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Specific Certification Program Fire Protection Systems for Products

Control & Indicating Equipment and Control for automatic fire protection equipment and Fire Protection Systems based on Solid Bound Compound (SBC) -generators



Trust
Quality
Progress

Preface

This specific certification program has been accepted by the Kiwa Board of Experts Fire Safety, in which all relevant parties in the field of Fire Protection Systems are represented. The Board of Experts also supervises the certification activities and where necessary requires the evaluation guideline to be revised. All references to Board of Experts in this evaluation guideline pertain to the above mentioned Board of Experts.

This certification program will be used by Kiwa in conjunction with the Kiwa Regulations for Certification within the context of Certification Scheme K21045 "Fire Protection Systems".

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The use of this evaluation guideline by third parties, for any purpose whatsoever, is only allowed after a written agreement is made with Kiwa to this end.

Validation

This specific certification program within the context of certification scheme K21045 has been validated by the Director Fire Safety and Security of Kiwa on 2021-09-16

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1 Introduction

1.1 General

This specific certification program includes all relevant requirements which are employed by Kiwa when dealing with applications.

This specific certification program is a first version and shall be used in context with product certification scheme K21045 "Fire Protection Systems".

Fire Protection Systems (FPS) can be based on components being generators containing a Solid Bound Compound (SBC). This SBC is base material for the extinguishing medium. To activate the Fire Protection System should the SBC be expelled out of the generator in a physical form designed to extinguish or control the fire.

This first activation of the generator is an activation element that produces heat in short period to start up the process of the SBC in another physical composition. For this needs the activation element a short electrical power pulse.

A Fire Protection System needs a proper Fire Detection System (FDS). The standard for this central and indication equipment of the Fire Detection System is the "EN54-2 - Fire detection and fire alarm systems - Part 2: Control and indicating equipment".

Other elements of the Fire Detection System are arranged in the EN54-xx series.

It is also possible to use the EN12094-1 for the control and indicating equipment of the Fire Detection System. The "EN12094-1 - Fixed firefighting systems - Components for gas extinguishing systems - Part 1: Requirements and test methods for electrical automatic control and delay devices" is specific designed for gas extinguishing systems that needs mostly 1 electrical valve for the activation of this type of Fire Protection System.

Note.

A fire protection system based on SBC-generators consist mostly out of multiple generators to reach the necessary amount of extinguishing agent. This demands special attention to the control element of the automatic fire protection equipment which is responsible for the correct activation of all the generators which are part of the protection system.

SBC-generators are characterized by a low impedance, where common control elements are working at a 24Vdc power level. Without special technics and or equipment activation currents up to 30A can occur, which make activation on normal power supplies unreliable.

The additional technics and/or control and signaling elements to build a reliable SBC generator based fire protection system is subject of this specific certification program.

This certification program details the requirements for the product of Control & Indicating Equipment and Control for automatic fire protection equipment and Fire Protection Systems based on SBC-generators.

This specific certification program details the requirements for the product of Control & Indicating Equipment and Control for automatic fire protection equipment and Fire Protection Systems based on SBC -generators.

1.2 Field of application / scope

The functional and performance requirements for the product of Control & Indicating Equipment and Control for automatic fire protection equipment and Fire Protection Systems based on SBC - generators

Based on the results of this test protocol in this specific certification program is additional listing possible.

1.3 Acceptance of test reports provided by the supplier
See TIC scheme K21045.

1.4 Quality declaration
See TIC scheme K21045.

2 Terms and definitions

See TIC scheme K21045.

2.1 Additional terms and definitions

2.1.1 **Automatic switch / manual switch**

Means of converting the system from automatic to manual activation.

Source; paragraph 3.3 of EN15276-2; 2019.

2.1.2 **Control device (G)**

Device which is able to control the sequence of events leading to activation

Source; paragraph 3.8 of EN15276-2; 2019.

2.1.3 **Control device (G)**

Component which receives a signal from a fire sensor, a fire detector, a fire detection installation or a manual triggering device and processes and transmits signals for actuation and auxiliary functions.

Source; paragraph 3.1 of EN12094-03; 2003.

2.1.4 **E.C.D. (G)**

Electrical automatic control and delay device (see also 4.1 of EN12094-01).

Source; paragraph 3.2.2 of EN12094-01; 2003.

2.1.5 **Emergency hold device (J)**

Device that prevents the electrical actuation of aerosol generators.

Source; paragraph 3.13 of EN15276-2; 2019.

2.1.6 **Manual stop device (J)**

Electrical device which allows a person to initiate the emergency stop function of the electrical control of the fire extinguishing system (see also 4.1.2 of EN12094-03).

Source; paragraph 3.9 of EN12094-03; 2003.

2.1.7 **Abort Switches (J)**

Where provided, the abort switches shall be located within the protected area and shall be located near the means of egress for the area. The abort switch shall be of a type that requires constant manual pressure to cause abort. The abort switch shall not be of a type that would

allow the system to be left in an aborted mode without personnel present. In all cases, the manual emergency control shall override the abort function. Operation of the abort function shall result in both audible and distinct visual indication of system impairment. The abort switch shall be clearly recognizable for the purpose intended.

Source; paragraph 6.4.5.3 of NFPA 2010; 2015.

2.1.8 System isolate switch (W)

Key operated or dual mode switch manual device that prevents the electrical actuation of aerosol generators (see also 7.5.4 of EN15276-2).

Source; paragraph 3.30 of EN15276-2; 2019.

2.1.9 Unwanted System Operation (W)

Care shall be taken to thoroughly evaluate and correct any factors that could result in unwanted discharges. To avoid unwanted discharge of an aerosol system during maintenance, a supervised disconnect switch shall be provided. The disconnect switch shall interrupt the releasing circuit to the aerosol system.

Source; paragraph 6.4.6 of NFPA 2010; 2015

2.1.10 Manual triggering devices (D)

Non-electrical or electrical device which allows a person to trigger the control device of the fire extinguishing system (see also 4.1.1 of EN12094-03 and 7.5.3 of EN 15726-02).

Source; paragraph 3.10 of EN12094-03; 2003.

2.1.11 Key symbols

A = Fire detector(s)
B = Control and indicating equipment
C = Fire alarm device
D = Manual call point(s)
G = Control for automatic fire protection equipment
H = Automatic fire protection equipment

Source; figure 1 of EN54-01; 1996.

3 Procedure for granting a product certificate

See TIC scheme K21045.

4 Setup of this specific certification program

4.1 General

This chapter contains the setup for the specification certification program.

For the performance of its certification work, Kiwa is bound to the requirements as included in EN-ISO/IEC 17065 “Conformity assessment - Requirements for bodies certifying products, processes and services” and certification scheme K21045.

This program describes a test plan large pool fires.

It describes the test requirements and/or laboratories to be used for the testing, identifies the tests to be performed and provides in minimal schedules for test activities.

5 Testing of the product

5.1 General

These chapters describe the requirements that the products, applied in the processes stated, shall meet. These requirements are part of the technical specification of the process, which is recorded in the process certificate for the Fire Protection System.

Certified products

The supplier of the Fire Protection System shall also supply Fire Detection Systems according to EN54-series. The standard for this central and indication equipment of the Fire Detection System is the "EN54-2 - Fire detection and fire alarm systems - Part 2: Control and indicating equipment". Other elements of the Fire Detection System are arranged in the EN54-xx series.

It is also possible to use the EN12094-1 for the control and indicating equipment of the Fire Detection System. The "EN12094-1 - Fixed firefighting systems - Components for gas extinguishing systems - Part 1: Requirements and test methods for electrical automatic control and delay devices" is specific designed for gas extinguishing systems that needs mostly 1 electrical valve for the activation of this type of Fire Protection System.

The certified supplier has all the afore-mentioned certificates of these products available in a components file with an up-to-date overview.

This file shall be checked yearly by the certified supplier to verify if all certificates are still valid. The afore-mentioned components shall be checked visually for a valid product certificate and proper specification and marking on the packaging.

Normalized products with product control mark

These materials shall be checked yearly by the certified supplier for the declared specifications, based on a declaration by the supplier or manufacturer of the normalized products with product control mark, as well as the visual check of material and/or packaging specifications.

A Fire Protection System based on SBC-generators need mostly more generators to have an effective extinguishing. This requires an additional configuration of control and indicating of this SBC-generators. This specific certification program details the requirements for the product of control and indicating of this SBC-generators.

5.2 Control and indicating equipment of the SBC-generators

The control and indicating equipment of the SBC-generators shall be, after the activation signal generated by the second fire alarm, able to activate the SBC-generators(s) in the protected area after the determined delay time (EN12094-1 and EN15276-2).

The control and indicating equipment of the SBC-generators performance shall be demonstrated by type tests.

Voltage loss and power calculations (first and second law of Kirchhoff) and installation drawings in the installation plan shall be bases for this demonstration.

The calculations shall specify per component in the circuit the electrical power, the electrical current and the electrical potential in a control stage and an alarm / activation stage. All components shall be compatible with these calculations. Also fuses for components.

Chapter 5 of EN 54-13 "Fire detection and fire alarm systems - Compatibility assessment of system components" shall be taken into account during this inspection and tests.

Kiwa shall witness these tests and record the results.

The specific configuration shall be tested on its performance to active all the generators.

The output of the type test shall be declared in a Technical Approval part of the product certificate of the certified supplier.

When the configuration is changed, a new test shall be performed.
The type test shall be repeated every 5 years for verification.

In the type test report the following specifications shall be recorded:

- Cable length (at least 100 m) and cable specification;
- Voltage- and power of supply unit after full use in backup situation;
- Type and number of activators (all activators shall have been activated within the test set-up);
- Type test set-up: configuration of control and indicating equipment, cables and components;
- Function: short-circuit and wire cut protection and in case these occur, an fault message to the control and indicating equipment.

For the control for automatic fire protection equipment with mechanical elements like an electrical relay shall this be tested on their reliability to switch the activation power to the SBC-generators. After the environmental testing has to be performed according to:

- EN54-2 or;
- EN12094-1 or;
- EN54-18;

shall the mechanical elements be switched at full power 500 times. This means that the mechanical element of the relay is switched 500 times at the maximal electrical current. After this endurance test shall the relay be tested functionally. For the system engineering shall the electrical current be not higher than 80% of its maximum.

For maritime and / or railway application shall the test according to EN 60068-2-6, Test Fc be at an acceleration amplitude of 20 m s^{-2} ($\approx 2,0 \text{ g}_n$).

5.3 Setups for the control for automatic fire protection equipment

When the control for automatic fire protection equipment of the SBC-generators is incorporated in the central and indication equipment of the Fire Detection System shall this also be tested according to “EN54-2 - Fire detection and fire alarm systems - Part 2: Control and indicating equipment”.

When the control for automatic fire protection equipment of the SBC-generators is incorporated in the electrical automatic control and delay devices shall this also be tested according to EN12094-1 for the control and indicating equipment of the Fire Detection System. The “EN12094-1 - Fixed firefighting systems - Components for gas extinguishing systems - Part 1: Requirements and test methods for electrical automatic control and delay devices”.

When control and indicating equipment of the SBC-generators is a separate element in a ring loop configuration shall this also be tested according to EN54-18; Fire detection and fire alarm systems - Part 18: Input/output devices and if applicable to EN54-17; Fire detection and fire alarm systems - Part 17: Short-circuit isolators.

When the control for automatic fire protection equipment is a separate element outside the central and indication equipment for the Fire Detection System shall this also according to EN54-18; Fire detection and fire alarm systems - Part 18: Input/output devices.

A work safety switch has to comply with IEC 60947-3 or IEC 60947-5-1.

A manual call point (activation or electrical triggering devices according to 4.1.1 of EN12094-3) and emergency hold device (temporary or electrical stop devices according to 4.1.2 of EN12094-3) has to comply with EN12094-3.

Below are examples of the different possible configurations shown. The lines linking the various components indicate information flows and not physical interconnections.

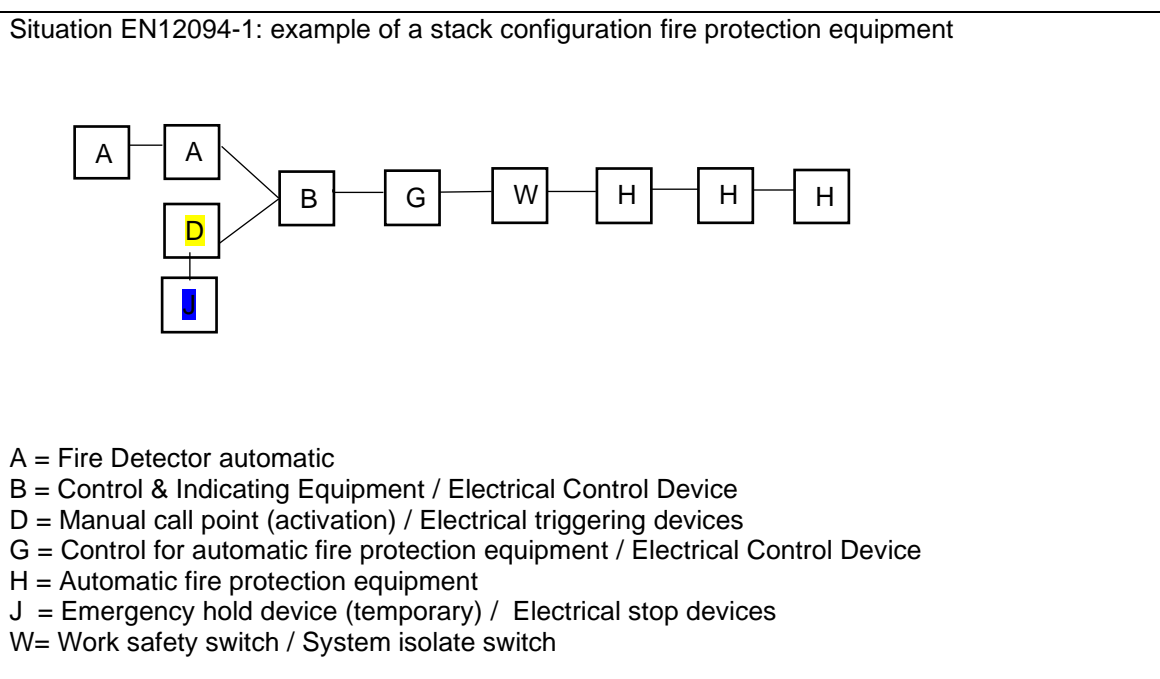


Figure 1; Situation EN12094-1: Stack configuration fire protection equipment

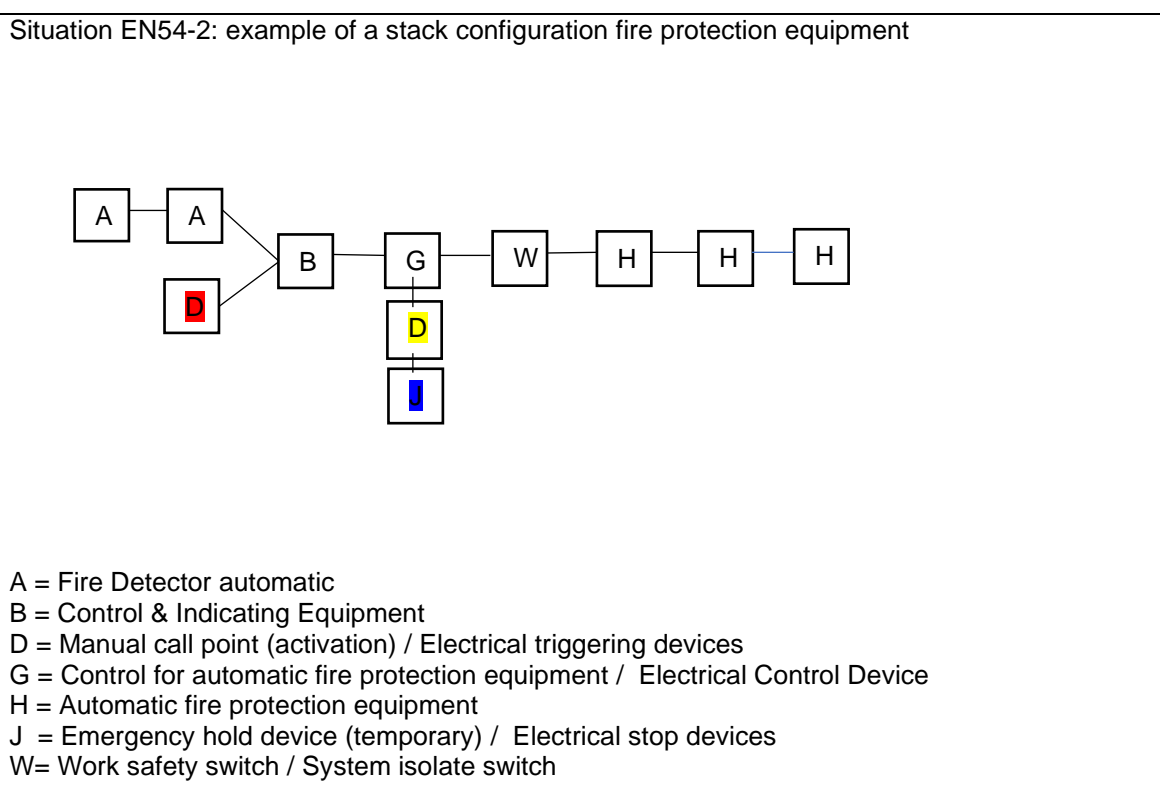
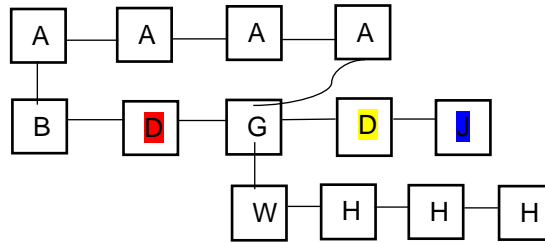


Figure 2; Situation EN54-2: Stack configuration fire protection equipment

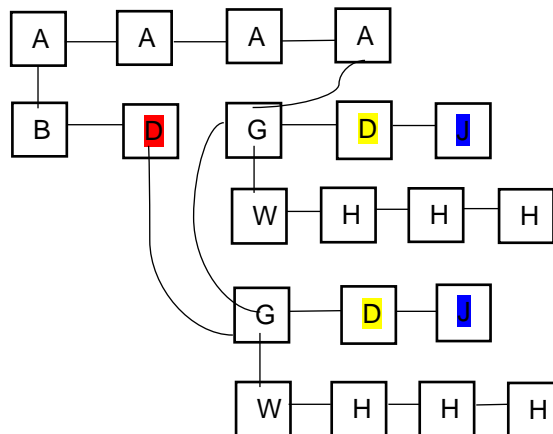
Situation EN54-2; example of a logical addressable ring loop configuration fire protection equipment



A = Fire Detector automatic
 B = Control & Indicating Equipment
 D = Manual call point (activation) / Electrical triggering devices
 G = Control for automatic fire protection equipment / Electrical Control Device
 H = Automatic fire protection equipment
 J = Emergency hold device (temporary) / Electrical stop devices
 W= Work safety switch / System isolate switch

Figure 3; Situation EN54-2; logical addressable ring loop configuration fire protection equipment

Situation EN54-2; example of a logical addressable ring loop configuration fire protection equipment 2 zones



A = Fire Detector automatic
 B = Control & Indicating Equipment / Electrical Control Device
 D = Manual call point (activation) / Electrical triggering devices
 G = Control for automatic fire protection equipment / Electrical Control Device
 H = Automatic fire protection equipment
 J = Emergency hold device (temporary) / Electrical stop devices
 W= Work safety switch / System isolate switch

Figure 4; Situation EN54-2; logical addressable ring loop configuration fire protection equipment 2 zones.

5.4 Reference matrix EN54-2 scheme K21045 control and indicating equipment of the SBC generators

The inspection points that should be verified are indicated in the table below for a central unit that only meets EN 54-2. Below is the reference Table EN12094-1 versus EN54-2.

Article number in EN12094-1	Topic in EN12094-1	Article number in EN54-2
1.	Scope	1.
2.	Normative references	2
3.	Concepts, definitions and abbreviations	3
3.1	Definitions	3.1
3.2	Abbreviations	3.2
4.	Functional requirements	
4.1	General	5
4.2	Environment Class	Environmental class = required
4.3	Signal processing and indicator	5.1
4.4	Receipt and processing of input initiating signals	Extra = required
4.5	Transmission of extinguishing signal	Extra = required
4.6	Activation of alarm equipment	7.8
4.7	Indication of power supply	5.4
4.8	Activated-condition	7.2
4.9	Indication of the activated-condition	7.5
4.10	Outflow Condition	Extra = required
4.11	Indication of the outflow condition	Extra = required
4.12	Re-establishment of the activated-condition and the outflow condition	Extra = required
4.13	Fault Reporting Condition	8.1
4.14	Indication of the failure notification condition	8.2
4.15	Disabled-condition	9.2
4.16	Indication of the Disabled-condition	9.3
4.17	Delay of extinguishing signal (option) (= x seconds, see BRL)	Extra = required
4.18	Signal that outflow of fire-extinguishing medium represented (option)	Extra = n/a
4.19	Monitoring the status of the components (option) (continuous surveillance signals, see BRL)	Extra = required
4.20	Emergency Guard Equipment	Extra = n/a
4.21	Control of outflow time	Extra = n/a
4.22	Initiating second outflow	Extra = n/a
4.23	Only manual mode	Extra = n/a
4.24	Control signals to equipment in the system (option)	7.8,7.9.1,
4.25	Fire signals to reserve cylinders (cylinders equals generators)	Extra = n/a
4.26	Controlling equipment outside the system	7.10
4.27	Emergency stop equipment (option)	Extra = required
4.28	Control of extensive discharge	Extra = n/a
4.29	Releasing extinguishing media for selected outflow zones	Extra = required
4.30	Activate alarm equipment with various signals (option)	7.8
5.	Design Requirements	
5.1	General	12.2
5.2	Mechanical design	12.3
5.3	Manual control	Extra = required
5.4	Visible indicators	12.7
5.5	Audible indicators	12.10
5.6	Electric design of components	12.4
5.7	Circuit Design	Extra = required
6.	Additional design requirements for software-controlled control and indication equipment	
6.1	General	13.1
6.2	Software Design	13.3
6.3	Application Control (program)	13.4
6.4	Storage of programs and data	13.5
6.5	Control of memory contents	13.6
6.6	Software documentation (is checked)	Extra = required
6.7	Use of the control and indication equipment in case of system error	13.7
7.	Marking	14
8.	Documentation (see BRL)	Extra = required
9.	Tests	15
9.1	General test requirements	15.1
9.2	Functional tests	15.2
9.3	Environmental tests	15.3
9.4	Damp heat, cyclic	15.4,15.5
9.5	SO2-corrosion (durability)	15.15
10.	Evaluation of conformity	Extra = required
10.1	General	
10.2	Testing of Initial type	Extra = required
10.3	Factory production control	Extra = required
Annex A	Summary of indications	Info
Annex ZA	Clauses on the facilities of the EU Construction Products Directive 89/106/ECC	Info

6 Factory Production Control Fire Protection Components by Kiwa

See TIC- scheme K21045.

7 Inspection of Fire Protection Systems by Kiwa

See TIC- scheme K21045.

8 Marking

8.1 General

See TIC scheme K21045.

8.2 Certification mark

See TIC scheme K21045.

9 Requirements in respect of the quality system

See TIC scheme K21045.

10 Summary of tests and inspections

See TIC scheme K21045.

11 Agreements on the implementation of certification

See TIC scheme K21045.

12 Titles of standards

12.1 Public law rules

See TIC scheme K21045.

12.2 Standards / normative documents

See TIC scheme K21045. Additional standards are shown below.

Number	Title	Version*
IEC 60947-3	Low-voltage switchgear and controlgear - Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units	
IEC 60947-5-1	Low-voltage switchgear and controlgear - Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices	
EN 12094-3	Fixed firefighting systems - Components for gas extinguishing systems - Part 3: Requirements and test methods for manual triggering and stop devices	
EN54-17	Fire detection and fire alarm systems - Part 17: Short-circuit isolators	
EN 54-18	Fire detection and fire alarm systems - Part 18: Input/output devices	

*) When no date of issue has been indicated, the latest version of the document is applicable for new systems. Kiwa shall inform the certificate holders about changes in version. For design, installation and maintenance is the version of standard applicable set in the basic design.