

“Function maintenance” means the guarantee of the power supply to safety-relevant installations, such as emergency lighting and smoke extractors, in the event of fire.

OBO offers a broad range of practical systems for electrical installations for function maintenance for almost every field of application and mounting type. All the OBO systems are tested according to DIN 4102 Part 12 and can thus be used easily.



Basic principles of function maintenance systems



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3rd protection aim:

Important electrical systems must continue to function.

Solution: function maintenance for electrical systems

To ensure that emergency and escape routes remain usable and also important technical equipment such as emergency lighting, fire alarm systems, smoke exhaust systems, etc.

in case of fire, it is absolutely essential to provide special protection for the power supply for these systems. The use of special cables and routing systems means that it is possible

to maintain the power supply, even in the case of fire, thus guaranteeing the function maintenance.



What is a cable system with integrated function maintenance?

A cable system with integrated function maintenance is, according to DIN 4102 Part 12, the combination of the routing system (cable ladder, cable tray, etc.) and cables with integrated function maintenance.

Routing system

+

Cables with integrated function maintenance

=

Cable system with integrated function maintenance according to DIN 4102 Part 12

Cables and standard routing systems

The standard specifies that function maintenance of an electrical cable system includes not just the cables themselves, but also the routing systems. DIN 4102 Part 12 defines three standard routing systems:

- ▶ Routing on cable ladders
- ▶ Routing on cable trays
- ▶ Individual cable routing under the ceiling

All the OBO routing system for electrical installations with function maintenance correspond to DIN 4102 Part 12.

Function maintenance in the building regulations

The requirement for electrical installations with function maintenance is a component part of the building regulations of the German federal states. This type of installation is particularly required for buildings in which many people meet regularly: public buildings, hotels, meeting places, large industrial complexes, etc. Function maintenance applies solely to those areas which provide the power supply to safety-relevant systems such as emergency lighting, alarm systems, fire alarm systems, smoke extraction systems, etc. Here, the regulations require the power supply to be guaranteed for a specific period of time, even if there is a fire.



System labelling by the installation engineer

Each cable system must be permanently labelled with a sign. This labelling must contain the following information:

- ▶ Name of the erection engineer of the cable system (installation engineer)
- ▶ Function maintenance class E...
- ▶ Test certificate number
- ▶ Owner of the test certificate
- ▶ Year of manufacture



Besides the type and quantity of cables, the selection of the correct system is dependent on the actual conditions on the construction site.

Fastening systems

Of equal importance to the selection of the support system is the decision for the most suitable fastening system. Here, too, the individual factors on the construction site must be taken into account. The Fastening systems section contains professional, easy-to-mount solutions for any requirements.

Space with multiple girders

Please note that, if there are jumps in height, the installed cables must be supported. This may be required, when cables with large cross-sections are not supported by the support system.

Combination with other systems

Ventilation systems, pipes, etc. may not be mounted above the electrical installation with function maintenance, as, if there is a fire, parts may fall down, damaging the function maintenance cables. The solution is to employ cable mounting with clips directly under the ceiling or on the wall.

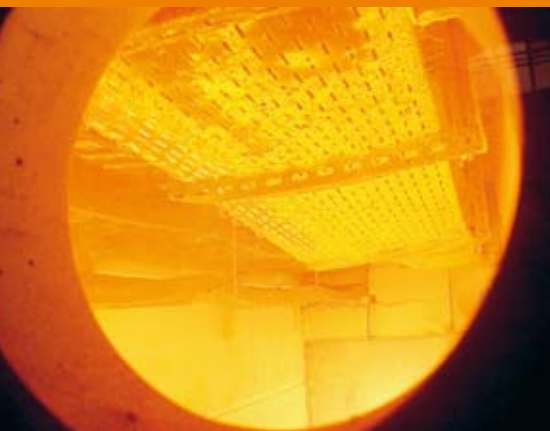
Restricted spaces

The solution here is either cable mounting with clips or pressure clips directly under the ceiling or the installation of multiple narrow cable tracks above each other instead of one wide track.

Problematic substrate

As, for old ceiling structures, e.g. during renovation projects, the support force cannot be officially clarified, we recommend wall mounting.

Fire tests, proofs and approvals



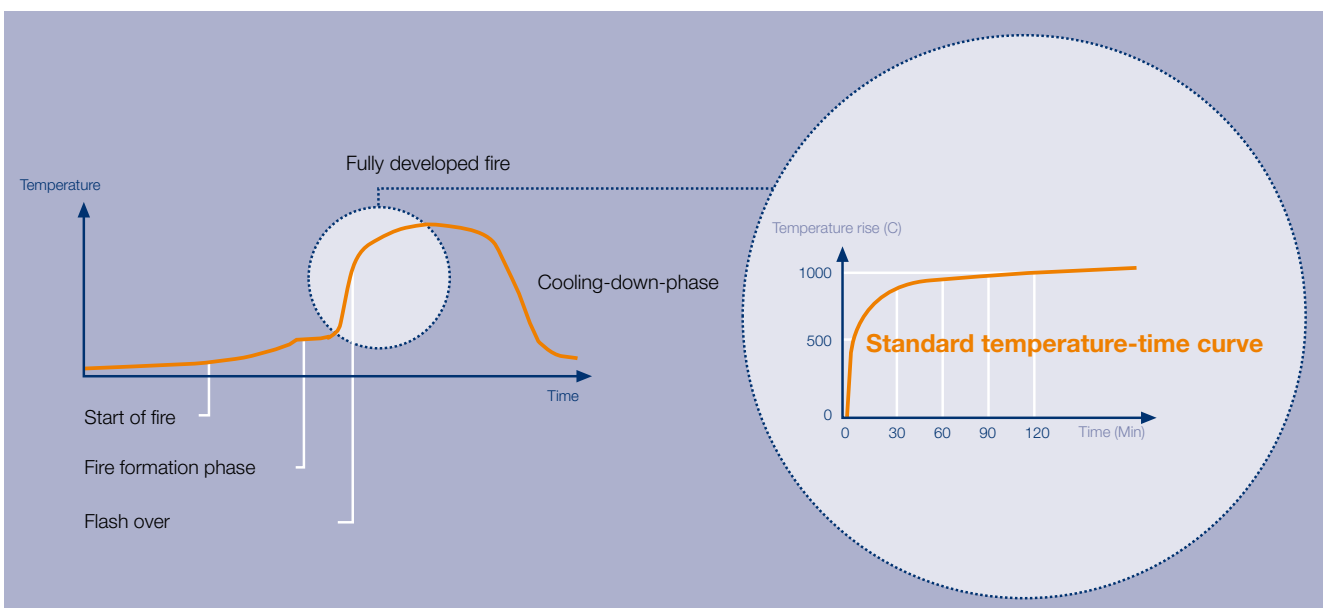
Fire testing

The proof of the function maintenance property of electrical installation material must be provided by fire testing to DIN 4102 Part 12 in an independent materials testing office. The test is carried out in a special testing furnace in which the installation to be tested is heated up according to a standard temperature-time curve. The cable systems are awarded the classes E30 to E90, depending on the length for which they manage to survive.

The result of the fire test is documented in a construction testing certificate.

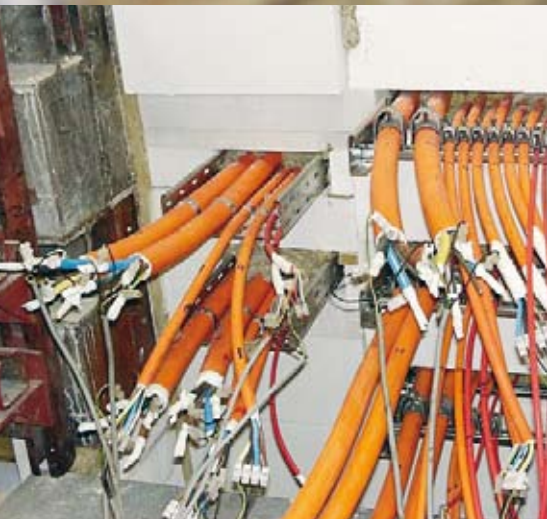
- ▶ This test certificate is valid for cable systems with cable-specific support structures as a proof of function maintenance.
- ▶ With standard support structures, the proof of function maintenance also requires surveyor's comments in addition to the testing certificate.

Phases of natural fires / standard temperature-time curve (ETK)





A glimpse into the testing furnace: glowing of the support structure, cable with insulating layer of ash



Electrical monitoring during the test

Extreme loads for cables

If there is a fire, the cables are subjected to extreme loads from flames and heat. Nevertheless, cables used for a function maintenance installation must be able to withstand temperatures of 1,000 °C and more for a certain period of time, without there being a short-circuit of the copper conductor. As the copper conductor may anneal at these extreme temperatures, thus impairing its own mechanical stability, the support system serving as a “support corset” has a special significance.

Cables with integrated function maintenance

Therefore, in the case of cables with integrated function maintenance, the insulation has a special role to play. These cables possess a special winding around the copper conductor or made of glass silk or mica tape. If there is a fire, then the cable insulation burns completely, creating a layer of ash. This is kept together by the windings and ensures that the copper conductors are kept apart and that no short-circuit of the support system can take place. In addition, a new product on the market is a cable, which, instead of special windings, has a ceramising plastic insulation. If there is a fire, this special plastic forms a ceramising ash, which also produces the required insulation of the current-carrying cores.

Halogen-free plastic

Cables with integrated function maintenance are always made of halogen-free plastic. These materials, which do not contain any chlorine, bromine or fluorine, do not create any corrosive fire gases during combustion.

Low smoke and reduced fire spread

In addition, cables with integrated function maintenance have additional positive properties during a fire, for example:

- ▶ Low smoke and/or
- ▶ Reduced fire spread

Selection aid, function maintenance systems

Standard support structure

With standard support structures, it is possible to select freely the cables required for the installation. This is possible, as all the cable manufacturers have proven the function maintenance of their cables for the standard support systems.

Benefits

- ▶ Free choice of cables, as the combination of cables and the standard support structure has the function maintenance proof
- ▶ Not bound to one specific cable type
- ▶ This structure is ideal for smaller projects
- ▶ Testing means that the countless installation variants are approved for many years

Summary:
Here, the installation engineer can “play it safe”.



Standard support structures are marked in blue in the catalogue.

Cable-specific support systems

With cable-specific support systems, specific cables are required. Any proof is only valid for the actually tested combination of laying variant and cable. A summary cable list provides information on tested combination options.

Benefits




- ▶ Low material and mounting costs
- ▶ Limited cable selection (approval only valid for the cables tested with the system)
- ▶ Higher planning costs: the complete cable system (cable and support system) must be fully planned out
- ▶ Ideal for larger buildings (project business)



Summary:
Here, the possibilities of the combination of cables and support systems can be fully exploited – the system is optimised for the appropriate application.



Cable-specific support systems are marked in orange in the catalogue.

Selection aid, function maintenance systems

Individual cable (unlimited cross-section)		Small cable bundle (limited cross-section)		Multiple cables	
					
Standard	Cable-specific	Standard	Cable-specific	Standard	Cable-specific
Clip types: 732, 733	Clip types: 732, 733	Clip types: 732, 733 2056M 2056M LW (with long trough)	Clip types: 732, 733 2056M 2056M LW (with long trough) electrical pipes	–	Models: 2031 M15 2031 M30 2031 M70 2033M 2034M
Clearance: 0.3 m	Clearance: cable-specific, see note	Clearance: 0.3 m, with long trough 0.6 m	Clearance: cable-specific, see note	–	Clearance: cable-specific, see note
Retro-installation in the system: not possible		Retro-installation in the system: limited possibility		Retro-installation in the system: limited possibility	

Many cables (small cross-sections)		Many cables (large cross-sections)	
			
Standard	Cable-specific	Standard	Cable-specific
Tray type: SKS	Tray types: RKSM, GRM, EKS	Ladder type: LG6	Ladder type: SL
Clearance: 1.2 m	Clearance: cable-specific, see note	Clearance: 1.2 m	Clearance: cable-specific, see note
Cable load: max. 10 kg/m per tray with threaded rod lock	Cable load: up to 30 kg/m per tray with or without threaded lock	Cable load: max. 20 kg/m per ladder with or without threaded rod lock	Support spacing: 1.5 m with or without threaded rod lock
Retro-installation in the system: single		Retro-installation in the system: single	

Note:

- ▶ **Data for cable cross-sections, distances and maximum loads may vary according to cable type and cable manufacturer.**
- ▶ **Do not exceed the maximum approved cable load.**
- ▶ **For retro-installations in cable-specific routing types, observe the approved cable types.**

Overview of standard support structures

The standard laying systems defined in the testing standard DIN 4102 Part 12 include installation on cable trays, cable ladders, individual cable laying under the ceiling with profile rails,

clamp clips and long troughs, and the individual cable laying under the ceiling with single clips. Please comply with the specifications of the planner in the selection of products

approved for function maintenance. In addition, the on-site factors on the construction site must be taken into account.



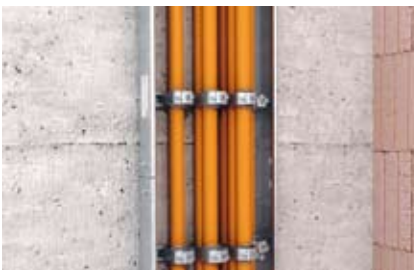
Cable tray systems

- ▶ Support width max. 1.2 m
- ▶ Cable weight max. 10 kg/m
- ▶ Tray width max. 300 mm



Cable ladder systems

- ▶ Support width max. 1.2 m
- ▶ Cable weight max. 20 kg/m
- ▶ Ladder width max. 400 mm



Vertical ladder systems

- ▶ Clip distance max. 300 mm
- ▶ Rising track width max. 600 mm
- ▶ Cable weight max. 20 kg/m



Individual routing systems

- ▶ Single clips max. 300 mm fastening distance
- ▶ Clamp clips with long troughs max. 600 mm fastening distance



Fire protection duct

BSK and BSKH

- ▶ BSK for direct wall and ceiling mounting
- ▶ BSKH for suspended mounting
- ▶ No function maintenance cables required
- ▶ You can find additional information in the "Escape route installation system" chapter

Overview of cable-specific support structures

The following cable-specific support systems are viable for electrical installation with function maintenance: cable trays with and without threaded rod lock, mesh cable trays, cable

ladders, single clips, collecting clamps and pressure clips. Ensure an approved combination with tested cables.

Cable tray systems

- ▶ Support spacing max. 1.5 m
- ▶ Cable weight max. 30 kg/m
- ▶ Tray width max. 500 mm
- ▶ Variants: to 5-layer
- ▶ Also without threaded rod



Mesh cable tray systems

- ▶ Support spacing max. 1.2 m
- ▶ Cable weight max. 10 kg/m
- ▶ Widths 200 and 300 mm
- ▶ Variants: 1/2/3-layer



Cable ladder systems

- ▶ Support spacing max. 1.5 m
- ▶ Cable weight max. 20 kg/m
- ▶ Width max. 500 mm
- ▶ Variants: 1/2/3-layer



Cable and pipe clamps

- ▶ Various variants, e.g. larger fixing distances, bundling...
- ▶ Space-saving mounting



Collecting clamps and pressure clips

- ▶ Various variants, e.g. larger fixing distances, bundling...
- ▶ Space-saving mounting



Cable list

The cable list simplifies the allocation of cables and routing systems to the cable system.

You can find the current cable list at www.obo.de

Approved installation options for cable systems with integrated function maintenance in conjunction with routing systems from OBO Bettermann, Menden

Kabelhersteller	Kabeltyp	Klasse	Daten	Bemerkung
Dätwyler	NHXH	E30-E90	$\geq nx1,5mm^2$	
	NHXCH	E30-E90	$\geq nx1,5/1,5mm^2$	
	JE-H(St)H	E30	$\geq nx2x0,8mm$	
	JE-H(St)HRH	E30	$\geq nx2x0,8mm$	
Eupen	NHXH	E30-E90	$\geq nx1,5mm^2$	
	NHXCH	E30	$\geq nx1,5/1,5mm^2$	B \leq 300 mm
	NHXCH	E90	$\geq nx1,5/1,5mm^2$	B = 400 mm
	JE-H(St)H	E30	$\geq nx2x0,8mm$	
Nexans	N2XH	E30	$\geq nx1,5mm^2$	B = 400 mm
	N2XCH	E30	$\geq nx1,5/1,5mm^2$	
	JE-H(St)H	E30	$\geq nx2x0,8mm$	
Prysmian	(N)HXH	E30	$\geq nx1,5mm^2$	
	(N)HXCH	E30	$\geq nx2,5/2,5mm^2$	
	JE-H(St)H	E30	$\geq nx2x0,8mm$	

Kabelrinne RKS

Application example 1

- 1 Approved combination:
 RKS-Magic® cable tray with power cable, type NHXH E30 – E90 of make Dätwyler, function maintenance class E90, useful cross-section $\geq n \times 1.5 \text{ mm}^2$, without restrictions usable with all tray widths for wall and ceiling mounting

	Kabelhersteller	Kabeltyp	Klasse	Daten	Abstände	Bemerkung
7	Dätwyler	NHXH	E30	≤ nx2,5mm ²	0,5 m	mit Langwanne, ≤ 1,1 kg/m
		JE-H(St)H	E30	≥ nx2x0,8mm	0,5 m	≤ 1,1 kg/m
		JE-H(St)H	E60	≥ nx2x0,8mm	0,5 m	mit Langwanne, ≤ 1,1 kg/m, ≤ 20 Kabel
		JE-H(St)HRH	E30	≥ nx2x0,8mm	0,5 m	≤ 1,1 kg/m
		JE-H(St)HRH	E60	≥ nx2x0,8mm	0,5 m	mit Langwanne, ≤ 1,1 kg/m, nur Wand, ≤ 20 Kabel
		JE-H(St)HRH	E90	≥ nx2x0,8mm	0,5 m	mit Langwanne, ≤ 1,1 kg/m, nur Decke, ≤ 20 Kabel
	Eupen	(N)HXH Keramik	E30	nx1,5mm ²	0,5 m	mit Langwanne, ≤ 1,1 kg/m, nur Wand
		NHXH Mica	E90	nx1,5mm ²	0,5 m	mit Langwanne, ≤ 1,1 kg/m
		NHXH Mica	E90	≥ nx1,5mm ²	0,5 m	mit Langwanne, ≤ 1,3 kg/m, nur Wand
		JE-H(St)H Keramik	E30	≥ nx2x0,8mm	0,6 m	mit Langwanne, ≤ 1,1 kg/m
		JE-H(St)H Keramik	E30	≥ nx2x0,8mm	0,5 m	≤ 1,1 kg/m
		JE-H(St)H Mica	E90	≥ nx2x0,8mm	0,5 m	mit Langwanne, ≤ 1,3 kg/m, nur Wand
	Facab Lynen	JE-H(St)H	E30	≥ nx2x0,8mm	0,5 m	≤ 1,1 kg/m
		JE-H(St)H	E90	≥ nx2x0,8mm	0,5 m	mit Langwanne, ≤ 1,1 kg/m, nur Decke
		JE-H(St)HRH	E30	≥ nx2x0,8mm	0,5 m	≤ 1,1 kg/m
		JE-H(St)HRH	E90	≥ nx2x0,8mm	0,5 m	mit Langwanne, ≤ 1,1 kg/m, nur Decke
	Nexans	N2XH	E30	nx1,5mm ² bis 4mm ²	0,5 m	mit Langwanne, ≤ 1,1 kg/m
		N2XCH	E30	nx1,5mm ² bis 4mm ²	0,5 m	mit Langwanne, ≤ 1,1 kg/m
		N2XH	E90	nx1,5mm ²	0,5 m	mit Langwanne, ≤ 1,1 kg/m
N2XCH		E90	nx1,5mm ²	0,5 m	mit Langwanne, ≤ 1,1 kg/m	
J/JE-H(St)H		E30	≥ nx2x0,8mm	0,5 m	mit Langwanne, ≤ 1,1 kg/m	
Prysmian	(N)HXH	E30	≥ nx1,5mm ²	0,5 m	mit Langwanne, ≤ 1,2 kg/m, nur Decke	
Studer	JE-H(St)H	E30	≥ nx2x0,8mm	0,5 m	≤ 1,1 kg/m	
	JE-H(St)HRH	E30	≥ nx2x0,8mm	0,5 m	≤ 1,1 kg/m	
8	Dätwyler	JE-H(St)H	E30	≥ nx2x0,8mm	0,5 m	≤ 2,5 kg/m, nur Wand
		JE-H(St)HRH	E30	≥ nx2x0,8mm	0,5 m	≤ 2,5 kg/m, nur Wand
	Eupen	JE-H(St)H Keramik	E30	≥ nx2x0,8mm	0,5 m	≤ 2,5 kg/m, nur Wand
	Facab Lynen	NHXH	E90	nx6mm ²	0,5 m	≤ 2,2 kg/m, nur Wand
		NHXH	E90	nx1,5mm ² bis 6mm ²	0,5 m	≤ 2,2 kg/m, nur Decke
		NHXCH	E90	nx6mm ²	0,5 m	≤ 2,2 kg/m, nur Wand
		JE-H(St)HRH	E30	≥ nx2x0,8mm	0,5 m	≤ 2,5 kg/m
	Nexans	JE-H(St)H	E30	≥ nx2x0,8mm	0,5 m	≤ 2,5 kg/m, nur Decke
	Studer	JE-H(St)H	E30	≥ nx2x0,8mm	0,5 m	≤ 2,5 kg/m
		JE-H(St)HRH	E30	≥ nx2x0,8mm	0,5 m	≤ 2,5 kg/m

2031/M15

2031/M30

Application example 2

- 2 Approved combination:
Collecting clamp, type 2031M/15, with data cable, type J/JE-H(St)H, of make Nexans, function maintenance class E30, cable cross-section $\geq n \times 2 \times 0.8 \text{ mm}$, fastening spacing 0.5 m, restriction: with long trough and maximum cable load of 1.1 kg/m