CERTIFICATE

Product certificate
K-0218375/01

Issued *2024-06-05*

Replaces *N/A*

NAFFCO - Non-Pressurized Condensed Aerosol Generators and Components

STATEMENT BY KIWA
With this product certificate, issued in accordance with the Kiwa Regulations for Certification, Kiwa declares that legitimate confidence exists that the products supplied by

National Fire Fighting MFG FZO

as specified in this product certificate and marked with the Kiwa®-mark in the manner as indicated in this product certificate may, on delivery, be relied upon to comply with Kiwa Product Certification Scheme BRL-K23001/06 “for non-pressurized condensed aerosol generators and components used in fixed fire extinguishing systems” of September 2th, 2020.

Ron Scheepers
Kiwa

Publication of this certificate is allowed.
Advice: consult www.kiwa.nl in order to ensure that this certificate is still valid.

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Certification process consists of initial and regular assessment of:
- **quality system**
- **product**

Technical specification & Approval

The Kiwa Product Certification Scheme K23001/06 "for non-pressurized condensed aerosol generators and components used in fixed fire extinguishing systems" of September 2th, 2020 is based on the following standards:

- EN15276-1 Fixed fire fighting systems – Condensed aerosol extinguishing systems - Part 1: Requirements and test methods for components;
- ISO 15779 Condensed aerosol fire extinguishing systems - Requirements and test methods for components and system design, installation and maintenance - General requirements.

The following Aerosol non-pressurized generators belong to this product declaration.
E - Built-in starter T - Built-in thermocord S - Screw-in starter

Type	Housing Red coated steel	Activation
NF-ARS 09S	Cylindrical, axial	Electrical
NF-ARS 32S	Cylindrical, axial	Electrical
NF-ARS 241	Cylindrical, axial	Electrical
NF-ARS 11ET	Disk, radial, double shaped plate	Electrical
NF-ARS 12ET	Disk, radial, double shaped plate	Electrical
NF-ARS 13ET	Disk, radial, double shaped plate	Electrical
NF-ARS 14E	Disk, radial, double shaped plate	Electrical
NF-ARS 15S	Disk, radial, double shaped plate	Electrical
NF-ARS 16S	Disk, radial, double shaped plate	Electrical
NF-ARS 17E	Disk, axial, double shaped plate	Electrical
NF-ARS 20E / NF-ARS 25T	Disk, radial, single shaped plate	Electrical or Thermal cord
NF-ARS 22E / NF-ARS 26T	Disk, radial, single shaped plate	Electrical or Thermal cord
NF-ARS 22E / NF-ARS 27T	Disk, radial, single shaped plate	Electrical or Thermal cord
NF-ARS 23E / NF-ARS 28T	Disk, radial, single shaped plate	Electrical or Thermal cord
NF-ARS 24T	Disk, radial, single shaped plate	Thermal cord

Type	Housing Aluminum	Activation
NF-ARS 902	Cylindrical, axial	Electrical
NF-ARS 452	Cylindrical, axial	Electrical

Application and use

It is important that the fire protection of a building or plant be considered as a whole. Condensed aerosol extinguishing systems form only a part, though an important part, of the available facilities, but it should not be assumed that their adoption necessarily removes the need to consider supplementary measures, such as the provision of portable fire extinguishers or other mobile appliances for first aid or emergency use, or to deal with special hazards.

Condensed aerosol extinguishants are an effective medium for the extinction of flammable liquid fires (Class B according to EN2), and ordinary Class A to EN2 hazards (solid surface burning fires), but it should not be forgotten, in the planning of comprehensive schemes, that there may be hazards for which these mediums are not suitable, or that in certain circumstances or situations there may be dangers in their use requiring special precautions. For Class C to EN2 (fires involving gases) is the extinguishing density also determined.

Advice on these matters can be obtained from the approved supplier of this manufacturer of the extinguishant and / or the extinguishing system according to scheme K23003. Information may also be sought from the appropriate fire authority, the health and safety authorities and insurers. In addition, reference should be made as necessary to other national standards and statutory regulations of the particular country.

It is essential that firefighting equipment be carefully maintained to ensure instant readiness when required. Routine maintenance is liable to be overlooked or given insufficient attention by the owner of the system. It is, however, neglected at peril to the lives of occupants of the premises and at the risk of crippling financial loss. The importance of maintenance cannot be too highly emphasized. Installation and maintenance should only be carried out by qualified personnel according to scheme K23003.

Inspection should include an evaluation that the extinguishing system continues to provide adequate protection for the risk (protected zones as well as state of the art can change over time).

Where aerosol generators are used in a potentially explosive application, the suitability of the generator to the atmosphere for the determined life shall be assessed.

Conditions for application

- The detail engineering and installation of the extinguishing system shall to be determined in conformity with the guidelines and calculation methods of the manufacturer.
- The user of the extinguishing system is instructed by an instructor for this system authorized by the supplier on behalf of the manufacturer.
- The detail engineering, installation and maintenance of the fire extinguishing components have to take place according to the specifications of the manufacturer, ISO15779, EN15276-2 and certification scheme K23003. The minimal density for the extinguishing systems shall be based on a Class A according to EN2 for the compatible wood crib according to ISO15779. For risk associated with deep seated fires shall be based on a Class A wood crib test according to EN15276-1.

Point of interest during use

The condensed aerosol extinguishing components should not be used on fires involving the following unless relevant testing by accredited testing laboratories has been carried out to the satisfaction of the Authority:

- Temperatures for use of aerosol extinguishing agents shall be within the supplier's listed limits.
- Local applications of condensed aerosol extinguishing systems are not covered by this product declaration. Local applications require a pre-engineered and pre-designed system which has been tested and approved for a specific application by an authority such as Kiwa or by an accredited testing laboratory.

Design Installation,& Operating Manual (DIOM)

At delivery the product should be accompanied by an operation manual in the English language, known and authorized by Kiwa. Following minimum items shall be described:

- Type of aerosol generators;
- Design application density in relation to Fire Class according to EN2 with a minimum based on Fire Class A (compatible wood crib);
- Description of occupancies and hazards to be protected against;
- Specification of aerosol generators;
- Equipment schedule or list of materials for each piece of equipment or device, showing device name; supplier, model or part number and description;
- System calculation;
- Enclosure pressurization and venting calculations;
- Description of fire detection, actuation and control systems.
- Requirements for inspection, maintenance and testing of an aerosol fire-extinguishing system and for the training of inspection and maintenance personnel.

For specific details regarding the (DIOM) Design Installation,& Operating Manual, see EN15276-1&2, ISO15779 & NFPA 2010.

Marking

The products should be marked with the Kiwa®-mark.

Place of the mark:

- On the generator

Required specifications:

- Name of the product and supplier
- Supplier's type designation
- Production date and serial number
- Mass of aerosol-forming compound
- Temperature range
- Storage humidity range
- Service life
- Distances as specified in table 5 of this certificate
- Reference to the application instructions
- Certification mark
- Class A according EN2
- Class B according EN2

Method of marking

- Non-erasable and non-detachable;
- Non-flammable;
- Permanent and legible

RECOMMENDATIONS FOR CUSTOMERS

Check at the time of delivery whether:

- the supplier has delivered in accordance with the agreement;
- the mark and the marking method are correct;
- the products show no visible defects as a result of transport etc.

If you should reject a product on the basis of the above, please contact:

- NAFFCO FZCO

and, if necessary,

- Kiwa Nederland B.V.

Consult the supplier's processing guidelines for the proper storage and transport methods.

Product specifications - Approval

Table 1 – pre burn time – soak time – density of the aerosol

Fire Class EN2	Listing Material / fuel	According EN 15276-1	Pre burn time in seconds	Soak period in seconds	Test room in m^3	Density in grams / m^3
A	Wood crib	A.6.1	120	600	101.3	116
A	Class A compatible wood crib test	A.6.4	120	600	101.3	79
A	Polymethylmethacrylate	A.6.3	210	600	112.12	97
A	Polypropylene	A.6.3	210	600	112.12	58
A	ABS	A.6.3	210	600	112.12	87
A	Reformed wood (chops)	A.6.4	360	600	112.12	29
A	MDF	A.6.4	360	600	112.12	59
A	Multilayers plywood	A.6.4	360	600	112.12	87
B	Heptane	A.6.2	30	600	112.12	34
C	Propane (30 Kilowatt)	A.6.5	30	600	106.16	31

Table 2 – Efficiency of the generator types

Type	Efficiency in %	Type	Efficiency in %	Type	Efficiency in %
NF-ARS 11ET	100	NF-ARS 09S	100	NF-ARS 241	100
NF-ARS 12ET	88 - 100	NF-ARS 32S	100	NF-ARS 902	100
NF-ARS 13ET	90 - 100	NF-ARS 20E / NF-ARS 25T	100	NF-ARS 452	98 - 100
NF-ARS 14E	100	NF-ARS 22E / NF-ARS 26T	100		
NF-ARS 15S	94 - 100	NF-ARS 22E / NF-ARS 27T	96 - 100		
NF-ARS 16S	100	NF-ARS 23E / NF-ARS 28T	100		
NF-ARS 17E	100	NF-ARS 24T	90 - 100		

Table 3 – Agent distribution of the generators

Type	Housing, type and discharge method	Agent distribution according EN 15276-1			
		Minimum height in m	Maximum area coverage in m	Maximum height in m	Maximum area coverage in m
NF-ARS 902	Cylinder, axial	0.50	2.00 x 2.00	2.00	0.50 x 2.00
NF-ARS 452	Cylinder, axial	0.50	2.00 x 1.00	1.00	0.50 x 1.00
NF-ARS 09S	Cylinder, axial	2.44	9.76 x 3.66	4.88	4.88 x 3.66
NF-ARS 09S	Cylinder, axial	2.44	9.76 x 3.66	4.88	4.88 x 3.66
NF-ARS 32S	Cylinder, axial	2.44	7.32 x 4.00	6.10	4.88 x 2.44
NF-ARS 241	Cylinder, axial	2.44	4.00 x 3.66	6.10	2.44 x 2.44
NF-ARS 11ET	Disk, radial	0.50	3.66 x 1.22	1.83	1.22 x 1.22
NF-ARS 12ET	Disk, radial	0.50	3.66 x 2.44	2.44	1.22 x 1.22
NF-ARS 13ET	Disk, radial	0.50	3.66 x 2.44	2.44	1.22 x 1.22
NF-ARS 14E	Disk, radial	1.22	3.66 x 3.66	3.05	1.83 x 1.83
NF-ARS 15S	Disk, radial	1.22	4.88 x 3.66	3.66	2.44 x 2.44
NF-ARS 16S	Disk, radial	1.22	7.32 x 3.66	3.66	2.44 x 2.44
NF-ARS 17E	Disk, axial	1.22	7.32 x 1.22	3.05	1.83 x 1.83
NF-ARS 20E / NF-ARS 25T	Disk, radial,	0.50	0.81 x 0.73		

NF-ARS 22E / NF-ARS 26T	Disk, radial,	0.50	0.81 x 1.60	0.80	0.81 x 0.74
NF-ARS 22E / NF-ARS 27T	Disk, radial,	0.80	0.81 x 1.49	1.99	0.81 x 0.86
NF-ARS 23E / NF-ARS 28T	Disk, radial,	1.60	0.81 x 1.99	1.99	0.81 x 1.60
NF-ARS 24T	Disk, radial,			0.53	0.25 x 0.59

Table 4 – Discharge time of the generators

Type	Discharge time In seconds	Type	Discharge time In seconds	Type	Discharge time In seconds
NF-ARS 11ET	6 - 10	NF-ARS 09S	67 - 89	NF-ARS 241	48 - 53
NF-ARS 12ET	9 - 15	NF-ARS 32S	48 - 58	NF-ARS 902	53 – 57
NF-ARS 13ET	14 - 26	NF-ARS 20E / NF-ARS 25T	9 - 11	NF-ARS 452	27 – 28
NF-ARS 14E	19 - 31	NF-ARS 22E / NF-ARS 26T	13 - 15		
NF-ARS 15S	40 - 60	NF-ARS 22E / NF-ARS 27T	9 - 11		
NF-ARS 16S	30 - 50	NF-ARS 23E / NF-ARS 28T	11 - 14		
NF-ARS 17E	30 - 50	NF-ARS 24T	5 - 7		

Table 5 – radiated heat of the generators

Type	Distance in m		
	75°C	200°C	400°C
NF-ARS 902	0.15	n/a	n/a
NF-ARS 452	0.15	n/a	n/a
NF-ARS 09S	1.5	0.75	0.15
NF-ARS 32S	3.0	1.0	0.10
NF-ARS 241	1.15	0.6	n/a
NF-ARS 11ET	0.5	0.15	0.05
NF-ARS 12ET	0.5	0.15	0.05
NF-ARS 13ET	0.5	0.15	0.05
NF-ARS 14E	1.0	0.25	0.15
NF-ARS 15S	1.0	0.25	0.15
NF-ARS 16S	1.5	0.35	0.15
NF-ARS 17E	1.5	0.50	0.10
NF-ARS 20E / NF-ARS 25T	0.08	0.03	0.01
NF-ARS 22E / NF-ARS 26T	0.15	0.08	0.02
NF-ARS 22E / NF-ARS 27T	0.25	0.10	0.03
NF-ARS 23E / NF-ARS 28T	0.30	0.15	0.05
NF-ARS 24T	0.08	0.03	0.01

Table 6

Listing	According EN 15276-1	Leakage to volume ratio	Hold Time	Test room	Density

EN2	Test		in %	in minutes	in m^3	in grams / m^3
B	Hold Time	A.7	0.10	10	101.3	78
B	Hold Time (optional)	A.7.1.5	0.10	30	101.3	78

Cross reference EN 15276-1, Fixed fire fighting systems - Condensed aerosol extinguishing systems - Part 1: Requirements and test methods for components - 2019

Chapter	Description	Demand [1)]	Result	Remarks and reference to relevant chapter, table(s) and tests (if available)
1.	Scope			
2.	Normative references			
3	Terms and definitions			
4	Component requirements			
4.1	Condensed aerosol generator	A	Pass	Drawings and product material specifications
4.2	Solid aerosol forming compound	A	Pass	Product material specifications – formula
4.3	Cooling mechanism	A	Pass	Drawings and product material specifications and function testing. See 5.11.
4.4.1	Ignition device	A	Pass	Drawings and product material specifications and function testing. See 5.12.
4.4.2	Electrical ignition device	A	Pass	
4.4.3	Thermal ignition device	A	Pass	Types 12: Thermal cord only tested for function
4.4.4	Other methods of ignition device	N/A		
4.5	End plate and housing	A	Pass	Drawings and product material specifications
4.6	Extinguishants	A	Pass	Product material specifications – formula
5.	Condensed aerosol generator requirements			
5.1	General Drawings; part lists; descriptions of function and operated instructions.	A	Pass	See 5.16 and 7.3 See table 2 See table 5
5.2	Extinguishing density Annex A	A	Pass	See 7.4 See table 1
5.3	Agent distribution	A	Pass	See 7.5 See table 3
5.4	Discharge time	A	Pass	See 7.14 See table 4
5.5	Ambient temperature and humidity operation ranges	A	Pass	See 7.6
5.6	Service life and service conditions	A	Pass	See 7.6 and 7.7
5.7	Shelf life and storage conditions	A	Pass	Manual
5.8	Corrosion	A	Pass	See 7.8 and 7.9
5.9	Vibration	A	Pass	See 7.10
5.10	Mechanical shock	A	Pass	See 7.11 and 7.14
5.11	Discharge temperature			
5.11.2	Casing temperature	A	Pass	See 7.14

Chapter	Description	Demand [1)]	Result	Remarks and reference to relevant chapter, table(s) and tests (if available)
5.11.3	Aerosol flow temperature	A	Pass	See 7.14 See table 5
5.12	Activation device			
5.12.2	Electrical ignition device	A	Pass	See 7.13
5.12.3	Thermal ignition device	A	Pass	See 7.14; Implemented Types 12: Thermal cord only tested for function; see 7.14 Rated temperature 182°C
5.13	Function reliability	A	Pass	See 7.14
5.14	Open fire conditions	A	Pass	See 7.15
5.15	Accessories – mounting brackets	A	Pass	See 7.8, 7.10 and 7.13.
5.16	Documentation; General description; Technical specification; Installation instructions; Operation instructions; Maintenance instructions; Safety Data Sheet	A	Pass	
6	Marking	A	Pass	K23001
7.	Test methods			
7.1	Conditions	A	Pass	
7.2	Samples	A	Pass	
7.3	Compliance	A	Pass	
7.4	Extinguishing density determination Annex A	A	Pass	See A6
7.5	Coverage determination Annex A	A	Pass	See A5 See table 3
7.6	Temperature and humidity operation range tests EN60068-2-30: 2005; 25 <> 55 °C at 95% with 10 cycles. Low temperature at -20 °C at 16 hours	A	Pass	Temperature limitations from -40 °C to +75°C and ambient humidity up to 95 %.
7.7	Accelerated ageing test 15 years; -10 <> 50°C one cycle at 8 hours; 50 cycles. Start and end at -10 °C	A	Pass	116 test days at 90 ºC = 15 years based on UL 2775
7.8	Corrosion test	A	Pass	
7.9	Stress corrosion test	A	Pass	Materials used in the construction are not susceptible to ammonia stress corrosion
7.10	Vibration test EN-IEC 60068-2-6: 2008	A	Pass	Acceleration amplitude for components which are designed to be attached to machinery according NEN-EN-IEC 60068-2-6 Type 8-1 and 8-1-60 only at 0,5G Acceleration amplitude for components which are designed to be attached to walls

Chapter	Description	Demand [1)]	Result	Remarks and reference to relevant chapter, table(s) and tests (if available)
7.11	Drop test	A	Pass	2 meter
7.12	Aerosol flow test	A	Pass	
7.13	Activation performance test	A	Pass	500 activation devices are tested of the electrical activation device. >20 activation devices are tested of thermal activation device
7.14	Function test			
7.14.1	Discharge time	A	Pass	See table 4
7.14.2	Aerosol flow temperature	A	Pass	See table 5
7.14.4	Casing temperature test	A	Pass	
7.14.5	Efficiency	A	Pass	See table 2
7.15	Fire exposure test	A	Pass	Tested with normal electrical ignition device only
Annex A	(normative) Extinguishing factor/coverage test procedure			
A5	Aerosol generator distribution verification tests			
A5.1	Minimum height/maximum coverage test	A	Pass	The following types were tested: • All See table 3
A5.2	Maximum height test	A	Pass	The following types were tested: • All See table 3
A6	Extinguishing factor tests			
A6.1	Wood crib test	A	Pass	See table 1
A6.2	n-Heptane pan test	A	Pass	See table 1
A6.3	Polymeric sheet fire test A6.3.2.2 Polymethyl methacrylate (PMMA); A6.3.2.2 Polypropylene, A6.3.2.2 Acrylonitrile-butadiene-styrene polymer (ABS)	A	Pass	See table 1
A6.4	Class A compatible wood crib test	A	Pass	See table 1
	Composite wood fire test according to K23001 Reformed wood (chops) both sides plastic lined MDF (Medium Density Fibreboards) according to EN 622 and EN 316 not lined Multilayers plywood (kiln spruce or fir) not lined	A	Pass	See table 1
A7	Hold time	A	Pass	See table 6

[1)] A = Applicable N/A = Not Applicable Not tested

Cross reference ISO 15779, Condensed aerosol fire extinguishing systems - Requirements and test methods for components and system design, installation and maintenance - General requirements (ISO 15779:2011,IDT), December 2011

Chapter	Description	Demand [1)]	Result	Remarks
Annex C	(normative) Test methods			
C2	Conditions	A	Pass	
C3	Samples	A	Pass	
C4	Compliance	A	Pass	
C5	Extinguishing application density determination			See D5
C6	Discharge time test			See C16
C7	Temperature and humidity operation range tests C7.1 Object of the test C7.2 Procedure C7.3 Low temperature test	A	Pass	Temperature limitations from -40 °C to +75°C and ambient humidity up to 95 %.
C8	Accelerated ageing test	A	Pass	116 test days at 90 ºC = 15 years based on UL 2775
C9	Corrosion test	A	Pass	
C10	Stress corrosion test	A	Pass	Materials used in the construction are not susceptible to ammonia stress corrosion.
C11	Vibration test	A	Pass	Acceleration amplitude for components which are designed to be attached to machinery according NEN-EN-IEC 60068-2-6 Type 8-1 and 8-1-60 only at 0,5G Acceleration amplitude for components which are designed to be attached to walls
C12	Impact test	A	Pass	
C13	Drop test	A	Pass	Drop test at 2 meters
C14	Casing and aerosol flow temperatures test C14.1 Casing temperatures test C14.2 Aerosol flow temperature test		Pass	See C.16.3 See C.16.2
C15	Ignition performance test	A	Pass	
C16	Function test	A	Pass	
C16.1	Discharge time	A	Pass	See table 4
C16.2	Aerosol flow temperatures	A	Pass	See table 5
C16.3	Casing temperature test	A	Pass	Manual
C16.4	Effective mass of extinguishant	A	Pass	See table 2
C16.5	Test procedure	A	Pass	
C16.6	Requirements	A	Pass	

Chapter	Description	Demand [1)]	Result	Remarks
C17	Fire exposure	A	Pass	
Annex D	(normative) Extinguishing application density/coverage test procedure			
D5	Aerosol generator distribution verification tests			
D5.1	Minimum height/maximum coverage test	A	Pass	The following types were tested: • All See table 3
D5.2	Maximum height test	A	Pass	The following types were tested: • All See table 3
D6	Extinguishing application density tests			
D6.1	Wood crib test	A	Pass	See table 1
D6.2	n-Heptane pan test	A	Pass	See table 1
D6.3	Polymeric sheet fire test D6.3.2.2 Polymethyl methacrylate (PMMA); D6.3.2.2 Polypropylene, D6.3.2.2 Acrylonitrile-butadiene-styrene polymer (ABS)	A	Pass	See table 1
D6.4	Class A compatible wood crib test	A	Pass	See table 1
D7	Test of the determination of the maximum leakage area/volume ratio	A	Pass	See table 1A

[1)] A = Applicable N/A = Not Applicable Not tested

Product specifications - Approval

Table 1

Fire Class	Listing	According ISO 15779	Pre burn time	Soak period	Test room	Density
EN2	Material / fuel		in seconds	in seconds	in m^3	in grams per m^3
A	Wood crib	D.6.1	120	600	101.3	116
A	Class A compatible wood crib test	D.6.4	120	600	101.3	79
A	Polymethylmethacrylate	D.6.3	210	600	112.12	97
A	Polypropylene	D.6.3	210	600	112.12	58
A	ABS	D.6.3	210	600	112.12	87
B	Heptane	D.6.2	30	30	112.12	34

Table 1A

Listing		According ISO 15779	Leakage to volume ratio	Hold Time	Test room	Density
EN2	Test		in %	in minutes	in m^3	in grams / m^3
B	Hold Time	D.7	0.10	30	101.3	78