

A summary of the results can be found in Table 2a-2d. The test numbers refer to SP Method 4912. More information about the tests is shown in the test reports. The sign (-) indicates that the test has not been used as a basis for this approval.

**Table 2a. Fogmaker fire suppression system with 13 nozzles and an agent container pressurized to 105 bar. Suppression agent: Temper S and 3% AFFF**

Test	Air flow	Test scenario category	Result
1	0 m <sup>3</sup> /s	High fire load test Minimum operating temp. test T <sub>min</sub> = -30 °C	Pass
2	0 m <sup>3</sup> /s	Low fire load test	Pass*
3	0 m <sup>3</sup> /s	Hidden fire test	-
4	0.5 m <sup>3</sup> /s	Class A-fire test	Pass
5	1.5 m <sup>3</sup> /s	High fire load test	Pass
6	1.5 m <sup>3</sup> /s	Low fire load test	Pass*
7	1.5 m <sup>3</sup> /s	Hidden fire test	-
8	3 m <sup>3</sup> /s	High fire load test	-
9	3 m <sup>3</sup> /s	Low fire load test	Pass*
10	3 m <sup>3</sup> /s	Hidden fire test	-
11	0 m <sup>3</sup> /s	Hot surface re-ignition	No re-ignition

\* Passed with an amount of agent reduced by (1/1.2) compared to the ordinary amount of agent.

**Table 2b. Fogmaker fire suppression system with 14 nozzles and an agent container pressurized to 65 bar. Suppression agent: Temper S and 3% AFFF**

Test	Air flow	Test scenario category	Result
1	0 m <sup>3</sup> /s	High fire load test Minimum operating temp. test T <sub>min</sub> = -30 °C	Pass
2	0 m <sup>3</sup> /s	Low fire load test	Pass*
3	0 m <sup>3</sup> /s	Hidden fire test	Pass
4	0.5 m <sup>3</sup> /s	Class A-fire test	Pass
5	1.5 m <sup>3</sup> /s	High fire load test	Pass
6	1.5 m <sup>3</sup> /s	Low fire load test	Pass*
7	1.5 m <sup>3</sup> /s	Hidden fire test	-
8	3 m <sup>3</sup> /s	High fire load test	-
9	3 m <sup>3</sup> /s	Low fire load test	Pass*
10	3 m <sup>3</sup> /s	Hidden fire test	-
11	0 m <sup>3</sup> /s	Hot surface re-ignition	No re-ignition

\* Passed with an amount of agent reduced by (1/1.2) compared to the ordinary amount of agent.

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**Table 2c. Fogmaker fire suppression system with 13 nozzles and an agent container pressurized to 65 bar. Suppression agent: Temper S and 3% AFFF**

Test	Air flow	Test scenario category	Result
1	0 m <sup>3</sup> /s	High fire load test Minimum operating temp. test T <sub>min</sub> = -30 °C	Pass
2	0 m <sup>3</sup> /s	Low fire load test	Pass*
3	0 m <sup>3</sup> /s	Hidden fire test	-
4	0.5 m <sup>3</sup> /s	Class A-fire test	Pass
5	1.5 m <sup>3</sup> /s	High fire load test	Pass
6	1.5 m <sup>3</sup> /s	Low fire load test	Pass*
7	1.5 m <sup>3</sup> /s	Hidden fire test	-
8	3 m <sup>3</sup> /s	High fire load test	-
9	3 m <sup>3</sup> /s	Low fire load test	Pass*
10	3 m <sup>3</sup> /s	Hidden fire test	-
11	0 m <sup>3</sup> /s	Hot surface re-ignition	No re-ignition

\* Passed with an amount of agent reduced by (1/1.2) compared to the ordinary amount of agent.

**Table 2d. Fogmaker fire suppression system with 15 nozzles and an agent container pressurized to 105 bar. Suppression agent: H<sub>2</sub>O and 1% AFFF**

Test	Air flow	Test scenario category	Result
1	0 m <sup>3</sup> /s	High fire load test Minimum operating temp. test T <sub>min</sub> = 0°C	Pass
1	0 m <sup>3</sup> /s	High fire load test Minimum operating temp. test T <sub>min</sub> = 0°C	Pass
2	0 m <sup>3</sup> /s	Low fire load test	Pass*
3	0 m <sup>3</sup> /s	Hidden fire test	-
4	0.5 m <sup>3</sup> /s	Class A-fire test	Pass
5	1.5 m <sup>3</sup> /s	High fire load test	Pass
6	1.5 m <sup>3</sup> /s	Low fire load test	Pass*
7	1.5 m <sup>3</sup> /s	Hidden fire test	-
8	3 m <sup>3</sup> /s	High fire load test	-
9	3 m <sup>3</sup> /s	Low fire load test	Pass*
10	3 m <sup>3</sup> /s	Hidden fire test	-
11	0 m <sup>3</sup> /s	Hot surface re-ignition	No re-ignition

\* Passed with an amount of agent reduced by (1/1.2) compared to the ordinary amount of agent.

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## Appendix

### Component tests

In addition to fire tests components in the fire suppression system need to be verified and tested through international standards as specified below.

**Table 3.**

Property	Standard	Result
Mechanical stress resistance (vibration and shock)	ISO 16750-3:2007 (Test VII)	Pass
Corrosion resistance	ISO 21207, test method B (3 cycles)	Pass

### Conditions

Electrical equipment included in the system shall have a classification of at least IP65, and tested in accordance with IEC 60529:1989/A1:2009/COR3:2009.

A risk assessment in accordance with SPCR 183 section 3.2 shall be made prior to equipment being placed into service. The risk assessment shall be made by personnel having documented experience for the task.

It is the responsibility of the suppression system manufacturer to assure compliance of its suppression system components with legal requirements and vehicle manufacturer requirements.

The marking of the product shall be legible and durable and be placed adjacent to the engine compartment and be designed as below. The size of the sign shall be 40 x 60 mm.



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