

Securing the operational readiness of fire control systems

CFPA-E Guideline No 23:2010 F





FOREWORD

The European fire protection associations have decided to produce common guidelines in order to achieve similar interpretation in European countries and to give examples of acceptable solutions, concepts and models. The Confederation of Fire Protection Associations in Europe (CFPA E) has the aim to facilitate and support fire protection work in European countries.

The market imposes new demands for quality and safety. Today, fire protection forms an integral part of a modern strategy for survival and competitiveness.

This guideline is primarily intended for those responsible for safety in companies and organisations. It is also addressed to the rescue services, consultants, safety companies etc so that, in the course of their work, they may be able to help companies and organisations to increase the levels of fire safety.

The proposal for this guideline was produced by the Institute of Safety and Security and the author is Hans-Heinrich Wolfensberger from Switzerland.

This guideline has been compiled by Guidelines Commission and adopted by all fire protection associations in the Confederation of Fire Protection Associations Europe.

These guidelines reflect best practice developed by the countries of CFPA Europe. Where the guidelines and national requirement conflict, national requirements must apply.

Zürich, 5 May 2010
CFPA Europe

Dr. Hubert Rüegg
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Stockholm, 5 May 2010
Guidelines Commission

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1 Introduction

Fire detection systems and fire extinguishing systems must automatically identify any fire that may occur and to signal and alert all endangered persons and operational personnel. They can be used for activating and operating fire protection devices.

Owners and users of buildings and facilities are responsible for ensuring that appliances and equipment used for the structural, technical and preventive aspects of fire protection systems and facilities are to be maintained and operational at all times in accordance with regulations. A general overview can be found in Guideline No 1:2002, Internal Fire Protection Control.

The technical facilities for fire protection should be consistent with state-of-the-art technology and designed and maintained so that they are effective and operational at all times.

2 Scope

This Guideline documents the operational readiness of fire control systems and regulates their design and control.

Additionally an internal self-checking system must be implemented, that ensures the periodical checks of installations, which are relevant for fire protection. These checks are carried out more frequently than the control of fire control systems. The procedure of this self-checking system is not part of this document.

3 Definitions

Fire control systems (FCS)

Fire control systems are identified as those actuating devices of safety systems and/or safety components such as lift installations, venting systems, doors, fire dampers, etc, that are activated automatically or manually.

Integral test

An integral test is used to check all fire protection components, which are automatically activated, and their interrelationship with one another. This includes their proper activation and function.

Zone plan (see Attachment 2 and 4)

The zone plan is a graphical representation of defined areas to show where elements are to be activated as well as to indicate and identify individual components.

Matrix for fire control systems (see Attachments 3 and 5)

The matrix for fire control systems is in the form of a table showing all interrelationships between activated zones and those components to be activated.

**Action plan of the integral test (see Attachment 6)**

The action plan is the documentary evidence on the procedure or protocol for testing fire control systems. This is based on specific concepts of established protection objectives.

Periodic checks, function of activation

Periodic checks are those tests on systems and components at specific time intervals. These include:

- checking the correct functioning of individual components (ad hoc inspections)
- checking zone plans (conceptual)
- carrying out an integrated test (according to the action plan)

Self-checking system

A periodic internal check consists of a visual inspection and a status and function check of devices throughout the facility (e.g. emergency generator, fire doors, fire extinguishers). Results of these checks should be documented.

Documentation

The integral test, internal controls, maintenance and all incidents must be documented (e.g. log book).

4 Key

FDS	Fire detection system
SPS	Sprinkler system
FCS	Fire control system
FD	Fire damper
SHES	Smoke and heat exhaust system
FBCP	Fire brigade control and indicator panel

5 Strategy

Based on the fire protection strategy, a facility-specific, targeted solution for fire control systems is to be drawn up. The following describes the approach to planning and checking fire control systems:

1. Appointing personnel to be responsible for planning
- 2 Creating / checking / adapting a fire protection concept
- 3 Creating / adapting zone plans and the matrix to reflect the fire protection concept
5. Installing equipment and updating related documents
6. Creating / customizing the action plan for integral testing
7. Carrying out procedures for integral testing



8. Rectifying faults, if any
9. Determining periodic checks, function of activation, and time intervals
10. Carrying out an integral test after any significant changes to the system
11. Ongoing review of the fire protection concept and updating documents

6 Existing facilities

When extending fire protection measures and/or structural modifications, the documentation must be updated and an integral test carried out on the area concerned.

An integral test must be carried out after adjustments to the system or after updating hardware or software.

7 Frequency of integral tests

An integral test is to be carried out periodically, according to the national regulations, but at least every 3 years, preferably just before a periodic check of the fire protection system by the competent authorities.

8 Demands placed on the operator and resulting obligations

8.1 Checks and maintenance work

The operator is responsible for ensuring that internal controls and maintenance work on the components is conducted according to a set schedule (according to manufacturer's specifications).

8.2 Changes during operation

Documents are to be updated after any functional or structural change or significant modification to the actuating equipment. Depending on the scope of the modifications, the procedure described in Section 5 must be adhered to.

8.3 Documentation and verification

All incidents relating to the operation of fire control systems must be documented (e.g. log book).

9 Required documentation

- Zone plan of the building
- Matrix of automatic fire control system with key
- Action plan of integral test



- Checklist for internal fire protection control
- Verification of events and checks (e.g. log book)

10 Attachments

Examples are given in the attachment (although not exhaustive, possible solutions), as a guide for full documentation. The extent and definitive illustration or labelling is notional only and can be freely selected.

- A1 Survey of documents, necessary planning documents
- A2 Zone plans for fire control systems (collective activation)
- A3 List of fire control systems (collective activation)
- A4 Zone plans of fire control systems (selective activation)
- A5 Matrix for fire control systems (selective activation)
- A6 Implementation of action plan
- A7 Periodic check of fire control systems
- A8 Key

11 European guidelines

- Guideline No 1:2002 F - Internal fire protection control
- Guideline No 2:2007 F - Panic & emergency exit devices
- Guideline No 3:2011 F - Certification of thermographers
- Guideline No 4:2010 F - Introduction to qualitative fire risk assessment
- Guideline No 5:2003 F - Guidance signs, emergency lighting and general lighting
- Guideline No 6:2004 F - Fire safety in residential homes for the elderly
- Guideline No 7:2011 F - Safety distance between waste containers and buildings
- Guideline No 8:2004 F - Preventing arson – information to young people
- Guideline No 9:2005 F - Fire safety in restaurants
- Guideline No 10:2008 F - Smoke alarms in the home
- Guideline No 11:2005 F - Recommended numbers of fire protection trained staff
- Guideline No 12:2006 F - Fire safety basics for hot work operatives
- Guideline No 13:2006 F - Fire protection documentation
- Guideline No 14:2007 F - Fire protection in information technology facilities
- Guideline No 15:2010 F - Fire safety in guest harbours and marinas
- Guideline No 16:2008 F - Fire protection in offices
- Guideline No 17:2008 F - Fire safety in farm buildings
- Guideline No 18:2008 F - Fire protection on chemical manufacturing sites
- Guideline No 19:2009 F - Fire safety engineering concerning evacuation from buildings



- Guideline No 20:2009 F - Fire safety in camping sites
- Guideline No 21:2009 F - Fire prevention on construction sites
- Guideline No 22:2010 F - Wind turbines – Fire protection guideline
- Guideline No 23:2010 F - Securing the operational readiness of fire control system
- Guideline No 24:2010 F - Fire safe homes
- Guideline No 25:2010 F - Emergency plan
- Guideline No 26:2010 F - Fire protection of temporary buildings on construction sites

Summary of Documents

Attachment 1

Check-Plan for fire control systems

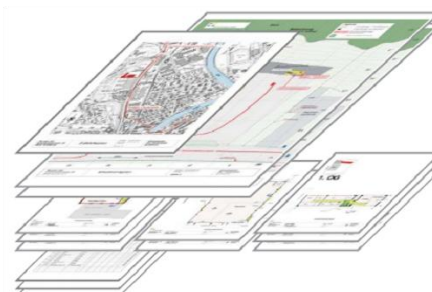
Consisting of:

- Zone plans for fire control systems
- Matrix for fire control systems
- Control plans
(Action plans for integral test)
 - a) for the approval
 - b) for periodic check
- Documents of internal fire protection control


Other fire protection documents with potential interfaces
Fire Brigade Intervention Plans and Fire Protection Plans

Consisting of:

- Access plan
- Situation plan
- Environment and hazard plans
- Floor plans
- Information sheets etc.

**Plans for Escape routes, Orientation and Evacuation**

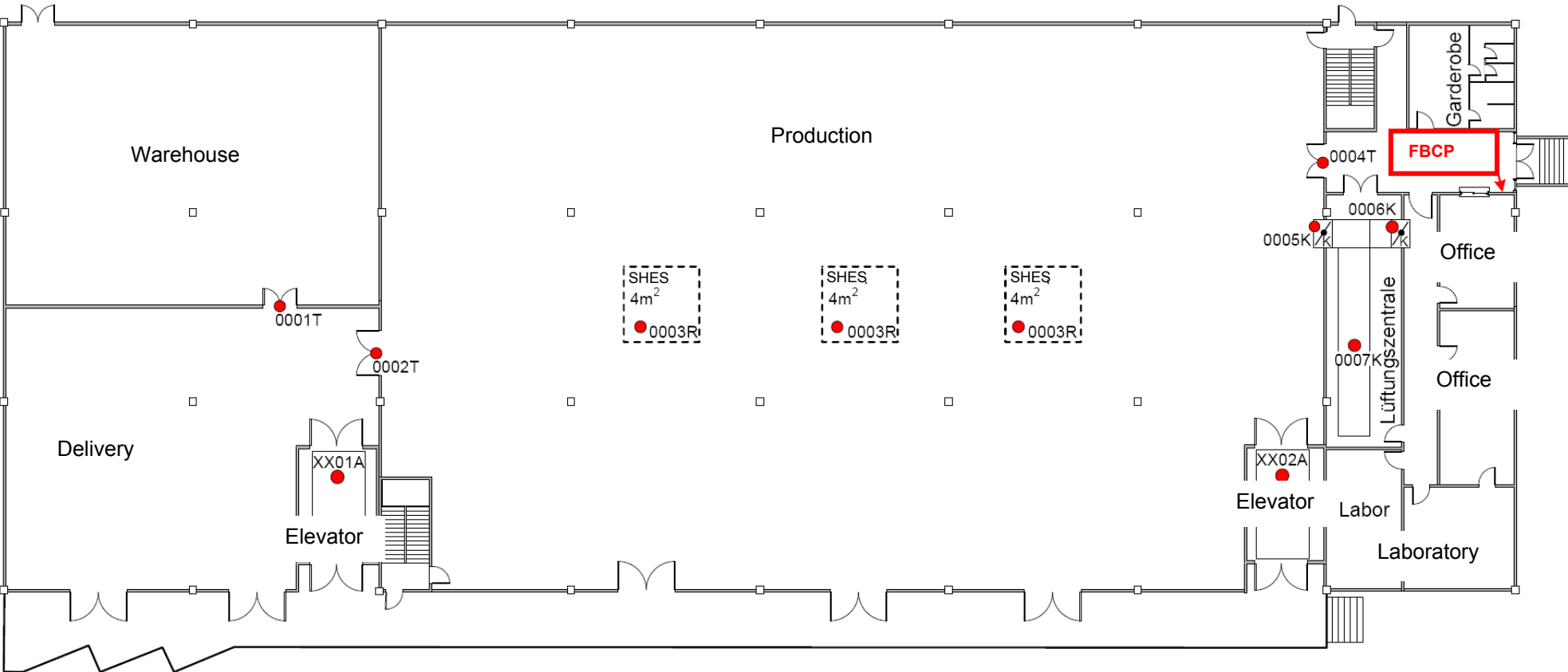
Consisting of:

- Evacuation and orientation plans
- Evacuation concept
- Leaflet "Behaviour in case of fire"



Zone plans for fire control systems (Collective Activation)

Attachment 2



See Attachment 8 for key

-  0001T = Element of Fire control system with Identification number
-  = Fire brigade control and indicator panel

Objekt:	Plan view Ground Floor	Planer:	Revision :		
			Datum	Version	Visum

List of fire control systems (Collective Activation)

Attachment 3

Loca tion	Activated Element			Activation	Function		Comments	Date / Initials
	Number	Type	Description		fulfilled			
				from	yes	no		
EG	00 01	T	Fire gate	closure	I*	☐	☐	
	00 02	T	Fire gate	closure	I	☐	☐	
	00 03	R	Smoke exhaust, 3 vent openings	opening	E	☐	☐	3 vent openings, simultaneously activated
	00 04	T	Fire gate	closure	I	☐	☐	
	00 05	K	Fire damper, Production	closure	E	☐	☐	
	00 06	K	Fire damper, Office	closure	E	☐	☐	
	00 07	L	Ventilating system	switch off	E	☐	☐	
XX	XX 01	A	Elevator	Displace to ground floor	I	☐	☐	
XX	XX 02	A	Elevator	displace to ground floor	I	☐	☐	

See Attachment 8 for key

* I: Internal alarm e.g. daytime operation
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E: External alarm to the fire brigade or activation by pushbutton
EFSAC Endorsed

EG



Matrix of Fire Control Systems (Selective Activation)

Loca tion	Activated Element				Release Area				Remarks	
	Number	Type	Description	Action	Warehouse Conveyance	Production	Office Laborat.	Release Criterion		
			Warehouse/Conveyan.							
EG	00	03	T	Fire gate	closure	I*	I		FDS	
	00	01	T	Fire gate	closure	I			FDS	
	00	02	R	Smoke exhaust, 4 vent openings	opening	I			FDS	
XX	00	01	A	Elevator	Displace to ground floor	I	I	I		
XX	00	02	A	Elevator	Displace to ground floor	I	I	I		
			Production							
EG	00	03	T	Fire gate	closure	I	I		FDS	
	00	10	T	Fire gate	closure		I	I	FDS	
	00	04	R	Supply air	opening		E		FDS	Supply air for fume exhaust ventilation
	00	05	E	Production Line 1	switch off		E		FDS	
	00	06	E	Production Line 2	switch off		E		FDS	
	00	07	R	Fume exhaust ventilation	Switch on		E		FDS	
	00	08	L	Ventilation	Switch off		I		FDS	
	00	09	K	Fire damper to basement	closure		I		FDS	
	00	13	K	Fire damper to Production	closure		I		FDS	
XX	XX	01	A	Elevator	Displace to ground floor	I	I	I	FDS	
XX	XX	01	A	Elevator	Displace to ground floor	I	I	I	FDS	

* I: Internal alarm e.g. daytime operation
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E: External alarm to the fire brigade or activation by pushbutton
EFSAC Endorsed

		Office / Laboratory						
EG	00 11 T	Fire door	closure			I	FDS	
	00 12 T	Fire door	closure			I	FDS	
	00 10 T	Fire door	closure		I	I	FDS	
XX	XX 02 A	Elevator	Displace to ground floor	I	I	I	FDS	
XX	XX 02 A	Elevator	Displace to ground floor	I	I	I	FDS	

See Attachment 8 for key

**Certification for Automatic Fire Control Systems
Scenario Integrated Test****Contents**

- 1. Basic Principals
 - 1.1 Participants
 - 1.2 Documents
 - 1.3 Procedure for integral tests of fire control systems
- 2. Integral test of automatic fire control systems
 - 2.1 Scenario 1, Fire in the Ex-Zone Production ground floor
 - 2.1.1 Test Scenario 1
 - 2.1.2 Remarks / Information
 - 2.2 Scenario 2 ff
- 3. List of deficiencies, action planning
 - 3.1 Deficiencies
 - 3.2 Improvements

1. Basic Principles

As part of building renovations, the fire and gas detection systems were modernized and a personal alarm system was installed. The fire protection systems and all relevant actuating safety equipment and systems are to be checked for functionality and safe operation. An integral test with five scenarios is to be carried out to this end.

1.1 Participants

Company	Function	Name	present
Company X	Owner	Mister A	yes
Company X	Chief technical service	Mister B	yes
Construction Inc.	Construction management	Mister C	yes
...	...	...	...

1.2 Documents

For survey the following documents are given to all participants in advance:

- Fire protection plans and zone plans
- ...

For verification and gap analysis the following documents are essential and must be available at place:

Updated documents	available		Comments
	yes	no	
Construction plans, revised	☒	☐	
Ventilation plans, revised	☐	☒	<i>Not actual version, data for test okay</i>
Sanitary plans	☒	☐	
...	☐	☐	...

1.3 Procedure for integral tests of fire control systems

Time	Action	Responsible
08:00 - 08:15	Welcome, Presence control	Safety representative, Company X
08:15 - 08:30	Document Verification	Company XX
08:30 - 09:00	Meeting, Fire scenario verification	All participants
...	...	...

2. Integral test of automatic fire control systems

The automatic activation of all security elements such as doors, fire doors, fire dampers, etc. is done periodically within specified time intervals by carrying out an integral test.

The test initially requires all elements to be put into operational readiness. According to the scenarios and action plan, security elements must assume the status for the particular emergency for which they were set. After resetting the alarm systems, the security devices must also be reset to their operating status either automatically or manually.

System functions are to be verified and documented throughout the entire installation. By its signature, the company responsible for the installation and its operation confirms that the safety devices are operating correctly and that the information given is accurate.

2.1 Scenario 1, Fire in the Ex-Zone Production ground floor

Activation of a fire detector in production area; acknowledge of internal alarm within 3 minutes (daytime operation); Activation of an external alarm by pressing a manual fire alarm button

2.1.1 Test Scenario 1

Pos.	Action	Responsible company	Function okay		Responsible person
			yes	no	
	Preparations				
1	Control and indicating equipment: No alarms, failures etc. present	Company of fire detection systems	☒	☐	<i>T. Isler</i>
2	Access to all rooms ensured	Company X	☒	☐	<i>B. Bodmer</i>
3	Plants switched on	Company X	☒	☐	<i>B. Bodmer</i>
4	Closures opened, in operating position	Company X	☒	☐	<i>B. Bodmer</i>
5	Building services in operation	Company XX	☒	☐	<i>E. Ebner</i>
	Test Scenario 1				
6	No activation of any fire control systems of other scenarios	all	☒	☐	<i>E. Ebner</i>
7	Activation of a pre-alarm of a smoke detector in delivery office	Company of fire detection systems	☒	☐	<i>T. Isler</i>
8	Approval of the transmission to the control and indicating equipment Acknowledge receipt of the alarm within 3 minutes	Company of fire detection systems	☒	☐	<i>T. Isler</i>

Certification (example for selective control)

Attachment 6

Pos.	Action	Responsible company	Function okay		Responsible person
			yes	no	
9	Closure of fire gates: Gate (0003T) Gate (0010T)	Company XX	☒	☐	<i>E. Ebner</i>
10	Fire damper to basement (0009K) is closing	Ventilation Inc.	☒	☐	<i>H. Hasler</i>
11	Elevator (XX01A / XX02A) displaces to ground floor and remains blocked.	Company XX	☒	☐	<i>E. Ebner</i>
12	Damper supply air (0004R) opens and fume and smoke exhaust ventilation (0007R) works.	Ventilation Inc.	☐	☒	<i>Damper (0004R) don't works H. Hasler</i>
13	Production Line 1 (0005E) goes to a stable state and switched off.	System Inc.	☒	☐	<i>M. Manser</i>
14	Production Line 2 (0006E) goes to a stable state and switched off.	System Inc.	☒	☐	<i>M. Manser</i>
15	Ventilation (0008L) is switched off	Ventilation Inc.	☒	☐	<i>H. Hasler</i>
16	Fire damper (0013K) is closing.	Ventilation Inc.	☒	☐	<i>H. Hasler</i>
17	Removal of the fuse for the illumination	Electrical Inc.	☒	☐	<i>K. Kübler</i>
18	Control of the emergency lighting	Electrical Inc.	☒	☐	<i>K. Kübler</i>
Reconnection					
19	Reset of the control and indicating equipment, no alarms, failures etc. present	Company of fire detection systems	☒	☐	<i>J. Isler</i>
20	Reset of Illumination Emergency lighting off	Electrical Inc.	☒	☐	<i>K. Kübler</i>
21	Reset and run up of all facilities; no alarms, failures etc. present	All	☒	☐	<i>E. Ebner</i>
22	No other faults or effects on Installations or facilities.	All	☒	☐	<i>E. Ebner</i>

2.1.2 Remarks / Information

12. Damper (0004R) receives no signal respectively don't open. H. Hasler: Clarification with J. Isler about the activation through control and indicating equipment.

2.2 Scenario 2 ff

Tests of further Scenarios analogue to scenario 1

3. List of deficiencies, action planning**3.1 Deficiencies**

Pos.	Deficiency, error	Responsible / Name	Date	Completed: Date/Visa
1	Production ground floor: Ventilation control: Malfunction of the activation (0004R) from control and indicating equipment. Clarification and elimination	Company of fire detection systems Herr Isler	28.10.07	
...	...	...	...	...

3.2 Improvements

Pos.	Measure	Offer from	Date	Completed: Date/Visa
1	Office / Laboratory: Illumination level in stair cases inadequately, touching up necessary.	Electrical Inc. Herr Kübler	15.11.07	
...	...	...	...	...

1. Integral test of fire control systems

The automatic activation of all security elements such as doors, fire doors, fire dampers, etc. is done periodically within specified time intervals by carrying out an integral test.

The test initially requires all elements to be put into operational readiness. According to the scenarios and action plan, security elements must assume the status for the particular emergency for which they were set. After resetting the alarm systems, the security devices must also be reset to their operating status either automatically or manually.

System functions are to be verified and documented throughout the entire installation. By its signature, the company responsible for the installation and its operation confirms that the safety devices are operating correctly and that the information given is accurate.

1.1 Procedure for integral tests

Time	Function	Responsible Person
1 week earlier	Information of employees	Safety representative
08:00 - 08:15	Document Verification	Safety representative
08:15 - 08:30	Meeting, Fire scenario verification	Safety representative, Production manager, Chief technical service
...	...	

2. Procedure for integral test

The procedure is based on the basic grid of the integral test for the implementation (see Annex 6).

2.1 Scenario 1ff

- ...
- ...

Key

Attachment 8

	Description	Example
Location	[No] basement until [No] floor	Floor description 2 nd floor / 1 st floor / Ground floor / 1 st basement / 2 nd basement 2 nd basement to 5 th floor elevator, etc.
Activated element		Components and/or equipment activated by fire detection system or sprinkler system
- Number	[No] + [No]	Composed number from two-digit floor number and continuous two-digit element number 2 nd floor = 02 plus 01, 02, ...etc. ► 0201 etc. 1 st floor = 01 Ground floor = 00 1 st basement = -1 2 nd basement = -2 XX = Multi-storey ducts
- Type	[Cipher]	Abbreviation for activation mode A = Elevator E = plants, components, control devices etc... K = Fire damper L = Ventilation R = smoke exhaust T = closure, door, gate
- Description	[Text]	Fire gate, Ventilation, Elevator, Fire damper etc.
- Action	[Text]	Action, function of control system Closure, opening, displacement to ground floor, switching off, unlocking etc.
Release area		Building area activated by fire detection system or sprinkler system Production building, service floor etc.
- Activation criteria	[Text]	Sensor or fire detector FDS = Fire detection system (Zone) SD = Smoke detector GDS = Gas detection system SPS = Sprinkler system FI = Flow indicator of sprinkler system PB = Manual call point, pushbutton
- Moment of activation	[Cipher]	By pre-alarm / main-alarm / direct local activation I = Internal alarm e.g. daytime operation E = External alarm to the fire brigade or activation by pushbutton