





FIREX
Fire Kloud Aerosol Generators
FKa 20 ÷ FKa 800
Extinguishing Test
Evaluation Report

Document Code	**2017QTL84 RV_FIREX_001**			
Work number ***Contract number***	*2017/DG/PF/176* *2017QTL84*		***Customer***	FIREX TECNOLOGIE ANTINCENDIO
Revision	***Date***	***Prepared by***	***Approved by***	***Authorised by***
2.0	*05/02/2021*	*Fabio Polidori* *Chiara Astengo*	*José M. Cerruto*	RINA Services S.p.A. *Francesco Manca*

Revisions

Revision	***Date***	***Description***	***Prepared by***	***Approved by***	***Authorised by***
2.0	05/02/21	Extension to vertical compartments. Added EN 15276. Brand update. Added FKa 800 model.	F. Polidori C. Astengo	J. M. Cerruto	F. Manca
1.0	21/02/18	First issue	F. Polidori	J. M. Cerruto	F. Manca

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1 Scope of the document

The purpose of this document is the evaluation of the results of the extinguishing tests for technical areas of railway vehicles of the Aerosol system:

- FIREX **Fire Kloud FKa 20 RF, FKa 200 RF** described in §4

performed by the LS Fire Testing Institute Laboratory and reported in the reports at §2.2, in accordance with the provisions of UNI 11565:2016 §10.4.2.

Update note, rev. 2.0 of this report: in addition to the tests carried out by the LS Fire Testing Institute Laboratory, related only to horizontal technical compartments, further extinguishing tests for vertical technical areas were carried out at the FIREX production site with RINA witnessing.

It should also be noted that the *FirePro System FPa* brand, used in the first phase, was then replaced by the *Fire Kloud FKa* brand, without making any construction changes to the generators themselves. However, references to the previous brand may be present within this Evaluation Report.

The evaluation is carried out by RINA Services S.p.A. as a Third Part Assessor.

2 Documentation

2.1 Reference standards

[1] UNI 11565, "Rail vehicles - Design, installation, validation and maintenance of fire detection and extinguishing systems to be used in railway vehicles – General principles", June 2016.

[2] ISO 15779, "Condensed aerosol fire extinguishing systems – Requirements and test methods for components and system design, installation and maintenance – General requirements", 2011.

[3] ARGE Guideline – Part 2 "Fire-fighting in Rolling Stock – Functional assessment procedure for the effectiveness of firefighting systems in rooms accessible to persons, in electrical cabinets and in areas of combustion engines – Guideline/Inspection Procedure", rev. 3.0.

[4] UNI EN 15276-1, "Fixed fire-fighting systems – Condensed aerosol extinguishing systems – Part 1: Requirements and test methods for components", 2019.

[5] UNI EN 15276-2, "Fixed fire-fighting systems – Condensed aerosol extinguishing systems – Part 2: Design, installation and maintenance", 2019.

2.2 *Documents reviewed*

[6] RINA, 2017QTL84 NTC_FIREX_001 "Technical Note – PDP 1704-D15779 rev. 03 – Extinguishing test procedure", rev. 4.0 of 29/12/2017;

[7] FIREX, PDP 1704-D15779 R03, Test protocol for the verification of the extinguishing coefficient of the Firepro System aerosol generators Models FPa 20, FPa 50, FPa 100, FPa 200, FPa 400, rev. 03 of 15/12/2017;

[8] FIREX, PDP 2006–A15276 R02, Test protocol for the verification of the extinguishing coefficient of the Fire Kloud Aerosol Generators Models FKa 20, FKa 50, FKa 100, FKa 200, FKa 400 in technical compartments for railway applications, rev. 02 of 14/10/2020;

[9] L.S. Fire Testing Institute, Test Report NC 08773 "Aerosol Firepro System – FPa 200 RF", of 18/01/2018;

[10] L.S. Fire Testing Institute, Test Report NC 08774 "Aerosol Firepro System – FPa 20 RF", of 18/01/2018;

[11] FIREX, REP 1801 R00, Test Report 08773 and 08774 – Analysis of the conclusions of the Firepro System aerosol generator test Models FPa 20, FPa 50, FPa 100, FPa 200, FPa 400, rev. 00 of 05/02/2018;

[12] FIREX, RDP 2040-A15276 R00, TEST REPORT - Verification of the extinguishing coefficient of Fire Kloud aerosol generators models FKa 20, FKa 50, FKa 100, FKa 200 FKa 400 in technical compartments for railway applications, rev. 00 of 04/12/2020.

2.3 *Reference Documents*

FKa 20 RF

[13] FIREX, Drawing no. F2101000 RQ-RF, Aerosol Generator FKa 20 RQ – FKa 20 RF, rev. 00 of 15/01/2020;

[14] FIREX, Technical data sheet FKa 20 – Model FKa 20 RF, rev. 00IT of 04/2020;

[15] FIREX, FKa 20 RF – Installation sheet – Installation, assembly and connection instructions, rev. 00IT of 01/2021;

FKa 200 RF

[16] FIREX, Drawing no. F2071000 R-RQ-RF, Aerosol Generator FKa 200 R – FKa 200 RQ – FKa 200 RF, rev. 00 of 15/01/2020;

[17] FIREX, Technical data sheet FKa 200 – Model FKa 200 RF, rev. 00IT of 04/2020;

[18] FIREX, FKa 200 RF – Installation sheet – Installation, assembly and connection instructions, rev. 00IT of 01/2021;

For other generators belonging to the FKa family (50-100-400-800) refer to the same product documentation.

2.4 Further documentation

[19] RINA, P0019412 RV_FIREX_001, FIREX – Fire Kloud Aerosol Generators – FKa 20 ÷ FKa 800 - Fka 1000 ÷ Fka 3000 – Extinguishing Test – Evaluation Report, *latest revision available*

3 Introduction

According to §10.4.2 of UNI11565, fire extinguishing systems intended for technical areas of railway vehicles shall comply with current standards which, for aerosol systems, are

- ISO 15779[2], as applicable;
- UNI EN 15276 [4]and[5], as applicable[1];
- ARGE Guideline – Part 2[3], as applicable.

The following should be noted:

– The ISO 15779 [2] and EN 15276-1 standards [4], in their test methods for determining the extinguishing coefficient, do not appear to be fully applicable to a system designed to protect confined technical compartments of railway vehicles (example: converter). Annex D of ISO 15779 and Annex A of EN 15276-1, intended for use in stationary installations, consider significantly higher test volumes.

– The ARGE Guideline – Part 2 [3], dedicated to the railway sector, does not constitute a complete and fully applicable reference in the test methods for an Aerosol extinguishing system, not fully identifiable as a gaseous agent.

For this reason, the test procedure used for the verification of the products object of the present assessment was developed by applying and adapting to the specific case what is applicable in the aforementioned regulations (ARGE – Part 2 §3.2, Annex D of ISO 15779, Annex A of EN 15276-1). RINA Service, on the basis of these reference standards, has previously approved the test procedure PDP 1704-D15779[7] with the issue of the evaluation note 2017QTL84 NTC_FIREX_001 [6] and the

[1]EN15276 [4][5] is not directly referred to by the current UNI11565:2016 since its emission by CEN is subsequent. However, given that it is to be classified as an European version (EN standard) of the International Standard (ISO) 15779, it is included in the legislation applicable in Italy.

test procedure PDP 2006-A15276 R02[8], almost similar to the previous one apart from the orientation – vertical rather than horizontal – of the tested volumes.

With reference to horizontal technical compartments, the L.S. Fire laboratory carried out the tests, in accordance with the approved procedure [7], on 19/12/2017 with RINA witnessing, with the issue of test reports NC 08773 [9] (200g generator [17]) and NC 08774 [10] (20g generator [15]).

With reference to vertical technical compartments, FIREX carried out the tests, in accordance with the approved procedure [8], on 13/10/2020 with RINA witnessing, with the issue of the test report RDP 2040-A15276 R00[12].

FIREX with document REP 18001 [11] provides a technical note about the results aimed also at extending them to the entire FKa product family.

Finally, it should be noted that the evaluation of conformity of the Aerosol generators in object with product specifications required by ISO 15779 (Annex C) and UNI EN 15276-1 (Par.7) is carried out in RINA Report 2017QTL84 RV_FIREX_002 (*latest revision available*).

4 Description of tested product

The FKa extinguishing system delivers condensed aerosol generated through the exothermic transformation of a solid compound placed inside a metal container, provided with holes for the delivery of the extinguishing product inside the protected volume (aerosol generator). Once released into the environment, the aerosol consists of a nebulisation of solid microparticles based on potassium carbonate suspended in inert gas. The extinguishing action is based on flooding of the protected volume and fire inhibition by binding, at molecular level, with the free radicals that support the combustion reaction (autocatalysis block) with consequent extinguishing of the fire. It does not work as a simple flooding system of the protected environment with action on the oxidiser. The extinguishing action is both physical – potassium carbonate attenuates the energy of the flame through the ionisation process to which it is subjected in the presence of fire (formation of K+ potassium radicals) – and chemical – through the formation of the stable compound KOH (subtracting the OH- radicals from the combustion reaction).

The transformation reaction of the solid compound into Aerosol is started through a pyrotechnic actuator activated by electric current (ignition current 0.7 A) generated by the fire detection and control system of the fire-fighting system. This last element is not included in this evaluation. In the railway version (FKa XXX RF) the electrical connection is declared compliant with EN 50264-2-2 and EN50200.

The aerosol generators covered by this report belong to the same product family FKa and are always composed by the metal body, the extinguishing mass and the electrical activator (FGG 15).

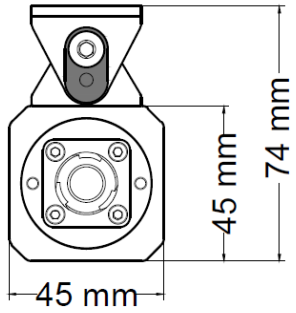
	FKa 20	FKa 50	FKa 100	FKa 200	FKa 400	FKa 800
Extinguishing mass [g]	20	50	100	200	400	800
Gross weight [g]	520±50	780±50	1110±50	1970±100	3080±100	6470±100
Dimensions [mm]	45x45x129	45x45x190	45x45x291	85x85x211	85x85x335	150x150x343
Activation	Electrical, 0.7 A	Electrical, 0.7 A	Electrical, 0.7 A	Electrical, 0.7 A	Electrical, 0.7 A	Electrical, 0.7 A
Delivery type	Lamellar directable	Lamellar directable	Lamellar directable	Lamellar directable	Lamellar directable	Lamellar directable

Table 1 – Fire Kloud aerosol generator characteristics

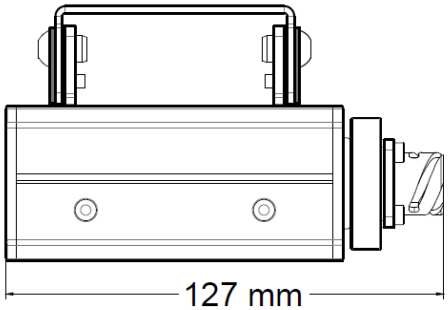
Two generators belonging to the FKa family were adopted to carry out the tests, namely FKa 20 and FKa 200, scaled with an order of magnitude 10 and designed to protect, with the use of a single generator, the minimum and maximum volumes normally found in technical compartments of railway vehicles.

FKa 20

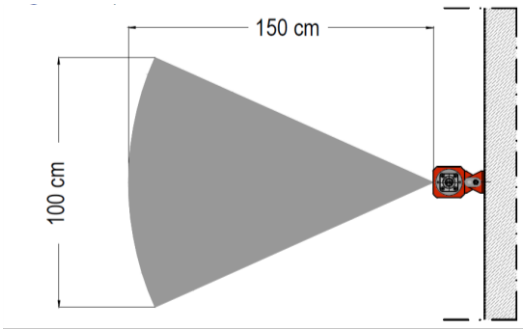
Maximum protected design volume **0.38**m³

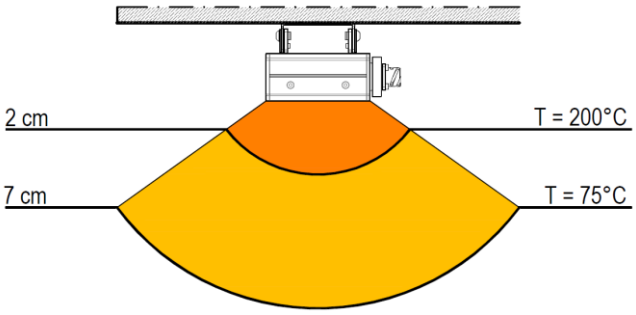


Vista Frontale



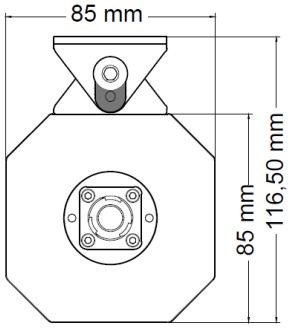
Vista Laterale



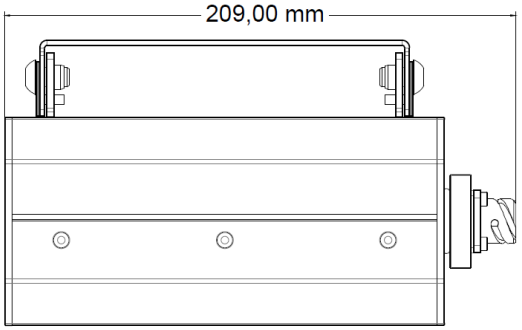


FKa 200

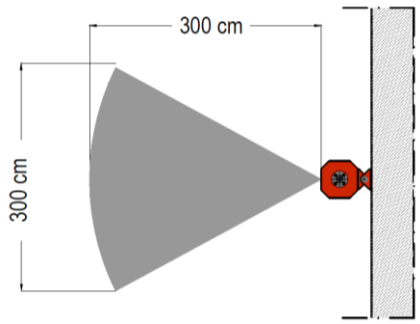
Maximum protected design volume **3.8**m³

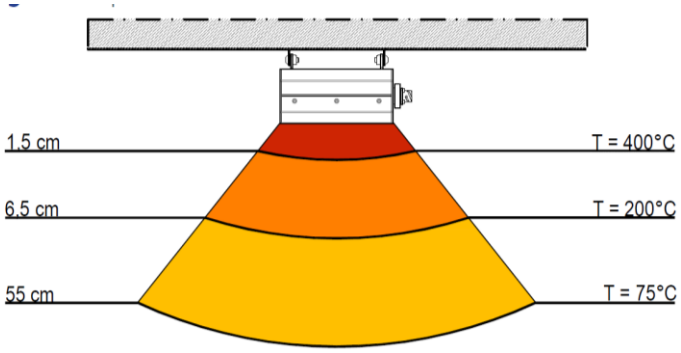


Vista Frontale



Vista Laterale





5 Evaluation of conformity

5.1 Test procedure

Reference:

Procedures: PDP 1704-D15779 R03[7], for horizontal technical compartments

PDP 2006–A15276 R02[8], for vertical technical compartments

Validation RINA 2017QTL84 NTC_FIREX_001 [6]

The test procedures include the execution of extinguishing tests in order to confirm the extinguishing coefficient and determining the coverage of the aerosol generator in accordance with ISO 15779 [2] and UNI EN 15276-1[4].

As explained above, considering the nature and application of the system in object, the procedures have been adapted by taking into account the applicable requirements of the ARGE Guideline. For details refer to validation document 2017QTL84 NTC_FIREX_001[6].

It is important to note the following:

- the fire scenario for the determination of the extinguishing coefficient was determined (with appropriate adaptations) from the ARGE Directive §3.2.3 *Application of electrical areas* (two ducts with 7 8mm FROR cables and a pre-burn time of 210 s through a basin containing 200 ml of n-heptane placed below).
- the test method for determining the extinguishing coefficient is determined, as applicable, from Annex D of ISO 15779 §D.6.2 and Annex A of EN 15276 §A.6.2 (closure of the test volume after the pre-burn phase, flame suppression within 30 s and no reignition after 5 minutes of immersion).
- with reference to horizontal technical compartments, test methods and fire scenario to verify the distribution of the aerosol generator derive directly from Annex D of ISO 15779 §D.5.1 and Annex A of EN 15276 §A.5.1, *Test at minimum height/maximum coverage*, with appropriate adaptations.
- with reference to vertical technical compartments, test methods and fire scenario to verify the distribution of the aerosol generator derive directly from Annex D of ISO 15779 §D.5.2 and Annex A of EN 15276 §A.5.2, *Test at maximum height/maximum coverage*, with appropriate adaptations.
- in order to keep the test extinguishing coefficient constant (see ISO 15779 and EN 15276) for the two tested generators, and taking into account the 76.9% reduction of it as required by the aforementioned standards, the tests were carries out in two separate volumes: FKa 20 @ 0.5 m^3 and FKa 200 @ 5m3.

- at the end of the validation process of the test procedures carried out by the DeBo in [6], the following emerges:
  - the tests carried out as per specification imply the following condition of use of the aerosol during operation: positioning of the extinguisher within the volume to be protected in the direction of the potential fire source;
  - test specifications appear consistent with the applicable regulatory framework.

For more details refer to reference documentation.

5.2 Evaluation of test results

5.2.1 Requirements

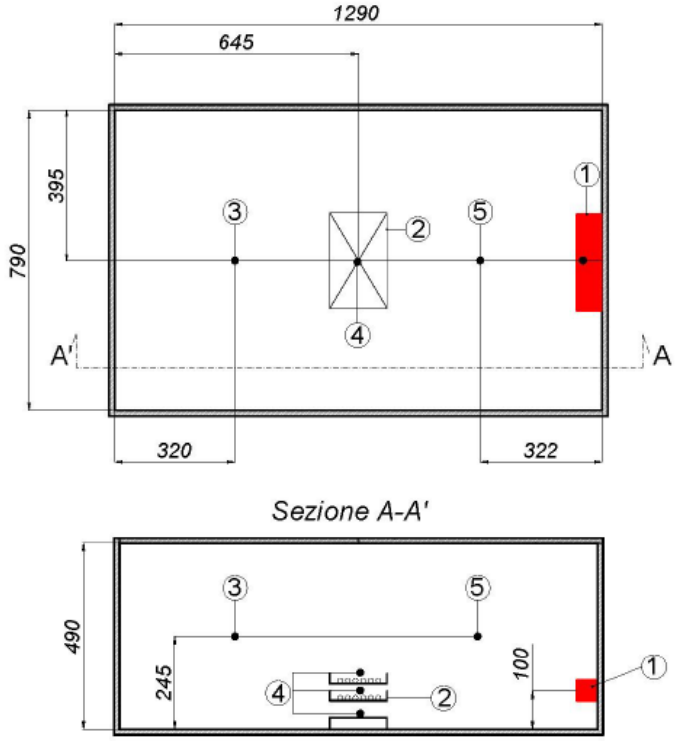
Requirements are reported in test procedures PDP 1704-D15779 R03 [7] and PDP 2006-A15276 R02 [8] and summarised below:

Type	Test volume	**Confirmation of the extinguishing coefficient** Fire scenario: Electric cables, 210s pre-burn with open compartment, compartment closure and manual extinguisher activation.	**Verification of Generator distribution** Fire scenario: 4 cans of n-heptane on 4 sides of the test volume, 30 s pre-burn with open compartment, compartment closure.
FKa 200	5 m³	O_2 must not vary more than 1.5 vol% due to the products of the fire (base, cold discharge)	
FKa 20 FKa 200	0.5 m³ 5 m³	$O_2 \geq 0.95\%$ atmospheric concentration at activation	
		Flame suppression within 30s at the end of the discharge No flames within 60s at the end of the discharge No spontaneous restart after 300s of immersion	Flame extinguished within 30s

5.2.2 *Horizontal compartments*

Below is the test layout for the 0.5 m³ volume

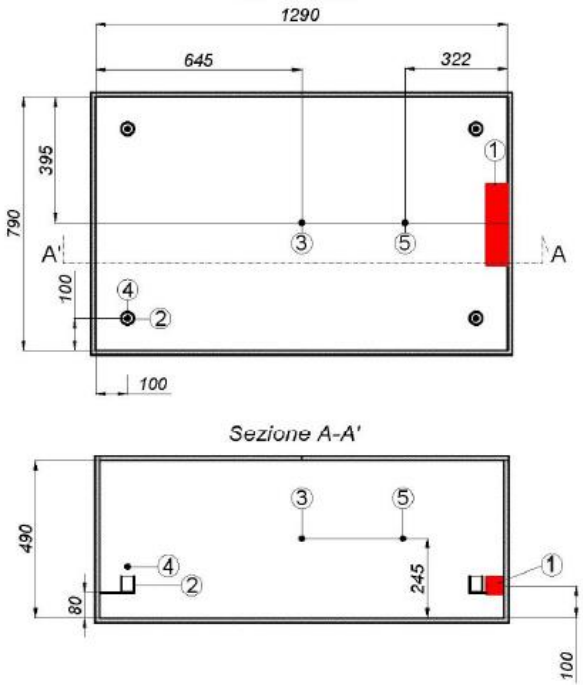
Confirmation of the extinguishing coefficient



Legend

1- Aerosol generator
2- Fire scenario
3- Thermocouple
4- Fire scenario thermocouple
5 - Oxygen probe

Verification of Generator distribution



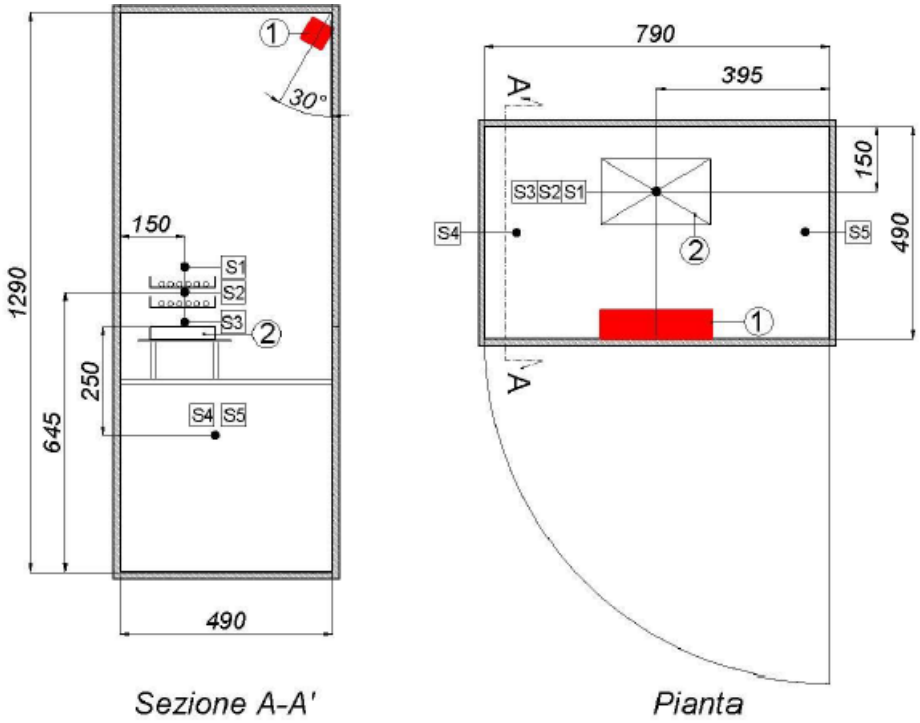
Legend

1- Aerosol generator
2- Fire scenario
3- Thermocouple
4- Fire scenario thermocouple
5 - Oxygen probe

5.2.3 Vertical compartments

Below is the test layout for the 0.5 m³ volume

Confirmation of the extinguishing coefficient



Legend

1- Aerosol generator

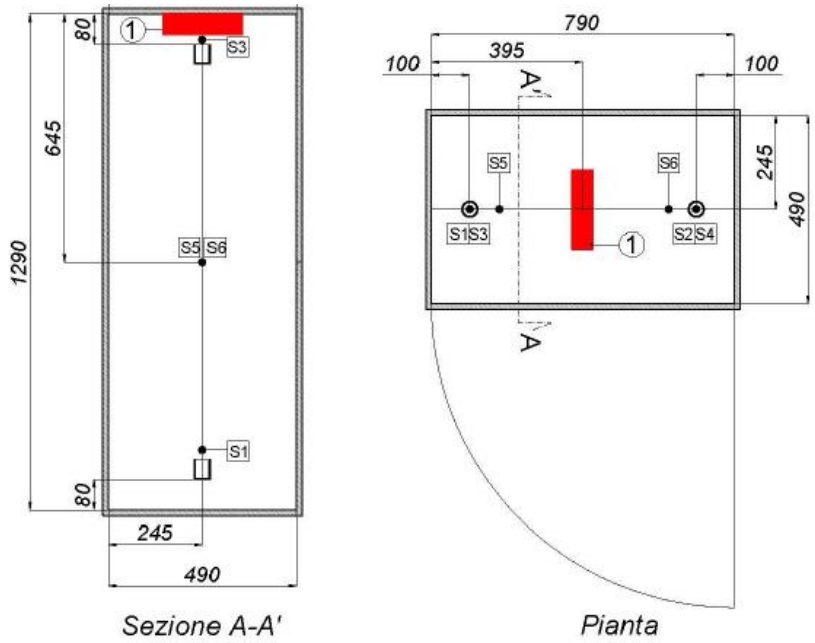
2- Fire scenario

S1-S2-S3 - Fire scenario thermocouple

S4- Thermocouple

S5 - Oxygen probe

Verification of Generator distribution



Legend

1- Aerosol generator

2- Fire scenario

S1-S2-S3-S4 - Fire scenario thermocouple

S4- Thermocouple

S5 - Oxygen probe

5.3 Confirmation of the extinguishing coefficient

5.3.1 FKa 200

Reference NC 08773 [9] – Horizontal compartments

Reference RDP 2040 – A15276 R00 [12] – Vertical compartments

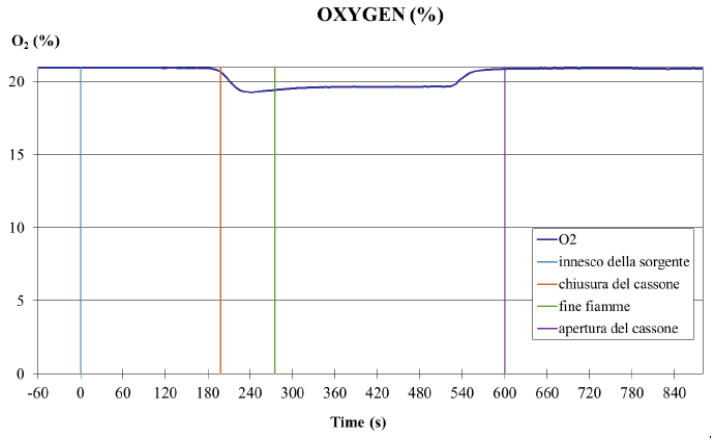
The system extinguished the flames less time than the expected limit (5 s for horizontal compartment and a maximum of 27 s for vertical compartment). No reignitions were recorded at the end of the immersion period.

The effectiveness of the system is also visible from the comparison, presented below, of the trend of oxygen and the temperatures detected in the chamber between the free combustion tests and the extinguishing test:

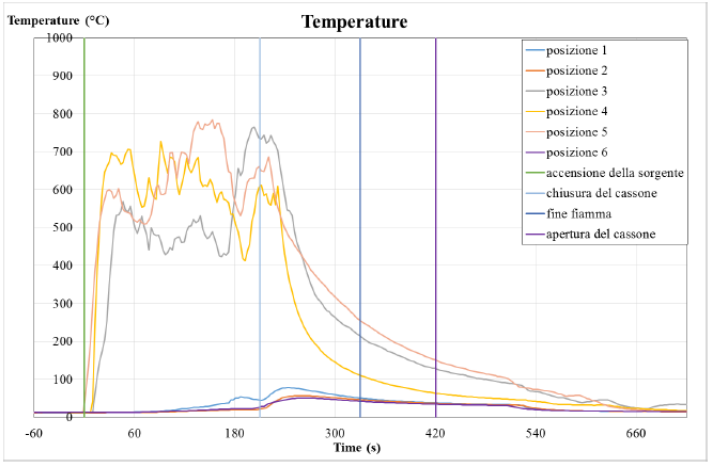
Horizontal compartments

Note: T3, T4, T5 correspond to the source of fire

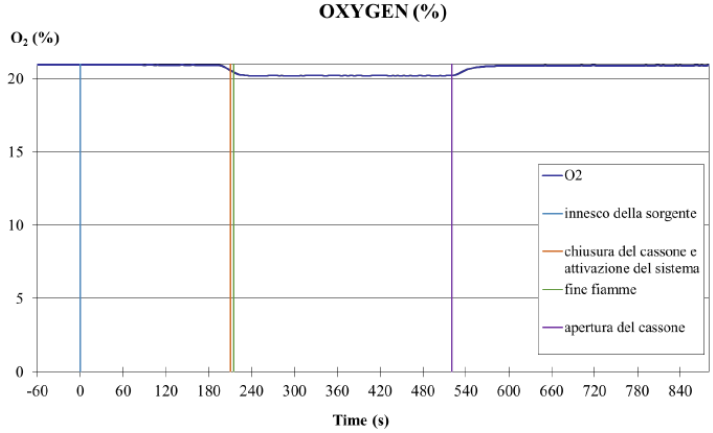
Free combustion



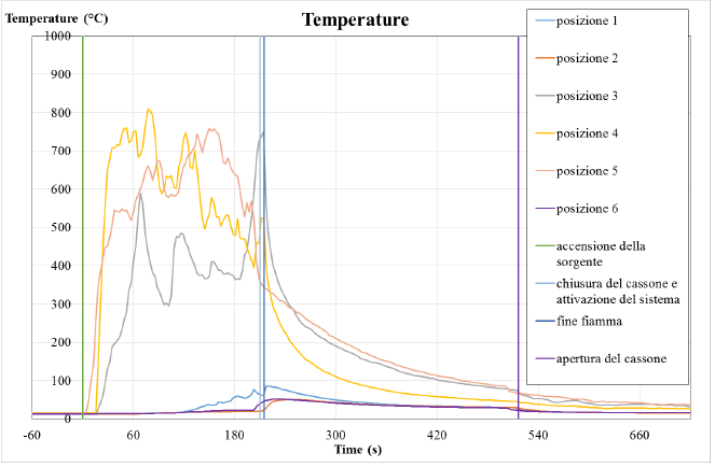
Free combustion (test 8773-4)



Extinguishing (test 8773-4)



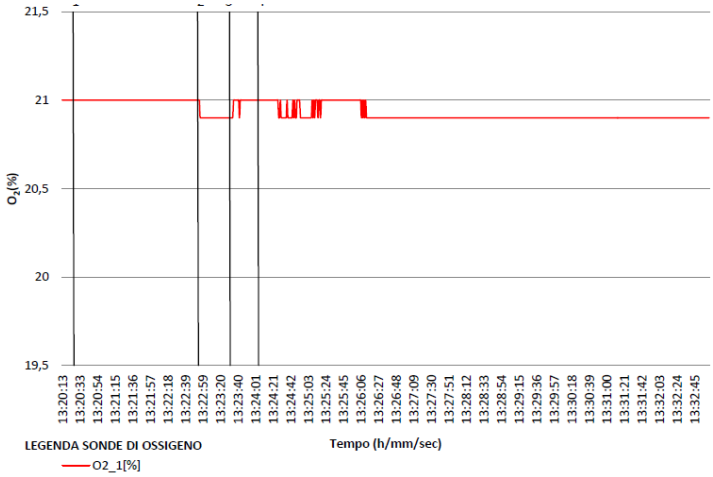
Extinguishing (test 8773-4)



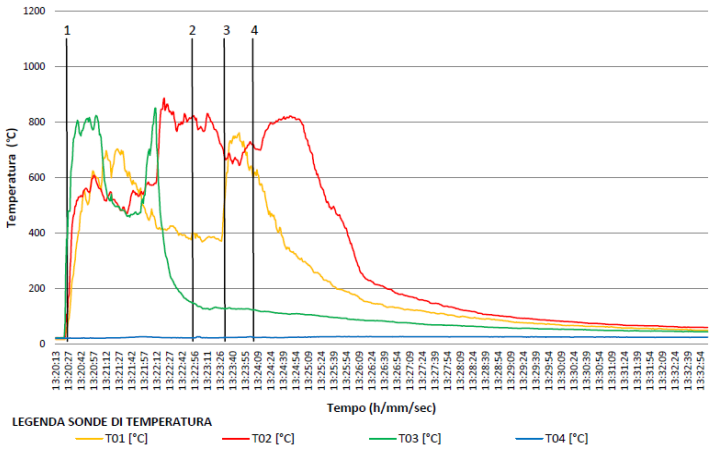
Vertical compartments

Note: T01, T02, T03 correspond to the source of fire

Free combustion

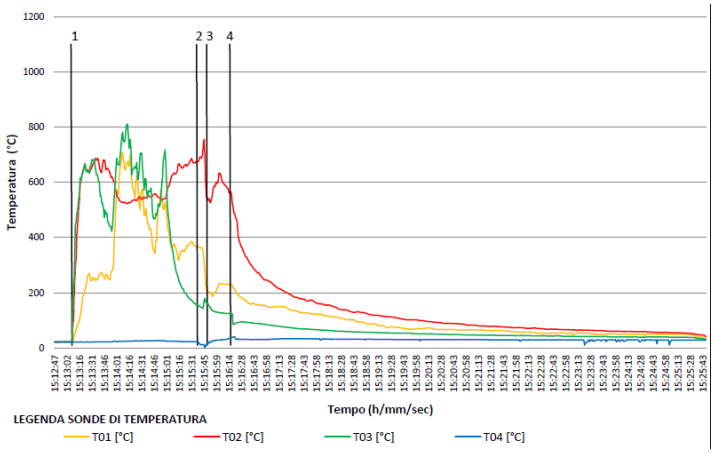


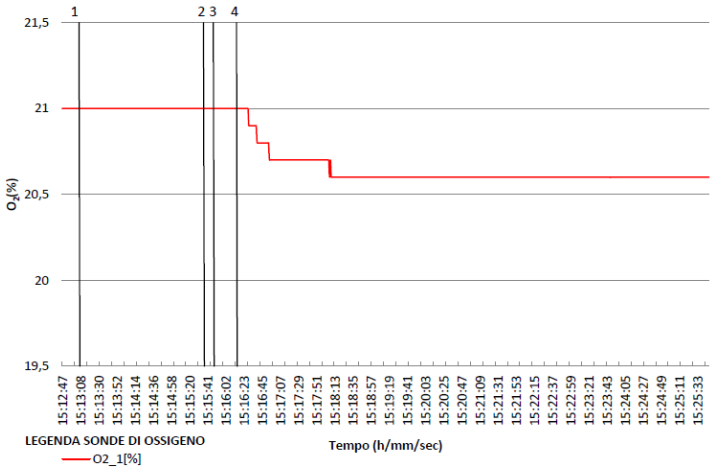
Free combustion



Extinguishing (Extinguishing Test No. 2)

Extinguishing (Extinguishing Test No. 2)





Where:

1 – Heptane ignition

2 – Extinguishing activation

3 – End of discharge

4- Flame suppression

All requirements were met.

The analysis of the weight loss of electric cables demonstrates a reduction of this parameter in tests with extinguishing compared to free combustion.

5.3.2 *FKa 20,*

Reference NC 08774 [10] – Horizontal compartments

Reference RDP 2040 – A15276 R00 [12] – Vertical compartments

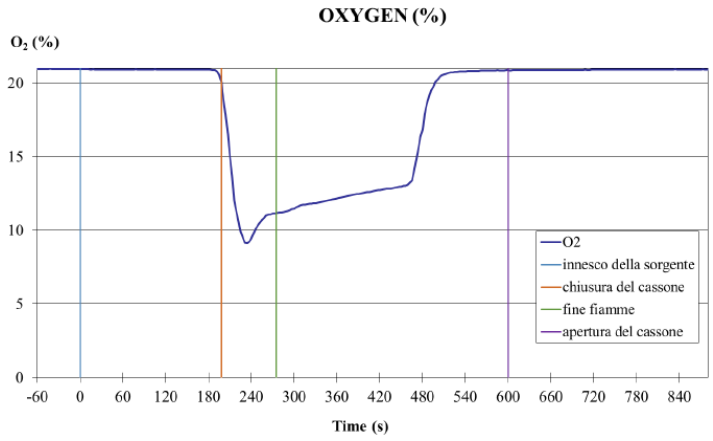
The system extinguished the flames in less time than the expected limit (average of 3 tests 8 s for horizontal compartments and a maximum of 15 s for vertical compartments). No reignitions were recorded at the end of the immersion period.

The effectiveness of the system is also visible from the comparison, presented below, of the trend of oxygen and the temperatures detected in the chamber between the free combustion tests and an extinguishing test:

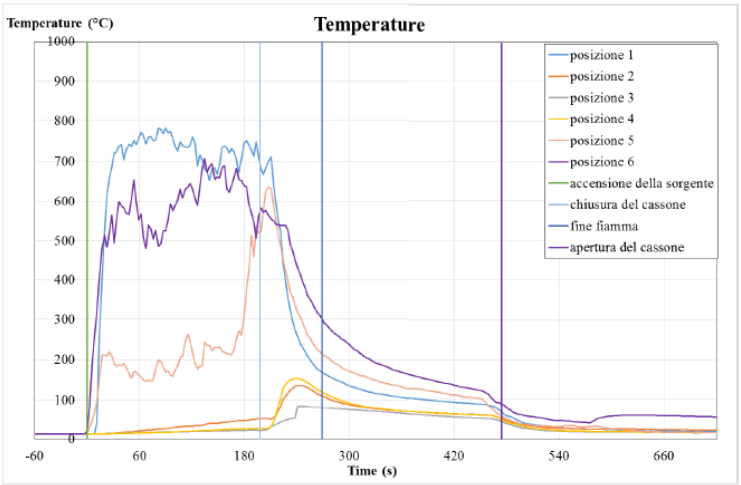
Horizontal compartments

Note: T3, T4, T5 correspond to the source

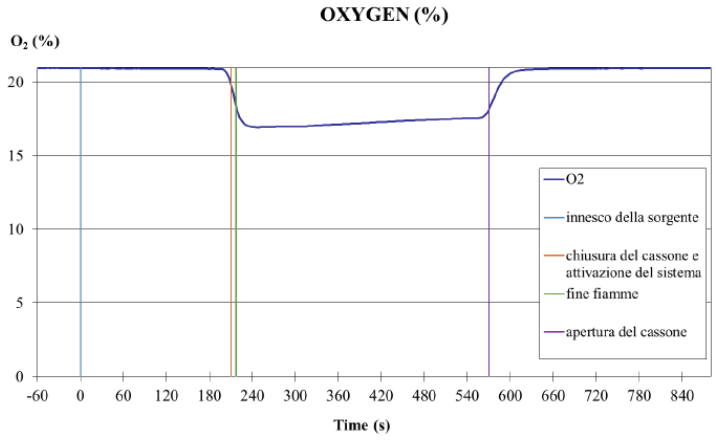
Free combustion



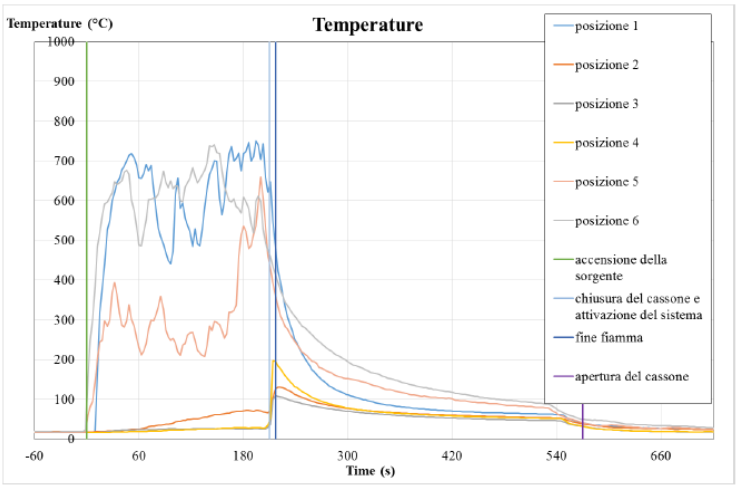
Free combustion (test 8774-7)



Extinguishing (test 8774-7)



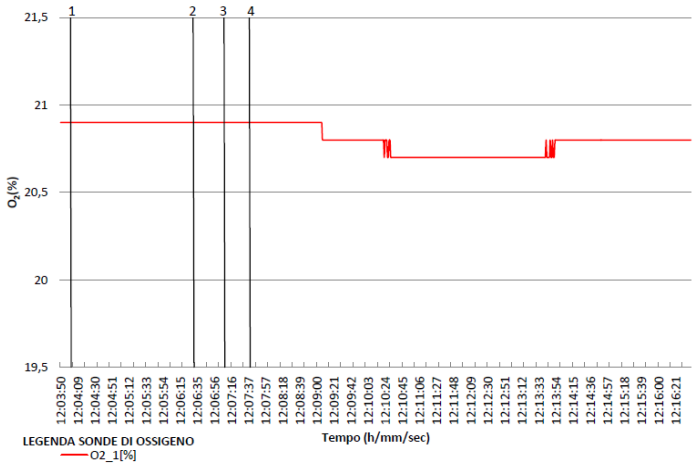
Extinguishing (test 8774-7)



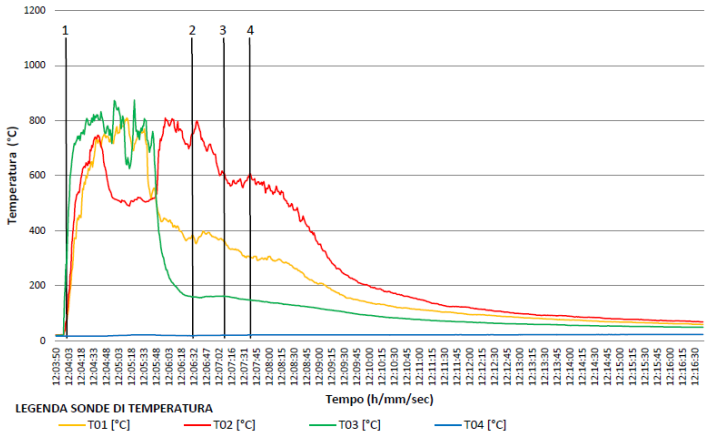
Vertical compartments

Note: T01, T02, T03 correspond to the source of fire

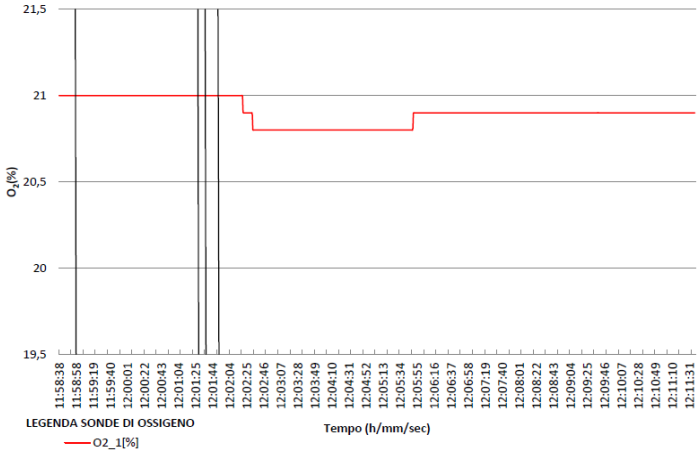
Free combustion



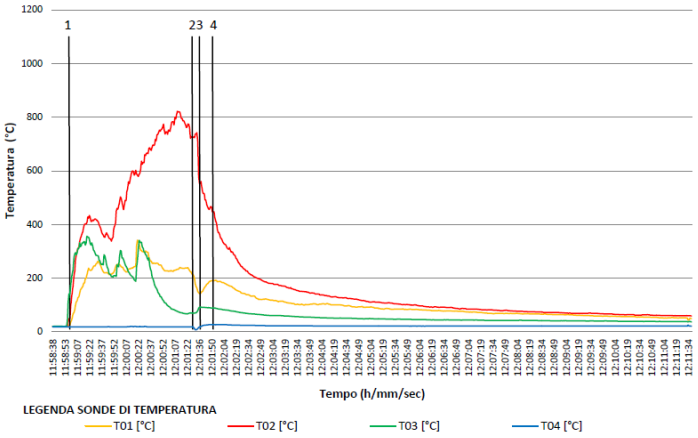
Free combustion (test 8774-7)



Extinguishing (Extinguishing Test No. 3)



Extinguishing (Extinguishing Test No. 3)



Where:

1 – Heptane ignition

2 – Extinguishing activation

3 – End of discharge

4- Flame suppression

All requirements were met.

Although with less emphasis than in the previous test, the analysis of the weight loss of electric cables demonstrates a reduction of this parameter in tests with extinguishing compared to free combustion.

The analysis of the performance of the oxygen during the extinguishing tests shows that, even with a significant reduction of the available oxygen due to the very

small closed volume, the absolute value is not such as to affect the extinguishing performance of the system; it is also evident the difference with respect to the test in the absence of extinguishing. Therefore, the test is considered significant. The temperature trend demonstrates the effectiveness of the system.

5.4 Verification of Generator distribution

5.4.1 FKa 200

Reference NC 08773 [9] and RDP 2040 – A15276 R00 [12]

In both tests, the system extinguished the 4 cans within 13s from the end of the discharge and therefore well within the expected limits (30s). As expected, the most critical cans to be extinguished were those placed on the sides of the generator.

5.4.2 FKa 20

Reference NC 08774 [10] and RDP 2040 – A15276 R00 [12]

In both tests the system extinguished the 4 cans within the time limit set by the specifications. Just like the 5 m^3 volume, the most critical cans were those placed on the sides of the generator. A negative test resulted in the last can being extinguished beyond the expected time limit, while highlighting how extinguishing is actually due to system effectiveness. RINA agree with the manufacturer's note [11] that this result does not affect the positive outcome of the distribution test.

5.4.3 Conclusions regarding FKa 20 and FKa 200

The Aerosol generators comply with the requirements of the Test Specifications PDP 1704-D15779 R03 and PDP 2006-A15276 R02 based on the applicable requirements of ISO 15779 (Annex D), UNI EN 15276-1 (Annex A) and ARGE-Part 2 Directive for the extinguishing of horizontal and vertical electrical technical compartments in railway sector (typically underframe – above roof).

Results show that the positioning of the generator and the correct sizing of the system according to the volume to be protected are aspects that must be dealt with carefully during the design phase of the extinguishing system. Any obstacles, due to the equipment placed inside the compartment, must be taken into account, opting, where necessary, also for the adoption of a greater number of smaller generators than the adoption of a single unit with the same design extinguishing coefficient.

Based on the tests carried out, it is confirmed that the maximum protected volume for the two generators is (taking into account the safety coefficient of ISO 15779 and EN15276):

FKa 20: 0.38m^3, Extinguishing coefficient C_p= 52 g/m^3

FKa 200: 3.8m^3, Extinguishing coefficient C_p= 52 g/m^3

5.5 Extension of the results to the FKa RF family 20 ÷800

Based on what is reported in §5.3 of manufacturer's technical note REP1801[11], and taking into account the positive results of the tests carried out on two generators of the family (factor 10), we agree with the extension of the validity of the results to the entire family of generators according to the following tables:

Mod.	H_{min}, m	L/P	C_p, g/m³	V_{max}, m³	LXP, m²	L, m	P, m
FKa 20	0,45	1,63	52	0,38	0,85	0,72	1,18
Fka 50(*)	0,45	1,63	52	0,96	2,14	1,14	1,87
Fka 100 (*)	0,65	1,63	52	1,92	2,96	1,35	2,20
Fka 200	0,85	1,12	52	3,85	4,52	2,01	2,25
Fka 400(*)	0,85	1,12	52	7,69	9,05	2,84	3,18

Table 2 – Coverage area at minimum height

Mod.	H_{max}, m	L/P	C_p, g/m³	V_{max}, m³	LXP, m²	L, m	P, m
FKa 20	1,20	1,63	52	0,38	0,32	0,44	0,72
Fka 50(*)	1,80	1,63	52	0,96	0,53	0,57	0,93
Fka 100 (*)	2,00	1,63	52	1,92	0,96	0,77	1,25
Fka 200	3,00	1,12	52	3,85	1,28	1,07	1,20
Fka 400(*)	3,00	1,12	52	7,69	2,56	1,51	1,69

Table 3 – Coverage area at maximum height

Where

H_{min}: Minimum height of the volume to be protected

H_{max}: Maximum height of the volume to be protected

L/P: Ratio between the sides of the area to be protected

C_p: Design extinguishing coefficient

V_{max}: Maximum protected volume

LXP: Maximum protected area (plan)

L: maximum length of the area to be protected (plan)

P: minimum length of the area to be protected (plan)

With regard to the FKa 800 generator, refer to the following §5.6.

5.6 Extinguishing coefficient according to EN15276 and ISO 15779

In addition to the extinguishing tests in vertical technical compartments, a further activity was carried out to demonstrate the compliance of FKa products with ISO 15779 and EN 15276 standards, see[19].

From the tests carried out in accordance with Annex D of ISO 15779 §D.6.2 and Annex A of EN 15276 §A.6.2, relating to the extinguishing tests, an extinguishing coefficient of 58.95 g/m^3 was obtained, which is greater and therefore conservative with respect to the value of 52 g/m^3 obtained from the tests referred to in this report: the results of the extinguishing tests according to the ARGE Directive reported in §5.3 are therefore also confirmed with the aforementioned extinguishing coefficient.

The extinguishing coefficient of **58.95 g/m^3,** fully compliant with ISO 15779 and EN 15276 and compliant with the ARGE Directive, *as applicable*, is therefore applied to all FKa products for rail with lamellar outlets from the minimum size to the maximum size (FKa 20÷FKa 800).

In light of the above, the values of maximum and minimum height, maximum protected volume, coverage area and ratio between the sides referred to in §5.5 are updated as reported in the data sheets of the generators themselves ([14]for FKa 20 RF, [17] for FKa 200 RF, and equal product documentation for models FKa 50, FKa 100, FKa 400 and FKa 800).

6 Conclusions

Based on the above, it can be concluded that the family of Aerosol **Fire Kloud FKa 20÷ 800 RF** extinguishing system in object **complies with** the Test Specifications PDP 1704-D15779 **R03** [7] and **PDP 2006-A15276 R02**[8] drawn up on the basis of the applicable requirements of **ISO 15779** [2] Annex D, **EN 15276-1** [4]Annex A and **ARGE Directive** §3.2.3 [3].

Compliance of the extinguishing systems with Aerosol Fire Kloud has been demonstrated in accordance with the following:

- EN 15276 and ISO 15779, as regards extinguishing tests: determination of extinguishing coefficient, verification of distribution and verification of hold time – see also[19];
- ARGE Directive rev. 3.0, *as applicable*

the system in question can be considered **compliant with UNI 11565 [1] §10.4.2** "*Fire protection/extinguishing system for technical areas*".

It should be noted, however, that the above is valid when in compliance with the following conditions of use:

- Compliance with the extinguishing coefficient of 58.95 g/m^3;
- Compliance with the maximum volumes and dimensions provided by the product data sheets provided by FIREX referred to in §2.3 ([14]for FKa 20 RF, [17] for FKa 200 RF, and equal product documentation for FKa 50, FKa 100, FKa 400 and FKa 800 models);
- Positioning the generator in the direction of the potential fire source;
- Compliance with the dedicated installation sheets provided by FIREX referred to in §2.3 ([15]for FKa 20 RF, [18] for FKa 200 RF, and equal product documentation for FKa 50, FKa 100, FKa 400 and FKa 800 models);
- During the design phase of the extinguishing system, particular attention to the correct identification of the installation points shall be paid and, where necessary, it is necessary to adopt more installation points, always in compliance with the Extinguishing Coefficient set out in the previous §5.6; this aspect is considered specific to Aerosol systems, linked to good installation practice and not specific to the product under assessment.