

Method for operating a remote-controlled portable fire extinguisher

The present invention relates to a method for monitoring a portable fire extinguisher according to the features in claim 1.

The prior art includes portable fire extinguishers that are kept at various locations to give people in the vicinity the opportunity to fight a fire quickly and effectively in the event of a fire breaking out. Such portable fire extinguishers are used particularly in public institutions and commercially managed companies, but also in private households. In most cases, having portable fire extinguishers on hand is a legal requirement.

To ensure that portable fire extinguishers, once installed, can be used directly for years to come, there are various laws, standards, and occupational safety regulations stipulating that these portable fire extinguishers must be tested for functionality at a specific interval, for example every two years or annually.

For this purpose, it is absolutely necessary that a suitably trained and qualified person inspects each individual portable fire extinguisher on site at the specified time intervals, subjects it to at least a visual and technical test, and leaves a test seal and corresponding test report.

The object of the present invention is to demonstrate, starting from the prior art, a way to monitor portable fire extinguishers while simultaneously complying with specified testing standards and minimizing the workload for testing.

The aforementioned problem is solved by a method for a remotely monitored portable fire extinguisher according to the features in claim 1.

The portable fire extinguisher has a container with a fire extinguishing medium, a handle for transport and operation of the portable fire extinguisher, a discharge nozzle and optionally a hose.

The method according to the invention is now characterized in that a remote monitoring module is provided for monitoring the status of the portable fire extinguisher. With the help of the remote monitoring module, in particular, status data of the portable fire extinguisher can be recorded, evaluated and sent or retrieved, as described below in this application. According to the invention, the method is characterized in that a test report is then created or processed using the condition

data, whereby this test report or the result is then sent to the operator of the portable fire extinguisher and/or to third parties by means of a digital signature. The third parties could be, for example, an insurance company, a government agency, a fire safety officer, or a partner company. The test report or result can also be sent in the form of a digital inspection sticker or digital seal.

5 This inspection sticker or seal indicates that the inspected portable fire extinguisher has met all criteria and is ready for use.

The test report depends on the respective legislation of the country, the responsible technical monitoring service, and other fire protection measures or conditions. The end result should be a status report or the result of the test report. The fire extinguisher is ready for use. It meets the
10 requirements of the test report and is ready for use. The test report is therefore a record of a visual and/or mechanical inspection on site, which is, however, made possible via remote access through remote monitoring.

The test report or its result can then be stored, for example, in the respective company's internal documentation. The test report can also be printed out, for example, and in particular printed on a
15 suitable adhesive label and then attached to the fire extinguisher. In this case, a seal or label, for example in the form of a barcode or QR code, would be printed, which represents the fulfillment of all test criteria. The test report can, for example, include an additional QR code, so that a security officer can immediately verify the authenticity of the test report, which is then also stored in a database, by scanning the QR code.

20 This offers a significant advantage compared to methods previously known in the prior art. Here, the status and operational readiness of the fire extinguisher had to be tested and certified by a respective employee during an on-site inspection at specified intervals. Through the interplay of remote monitoring and digitally certified test reports or results, it is possible to carry out these activities entirely remotely. This results in immense potential savings, as employees no longer need
25 to make on-site appointments to test the functionality and operational readiness of a particular portable fire extinguisher. This results in staff savings. Furthermore, resources are saved, as no vehicles, travel times, etc. are required. If the test certificates, i.e., the test report and/or the test

result, are stored digitally, so that, for example, the fire extinguisher can be scanned via a barcode or QR code and a test can then be carried out to determine that a digital test certificate is stored for this fire extinguisher, this also saves printing costs and paper costs as well as costs for any stickers and thus plastic costs, which is both economical and environmentally friendly.

5 In contrast to NFC tags previously known from the prior art, it is therefore not necessary to store the test report on site on the NFC tag itself; rather, the storage or recording of the test report or test result and thus of the test seal can be done remotely. This allows, in particular, the fire extinguisher to be tested via remote inspection or remote monitoring. The test result can then be stored on a server or in a cloud. The test result is then stored for the identification of the fire
10 extinguisher, for example via barcode or QR code. If the fire extinguisher is then tested on site on a random basis, the test result or test seal can be retrieved from a server by scanning the barcode or QR code and thereby confirmed. This completely eliminates the need for on-site inspection and the on-site application of a test seal or test label.

 The digital signature is a qualified digital signature or qualified electronic signature (QES) or
15 a comparable qualified signature. This ensures that a handwritten signature of an inspector, reflected in his inspection report or inspection sticker, is stored in a forgery-proof manner. The inspector or the inspecting organization, who, for example, monitors the remote monitoring software, thus complies with the required inspection standard, i.e., the minimum requirements for the respective country-specific or other regulations, such as internal operating regulations, fire
20 protection regulations, or similar, i.e., minimum standards that are necessary for inspection as well as the minimum standards that are necessary for certifying the inspection.

 The remotely monitored portable fire extinguisher can be designed as described below. It has a container with a fire extinguishing agent. This could be a permanent pressure fire extinguisher. However, it could also be a portable fire extinguisher with rechargeable technology.

25 Furthermore, a handle is provided for transporting and/or operating the portable fire extinguisher. This handle is located particularly in the region of an upper end of the container.

Furthermore, an outlet nozzle is provided. Optionally, this outlet nozzle is located at one end of a hose.

The portable fire extinguisher according to the invention is now characterized in that a remote monitoring module is associated therewith. In particular, this remote monitoring module is located in the region of the handle. The remote monitoring module measures and therefore has sensors for the pressure and temperature in the container or the environment, especially ambient temperature. This allows pressure and temperature to be measured inside the container. However, it can also measure the pressure and temperature of the environment. A combination of both is also possible.

Furthermore, the remote monitoring module has a motion sensor.

The remote monitoring module can then transmit the status of the portable fire extinguisher via a GSM signal; alternatively or additionally, the status of the portable fire extinguisher can be retrieved via the GSM signal.

In particular, an M2M-GSM connection is used for this purpose. This enables almost continuous communication with a corresponding receiver with extremely low energy consumption. Thus, for example, a status message can be emitted several times a week, especially several times a day and also several times an hour, and a status message can be requested as needed or at predetermined intervals.

According to the invention, it is further provided in particular that the end of the hose or the outlet nozzle located there is detachably attached to the portable fire extinguisher, in particular to the container of the portable fire extinguisher. Furthermore, a plug contact is provided here, which records a change in the position of the end of the hose and transmits it to the remote monitoring module. This allows, for example, the detection of manipulation or similar issues. For example, if such a portable fire extinguisher is located in the region of a school and young people want to put chewing gum into the nozzle, this unauthorized use or disposal can be recorded. This offers a further safety advantage compared to manual testing at predetermined time intervals, as the end of the outlet opening or the end of the hose is thus constantly monitored. Furthermore, it may be provided that a protective device monitors one end of the outlet nozzle. For example, a type of seal

or sensor can be provided here that monitors any kind of access to or modification of the outlet nozzle and issues a corresponding message.

In a further preferred embodiment variant, it is provided that an additional sensor is arranged on the fire extinguisher, in particular on the remote monitoring module. The sensor measures the ambient air quality. In particular, the sensor can measure the carbon monoxide and/or carbon dioxide levels in the environment. However, it could also be a nitrogen oxide sensor or a particle sensor (PM sensor). This allows the air surrounding the fire extinguisher to be also monitored, and a fire can even be detected if necessary. This fire incident can then be reported via the remote monitoring module.

Furthermore, the fire extinguisher can be charged wirelessly. A wireless charging port can be integrated for this purpose, for example based on the principle of inductive charging. For example, a suitable coil may be arranged at the bottom of the fire extinguisher. Furthermore, at the location assigned to the fire extinguisher, a corresponding energy source or transmission device is available that can supply or charge the remote monitoring module of the fire extinguisher via wireless energy transfer. The energy supply unit described later can therefore be supplied with energy.

It is further provided that a hood is placed over the upper part of the container, preferably over the handle, with the remote monitoring module being integrated into the hood. The hood can cover the entire handle. However, the hood can also be integrated into the handle itself, so that, depending on the requirements, the portable fire extinguisher can be gripped together with the hood.

Furthermore, a power supply unit is provided, which is assigned to the remote monitoring module. The remote monitoring module can also have tamper protection. This is, for example, a sensor that monitors the immediate surroundings of the remote monitoring module. In particular, the sensor is linked to the hood. Removing the hood would therefore indicate possible tampering and would also emit and generate an error signal.

Furthermore, the data is then transmitted via the GSM connection, which works independently of other infrastructure, such as a WLAN connection, Bluetooth connection or similar, so that the fire extinguisher can be positioned completely autonomously also in factory halls without other

network coverage. The data that can be retrieved or transmitted via the remote monitoring module therefore includes at least the following parameters:

The device/location ID contains information such as the year of manufacture of the fire extinguisher, the position of the fire extinguisher, and the model of the fire extinguisher.

5 Furthermore, a date/time stamp indicating when the data was retrieved. The parameters pressure, temperature, and movement. Furthermore, information about the plug contact or protective device as well as the tamper protection. In addition, information about the battery status can also be transmitted. A GPS module for location tracking might also be present.

10 Another feature of the remotely monitored fire extinguisher according to the invention is a signaling function in case of malfunction. Should any of the previously described sensors fail to deliver a signal or deliver a faulty signal, an error query will be transmitted by the receiving station or a cloud. The remote monitoring module confirms this error query. However, if at least one parameter, signal, or sensor continues to receive feedback with a faulty signal or no parameter value at all, the fire extinguisher enters an error mode. This error mode can then send a visual
15 and/or acoustic signal. For example, a warning tone and/or a flashing warning light, so that it is locally signaled that the fire extinguisher is emitting an error message. People in the vicinity are thus informed that this fire extinguisher is not ready for use. Because the receiving station or the cloud has a record indicating that the fire extinguisher is malfunctioning, a service technician can be sent to the fire extinguisher in question to repair and/or replace it. This increases the operational
20 safety and, above all, the operational readiness of remotely monitored fire extinguishers in contrast to fire extinguishers monitored using the conventional method of on-site testing, as operational readiness is constantly and continuously tested.

Further advantages, features, properties, aspects of the present invention are the subject of the following description. Preferred properties are shown in schematic figures. These simplify the
25 understanding of the invention. In the figures.

Fig. 1 shows a remotely monitored portable fire extinguisher,

Fig. 2 shows an adapter disc,

Fig. 3 shows a remote monitoring module.

Fig. 1 shows a remotely monitored portable fire extinguisher according to the invention. This portable fire extinguisher has a container 2 containing a fire extinguishing medium not shown in detail. A handle 3 is arranged on the top side to allow the fire extinguisher to be carried and also to be activated using the handle 3. A hose 4 extends from the handle 3 itself. An outlet nozzle 5 is arranged at the end of the hose 4, so that, if necessary, fire extinguishing medium can be directed towards a fire via the nozzle 5. According to the invention, a remote monitoring module 6 is now arranged in the region of the handle 3. This measures the temperature and pressure of the fire extinguishing medium inside container 2. It also detects movements, i.e., when the fire extinguisher is lifted or moved to a different location. Furthermore, a lower base tray is shown. A plug contact 8 is located on the lower base tray. The outlet nozzle 5 is positioned in this plug contact 8 when the unit is assembled. This allows the activation or removal of the outlet nozzle 5 to be detected, so that it can be assumed that the fire extinguisher is being used or at least sabotaged. Furthermore, a hood 9 is shown, which is arranged over the upper region of the fire extinguisher. The remote monitoring module 6 also includes a remote communication module, in particular a GSM module, which wirelessly transmits signal 10, in particular via a mobile communication standard, to a receiving station 11 not shown in detail. For example, receiving station 11 could be a company that maintains and tests fire extinguishers.

Fig. 2 shows an adapter disc. An opening 12 of the container 2 can thus be reduced from a larger diameter 13 to a smaller diameter 13. Thus, existing containers 2 can also be retrofitted with the solution according to the invention, since the remote monitoring module 6 is preferably located in the region of the handle 3 and therefore has a screw thread. This means that various existing fire extinguishers can also be retrofitted.

Another essential part is now shown in the schematic picture in Fig. 3. The remotely monitored portable fire extinguisher has a remote monitoring module 6. This sends data about the status and operational readiness to a receiving station 11. Now, a certified body 14 can read this data and test it according to the respective standards and/or laws or requirements. If the remotely monitored fire

extinguisher meets all requirements and is ready for use, the certified body 14 can transmit a certificate 15, i.e., a test certificate with a digital signature. This can then optionally or additionally be stored, for example, in a Cloud 16. It can also be printed out and attached directly to the fire extinguisher, for example in the form of an adhesive label or similar. However, it can also be stored, for example, in an office building or with a corresponding security officer or fire safety officer. The fire extinguisher may, for example, also have a barcode or bar code 17. For the bar code or barcode 17, the certificate 15 is then renewed and stored in a database or cloud 16. A fire safety officer or a legally mandated occupational safety inspector can then inquire about the current test status of the fire extinguisher by scanning the barcode or bar code 17. This eliminates the need for a testing technician to visit a locally stationed portable fire extinguisher at predetermined intervals, subject it to a visual and/or technical inspection, and then certify its operational readiness with an analogous seal. This eliminates the need for travel and on-site inspection through the combination of remote monitoring and a certificate 15 with a digital signature. This saves resources, labor, and protects the environment.

Reference numerals:

1 -portable fire extinguisher

2 -container

3 -handle

4 -hose

5 -outlet nozzle

6 -remote monitoring module

7 -bottom plate

8 -plug contact

9 -hood

10 - wireless signal

11 - receiving station

12 - opening

13 - diameter

14 - certified body

15 - certificate

16 - Cloud

5 17 - Code

CLAIMS

1. A method for testing a hand-held fire extinguisher (1), comprising a container with a fire extinguishing medium, a handle (3) for transporting and/or operating the hand-held fire extinguisher (1), an outlet nozzle (5) optionally with a hose (4), characterized in that the hand-held
5 fire extinguisher (1) is associated with a wireless remote monitoring module (6) for monitoring the status of the hand-held fire extinguisher, and wherein the remote monitoring module (6) transmits status data of the portable fire extinguisher (1), wherein these status data are read out and a test report/test result with digital signature is sent to the operator of the hand-held fire extinguisher (1) and/or to third parties and/or stored in a database.

10 2. The method for testing a hand-held fire extinguisher (1) according to claim 1, characterized in that the digital signature is a qualified electronic signature.

3. The method for testing a hand-held fire extinguisher (1) according to any one of claims 1 or 2, characterized in that a test seal with a code, in particular a barcode or bar code, in particular a QR code or bar code, is printed or sent and applied to the hand-held fire extinguisher (1), wherein,
15 upon reading the code, the most recently available test data, at least the test result of the hand-held fire extinguisher, can be retrieved.

4. A method for testing a hand-held fire extinguisher (1), in particular according to claim 1, comprising a container with a fire extinguishing medium, a handle (3) for transporting and/or operating the hand-held fire extinguisher (1), an outlet nozzle (5)
20 optionally with a hose (4), characterized in that the hand-held fire extinguisher (1) is associated with a wireless remote monitoring module (6) which monitors the pressure and temperature in the container and has a motion sensor, wherein the remote monitoring module (6) transmits status data of the portable fire extinguisher (1) and/or the status of the portable fire extinguisher (1) can be retrieved by means of a GSM signal.

25 5. The method for testing a hand-held fire extinguisher (1) according to any one of claims 1 to 4, characterized in that the end of the hose (4) is attached to the hand-held fire extinguisher (1) and

that a plug contact (8) records a change in the position of the end of the hose (4) and transmits it to the remote monitoring module (6).

6. The method for testing a hand-held fire extinguisher (1) according to any one of claims 1 to 5, characterized in that a protective device monitors one end of the outlet nozzle (5).

5 7. The method for testing a hand-held fire extinguisher (1) according to any one of claims 1 to 6, characterized in that the remote monitoring module (6) is retrofitted.

8. The method for testing a hand-held fire extinguisher (1) according to any one of claims 1 to 7, characterized in that a hood (9) is placed over the upper part of the container, in particular over the handle (3), wherein the remote monitoring module (6) is integrated into the hood (9).

10 9. The method for testing a hand-held fire extinguisher (1) according to any one of claims 1 to 8, characterized in that an M2M-GSM connection is used as a GSM transmitting unit.

10. The method for testing a hand-held fire extinguisher (1) according to any one of claims 1 to 9, characterized in that an energy supply unit is provided, which is associated with the remote monitoring module (6).

15 11. The method for testing a hand-held fire extinguisher (1) according to any one of claims 1 to 10, characterized in that the remote monitoring module (6) has a tamper protection, in particular a sensor, such that unauthorized third-party access is detectable.

12. The method for testing a hand-held fire extinguisher (1) according to any one of claims 1 to 11, characterized in that a message which can be retrieved via the remote monitoring module
20 (6) has at least one of the following parameters: device ID, date/time stamp, pressure, temperature, movement, plug contact (8), protective device, battery status.

13. The method for testing a hand-held fire extinguisher (1) according to any one of claims 1 to 12, characterized in that an adapter plate is inserted in an upper opening (12) of the container, which reduces the size of the opening (12).