



# Housing construction

Solutions for electrical installations  
for new buildings and refurbishments

# Connections

## Building Connections

Our corporate considerations and actions are taken for the long term and embrace change. The core of our success is based on mutual trust and the committed interaction between our employees, customers and suppliers. As an independent family company, we stand by these connections. It is the benchmark of our everyday activities and is lived and also supported by all employees. As your partner, we wish to be the first port of call for the best and most innovative connections for electrical and data technology infrastructure. We develop existing products further and match them to your requirements.

In doing so, we supply modern, efficient electrical installation materials for the refurbishment of existing buildings and for the equipment of state-of-the-art architecture with intelligent electrical infrastructure.

We are aware of the responsibility connected to routing power and our aim, together with you, is to network buildings and people in a way that is particularly reliable and safe. Thus, we are laying the foundation stone for sustainable, solid electrical installations.

” *OBO – simply better*







since

## Many years of experience

OBO BETTERMANN has offered products and solutions for electrical installation for over 100 years. Our focus has always been particularly directed towards building protection and safety. This is because electrical installations pass through buildings like a network and need special protection.

We can supply you, our customers, not only with products and systems for the electrical infrastructure, but, at the same time, we can happily pass on our many years of experience and knowledge to you.



## OBO ACADEMY

Connect to knowledge

**From the basics through to concrete applications – OBO provides knowledge.**

For many years, the OBO ACADEMY has offered a comprehensive range of seminars. **"Advantage through knowledge"** is not just a slogan but also our desire to pass on our practical knowledge to you.



Current dates,  
all seminars and  
registration at  
[www.obo-bettermann.com](http://www.obo-bettermann.com)  
or scan the QR code:



Seminars



Planner days



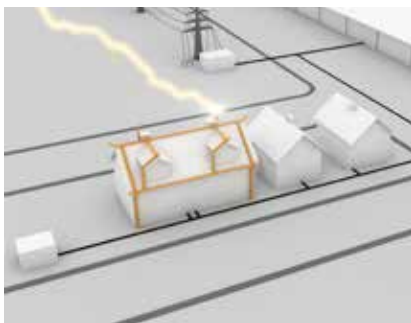
Online seminars

# Focus on risks

The underestimated risk from lightning strikes, surge voltages and the spread of fires

The risks for electrical building installations are wide ranging and frequently are not considered enough. This is because it is not only direct lightning strikes that can lead to considerable damage. Lightning strikes at distances of up to two kilometres can also cause devastating damage to electronic devices and

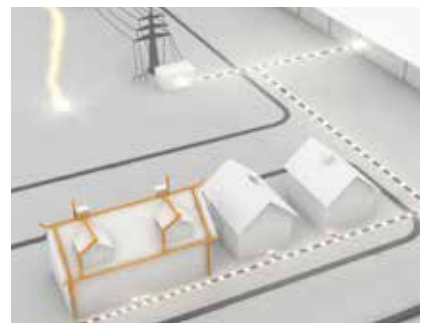
systems. Even everyday switching operations in the power network, for example through major systems, can trigger dangerous surge voltages in the power network, which then become a danger for building technology.



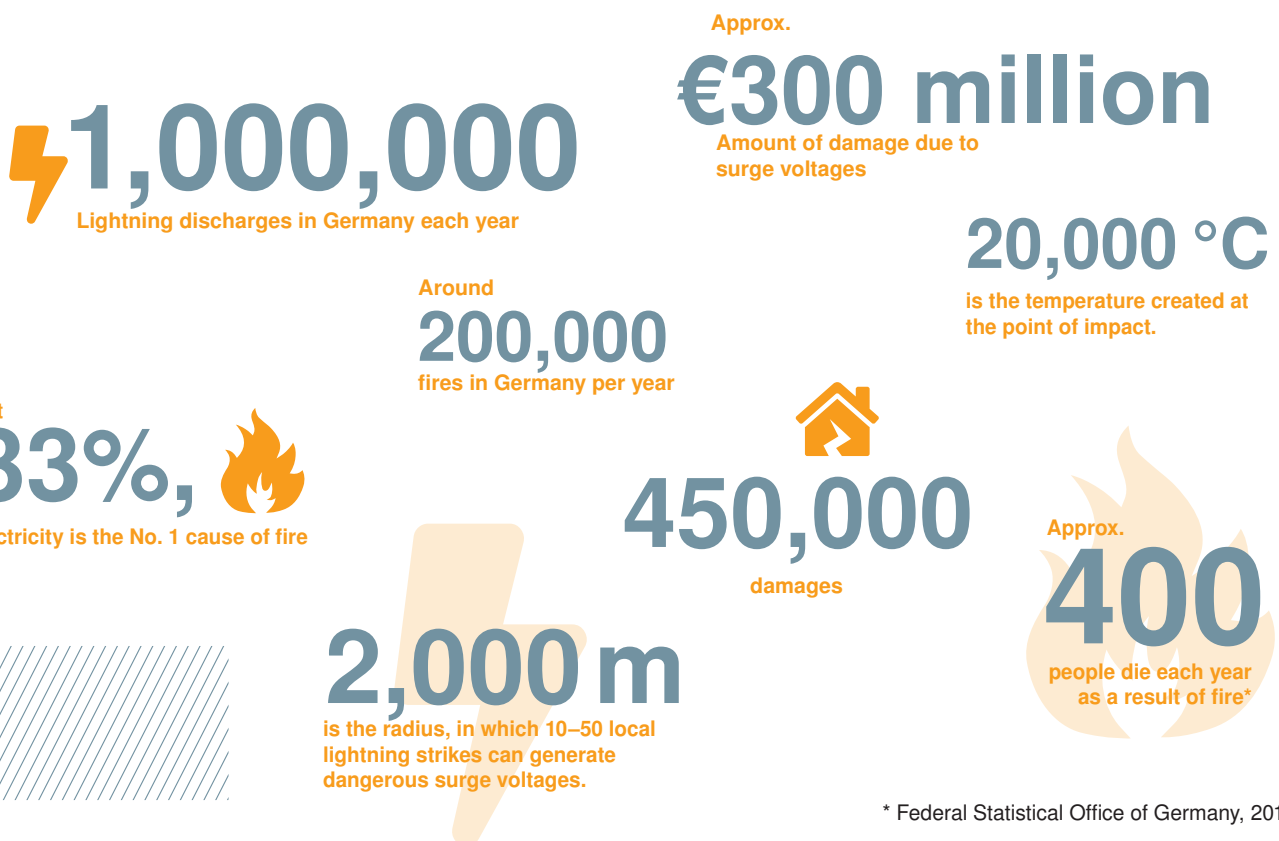
**Direct lightning strike**  
80% of lightning strikes lie in the area of between 100,000 A.



**Remote lightning strike**  
Creation of short-term voltage increase in millionths of seconds.



**Switching actions and induced surge voltages**  
Particularly when production plants, lighting systems or transformers are switched off, electrical equipment located in close proximity can be damaged.



\* Federal Statistical Office of Germany, 2017

In this context, the sensitivity towards necessary fire protection in buildings is also growing. The countless combustible materials and plastics used in electrical installations and home furnishings are responsible for strong smoke development and thus for the rapid spread of fires. To prevent this, structural fire protection is also essential in electrical installations.



**The force of lightning strikes is massive:**  
The current strength can be over 100,000 amps, the voltage can be several million volts.

## Technology in a state of flux

Protecting housing in new and existing buildings

80%

of construction projects are refurbishments, only 20% are new buildings.

### State of the art

The now widespread levels of multimedia technology which have entered all our households can rapidly overburden existing electrical installations. They frequently no longer meet the state of the art. The core components of the aged infrastructure are increasingly overloaded and can pose a serious risk to the safety of any resident. From damage to property, through spark formation up to the creation and spread of fires, the risks share a common characteristic: They can cause damage ranging from considerable through to the simply immeasurable.

With **50%,**

of buildings over 35 years old, no electrical installations have been renewed.

The obligation to keep the building systems up to date is carried by the person responsible for the building. In rental accommodation, this is the landlord or owner. In cases of non-observance, the liability amounts can be considerable, which is why investing in the refurbishment of a technical system is not only wise in the context of the duty of care, but is also of value from a financial and legal standpoint.

**Do not cut corners when updating safety!**

# Fire protection in housing construction

Legal regulations formulate the protection aims

## Construction law requirements

All the states specify the minimum requirements for buildings with regard to their construction law in ordinances and directives. Buildings must be constructed in such a way that they are stable and do not endanger anyone when used. Here, attention must also be paid to energy efficiency and resources. These are, of course, very abstract demands. It is important that the creation of fires and the spread of fire and smoke are prevented, and that the rescue of people and animals as well as effective extinguishing measures are possible. Three important construction protection aims can be derived:

1. Preventing the spread of fires
2. Protecting escape and rescue routes
3. Safety-relevant electrical systems must function

In general, the fire protection requirements increase strongly with the type, size and use of the buildings. To aid distinction, the construction regulations specify building classes (BC), for example (see graphic – Building classes in Germany).

## Guidelines and ordinances for electrical installations

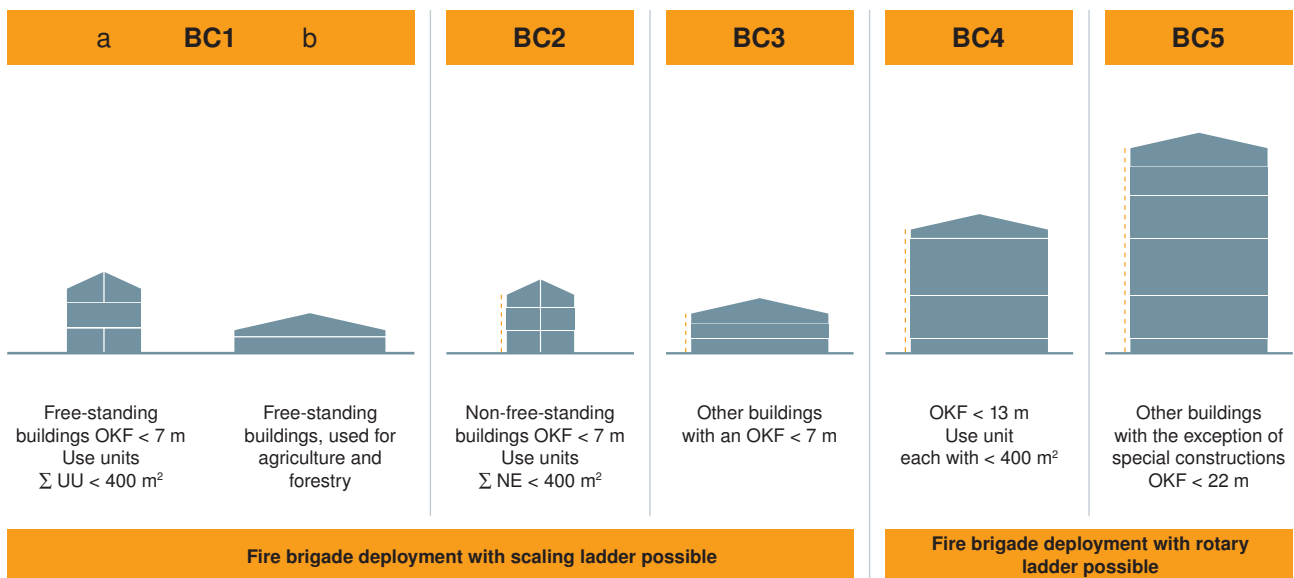
Taking fire protection into account, requirements in addition to the normal electrical standards apply to electrical installations. Special directives regulate electrical installations in escape and rescue routes, the penetration of installations through fire-resistant walls and ceilings, and the maintenance of electrical function of safety-relevant systems, e.g. safety lighting. Additional fire protection regulations also apply to system floors – i.e. raised and cavity floors – and tower blocks. These requirements are regulated in additional regulations.







## Classification of the building classes according to the Model Building Regulations (Germany)



UFE: Upper floor edge of the highest storey | UU: Use units | BC: Building classes

# Surge protection almost always mandatory

Since 2018, surge protection is almost always required

In larger and/or public buildings and areas, **surge protection is mandatory** according to IEC 60364-4-44. These include, for example, areas for safety purposes, medically used areas, museums, hotels, banks or schools. An exception to this is single-occupancy dwellings and individual residential units. Here, surge protection is only required when the overall value of the electrical system to be protected is more than five times the economic value of the surge protection. If the assignment is not clear, then a risk evaluation according to IEC 60364-4-44 is required. This can be waived if surge protection is used.

## Liability

Explanation and implementation are conditions of liability in case of damage

Here, the executive electrical installation engineer is always required to inform their client. If there is no explanation to the client and damages occur, then the planning installation engineer will be fully liable. If damages do not occur after insufficient explanation, then a claim for reworking is possible. However, if the client was properly instructed in writing and still waives measures, then they shall be liable – also to tenants. Not mandatory, but clearly recommended, is the additional explanation to the tenant to use surge protective devices for

According to the IEC/EN standards  
**IEC 60364-4-44**  
**IEC 60364-5-53**  
surge protection is frequently mandatory.



*"Surge protective devices should avoid dangerous spark formation and the resulting fires."*

sensitive terminals, such as PCs, TVs, etc, to avoid disputes in cases of damage and for insurance protection.





# When does the provision made to safeguard existing standards affect electrical installations?

The renovation of the electrical installation in an existing building is not mandatory. The borders of necessity are touched by the provision made to safeguard existing standards, which states that electrical installations installed correctly at the time of construction do not need to be replaced. **However**, this statement is determined by the requirement that **no major intervention in the electrical installation of the building** takes place.

The use of old electrical systems is only to be recommended when all of the following four conditions are fulfilled:

1. The electrical system corresponded to, and still corresponds to, the requirements (e.g. DIN VDE standards) valid at the time of erection.
2. Subsequent standards or other regulations do not make it necessary to make changes to the current state.
3. The system is still used under the same operating and environmental conditions for which it was originally designed.
4. There are no defects which represent a risk to life and limb or to property.

## Does surge protection have to be upgraded in an existing electrical system when the electrical system is expanded/renewed?

DIN VDE 0100-443 and -534 do not contain any requirements for upgrading.

The following always applies: If an existing electrical system is renewed/expanded or a part of an existing system is renewed/expanded, then the renewed/expanded part of the system is to be erected according to the standard status valid at the time of renewal. However, the system installation engineer should always inform the client (information requirement) that surge protective devices could also be required in the parts of the system which have not been renewed/expanded.

## For example, a distinction can be made between the following three cases:

### Case 1:

New meter location (main distributor), although no renewal expansion of the electrical systems in the residences:

*Surge protection is to be installed in the meter location/main distributor – information requirement, see page 8.*

### Case 2:

The meter location (main distributor) remains unchanged but the electrical system in the residence is renewed/expanded:

*Surge protection is to be installed in the residence distributor in this residence – information requirement, see page 8.*

### Case 3:

A final circuit is supplemented. However, the supply point of the system (e.g. meter location/main distributor OR residence distributor) remains unchanged:

*In this case, surge protection does not have to be installed at the supply point of the system. However, information should be provided (see page 8) and a recommendation of SPDs for the supplemented system section given, according to the requirement for protection.*

## Safe, modern residential installations offer solutions for any requirements

Electrical installations pass through the whole building. Following the path of the current from the entrance to the building in the cellar through to the socket in the living space or the PV system on the roof, suitable measures must be taken to guarantee the safety of the inhabitants and protect electrical devices.

### Application in corridors

Escape route installations and supply of emergency lighting

Page 20

### Application in the cellar

Earthing, protection and functional equipotential bonding, surge protection

Page 12





### **Application in vertical cable routing**

For example in vertical shafts, stairwells and pipe installations

**Page 18**

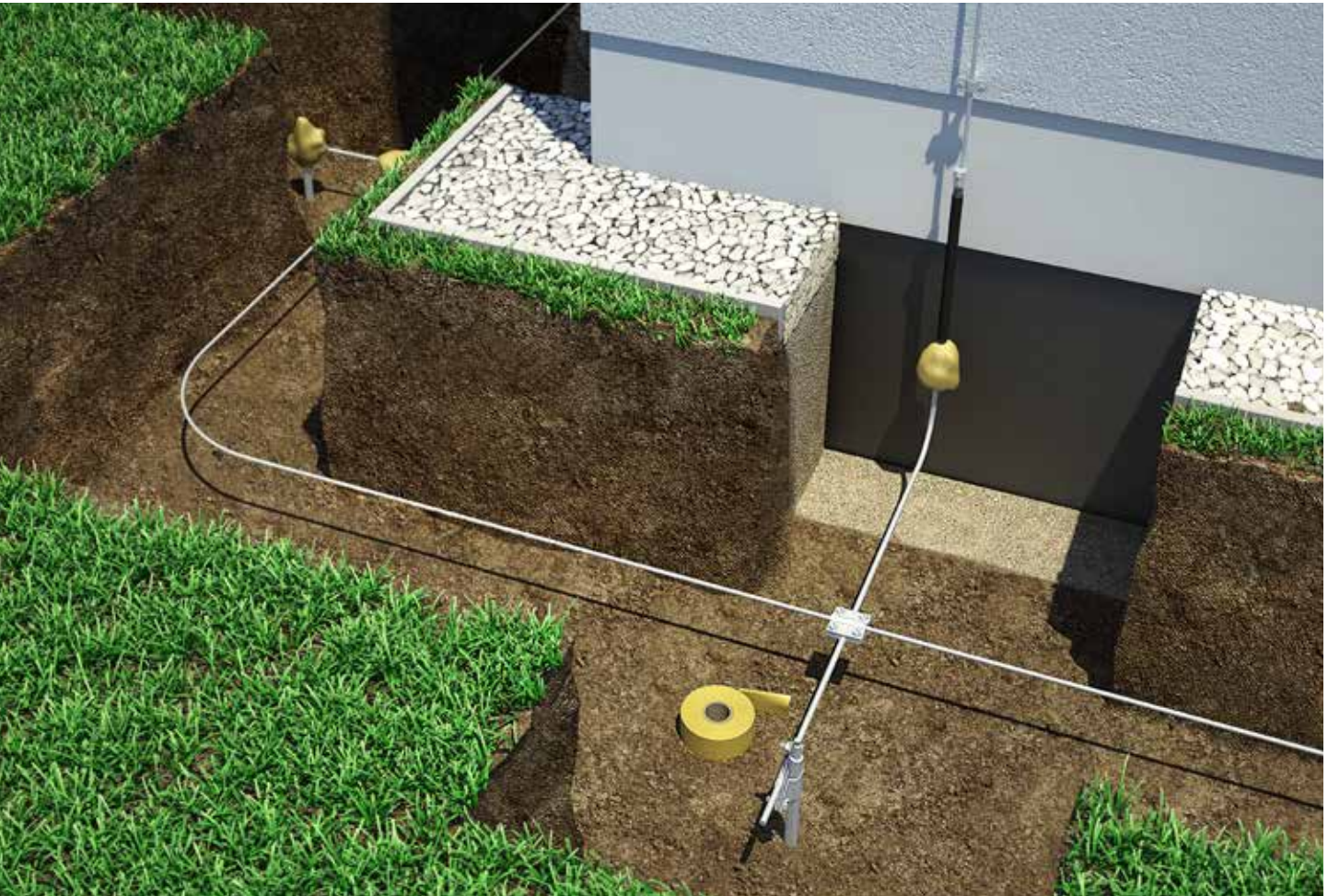
### **Application in the living space**

Modern cable routing and safe surge protection up to the terminal

**Page 22**

# Application in the cellar

## Earthing and equipotential bonding



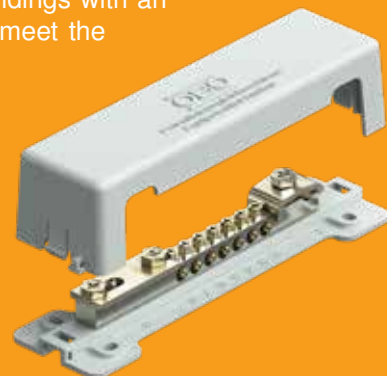
### Earthing, protection and functional equipotential bonding

The earthing system is the basis for the safe function of every electrical system and its protection devices, in both new and existing buildings.

A low-impedance system ensures operation and protects people against hazardous currents. In Germany, a foundation earth electrode complying to DIN 18014 must be installed for new buildings. An earth rod is recommended for existing buildings. In both cases, the system earther must be calculated and erected according to the newly installed protection devices of the electrical installation, such as RCDs. In the case of buildings with an external lightning protection system, the system earther must also meet the requirements of VDE 0185-305-3 (IEC 62305-3).

The protective equipotential bonding connects all the foreign conductive parts in the building with the system earther, preventing dangerous potential differences. Components such as equipotential busbars and earthing clamps are key components of the correct design of protective equipotential bonding.

In the context of lightning protection equipotential bonding, these clamps and terminals must fulfil the requirements as defined in VDE 0185-561-1 (IEC 62561-1).





# Surge protection

To prevent dangerous surge voltages in the electrical system, a surge protective device (SPD) must be installed as close to the supply point of the system as possible, e.g. in the meter cabinet, if a risk analysis according to IEC 60364-4-44 requires this.

If no risk analysis is performed, then surge protection must be used. IEC 60364-5-53 regulates the type of SPD to be used. For buildings with an earth cable supply, a type 2 SPD is sufficient. The devices of the V20 series are particularly suitable here.

Buildings with an external lightning protection system must be protected using a type 1 SPD or a type 1+2 combination arrester. Here, the use of a device from the V50 series, the MCF-NAR series or an MCF Compact is necessary.



# Application in the cellar

## Surge protection

### Surge protection for data technology

However, surge voltages do not only enter a system via the main power supply. Telephone and cable TV cables also enter the building from outside and can transmit dangerously high surge voltages into the system.

In order to complete the protection concept, these cables should also be connected to the equipotential bonding using suitable surge protective devices, such as the LSA-B-MAG LSA basic protection bar for multi-

wire telephone cables and the DS-F M/W for coaxial cables. As the area of application of the VDE 0100 only deals with the power supply, it can only recommend the use of SPDs in this area.

- LSA-B-MAG basic protection bar
- DS-F M/W coaxial protection device





# Protecting photovoltaic systems

## Surge protection in PV systems

IEC 60364-4-44 defines when surge protection is necessary on the AC side. IEC 60364-7-712 (Requirements for special installations or locations – Solar photovoltaic (PV) power supply systems) regulates when surge protection must be used in PV systems. The reference to IEC 60364-4-44 has existed here since 2017. In many cases, on the DC side, this results in the necessity for surge protection for systems with or without an external lightning protection system.

Care should always be taken to maintain the separation distance between the PV system and external lightning protection. If the separation distance has been maintained, a type 2 surge protective device (SPD) is sufficient. If the separation distance cannot be maintained for construction reasons, then the PV system must be connected to the lightning protection system using suitable components. In this case, an SPD of type 1 or a combination arrester of type 1+2 is required. Here, it is wise to use devices from the V50 PV or V25 PV series. For the correct selection of the surge protective device,

it is of decisive importance to know the maximum voltage of the MPP tracker. The number of required protective devices is calculated from the number of MPP trackers in the appropriate PV system. These measures mean that the PV system is optimally protected against surge voltages.

To protect the inverter as well as possible against dangerous surge voltages, the surge protection should be used on both the direct and alternating current side, directly at the inputs and at the output. If the inverter is connected to a network, then this supply line should be included in the equipotential bonding via a suitable SPD.



- V25 PV combination arrester
- V50 PV combination arrester
- Net Defender

*"The inverter does not have to be fixed in the cellar. It can, for example, be located on the roof or in the attic."*

# Application in the cellar

## Maintaining fire sections



If there is a fire, cable insulation ensures that fire and smoke cannot spread in the building. They close the openings in the walls and ceilings with a fire resistant component and prevent the spread of the fire for a defined time.

In residential buildings, it is often small bundles of cables which must be run through the walls and ceilings. Often, a fire protection closure is forgotten here. Small insulation solutions with materials forming an insulation layer or flexible insulation made of fire protection foams are ideal solutions for the requirements in housing construction. The electrical installation en-

gineer can most easily implement the requirements when the cable bundles are run through openings in walls and ceilings which are only intended for electrical cables. This avoids a collision with other units.

- PYROSIT® NG fire protection foam
- PYROPLUG® Block and Peg foam blocks and plugs
- PYROCOMB® Intube pipe shells
- PYROMIX® Screed small insulation

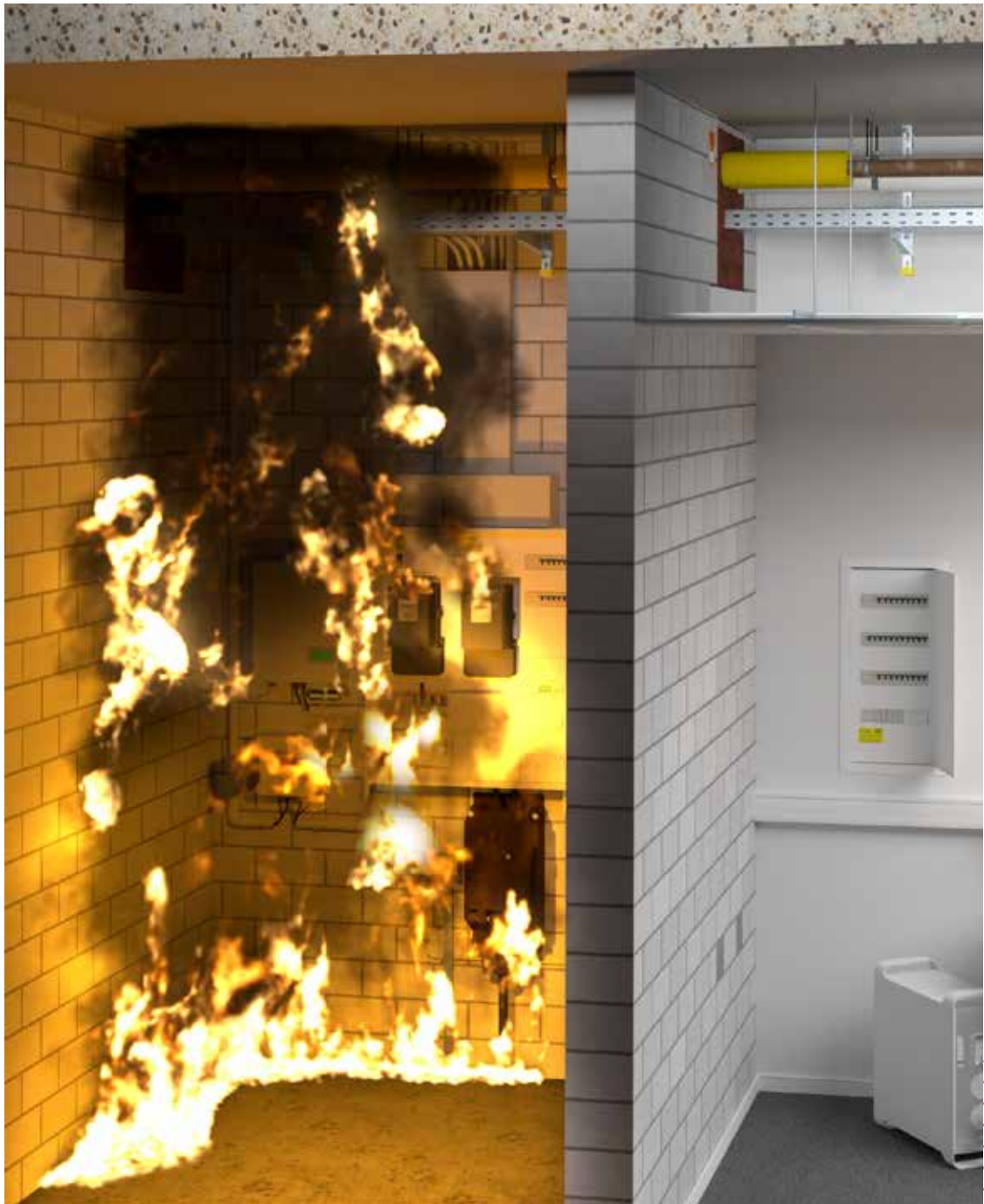
**Planning** has never been so easy. OBO Construct – smart planning.

This tool makes the correct, approval-conformant planning of fire insulation easier than ever before.



Try it now, completely *without* registration.



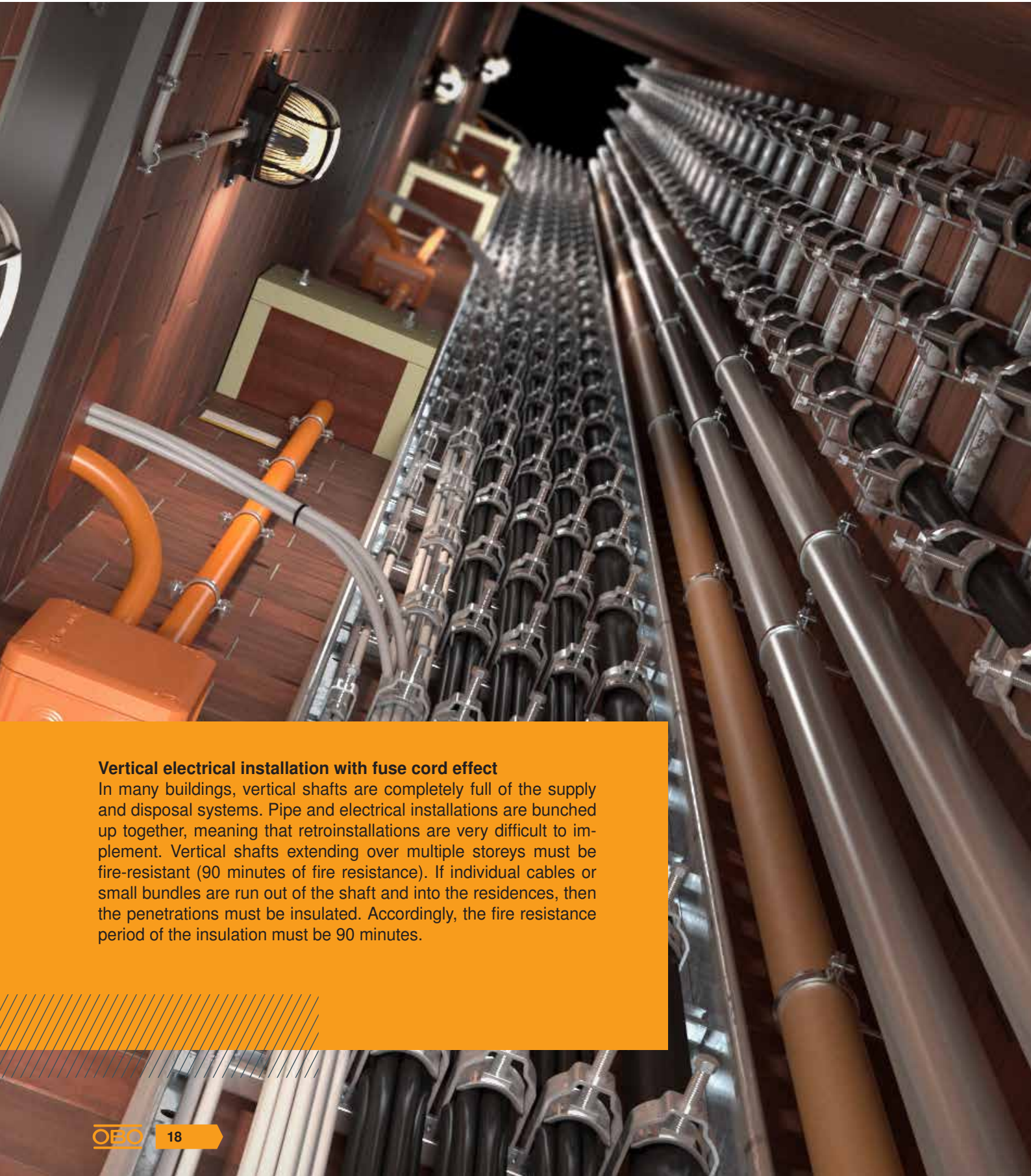


The fire resistance class of an insulation system must be selected in tandem with the class of the wall or ceiling. A fire-resistant wall has a fire resistance period of 90 minutes.

The insulation system must be approved for the installations made and for this period. Every system shares the fact that it has passed fire tests and is approved for the construction requirements.

# Application in vertical cable routing

Vertical shafts and stairwells



## Vertical electrical installation with fuse cord effect

In many buildings, vertical shafts are completely full of the supply and disposal systems. Pipe and electrical installations are bunched up together, meaning that retroinstallations are very difficult to implement. Vertical shafts extending over multiple storeys must be fire-resistant (90 minutes of fire resistance). If individual cables or small bundles are run out of the shaft and into the residences, then the penetrations must be insulated. Accordingly, the fire resistance period of the insulation must be 90 minutes.



### Fire protection ducts in stairwells

In escape and rescue routes, only short branch cables or cables to supply the electrical systems of the escape route itself can be routed openly. If there is no vertical shaft in the building, or it cannot offer space for further installations, then the stairwells are frequently used for vertical supply installations. The bundles of supply lines, as well as telephone and coaxial cables for cable TV, which supply the individual residences, must then be routed within fire protection duct. Fire protection ducts must have non-combustible surfaces and ensure that a cable fire within does not spread to

the stairwell. This is because, if there is a fire, smoke will mean that the escape route can no longer be used.

- PYROLINE® Rapid metal fire protection duct
- PYROLINE® Con concrete fire protection duct



### Pipe installations in stairwells

If individual cables are used for the supply of stairwell luminaires or escape route pictograms, then steel armoured pipes are suitable for the installation. They are not combustible and also resist outside impacts on account of their mechanical stability. Steel clips are used to fasten the pipes. Pipes are not the same as fire protection ducts and also do not fulfil their function.





It is primarily the corridors of the individual floors that are used to access each floor. If the corridor is an escape and rescue route, then the same conditions as for stairwells apply here. Open electrical installations are forbidden along the overall corridor length. Only the direct supply of the consumers in the corridor or short branch cables are permitted. This means that, if there is a fire, the spread is prevented along the escape route. Localised fire loads made of plastic, such as luminaires, smoke detectors or Wi-Fi devices, are acceptable, as the risk of fire creation from these components is extremely low and a fire spread need not be feared.

# Application in corridors

## Horizontal cable routing

Fire protection duct is also used for horizontal electrical installations in corridors. It fulfils the same tasks as in the stairwell: Encapsulation of the fire loads of the cable insulation and preventing the spread of fire inwards if there is a fire on the outside, e.g. if there is a fire in an apartment and flames from an open door spread into the corridor.

- **PYROLINE® Rapid**  
metal fire protection duct
- **PYROLINE® Con**  
concrete fire protection duct

If a large number of installations of various units is necessary in a corridor, then the installation of a suspended fire protection ceiling of fire-resistant quality (30 minutes of fire resistance) is often the only option for creating a fireproof installation. In doing this, care should be taken that the suspended ceiling cannot be damaged during a fire through falling components in the area between the raw and suspended ceiling. It is then that fire and smoke can enter the escape route, meaning residents can no longer use it safely. Special support and routing systems guarantee, through fire proofs, that the installations are performed in a fireproof way.

- **RKS-Magic®** cable trays
- **SKS** cable trays
- **Grouped supports**
- **Pressure clips**



If there is a fire, escape and rescue routes are the central lifelines in the building and must remain usable at all times!

# Application in the living space

## Protection of sensitive terminals

### Surge protection in the sub-distributor

IEC 60364-5-53 defines the effective protection area of surge protective devices (SPDs) with a cable length of 10 metres. If a resource to be protected is further than 10 metres from the last SPD, for example, then an additional surge protective device should be erected as close to the resource as possible.

If there is then a sub-distributor at a cable length of more than 10 metres from the last SPD, a further surge protective device should be used here, in order to provide effective protection of sensitive devices, such as power supply units, timer switches or the power unit of the media distributor. Here, the voltage protection level of the SPD may not exceed the necessary rated surge voltage  $U_w$  of the resource. Here, for example, a device from the V20 series or a V10 Compact, which is also available with acoustic or remote signalling, can be used.

For surge category I terminals, such as computers,

power supply units or TVs, the rated surge voltage is defined as 1,500 V. For surge category II, such as small household appliances, washing machines, portable tools or controllers, the rated surge voltage is defined as 2,500 V.

To offer complete, effective protection of all the terminals, not only all the power cables, but also all other cables, such as TV or network cables connected to the resources, should be included in the equipotential bonding using suitable surge protective devices. Only this can create comprehensive protection. The ÜSM-A was developed for use directly behind the socket or in a device connection housing. Quick and simple retrofitting can take place using the FC-D, which functions as an adapter. Devices connected to a network, such as PCs, are also given ideal protection using a Net Defender.



- V20 surge arrester
- V10 Compact surge arrester

Both the V20-3+NPE and the V10 Compact are very well suited to use in sub-distributors, depending on the application.



## Obligation to install smoke detectors

There are no structural fire protection requirements within residences in Germany. However, there is the obligation to install smoke detectors for residences in new and refurbished buildings, with some obligations going back 10 years. The transition period for refitting existing buildings ended at the end of 2020\*.

In all German federal states, the owner or landlord is responsible for the installation of the smoke detectors. The German federal states regulate the responsibility for the installation locations and maintenance, e.g. bedrooms and living rooms, differently using the state building regulations.

\* With the exception of Saxony.





# Application in the living space

Intelligent refurbishment solutions



## FC-D

Surge protection type 3  
as an adapter connector for  
protective contact sockets



## Net Defender

Surge protection for  
high-speed networks



## ÜSM-A

Type 3 surge protection module  
for use on sockets in  
installation systems







#### SL skirting duct system

Living space duct with maximum added value: Variable and individual electrical supply for living space installation and the refurbishment of existing buildings, particularly with insufficient wall depths, for uncomplicated routing on the wall/in the corners of rooms and flexible supply of the living space with telecommunication, TV and electrical connections.



#### One step further: RAUDUO combined electrical-heating duct

Patented refurbishment idea for safe, standardised routing of electrical and heating lines in shared skirting duct – without additional insulation. A thermal buffer ensures functional heat insulation. It ensures that the ambient temperature of 30 °C is not exceeded in the electrical chamber, despite the cables' own weight. No adaptation of the cable system, according to VDE 0298, Part 4.



Both duct solutions can also fit perfectly in uneven areas, on account of their malleable material and sealing lips which are perfect for existing buildings. This prevents the entry of dirt and moisture and ensures a visually tidy solution, even under tricky conditions.

# Everything from one source

## Installations made easy with OBO products

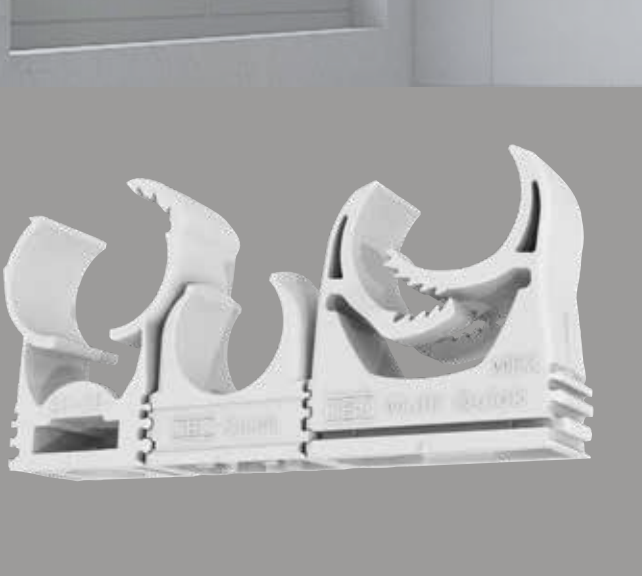
### We can do even more

Besides products for lightning, surge and fire protection, we can offer you a comprehensive product range for everyday electrical installation requirements – practical, flexible and tailor-made to your re-

quirements. Equipped with countless features, every product is focused on making your work simpler and reliably helping you to reach your aim.

### Junction boxes

As part of a large family for standard or special applications, the junction boxes of the OBO T series mean that you have the right solution to hand to master every requirement in residential construction. The intelligent construction, numerous practical details and a comprehensive range of sizes give you a guarantee of the greatest flexibility as well as simple, uncomplicated wiring for your project.



### Quick clips

The OBO Quick series offers three different types of halogen-free pressure and pipe clips for the time-saving, securing fastening of cables and electrical installation pipes. The clips of the three types can be arranged together, and thus particularly quickly mounted, whilst still being extremely stable.



### Quick pipe

In connection with Quick clips, the OBO Quick pipe is the ideal solution for rapid surface-mounted installations and trouble-free reinstallation. Thanks to a highly elastic hinge, the cables can simply be inserted lengthways and the pipe safely closed through rotation in the clip.



### Adhesive clips

Of course, we'll ensure that you don't miss out the smaller members of the family. Adhesive clips from OBO for attaching to the cables will round off your everyday requirements – and are available in all standard sizes.



### WDK/mini duct

It's all about the basics: The WDK wall and ceiling duct with base perforation for mounting directly on the wall means maximum flexibility is combined with the simplest handling. Variants in numerous sizes can ensure tidy, discreet cable routing, even in the smallest installation spaces.



# Everything from one source

## Harmony of design and functionality as the supreme discipline

Where design and functionality are not mutually exclusive, we can create solutions that satisfy the highest quality requirements. In high-class residential construction, the power and data supply can be stylishly

integrated into the environment. During installation, there is a focus on flexibility and efficiency – giving you and your customers the decisive advantage.

### UDHOME

The family of UDHOME complete units can position power, data and multimedia connections exactly where they are required. Floor sockets and floor boxes of the UDHOME family are mounted directly on the raw floor or the screed and connected with flexible installation pipes. The efficient handling means you have the decisive installation advantage on your side. Thanks to the 54-degree angled socket, the smallest UDHOME2 socket offers enough space for even the largest of plugs and smaller charging units, which vanish below the closed cover. The UDHOME2 is inconspicuous in the floor covering, with its narrow cov-

er edges integrating seamlessly into different floor types. The versions with a folding cord outlet are suitable for dry or damp-care floor coverings, such as parquet or laminate. For the version with a floor covering recess, floor coverings of stone, tiles, plastic or wood can be integrated easily in the cover.





### GES R2 – underfloor solutions in the smallest areas

The round floor sockets of the GES R2 series supply data and power exactly where they are required. They are an ideal underfloor solution when a discreet appearance, a high load capacity and varied functionality are required. Particularly in high-quality residences, the floor sockets stand out through their fine design and also add value to high-quality flooring areas.

Depending on the cover version, the floor sockets are suitable for dry or wet-care floors.

### Deskbox for desks

Whilst we're working from home more often, the OBO Deskboxes can offer more efficiency at the workplace. Both elegant and practical, they guarantee direct access to power, data and multimedia connections. Variants for free positioning, folding or lowering are available to you in different configurations. For increased flexibility and optimum supply.





# OBO CONSTRUCT

Planning software and product configurators

## The OBO programs are electronic planning aids –

developed to support electrical installation engineers and planners in the design of electrical installation systems.

## The advantages of OBO Construct:

- Work aid – independent of time and place
- Transmit planning requirements to complete product systems
- Find suitable products quickly and simply
- Calculate quantities automatically
- Download configuration results as Excel or Word files

[www.obo-construct.de](http://www.obo-construct.de)



## Currently available versions:



**KTS AutoCAD Plug-in Version 3.0**  
(AutoCAD full version from 2013)



**UFS Planning Tool Version 3.0**  
(web app for all devices)



**TBS Earthing Systems Version 1.0**  
(web app for all devices)



**BSS Selection Aid, Insulation Version 2.5**  
(web application, iOS and Android app)

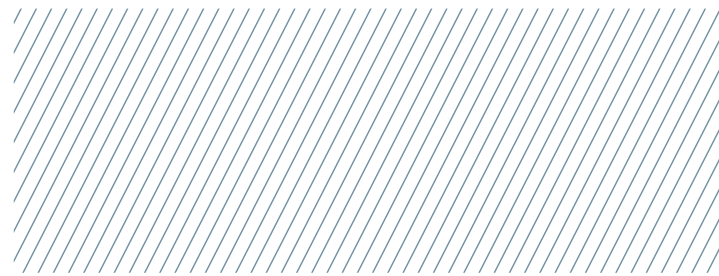


**TBS Surge Protection Version 1.0**  
(web application)



**KTS Cable Filling Version 3.0**  
(Windows PC application)





Our **guides** offer general and specific information about the topic of fire and lightning protection.

In the guides, our OBO experts explain key basic principles, present problems with matching solution approaches and provide information on testing methods and certificates. Of course, we have included current developments, standards and legal requirements in the revised version. Make use of our expert knowledge. You can order the guides online at [www.obo-bettermann.com](http://www.obo-bettermann.com) or download them.

In addition to our **product catalogues**, our **planning aids** contain basic knowledge, installation information and pictorial mounting aids for the OBO systems.



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