7 January 2021

Report fire extinguisher tests on Li-ion batteries

based on the Gloria WKL 6 P & WKL 9 P portable fire extinguisher with Imprex C

Kiwa NCP
Dwarsweg 10
5301 KT Zaltbommel
The Netherlands

Tel. +31 88 998 5100
NL.info.ncp.fss@kiwa.com
www.kiwafss.nl

Trust
Quality
Progress

15L70301

Colophon

Report fire extinguisher tests on Li-ion batteries based on the Gloria WKL 6 P & WKL 9 P portable fire extinguisher with Imprex C

Project nr: 210100193

J. Abelman

Chubb Fire & Security

P.E. Voshol

J. Abelman

Index

15t70301

1 Test report

1.1 Test requested by

Company	: Carrier Manufacturing Poland Spòlka Z.o.o.
Adress	: Kolejowa 24
Postal Code	: 39-100
City	: Ropczyce
Country	: Poland
Contact	: Rafał Kucharzyk

1.2 Test location & test date

Location	: Fire training facility Kleefse Waard B.V.
Adress	: Westerfoortsedijk 73
Postal Code	: 6827 AV
City	: Arnhem
Country	: The Netherlands
Test date(s)	: 30 & 31 January 2020

1.3 Test performed for compliance with:

☐ Normative test plan :
☒ Customized test plan : Preliminary NTA 8133
(further description of the test plan is given in the test report)

1.4 Identification of the fire extinguisher

Type	: WKL 6 P & WKL 9 P
Manufacturer	: GLORIA GmbH
Volume	: 6 & 9 liter
Medium	: Foam Imprex-C + Water
Trade name	: Gloria
Propellant	: CO_2
Propellant storage	: ☐ Stored pressure ☒ Cylinder
Volume of propellant	: 60 gram CO_2 (6 liter) & 120 gram CO_2 (9 liter)

1.5 Conclusion of the tests

Purpose of the fire extinguisher:
☐ fire control
☐ fire suppression
☒ fire extinguishing

Has the purpose of the fire extinguisher been achieved	: ☒ Yes / ☐ No
Is this in accordance with the test plan	: ☒ Yes / ☐ No
Achieved fire class Gloria WKL 6 P 18650 cells	: 642 W/h
Achieved fire class Gloria WKL 9 P 18650 cells	: 1285 W/h
Achieved fire class Gloria WKL 9 P pouch cells	: 700 W/h

1.6 Samples

The number of fire extinguishers used in the test is	: 9 (6 for test & 3 for backup)
During the test, has there been continuous supervision of the fire extinguishers to be tested	: Yes
Method of supervision	: ☒ Visually by notified body
	: ☒ Marking of the fire extinguishers
	: ☐ Closed storage

1.7 Compliance with documentation

The fire extinguishers supplied can be identified by detailed documentation provided by the manufacturer. This includes:

Annex 1: Overview of test reports relevant to this test (EN 3-7+A1 / Medium / PED / CE)

Annex 2: Overview of documents included in this test report with which the fire extinguisher can be identified

Annex 3: Overview of documents that are not included in this test report but that are registered by Kiwa in relation to the test

1.8 Report

This report contains: 29 pages
Annex A: Approval certificate medium
Annex B: EN 3-7 Report WKL 6 P
Annex C: EN 3-7 Report WKL 9 P

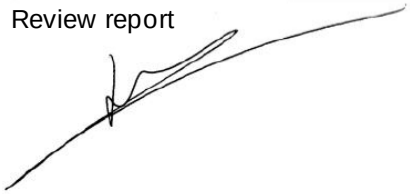
Only the fire extinguishers with the corresponding extinguishing medium have been tested in this test. This is not a generic test report of other fire extinguishers or extinguishing medium that have not been assessed within this test or where other ratios are used other than those recorded in this test.

1.9 Approval test report

Test engineer

J. Abelman
Scheme manager
Kiwa Fire & Security
Kiwa Nederland B.V.
Kiwa NCP
T +31 88 998 51 00

Review report



P.E. Voshol
Business Development Manager
Fire Safety and Security
Kiwa Nederland B.V.
Kiwa NCP
T +31 88 998 3072

2 Test plan

2.1 Summary test plan

In order to be able to assess and evaluate the tests, the fire extinguishers used in the tests are assembled at the test location. The foam arrives in a sealed jerry can and will be inserted on site in the separate container of the fire extinguisher. The extinguisher is then filled with water according to the nominal filling requirements. All components of the fire extinguisher, including the weight of the propellant cylinder, are checked by the notified body prior to the test. After the complete assembly of the fire extinguisher, an identification on the fire extinguisher is applied.

The test setups are all put together and measured before the various tests. During this check it was detected that some cells did not have the minimum voltage of 4.1 Volt. These have been removed from the batch and replaced with identical cells from the same batch that do contain the minimum voltage of 4.1 Volt. An identification on the test setup is applied.

Further information about the test and test procedure can be found in part 4.

2.2 Fire suppression or fire extinguishing

In the firefighting industry, the following definitions are used:

- Extinguishing mode, putting out a fire, with no re-ignition
- Suppression mode, sharply reducing the heat release by a fire preventing a regrowth of a fire
- Control mode, decrease the heat release of a fire.

2.3 Primary goal of the test

The primary goal is to determine if a trained person are able to achieve the extinguishing mode with a portable the Gloria WKL 6 P & WKL 9 P fire extinguisher containing Imprex-C.

3 Test setup

3.1 Description of components used

Below is a description of the components used in this test.

3.2 The fire extinguisher

The fire extinguishers are manufactured by GLORIA GmbH.

The propellant for this fire extinguisher is stored in an internal pressure cylinder.

The extinguishing agent Imprex-C has been tested by MPA Dresden and approved under number KB 107/20 according EN3-7. Imprex-C is a foam agent. (Annex A)

These fire extinguishers were tested by MPA Dresden in 2020, whereby it was established that these fire extinguishers comply with EN 3-7 + A1. (Annex B & C)

3.3 Li-ion batteries (cylindrical)

Li-ion batteries of the 18650 type were used for the test.
These are the most representative batteries for the market at the time of the test.
The cells are charged to > 95% State of Charge (SOC) and all the batteries have a minimum voltage of 4,1 Volt and load of 3200 m/Ah NMC.

Gloria WKL 6 P: 49x 18650 Li-Ion cells 3,2 Ah = 156,8 Ah * 4,1 Volt = 642,88 W/h
Gloria WKL 9 P: 98x 18650 Li-Ion cells 3,2 Ah = 313,6 Ah * 4,1 Volt = 1285,76 W/h

3.4 Li-ion batteries (pouch)

> 95% State of Charge and have a minimum voltage of 4,1 Volt
Gloria WKL 9 P: 7x EiG 100 W/h LiCo / NMC technology = 700 W/h

3.5 Test setup batteries

The cylindrical Li-ion batteries were combined into sets of five for the test. One of these cells has been replaced by a dummy cell. The heating element is placed in this dummy cell. This configuration simulates a thermal runaway of one cell. The dummy cell is placed in a way in the test set-up allowing optimal heat propagation between the cells. The pack of cells is placed on its side in the test fixture, clamped in a metal frame. A piece of fire-resistant plate has been placed at the head ends of the set-up to cool the cells by the frame of the test setup. Due to this setup it is not possible to immerse the test setup in the extinguishing agent. This means that more is required of the cooling capacity of the extinguishing agent. In this way an attempt is made to create a setup that is as representative as possible in which the pure Li-ion fire must be extinguished. Beware that this test setup is a not a pure Lithium fire. This is a same test setup as the EN 3-7/A1, whereby one fire source is used.
The Pouch cells are stacked in a bundle of 7 cells. This stack is clamped in a frame. The cells are ignited by means of overcharging. No fire-resistant plate was used in this test setup. The heat radiation of this test setup with pouch cells was such's that the frame can't be used to cool the cells.

4 Test

4.1 Requirements and observations

The following fire extinguishers are tested:

- Gloria WKL 6 P (6 liter) & Gloria WKL 9 P (9 liter) fire extinguisher with internal pressure cartridge and foam extinguishing agent Imprex C

- This test has been executed based on the preliminary NTA 8133:2020. Based on the fact that this standard has not been finalized yet is it not possible to declare that the test has been performed according to this standard.

- Kiwa observed that the test criteria were executed according the test plan and that the components and related materials and equipment used have remained within the test specification.

4.2 Stages of the test

- Ignition of the test setup with Li-ion batteries without attempting to extinguish. This is used to determine whether the test setup will ignite completely if no fire extinguisher is used to extinguish the fire.

- Performing the actual fire test with the first fire extinguisher. After the extinguishing attempt, a control time of 15 minutes is started. This should be the maximum response time for the fire brigade in the Netherlands. The criteria is that the object shall not re-ignite during 20 minutes, after 20 minutes further firefighting and handling is the response of the fire brigade to control the fire.

- The test are based on the following documents. The performance of the documentary check demonstrating compliance with the technical criteria.
    - EN 3-7
    - Foam Certificate

4.3 Overview of checks and tests

Nr	Item	Applicable Yes / No	Approved Yes	Approved No
1	The fire extinguisher used complies with EN 3-7 + A1	Yes	Yes	No
2	Demonstrated by means of a test report and ir-scan that the extinguishing agent during the test is identical to the extinguishing agent used in the EN-3-7 test fires to achieve the fire classifications.	Yes	Yes	
3	The extinguishing agent used is in accordance with the EN 3-7 test report of the fire extinguisher	Yes	Yes	
4	The applied proportions of the extinguishing agent are in accordance with the EN 3-7 test report of the fire extinguisher	Yes	Yes	
5	The applied pressure & volume of the pressure cylinder in the extinguisher is in accordance with the EN 3-7 test report of the fire extinguisher	Yes	Yes	
6	The diameter of the nozzle is in accordance with the nozzle used in the EN 3-7 test report	Yes	Yes	
7	All other parts in the fire extinguisher are in accordance with the EN 3-7 test report	Yes	Yes	
8	The way of using the fire extinguisher is the same as the operating instructions for the fire extinguisher in the EN 3-7 report	Yes	Yes	
9	There is a normative test plan for the fire test.	No		
10	It has been demonstrated that the fire test has been carried out in accordance with the normative test plan.	No		
11	There is an alternative test plan for the fire test.	Yes	Yes	
12	It has been demonstrated that the fire test has been carried out in accordance with the alternative test plan.	Yes	Yes	
13	The fire extinguishers used for the test shall comply with EN3-7 based on testing and reporting throughout approved laboratories by Kiwa	Yes	Yes	
14	The fire extinguishers used for the test shall comply with EN3-7 based on testing and reporting throughout approved laboratories by Kiwa	Yes	Yes	
15	The test with the Gloria WKL 6 P is performed on a test set-up with 49x 18650 Li-Ion cells 3,2 Ah = 156,8 Ah * 4,1 Volt = 642,88 W/h	Yes	Yes	
16	The test with the Gloria WKL 9 P is performed on a test set-up with 98x 18650 Li-Ion cells 3,2 Ah = 313,6 Ah * 4,1 Volt = 1285,76 W/h	Yes	Yes	
17	The test with the Gloria WKL 9 P is performed on a test set-up with 7x pouch Li-Ion cells EiG 100 W/h LiCo / NMC technology = 700 W/h	Yes	Yes	
18	At least two and a maximum of three extinguishing tests are executed in which the thermal runaway of the Li-ion batteries is stopped. After the test should the remaining Li-ion batteries still contain the initial voltage. Within >20 minutes of extinguishing the fire, no new flame phenomena should be observed (smoke is allowed). The test is successful if two of the three tests have been completed with a positive result. This ratio of tests is a regular ratio for EN 3 test fires	Yes	Yes	
18	Identical cells from the same batch were used in all tests. The cells were randomly placed together in the test set-up at the direction of the certification body.	Yes	Yes	
19	The cells were charged in the evening before the test and transported to the test location	Yes	Yes	
20	The cylindrical cells are ignited by superheating one dummy cell in the 600 w / h setup and two cells in the 1200 w / h setup. The pouch cells are ignited by means of an overcharging of one pouch cell.	Yes	Yes	
21	The test setup must ignite within at least 5 and 10 minutes. After the test setup has ignited, the heating of the dummy cell or the overcharging of the pouch cell is immediately stopped and the charging cable is (physically) disconnected.	Yes	Yes	

Nr	Item	Applicable Yes / No	Approved Yes	Approved No
22	The test setup must ignite within at least 5 and 10 minutes. After the test setup has ignited, the heating of the dummy cell or the overcharging of the pouch cell is immediately stopped and the charging cable is (physically) disconnected.	Yes	Yes	
23	The test setup must ignite within at least 5 and 10 minutes. After the test setup has ignited, the heating of the dummy cell or the overcharging of the pouch cell is immediately stopped and the charging cable is (physically) disconnected.	Yes	Yes	
24	During the test the conditions should be such that the ambient temperature is > 5 ^{o}C and the wind speed does not exceed 3 m / s. These values are measured at approximately 1 meter above floor level	Yes	Yes	
25	At the end of the free fire test, at least 1 pouch cell may not be burned	Yes	Yes	
26	The maximum extinguishing time for a 600 w/h test is a maximum of 3 minutes. The time measurement stares at the first moment of extinguishing. At the end of the extinguishing attempt, all flames must be extinguished and all cells must still be present in the test setup.	Yes	Yes	
27	After the test operator indicates that the extinguishing attempt has ended, an observation period of 20 minutes starts. During this period, no re-ignition should occur. Short-term local flame phenomena (<5 seconds) that extinguish by themselves are allowed.	Yes	Yes	
28	At the end of the fire test, 2/3 of the cylindrical cells must still be operational with the pre-measured charging voltage. At the pouch cells, at least one cell must still be operational with the pre-measured charge voltage.	Yes	Yes	

4.4 Observation Fire Extinguisher Assembly

The fire extinguishers have been transported empty to the test location by the manufacturer. The fire extinguisher was assembled on site, whereby a record was created of the components used as will be shown below.

4.5 Extinguishing Medium

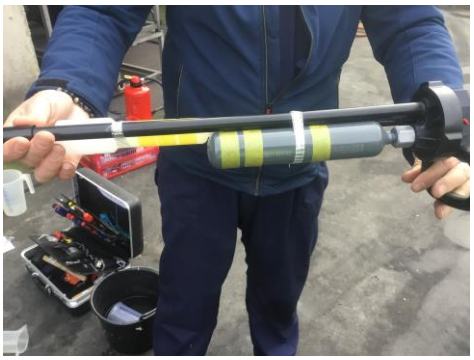
The extinguishing medium was transported from the factory in a closed and sealed container. The ratio of the extinguishing agent and water has been recorded. The agent is measured and placed in a separate container. After the extinguishing agent container has been assembled, a unique marking is applied which makes it possible to identify the extinguishing agent with which the fire test has been performed. The configuration and the deployment of the test setup and the fire extinguisher to be used is processed with the instructions of Kiwa.

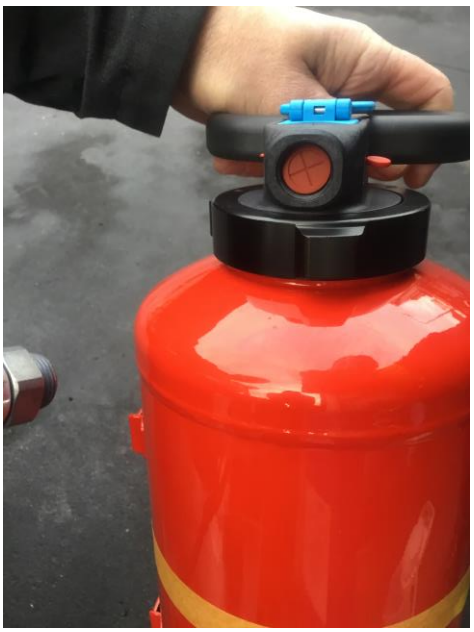
4.6 Pressure cylinder

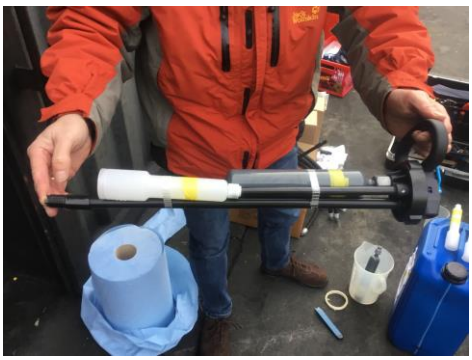
The propellant cylinders as used in the fire extinguishers during this fire test have been checked for the correct weight as shown below. The propellant cylinders were weighed and found to be within the EN 3-7 test specification prior to the placement in the fire extinguisher.

4.7 Complete assembly on-site

The fire extinguishers were assembled at the test location prior to the fire test under the inspection of Kiwa. It has been determined that all components and dimensions are in accordance with the EN 3-7 approval. After assembling the fire extinguishers, a unique marking has been applied by means of the yellow tape. So it can be traced back to which fire extinguisher has been used. The fire extinguishers have remained under the supervision of the certification body throughout the fire test.



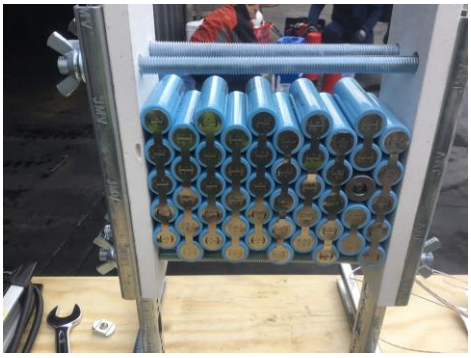




4.8 Test setup 1

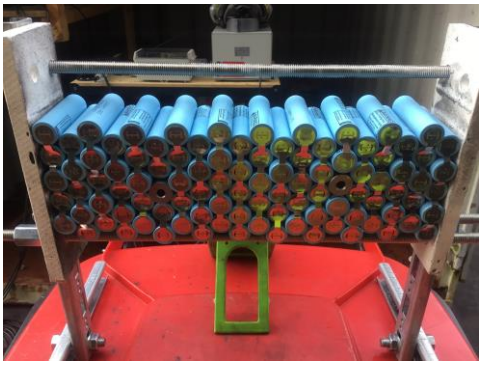
The test setup with the cells in it was assembled at the location of the fire test. Here too, a unique marking was applied after assembly, making all test setups identifiable. All cells were tested for the correct voltage in a 1: 1 ratio prior to testing. It has been demonstrated that the test setup meets the criteria of the test plan.

- 49x 18650 Li-ion cell + 1 dummy cell for ignition



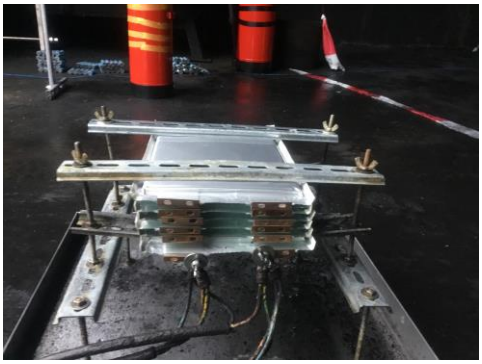
4.9 Test setup 2

- 98x 18650 Li-ion cell + 2 dummy cell for ignition



4.10 Test setup 3

- 7x pouch cell



4.11 Equipment for data collection during tests

- The volume of water and extinguishing agent is checked with a measuring cup (indication measurement).
- The pressure cylinders of the fire extinguishers have been checked on the basis of a calibrated weighting scale.
- The voltage in the Li-ion batteries has been checked by means of a calibrated multi meter before and after the fire test.
- The temperature measurement is executed with a laser temperature meter (indication measurement).
- The entire fire test was captured on video from multiple angles.

4.12 Test conditions for both days

The test was performed in outdoor situation with following conditions:

- Ambient temperature : 8,6 ºC / 11ºC
- Humidity : 76% / 79%
- Weather conditions : Cloudy
- Rain : No rain

(measured at 1.20 meters above floor level)

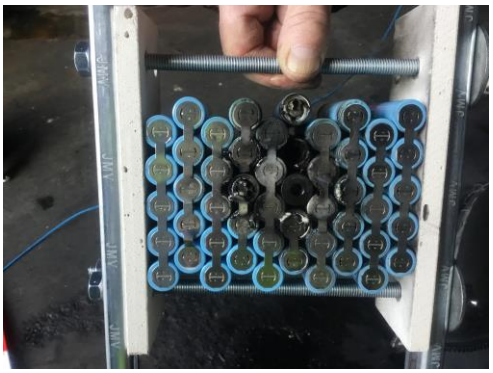
4.13 Free burn

As a reference check, a preliminary test fire was performed for each test setup. In this test was checked whether the test set-up works and that all cells ignite without fire extinguishing. This situation was observed with al test setups. Measurements have been performed to determine that all cells for the fire test have a full state of charge. After the fire test, none of the cells have any voltage left and all cells are burned.

Result free burn:

4.14 Test 1

6 liter fire extinguisher sample no.	: 1
Test set-up	: 49x 18650 + 1 dummy cell
The heating of the dummy cell starts at	: 00:00:00
The thermal runaway starts at	: +0:05:09
Flames are observed at	: +0:00:36
The extinguishing is delayed until	: +0:00:10
No more flames observed after	: +0:00:11
Fire extinguishing stopped at	: +0:02:13
No re-ignition was observed until	: > 120 minutes
Active cells remaining	: >20
Result	**: Passed**




4.15 Test 2

6 liter fire extinguisher sample no.	: 2
Test set-up	: 49x 18650 + 1 dummy cell
The heating of the dummy cell starts at	: 00:00:00
The thermal runaway starts at	: +0:04:56
Flames are observed at	: +0:00:20
The extinguishing is delayed until	: +0:00:12
No more flames observed after	: +0:00:06
Fire extinguishing stopped at	: +0:02:26
No re-ignition was observed until	: > 120 minutes
Active cells remaining	: >20
Result	**: Passed**


4.16 Test 3

6 liter fire extinguisher sample no.	: 3
Test set-up	: 49x 18650 + 1 dummy cell
The heating of the dummy cell starts at	: 00:00:00
The thermal runaway starts at	: +0:05:01
Flames are observed at	: +0:00:21
The extinguishing is delayed until	: +0:00:15
No more flames observed after	: +0:00:05
Fire extinguishing stopped at	: +0:01:20
No re-ignition was observed until	: > 120 minutes
Active cells remaining	: >20
Result	**: Passed**


4.17 Test 4

9 liter fire extinguisher sample no.	: 4
Test set-up	: 98x 18650 + 2 dummy cells
The heating of the dummy cell starts at	: 00:00:00
The first thermal runaway starts at	: +0:05:05
The second thermal runaway starts at	: +0:00:14
Flames are observed at	: +0:00:28
The extinguishing is delayed until	: +0:00:17
No more flames observed after	: +0:00:15
Fire extinguishing stopped at	: +0:02:31
No re-ignition was observed until	: > 120 minutes
Active cells remaining	: >20
Result	**: Passed**


4.18 Test 5

9 liter fire extinguisher sample no.	: 5
Test set-up	: 98x 18650 + 2 dummy cells
The heating of the dummy cell starts at	: 00:00:00
The first thermal runaway starts at	: +0:06:02
The second thermal runaway starts at	: +0:00:00
Flames are observed at	: +0:00:05
The extinguishing is delayed until	: +0:00:15
No more flames observed after	: +0:00:15
Fire extinguishing stopped at	: +0:03:44
No re-ignition was observed until	: > 120 minutes
Active cells remaining	: >20
Result	**: Passed**

4.19 Free burn pouch cells

The pouch cells were ignited by overcharging 1 pouch cell. After the fire test, none of the cells has the predetermined voltage of 4.1 Volt anymore and all pouch cells have become inoperable.

4.20 Test 6

9 liter fire extinguisher sample no.	: 6
Test set-up	: 7 pouch cells
The charging of the dummy cell starts	: 00:00:00
The thermal runaway starts at	: +0:15:37
Flames are observed at	: +0:00:00
The extinguishing is delayed until	: +0:00:06
No more flames observed after	: +0:00:05
Fire extinguishing stopped at	: +0:02:17
No re-ignition was observed until	: > 120 minutes
Active cells remaining	: 4
Result	**: Passed**

4.21 Test 7

9 liter fire extinguisher sample no.	: 7
Test set-up	: 7 pouch cells
The charging of the dummy cell starts	: 00:00:00
The thermal runaway starts at	: +0:17:25
Flames are observed at	: +0:00:01
The extinguishing is delayed until	: +0:00:05
No more flames observed after	: +0:00:17
Fire extinguishing stopped at	: +0:03:01
No re-ignition was observed until	: > 120 minutes
Active cells remaining	: 4
Result	**: Passed**

5 Conclusion

Based on the performed fire tests with fire extinguishers and the findings of these tests lead to following conclusions:

*The Gloria WKL 6 P & Gloria WKL 9 P as used in this fire tests show that it is possible to stop the burning of a Li-ion batterie with a foam fire extinguisher. It has been repeatedly demonstrated that the use of these fire extinguishers has a direct effect on the fire development in this fire test setup. Flame phenomena are immediately suppressed. After the fire extinguisher has been deployed, no re-ignition of the li-ion batteries in this test setup is detected. This leads to the conclusion that these fire extinguishers are able to extinguish a Li-ion fire equivalent to this test setup. The test with the Gloria WKL 9 P is performed on a test set-up with 49x Li 18650 3,2 Ah = 156,8 Ah * 4,1 Volt = 642,88 W/h. The test with the Gloria WKL 9 P is performed on a test set-up with 98x Li -Ion 18650 3,2 Ah = 313,6 Ah * 4,1 Volt = 1285,76 W/h 9 ltr and a test is performed on a test set-up with 7x EiG 100 W/h LiCo / NMC technology = 700 W/h.*

During the extinguishing of the test setup, a permanent drop in temperature is observed, on the basis of this drop in temperature the Li-ion batteries will decrease below the temperature limit at which a reignition will occur.

5.1 Safety notification

Burning Li-ion batteries releases very harmful gases and smoke. One of these substances is hydrogen fluoride (HF). This substance can cause serious health damage. Direct exposure to high concentrations of HF can cause acute cardiac arrest. It is therefore necessary to attend to the correct personal protective equipment and ventilation of the location / room when using these fire extinguishers.

Li-ion batteries can have an unpredictable character during a fire. Despite the presence of various safety devices, explosive reactions have been observed caused by the built-up pressure. Some cells have even been released from the test set-up and have been found at a distance of more than 10 meters.

It is therefore necessary that fire extinguishers are used in a Li-ion fire by persons who have been properly trained and qualified for these fire scenarios.

These tests was executed by highly qualified staff for this type of fire extinguishing. Performing this process with staff / persons with not the same qualification may lead to less results.

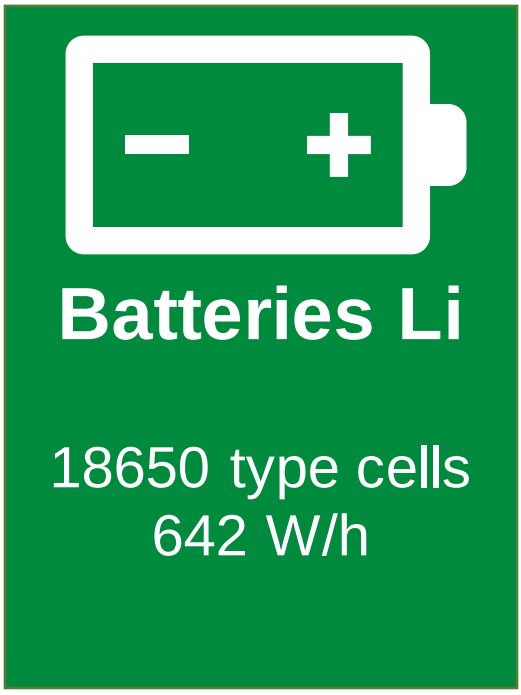
5.2 Disclaimer

The conclusion in this report only relates to the fire extinguishers as tested under the specified conditions. No free interpretation or findings can be linked to this conclusion other than as stated in this report. The rapid development of Li-ion batteries and portable fire extinguishers does not guarantee the same performance of these fire extinguishers when using other Li-ion batteries or adapting the extinguishing agent or associated techniques. The method of packaging or storage of the Li-ion batteries can also have a negative effect on the extinguishing power of the fire extinguishers. When drawing up this report, no validation is given about other fire extinguishers, fire-extinguishing foam, components, Li-ion batteries, test setups. Likewise, Kiwa does not determine where and to what extent these fire extinguishers should be placed in relation to packaging, storage and processing of Li-ion batteries. The instructions of the manufacturer / supplier are decisive in this.

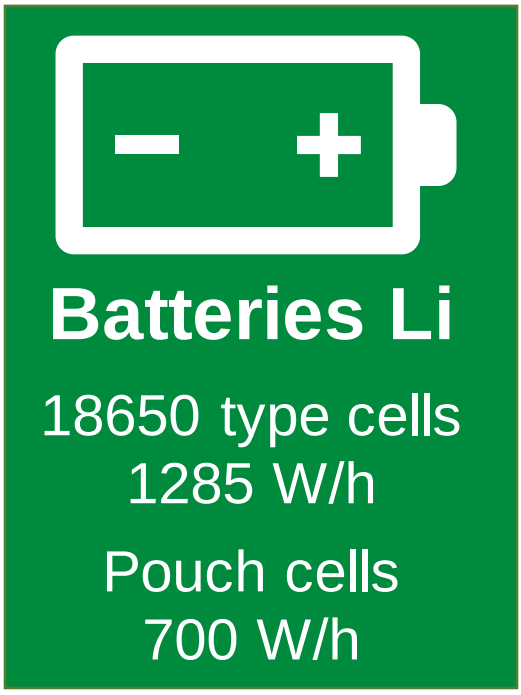
5.3 Use of logo and display of the test report

The achieved performance of the fire test is represented by the logos below (or similar). It is mandatory to place a direct link to this test report near to the logo. The manner in which this is technically arranged is left to the permit holder of the fire extinguisher. The test report that is linked to the logo must be shown in full. Reference should not be made to a single text item that allows a free interpretation of the test result. Another method of communication about the test result achieved and the way in which this is communicated to third parties must take place in coordination with Kiwa.

Gloria WKL 6 P:



Gloria WKL 9 P:



6 Annex A – Approval certificate Medium

Bauaufsichtlich anerkannte Prüf-, Überwachungs- und Zertifizierungsstelle
Prüfstelle für Feuerlöschmittel und -geräte
DIN EN ISO/IEC 17025 D-PL-17819-01-00
DIN EN ISO/IEC 17065 D-ZE-17819-01-00
DIN EN ISO/IEC 17020 D-IS-17819-01-00
ZLS-GS-0130
Notified Body no. 0767

MPA Dresden

Konformitätsbestätigung

Declaration of conformity

Nr./*no.* KB 107/20

Hersteller: *Manufacturer:*	Gloria GmbH Diestedder Str. 39 59329 Wadersloh, Deutschland
Herstellwerk: *Manufacturing plant:*	ORCHIDEE Europe BVBA Brielen 2 2830 Tisselt, Belgium
Produktname: *Product name:*	**IMPREX C**
Prüfgrundlagen: *Test specification:*	Prüfanweisung LM 01-01 der MPA Dresden GmbH vom 13.03.2017, Prüfung von wässrigen Löschmitteln *Test instruction LM 01-01 of MPA Dresden GmbH, dated 13 March 2017, Test of water based fire extinguishing media*
Prüfbericht-Nr.: *Test report no.:*	**20200334/Or 112**
Art des Löschmittels: *Type of extinguishing medium:*	Flüssiges Feuerlöschmittel (Konzentrat / Zusatz zum Löschwasser) *Liquid fire extinguishing medium (concentrate / additive to extinguishing water)*
Löschvermögen: *Extinguishing performance:*	siehe Seite 2 dieser Konformitätsbestätigung *see page 2 of this declaration of conformity*
Hinweise: *Notes:*	Anwendungskonzentration 2 % *Usage concentration 2 %*
Dieses Dokument umfasst: *This document comprises:*	2 Seiten *2 pages*

Die Konformität des geprüften Löschmittels mit den oben genannten Prüfgrundlagen wird bestätigt.
The conformity of the tested extinguishing medium with the above mentioned test specifications is confirmed.

24. Juni 2020
24 June 2020

Dipl.-Forsting. Holger Romberg
Leiter der Prüfstelle
Laboratory Manager

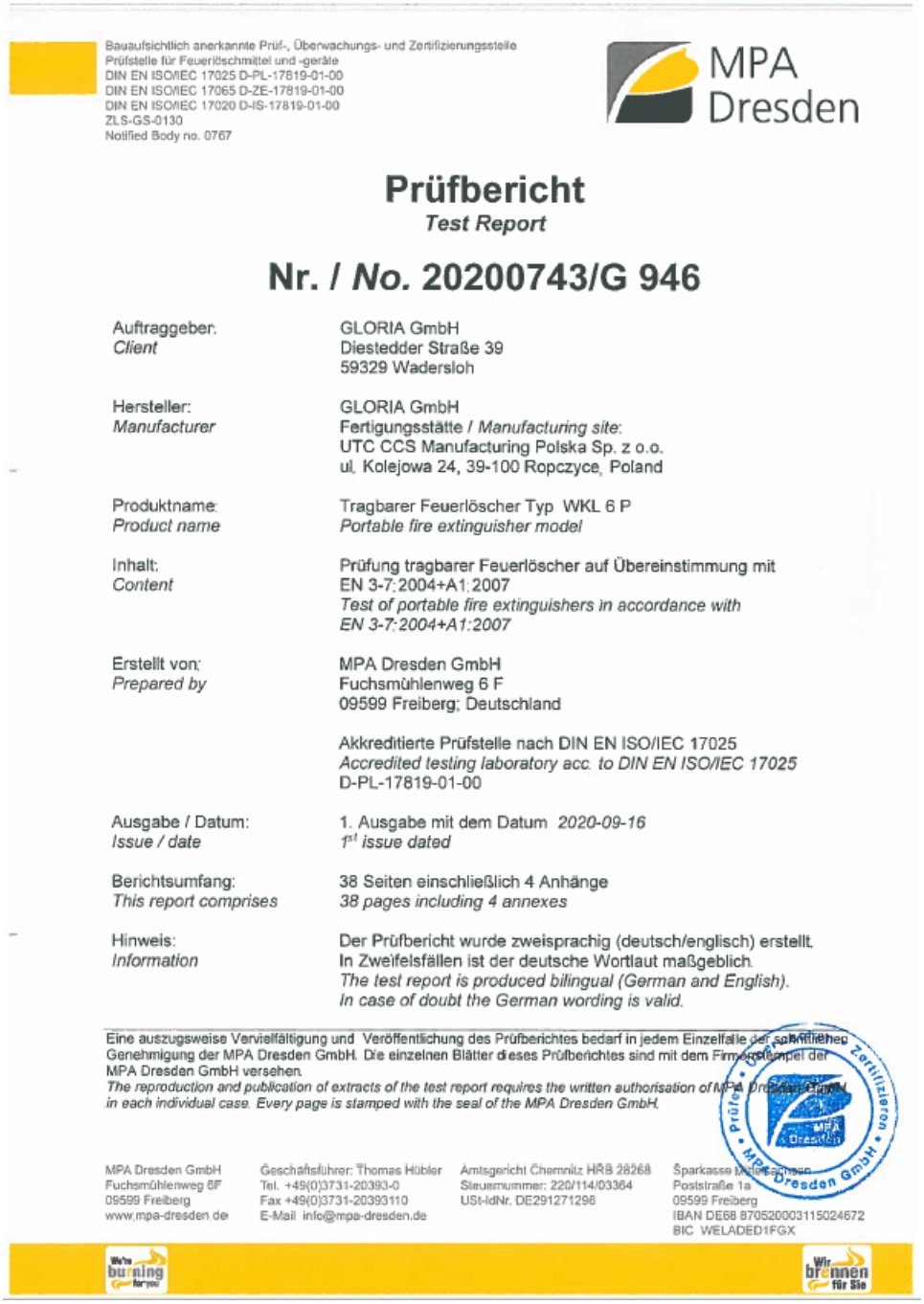
MPA Dresden GmbH
Fuchsmühlenweg 6F
09599 Freiberg
www.mpa-dresden.de

Geschäftsführer: Thomas Hübler
Tel. +49(0)3731-20393-0
Fax +49(0)3731-20393110
E-Mail info@mpa-dresden.de

Amtsgericht Chemnitz HRB 28268
Steuernummer: 220/114/03364
USt-IdNr. DE291271296

Sparkasse Mittelsachsen
Poststraße 1a
09599 Freiberg
IBAN DE68 87052000311502467 2
BIC WELADED1FGX

7 Annex B – Approval EN 3-7 WKL 6 P



Bauaufsichtlich anerkannte Prüf-, Überwachungs- und Zertifizierungsstelle
Prüfstelle für Feuerlöschmittel und -geräte
DIN EN ISO/IEC 17025 D-PL-17819-01-00
DIN EN ISO/IEC 17065 D-ZE-17819-01-00
DIN EN ISO/IEC 17020 D-IS-17819-01-00
ZLS-GS-0130
Notified Body no. 0767

MPA Dresden

Prüfbericht
Test Report

Nr. / *No.* 20200743/G 946

Auftraggeber: *Client*	GLORIA GmbH Diestedder Straße 39 59329 Wadersloh
Hersteller: *Manufacturer*	GLORIA GmbH Fertigungsstätte / *Manufacturing site:* UTC CCS Manufacturing Polska Sp. z o.o. ul. Kolejowa 24, 39-100 Ropczyce, Poland
Produktname: *Product name*	Tragbarer Feuerlöscher Typ WKL 6 P *Portable fire extinguisher model*
Inhalt: *Content*	Prüfung tragbarer Feuerlöscher auf Übereinstimmung mit EN 3-7:2004+A1:2007 *Test of portable fire extinguishers in accordance with EN 3-7:2004+A1:2007*
Erstellt von: *Prepared by*	MPA Dresden GmbH Fuchsmühlenweg 6 F 09599 Freiberg; Deutschland Akkreditierte Prüfstelle nach DIN EN ISO/IEC 17025 *Accredited testing laboratory acc. to DIN EN ISO/IEC 17025* D-PL-17819-01-00
Ausgabe / Datum: *Issue / date*	1. Ausgabe mit dem Datum *2020-09-16* *1st issue dated*
Berichtsumfang: *This report comprises*	38 Seiten einschließlich 4 Anhänge *38 pages including 4 annexes*
Hinweis: *Information*	Der Prüfbericht wurde zweisprachig (deutsch/englisch) erstellt. In Zweifelsfällen ist der deutsche Wortlaut maßgeblich. *The test report is produced bilingual (German and English).* *In case of doubt the German wording is valid.*

MPA Dresden GmbH
Fuchsmühlenweg 6F
09599 Freiberg
www.mpa-dresden.de

Geschäftsführer: Thomas Hübler
Tel. +49(0)3731-20393-0
Fax +49(0)3731-20393110
E-Mail info@mpa-dresden.de

Amtsgericht Chemnitz HRB 28268
Steuernummer: 220/114/03364
USt-IdNr. DE291271296

Sparkasse Mittelsachsen
Poststraße 1a
09599 Freiberg
IBAN DE68 87052000311502467 2
BIC WELADED1FGX

1. Identifizierung des geprüften Feuerlöschers
Identification of the tested fire extinguisher

Typbezeichnung: *Model name*	WKL 6 P
Zeichnungsnummer: *Drawing-no.*	409816.0000
Art und Handelsbezeichnung des Löschmittels: *Type and commercial name of extinguishing medium*	5,88 l Wasser / *Water* + 0,12 l Imprex C Aktenzeichen Nr.: KB 107/20 *Reference no.*
Nennfüllmenge: *Nominal charge*	6 l
Druckbeaufschlagung: *Pressurisation*	60 g CO_2 in Treibgasflasche (Aufladelöscher) *60 g CO_2 in propellant gas cartridge (cartridge type extinguisher)*

2. Angaben zur Probe
Information about the sample

Bereitgestellte Anzahl: *Provided quantity*	12
Eingangsdatum: *Date of receipt*	2020-06-15

Für die Prüfungen wurden nur die in diesem Bericht aufgeführten Materialien verwendet. Die Prüfergebnisse beziehen sich ausschließlich auf die geprüften Proben.
Only the materials detailed in this report have been subjected to tests. Test results apply to the test samples only.

3. Endergebnis der Prüfung
Conclusion of the tests

Zeitraum der Prüfungsdurchführung: *Period of testing*	2020-06-15	2020-09-16
Die vorgelegten Proben stimmen mit allen geprüften Abschnitten der Norm überein: *Conformity of submitted samples with all tested clauses of the standard*	ja / yes	Einzelheiten siehe Zusammenfassung auf Seite 5-6 *Details see summary on page 5-6*
Funktionstemperaturbereich: *Range of operating temperature*	von / *from* 5 °C	bis / *to* 60 °C
Überprüfter Betriebsdruck: *Checked working pressure*	bei / *at* T_{min}: 8 bar	bei / *at* T_{max}: 12 bar
Eignung für elektrische Anlagen (gilt nur für Feuerlöscher mit wässrigem Löschmittel): *Dielectric suitability (applicable only for water based extinguisher)*	ja / yes	
Brandklasseneignung: *Fire class(es) intended for*	A	
Erreichtes Löschvermögen: *Fire ratings achieved*	21 A	

4. Übereinstimmung mit den Unterlagen
Conformity to documentation

Die eingereichten Feuerlöschgeräte entsprechen den vom Antragsteller vorgelegten ausführlichen Unterlagen gemäß folgender Auflistung:
The fire extinguishers submitted can be identified from the detailed documentation supplied by the applicant comprising:

Anhang 1: *Annex*	Übereinstimmung des Feuerlöschmittels mit den technischen Angaben des Herstellers *Conformity of the fire extinguishing medium to the technical data provided by the manufacturer*
Anhang 2: *Annex*	Liste der Unterlagen zu diesem Prüfbericht *List of documents included in this test report*
Anhang 3: *Annex*	Liste drucktechnischer Nachweise nach 2014/68/EU (PED) *List of PED references*

5. Besondere Hinweise
Special information

Dieses Dokument ist ein Laborprüfbericht und keine Produktzulassung (Zertifizierung).
This is a laboratory test report and not a product certification approval.

Angegeben ist die erweiterte Messunsicherheit, die sich aus der Standardunsicherheit durch Multiplikation mit dem Erweiterungsfaktor k=2 ergibt. Der Wert der Messgröße liegt mit einer Wahrscheinlichkeit von 95'% im zugeordneten Werteintervall.
The indicated uncertainty of measurement is stated as the combined standard uncertainty multiplied by a coverage factor k = 2. The value of the measured variable is within the assigned value range with 95% probability.

Die Aussage zur Konformität wird auf der Grundlage der Toleranzgrenze, unter Berücksichtigung eines Sicherheitsbereichs, getroffen. Der Sicherheitsbereich entspricht dabei der erweiterten Messunsicherheit (nach GUM). Die Konformitätsaussage ist binär. Es wird von einer normalen Standardwahrscheinlichkeitsverteilung der Messgröße ausgegangen. In diesem Fall ist das Risiko einer falschen Konformitätszusprechung bei weniger als 2,5%. Das Risiko einer falschen Abweisung liegt ebenfalls bei weniger als 2,5%.
Decisions about conformity are based on guard banded acceptance limits, to result in less than 2,5% false accept risk. For this case the guard band is given by the expanded measurement uncertainty calculated per the GUM. Statements of conformity are binary. The measurand is assumed to have a normal probability distribution. The risk of accepted items to be outside the tolerance limit is less than 2,5%.

2020-09-16

Dipl.-Forsting. Holger Romberg
Leiter der Prüfstelle
Laboratory Manager

Prüfen • Überwachen • Zertifizieren • MPA Dresden GmbH

Dipl.-Ing. Bauer
Prüfingenieur
Test Engineer

8 Annex C – Approval EN 3-7 WKL 9 P

Bauaufsichtlich anerkannte Prüf-, Überwachungs- und Zertifizierungsstelle
Prüfstelle für Feuerlöschmittel und -geräte
DIN EN ISO/IEC 17025 D-PL-17819-01-00
DIN EN ISO/IEC 17065 D-ZE-17819-01-00
DIN EN ISO/IEC 17020 D-IS-17819-01-00
ZLS-GS-0130
Notified Body no. 0767

MPA Dresden

Prüfbericht
Test Report

Nr. / *No.* 20200743/G 947

Auftraggeber: *Client*	GLORIA GmbH Diestedder Straße 39 59329 Wadersloh
Hersteller: *Manufacturer*	GLORIA GmbH Fertigungsstätte / *Manufacturing site:* UTC CCS Manufacturing Polska Sp. z o.o. ul. Kolejowa 24, 39-100 Ropczyce, Poland
Produktname: *Product name*	Tragbarer Feuerlöscher Typ WKL 9 P *Portable fire extinguisher model*
Inhalt: *Content*	Prüfung tragbarer Feuerlöscher auf Übereinstimmung mit EN 3-7:2004+A1:2007 *Test of portable fire extinguishers in accordance with* *EN 3-7:2004+A1:2007*
Erstellt von: *Prepared by*	MPA Dresden GmbH Fuchsmühlenweg 6 F 09599 Freiberg; Deutschland Akkreditierte Prüfstelle nach DIN EN ISO/IEC 17025 *Accredited testing laboratory acc. to DIN EN ISO/IEC 17025* D-PL-17819-01-00
Ausgabe / Datum: *Issue / date*	1. Ausgabe mit dem Datum *2020-09-16* *1st issue dated*
Berichtsumfang: *This report comprises*	38 Seiten einschließlich 4 Anhänge *38 pages including 4 annexes*
Hinweis: *Information*	Der Prüfbericht wurde zweisprachig (deutsch/englisch) erstellt. In Zweifelsfällen ist der deutsche Wortlaut maßgeblich. *The test report is produced bilingual (German and English).* *In case of doubt the German wording is valid.*

Eine auszugsweise Vervielfältigung und Veröffentlichung des Prüfberichtes bedarf in jedem Einzelfall der schriftlichen Genehmigung der MPA Dresden GmbH. Die einzelnen Blätter dieses Prüfberichtes sind mit dem Firmenstempel der MPA Dresden GmbH versehen.
The reproduction and publication of extracts of the test report requires the written authorisation of MPA Dresden GmbH in each individual case. Every page is stamped with the seal of the MPA Dresden GmbH.

prüfen • überwachen • zertifizieren • MPA Dresden GmbH

MPA Dresden GmbH
Fuchsmühlenweg 6F
09599 Freiberg
www.mpa-dresden.de

Geschäftsführer: Thomas Hübler
Tel. +49(0)3731-20393-0
Fax +49(0)3731-20393110
E-Mail info@mpa-dresden.de

Amtsgericht Chemnitz HRB 28268
Steuernummer: 220/114/03364
USt-IdNr. DE281271296

Sparkasse Mittelsachsen
Poststraße 1a
09599 Freiberg
IBAN DE68 87052000311502467 2
BIC WELADED1FGX

We've burning for you
Wir brennen für Sie

1. Identifizierung des geprüften Feuerlöschers
Identification of the tested fire extinguisher

Typbezeichnung: *Model name*	WKL 9 P
Zeichnungsnummer: *Drawing-no.*	409817.0000
Art und Handelsbezeichnung des Löschmittels: *Type and commercial name of extinguishing medium*	8,82 l Wasser / *Water* + 0,18 l Imprex C Aktenzeichen Nr.: KB 107/20 *Reference no.*
Nennfüllmenge: *Nominal charge*	9 l
Druckbeaufschlagung: *Pressurisation*	120 g CO_2 in Treibgasflasche (Aufladelöscher) *120 g CO_2 in propellant gas cartridge (cartridge type extinguisher)*

2. Angaben zur Probe
Information about the sample

Bereitgestellte Anzahl: *Provided quantity*	15
Eingangsdatum: *Date of receipt*	2020-06-15

Für die Prüfungen wurden nur die in diesem Bericht aufgeführten Materialien verwendet. Die Prüfergebnisse beziehen sich ausschließlich auf die geprüften Proben.
Only the materials detailed in this report have been subjected to tests. Test results apply to the test samples only.

3. Endergebnis der Prüfung
Conclusion of the tests

Zeitraum der Prüfungsdurchführung: *Period of testing*	2020-06-15	2020-09-16
Die vorgelegten Proben stimmen mit allen geprüften Abschnitten der Norm überein: *Conformity of submitted samples with all tested clauses of the standard*	ja / yes	Einzelheiten siehe Zusammenfassung auf Seite 5-6 *Details see summary on page 5-6*
Funktionstemperaturbereich: *Range of operating temperature*	von / *from* 5 °C	bis / *to* 60 °C
Überprüfter Betriebsdruck: *Checked working pressure*	bei / *at* T_{min}: 11 bar	bei / *at* T_{max}: 16 bar
Eignung für elektrische Anlagen (gilt nur für Feuerlöscher mit wässrigem Löschmittel): *Dielectric suitability (applicable only for water based extinguisher)*	ja / yes	
Brandklasseneignung: *Fire class(es) intended for*	A	
Erreichtes Löschvermögen: *Fire ratings achieved*	27 A	

4. Übereinstimmung mit den Unterlagen
Conformity to documentation

Die eingereichten Feuerlöschgeräte entsprechen den vom Antragsteller vorgelegten ausführlichen Unterlagen gemäß folgender Auflistung:
The fire extinguishers submitted can be identified from the detailed documentation supplied by the applicant comprising:

Anhang 1: *Annex*	Übereinstimmung des Feuerlöschmittels mit den technischen Angaben des Herstellers *Conformity of the fire extinguishing medium to the technical data provided by the manufacturer*
Anhang 2: *Annex*	Liste der Unterlagen zu diesem Prüfbericht *List of documents included in this test report*
Anhang 3: *Annex*	Liste drucktechnischer Nachweise nach 2014/68/EU (PED) *List of PED references*

5. Besondere Hinweise
Special information

Dieses Dokument ist ein Laborprüfbericht und keine Produktzulassung (Zertifizierung).
This is a laboratory test report and not a product certification approval.

Angegeben ist die erweiterte Messunsicherheit, die sich aus der Standardunsicherheit durch Multiplikation mit dem Erweiterungsfaktor k=2 ergibt. Der Wert der Messgröße liegt mit einer Wahrscheinlichkeit von 95'% im zugeordneten Werteintervall.
The indicated uncertainty of measurement is stated as the combined standard uncertainty multiplied by a coverage factor k = 2. The value of the measured variable is within the assigned value range with 95% probability.

Die Aussage zur Konformität wird auf der Grundlage der Toleranzgrenze, unter Berücksichtigung eines Sicherheitsbereichs, getroffen. Der Sicherheitsbereich entspricht dabei der erweiterten Messunsicherheit (nach GUM). Die Konformitätsaussage ist binär. Es wird von einer normalen Standardwahrscheinlichkeitsverteilung der Messgröße ausgegangen. In diesem Fall ist das Risiko einer falschen Konformitätszusprechung bei weniger als 2,5%. Das Risiko einer falschen Abweisung liegt ebenfalls bei weniger als 2,5%.
Decisions about conformity are based on guard banded acceptance limits, to result in less than 2,5% false accept risk. For this case the guard band is given by the expanded measurement uncertainty calculated per the GUM. Statements of conformity are binary. The measurand is assumed to have a normal probability distribution. The risk of accepted items to be outside the tolerance limit is less than 2,5%.

Dieser Prüfbericht darf nur in vollem Wortlaut vervielfältigt und veröffentlicht werden. Eine auszugsweise Vervielfältigung und Veröffentlichung bedarf in jedem Einzelfalle der schriftlichen Genehmigung der MPA Dresden GmbH. Werbetexte dürfen nicht dem Prüfbericht widersprechen. Übersetzungen des Berichtes müssen den Hinweis: „Nicht von der MPA Dresden GmbH autorisierte Übersetzung der Originalfassung" enthalten.
This test report may only be reproduced and published in its full wording. The reproduction and publication of extracts of the test report requires the written authorisation of MPA Dresden GmbH in each individual case. Advertising texts and drawings may not contradict the test report. Translations of the report must contain the information "Translation of the original version not authorised by MPA Dresden GmbH".

2020-09-16

Dipl.-Forsting. Holger Romberg
Leiter der Prüfstelle
Laboratory Manager

Prüfen • Überwachen • Zertifizieren • MPA Dresden GmbH • MPA Dresden

Dipl.-Ing. Bauer
Prüfingenieur
Test Engineer