CERTIFICATE

Product Certificate
K104668/03

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N2G Non-pressurized Nitrogen 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

N2 Global SIA

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 the international Kiwa TIC - scheme **BRL-K21045** "Fire protection Systems" dated [02-03-2020]
inclusive Specific Certification Program for condensed nitrogen extinguishing components for object protection dated [02-03-2020]

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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Kiwa Nederland B.V.
Sir Winston Churchilllaan 273
Postbus 70
2280 AB RIJSWIJK
The Netherlands
Tel. +31 88 998 44 00
info@kiwa.com
www.kiwa.nl
Office Zaltbommel
Dwarsweg 10
5301 KT Zaltbommel
The Netherlands
Tel. +31 88 9985100

Company
N2 GLOBAL SIA
Dzirnavu iela 68 K2
Riga, LV-1050, Latvia
Email. info@n2global.net
Tel. +371 29 838870
www.n2global.net

Factory
N2 GLOBAL Manufacturing
Kapsedes iela 2
Liepaja, LV-3414, Latvia
Email: info@n2global.net
Tel. +371 29 838870
www.n2global.net

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

N2G Non-pressurized Nitrogen Generators and Components

PRODUCT SPECIFICATION

The International Kiwa Testing, Inspection and Certification Scheme K21045/01 for “Fire Protection Systems” dated [02-03-2020] and Specific Certification Program for condensed nitrogen extinguishing components for object protection dated [02-03-2020].
The specific requirements and test protocol is based on elements of the following standard:
EN 15276-1; Fixed fire fighting systems – Condensed aerosol extinguishing systems - Part 1: Requirements and test methods for components.
ISO15779; Condensed aerosol fire extinguishing systems - Requirements and test methods for components and system design, installation and maintenance - General requirements;
EN15004-1; Fixed firefighting systems - Gas extinguishing systems - Part 1: Design, installation and maintenance (ISO 14520-1:2006, modified);
EN15004-8; Fixed firefighting systems - Gas extinguishing systems - Part 8: Physical properties and system design of gas extinguishing systems for IG-100 extinguishant.

The following Nitrogen (N2) Generators belong to this product declaration.

Type	Housing	Activation; bridge resistance (Ohms)	Activation; all fire current (Ampere)	N2 generating compound, not less than
N2G Type 10,5	Box stainless steel	Electrical 0,8 – 0,9 Ω	Electrical 1,35A (10ms)	10,815 kg
N2G Type 5,0	Box stainless steel	Electrical 0,8 – 0,9 Ω	Electrical 1,35A (10ms)	5,15 kg
N2G Type 2,5	Box stainless steel	Electrical 0,8 – 0,9 Ω	Electrical 1,35A (10ms)	2,575 kg
N2G Type 1,5	Box stainless steel	Electrical 0,8 – 0,9 Ω	Electrical 1,35A (10ms)	1,545 kg
N2G Type 1,0	Box stainless steel	Electrical 0,8 – 0,9 Ω	Electrical 1,35A (10ms)	1,03 kg
N2G Type 0,5	Box stainless steel	Electrical 0,8 – 0,9 Ω	Electrical 1,35A (10ms)	0,515 kg

Table A - Non-pressurized generators N2G.

Application and use

It is important that the fire protection of a building or plant be considered as a whole. Condensed N2 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 nitrogen extinguishants are an effective medium for the extinction of flammable liquid fires (Class B according to EN2; fires involving liquids or liquefiable solids), and ordinary Class A to EN2 hazards (fired involving solid materials, usually of an organic nature, in which combustion normally takes places with the formation of glowing embers), 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 K21045. 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 K21045.

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 condensed nitrogen extinguishing components are used in a potentially explosive application, the suitability of the generator to the atmosphere for the determined life shall be assessed.

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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 and certification scheme K21045. 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.
The minimal design density/ design concentration for the extinguishing systems shall be based on a following table:

Fire Classes EN2	Description	Extinguishing application factor, N2 generating compound (kg/m^3)	Extinguishing concentration % by volume, at 20 ^0C	Safety Factor	Design application factor, N2 generating compound (kg/m^3)	Design concentration % by volume, at 20 ^0C	Nitrogen weight (IG-100), application density, kg/m3
A	Ordinary combustibles	0,967	34,86	1,3	1,257	45,32	0,52794
B	Flammable liquids	1,0314	37,19	1,3	1,341	48,35	0,56322
C	Flammable gases	1,1604	41,84	1,3	1,508	54,39	0,63336

Table B – Extinguishing- & application densities N2G

Point of interest during use

The condensed nitrogen 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:
Nitrogen shall not be used on fires involving the following unless relevant testing has been carried out to the satisfaction of the authority:
a. Class A materials that burn with deep-seated characteristics;
b. Chemicals containing their own supply of oxygen, such as cellulose nitrate;
c. Mixtures containing oxidizing materials, such as sodium chlorate or sodium nitrate;
d. Chemicals capable of undergoing auto-thermal decomposition, such as some organic peroxides;
e. Oxidizing agents such as nitric oxides and fluorine;
f. Pyrophoric materials such as white phosphorous or metallo-organic compounds
The above list may not be exhaustive.

Under certain conditions the potential for explosive atmospheres may exist.
Areas where such potential may exist are classified as hazardous.
Nitrogen generators may be used in hazardous areas subject to the manufacturer obtaining the specific listings and approvals for such areas from the appropriate authorities.

Temperatures for use of N2 extinguishing agents shall be within the supplier's listed limits.

Design, Installation and Operation Manual

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 N2 generators;
- Design application density in relation to Fire Class according to EN2 with a minimum based on Fire Class B (N-heptane test);
- Description of occupancies and hazards to be protected against;
- Specification of N2 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 fire-extinguishing system and for the training of inspection and maintenance personnel.

For specific details regarding the owner's manual, see scheme K21045 and the Specific Certification Program.

Marking

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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 N2 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
- Class C according EN2

Method of marking
- Non-erasable and non-detachable;
- Non-flammable;
- Permanent an 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:
- N2 Global SIA

and, if necessary,
- Kiwa Nederland B.V.

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

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Product specifications

Table 1 – pre burn time – soak time – density of N2

Fire Class	Listing	According K21045 SCP01	Pre burn time	Soak period	Test room	Density or concentration
EN2	Material / fuel		in seconds	in seconds	in m^3	Volume %
A	Wood crib	Y	120	600	36.35	34.86
A	Class A compatible wood crib	Y	120	600	36.35	34.86
A	Polymethylmethacrylate	Y	210	600	36.35	32.54
A	Polypropylene	Y	210	600	36.35	32.54
B	Heptane	Y	30	30	36.35	37.19
C	Propane (30 Kilowatt)	Y	30	600	36.35	41.84

Table 2 – Efficiency of the generator types

Type of generator	Efficiency in %	Weight of discharged N2 (IG-100), kg	Volume of discharged N2, m3, at 20^0C
N2G Type 10,5	42	4,542	3,899
N2G Type 5,0	42	2,163	1,857
N2G Type 2,5	42	1,082	0,928
N2G Type 1,5	42	0,649	0,557
N2G Type 1,0	42	0,433	0,371
N2G Type 0,5	42	0,216	0,186

Table 3 – Agent distribution of the generators

Type of generator	Agent distribution according EN 15276-1			
	Minimum height in m	Maximum area coverage in m	Maximum height in m	Maximum area coverage in m
N2G Type 10,5	1,31	4,0 x 2,01	4,0	2,01 x 1,31
N2G Type 5,0	0,96	4,0 x 1,31	4,0	1,31 x 0,96
N2G Type 2,5	0,81	3,003 x 1.036	3,003	1,036 x 0,81
N2G Type 1,5	0,63	2,0 x 1,2	2,0	1,2 x 0,63
N2G Type 1,0	0,42	2,0 x 1,2	2,0	1,2 x 0,42
N2G Type 0,5	0,31	1,4 x 1,2	1,4	1,2 x 0,31

Table 4 – Discharge time of the generators

Type of generator	Discharge time In seconds
N2G Type 10,5	14
N2G Type 5,0	12
N2G Type 2,5	12
N2G Type 1,5	10
N2G Type 1,0	8
N2G Type 0,5	5

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Table 5 – radiated heat of the generators

Type of generator	Distance in mm			#Outer casing Max in °C
	75°C	200°C	400°C	
N2G Type 10,5	Outlet gas less than 75°C	N/A	N/A	130
N2G Type 5,0	Outlet gas less than 75°C	N/A	N/A	130
N2G Type 2,5	Outlet gas less than 75°C	N/A	N/A	220
N2G Type 1,5	Outlet gas less than 75°C	N/A	N/A	220
N2G Type 1,0	Outlet gas less than 75°C	N/A	N/A	185
N2G Type 0,5	Outlet gas less than 75°C	N/A	N/A	140

The outer casing temperature reach maximum temperature 15 to 30 minutes after discharge.

Table 6 – hold time

Listing		According	Leakage to volume ratio	Hold Time	Test room	Density or concentration
EN2	Determination of the maximum leakage area/volume ratio	K21045 SCP01	in %	in minutes	in m^3	Volume %
B	Hold Time	5.1.21	0,06	10 (13 min. determined)	36.35	37.19

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Cross reference Specific Certification Program 01 of TIC scheme K21045 for the Kiwa product certificate for nitrogen extinguishing generators for object protection.

Chapter	Description	Required [1)]	Result	Remarks and reference to relevant chapter, table(s) and tests (if available)
5.	Condensed nitrogen generator requirements			
5.1.1	Chemical stability of the fire extinguishing agent and extinguishing performance	A	Pass	EN15004-8; 4
5.1.2	Function test (discharge/flow temperature/casing/efficiency)	A	Pass	See table 2, 4 and 5
5.1.3	Low temperature test	A	Pass	EN15726-1; 7.6
5.1.4	Auto activation of non-electrical thermal activation device	A	Pass	EN15726-1; 7.13
5.1.5	Temperature and humidity operation range test	A	Pass	EN15726-1; 7.6
5.1.6	Accelerated ageing test	A	Pass	EN15726-1; 7.7
5.1.7	Corrosion test (Salt Spray)	A	Pass	EN15726-1; 7.8
5.1.8	Stress corrosion test	A	Pass	EN15726-1; 7.9
5.1.9	Mounting bracket test	A	Pass	Kiwa specification
5.1.10	Vibration test	A	Pass	EN15726-1; 7.10
5.1.11	Drop test	A	Pass	EN15726-1; 7.11
5.1.12	Activation performance test	A	Pass	EN15726-1; 7.13
5.1.13	Fire exposure test	A	Pass	EN15726-1; 7.15
5.1.14	General extinguishing requirements, reduced dimensions	A	Pass	See table 1
5.1.15	Minimum height / maximum coverage test	A	Pass	See table 3; EN15726-1; A.5.1
5.1.16	Maximum height test	A	Pass	See table 3; EN15726-1; A.5.2
5.1.17	Wood crib test, reduced dimensions	A	Pass	See table 1
5.1.18	N-Heptane pan test, reduced dimensions	A	Pass	See table 1
5.1.19	Polymeric sheet fire test, reduced dimensions (room only)	A	Pass	See table 1
5.1.20	Class A Compatible Wood Crib Test, reduced dimensions	A	Pass	See table 1
5.1.21	Composite wood fire test	NA		
5.1.22	Test of the determination of the maximum leakage area/volume ratio	A	Pass	See table 6; EN15726-1; A.5.7
5.1.23	Nitrogen Generator - Explosive Atmosphere Test	NA		
5.1.24	EN2, Class C, fires gas	A	Pass	See table 1; Kiwa specification

[1)] A = Applicable NA = Not Applicable Not tested