

Lightning and surge protection for
maximum safety and security



Protected



THINK CONNECTED.



**Lightning and voltage surges
endanger people and assets.**



Protected

Like four well-trained bodyguards, our systems provide you with maximum protection.

1 Air termination and down conductor systems



2 Earthing systems



3 Equipotential bonding systems



4 Surge protection systems



Lightning and voltage surges endanger people and assets.

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Lightning strikes Germany around two million times a year, and that figure is rising. Discharges occur in both rural and densely populated areas, endangering people, buildings and technical equipment. Hundreds of millions of euros of damage is done each year,

especially as a result of electrical surges. That is because electrical devices – some of which are extremely sensitive – are nowadays part of everyday life. Such equipment is especially vulnerable to voltage surges and needs protecting just as much as buildings do.

1,500,000,000

More than 1.5 billion lightning events each year worldwide.

100



More than 100 lightning strikes occur every second worldwide.



30,000° C

300 km/s

30,000 degrees Celsius is the temperature of the air in the path of the lightning, which discharges at a speed of 300 kilometres per second.



31%

of all electronic damage is caused by direct or indirect lightning strikes.

450,000

Around 450,000 incidents of damage are reported to insurance companies each year.

40,000 A

80% of lightning strikes involve between 30,000 and 40,000 A.

Our everyday lives are shaped by the availability of modern control equipment, yet it is constantly at risk.



Intelligent controllers, high-power computers, data centres – computers, automation and telecommunications systems perform many important jobs in both the private and the professional world. Our lives are totally reliant on technological support, and hundreds of billions of euros is spent each year building up that support.

Just one lightning strike nearby, or an electrical failure in the power supply, and modern control equipment is destroyed. The economic consequences can be devastating: plant standstill, heavy losses on account of production downtime, data loss, repairs and system faults can potentially drive a company to bankruptcy.

Vital computer-assisted systems such as fire alarms, as well as industrial plants fitted with modern automation equipment, are highly sensitive and extremely vulnerable to electrical surges.

Case 1: Industrial building

A production hall housing a plastic injection moulding facility and adjoining office area: a lightning strike on a 10 kV medium voltage overhead power line 500 metres away, leading to surge damage to the injection moulding plant's control circuitry.

250 €

Control circuitry

20,000 €

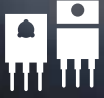
Computers and servers

500,000 €

Loss of production



230V



24V



5V



2.5V

Greater performance, greater susceptibility to interference

Highly developed modern electrical equipment is becoming ever more sensitive. Or to put it another way, as voltage ratings drop, so too does electrical stability. Electronic valves in the 1950s operated at a remarkably high rated voltage of 230 V, but as transistors arrived in the 1960s this dropped to 24 V. Integrated circuits came in around 1980, and they worked at just 5 V. Modern computers use 2.5 V – in other words, just one per cent of the original voltage, which makes them many times more susceptible to electrical interference. Coupled with all this, the number of devices has grown hugely. So effective protection against surges has become much more important than it used to be.



Direct lightning strikes, nearby lightning and switching operations. Three causes of damage.

Three causes of damage

Transient surges can be caused by three things:

- direct lightning strikes
- lightning striking nearby
- switching operations

Equipment and systems can be protected against all three.

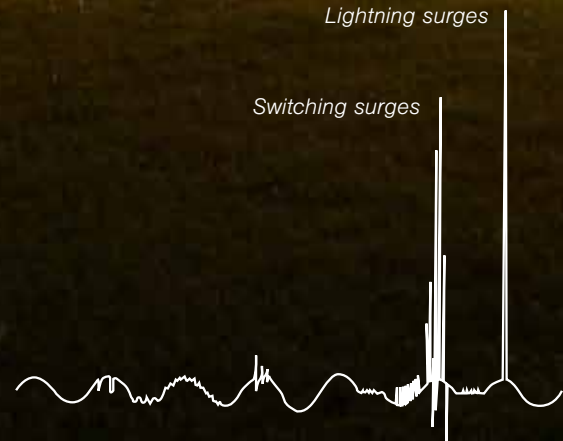
What are transient high-energy surges?

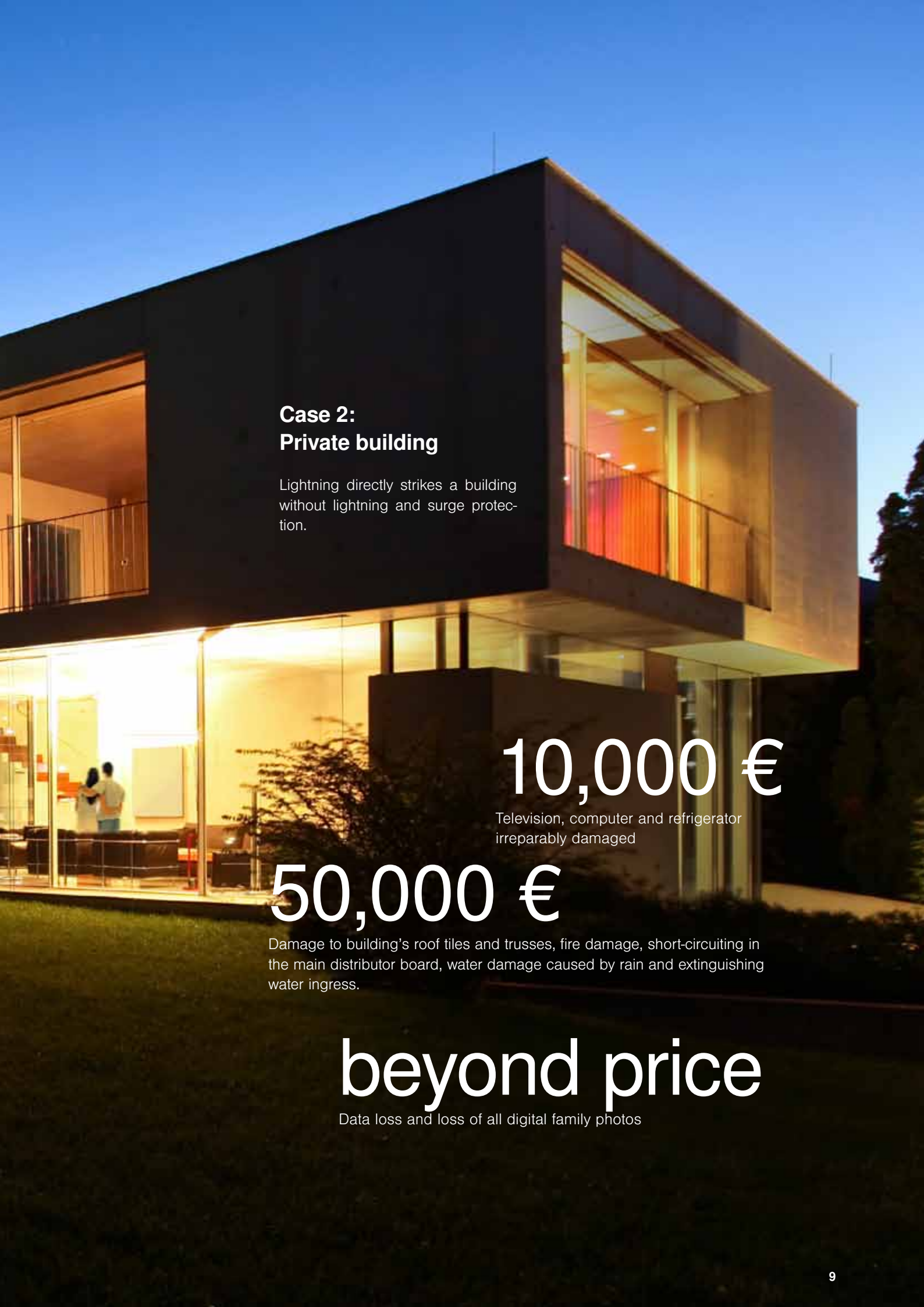
Transient voltage surges are short-term peaks in voltage lasting for just a few millionths of a second. They can be many times higher than the

mains voltage, and are caused by switching operations and by lightning. It is not just direct strikes that are dangerous, but also the much more frequent hits that occur in the vicinity of buildings.

Lightning surges

Switching surges





**Case 2:
Private building**

Lightning directly strikes a building without lightning and surge protection.

10,000 €

Television, computer and refrigerator irreparably damaged

50,000 €

Damage to building's roof tiles and trusses, fire damage, short-circuiting in the main distributor board, water damage caused by rain and extinguishing water ingress.

beyond price

Data loss and loss of all digital family photos

Protected

The “Protected to the power of four” principle: only if protection is coordinated is it real. Discover what our different systems do.



4 | Surge protection systems

Surge protection systems form a multi-stage barrier which no voltage surge can break through.

1

Air termination and down conductor systems

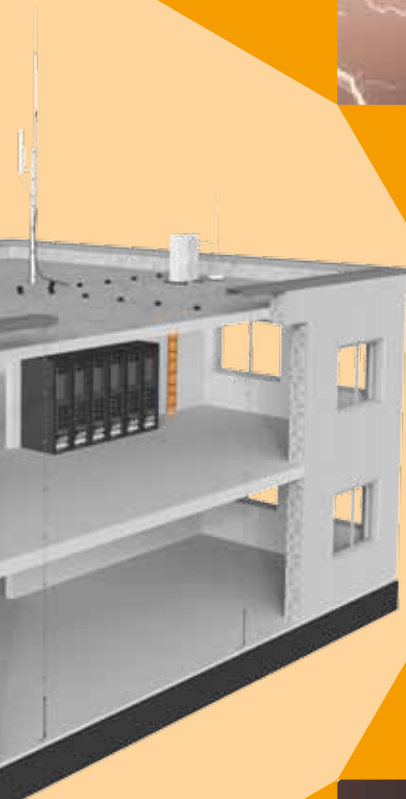
Direct lightning strikes with energy of up to 200,000 A are reliably received by air termination devices and conducted into an earthing system through the arrester system.



3

Equipotential bonding systems

These form the interface between external and internal lightning protection. They ensure that dangerous potential differences do not come about in the building.



2

Earthing systems

If the conducted lightning current reaches the earthing system, then approximately 50 per cent of the energy is passed into the ground, while the other half is distributed via the equipotential bonding system.



OBO systems for comprehensive lightning and surge protection



IsFang insulated lightning protection



Surge protection systems



Equipotential bonding systems

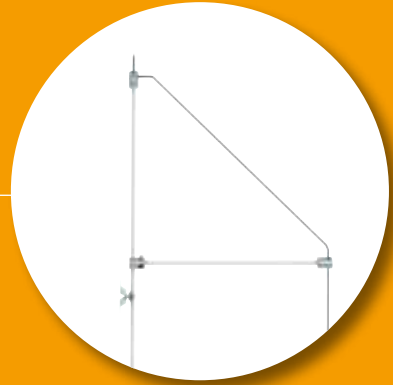


Earthing systems





IsCon® insulated lightning protection



Insulated lightning protection



Arrester



Surge protection systems



1

Tough stuff: Air termination and down conductor systems

OBO air termination and down conductor systems offer a wide range of solutions for almost every scenario, whether in parts of biogas plants that are at risk of explosion, in highly sensitive photovoltaic systems, or at power plants.

With around 1,500 different products in a range of different mate-

rials, OBO always has a suitable system on offer. OBO lightning protection components offer tested quality. They comply with IEC 62305 (VDE 0185-305) and have been tested in accordance with the IEC 62561 (VDE 0185-561) series of international and European testing standards. Air termination devices receive lightning strikes on roofs. Chimneys, antenna masts, ventilati-

on pipes, domed skylights and similar attachments that protrude from the roof are protected using separately positioned and insulated interceptor rods. These interceptor rods are connected together by what is known as interceptor cables, so that the lightning current can flow away down specific channels. From the air termination devices on the roof, insulated arrestors on or in the built-

1. Lightning protection

- Comprehensive: from roof cable holder to cross clamp
- Diverse materials: such as ten different types of terminals
- Intelligent installation features: pluggable interceptor rod systems such as Fangfix

2. Insulated lightning protection (GRP)

- Preassembled sets
- Adjustable holders
- Weatherproof

3. Insulated arresting with the isCon® system

- Outstanding installation properties: the patented isCon® system can be configured on the building site
- Standard-compliant copper conductor diameter
- Approved for use in areas at risk of explosion



Protected

ding walls carry the lightning current safely from the point of impact down to the earthing system. In this way the building and the people in it are protected against the lightning current itself and any fires that might otherwise be ignited.

4. Measuring and testing systems (PCS)

- Magnetic card system for recording lightning currents
- Easy to fit on round cable
- Mains-independent card reader



Application examples: air termination and down conductor systems

From the air termination devices on the roof, arrestors on or in the building walls carry the lightning current safely from the point of impact down to the earthing system.

OBO has the tested connection systems needed to install this arrangement safely.



A parapet wall connected to the lightning protection system



A metal facade connected to the lightning protection system



Insulated lightning protection on roof fittings

Protected



Insulated arrestor system in an explosion-prone area



isCon® system in the outlet area of a biogas plant



Separation point in an earthing system

2

Conducting lightning current safely into the ground: Earthing systems

Earthing systems conduct lightning current into the ground. They also act as links to protective devices such as surge protection equipment, whose protection devices do not trip until the earthing system signals them to do so.

A range of different earthing systems are available, depending on the building. OBO has the right systems for lightning protection earthing as described in IEC 62305 (VDE 0185-305), and for foundation earthing as laid down in DIN18014.

OBO has the right standard-compliant, long-lasting earthing system for every application

- Tested components compliant with IEC 62561 (VDE 0185-561)
- Solutions for every type of earthing: foundation, ring, deep, area
- Earthing systems for every application, from lightning protection to equipotential bonding

1. Conductor material

- A range of materials and designs
- Complies with the requirements of IEC 62561 (VDE 0185-561)
- Corrosion-protected by means of heavy zinc coating

2. Deep earthers

- Highly corrosion-resistant
- Quick to install using integrated coupling system (no connectors, secure contact with ground)
- Different versions available: solid, tube, cross and plate material

3. Connection and linking materials

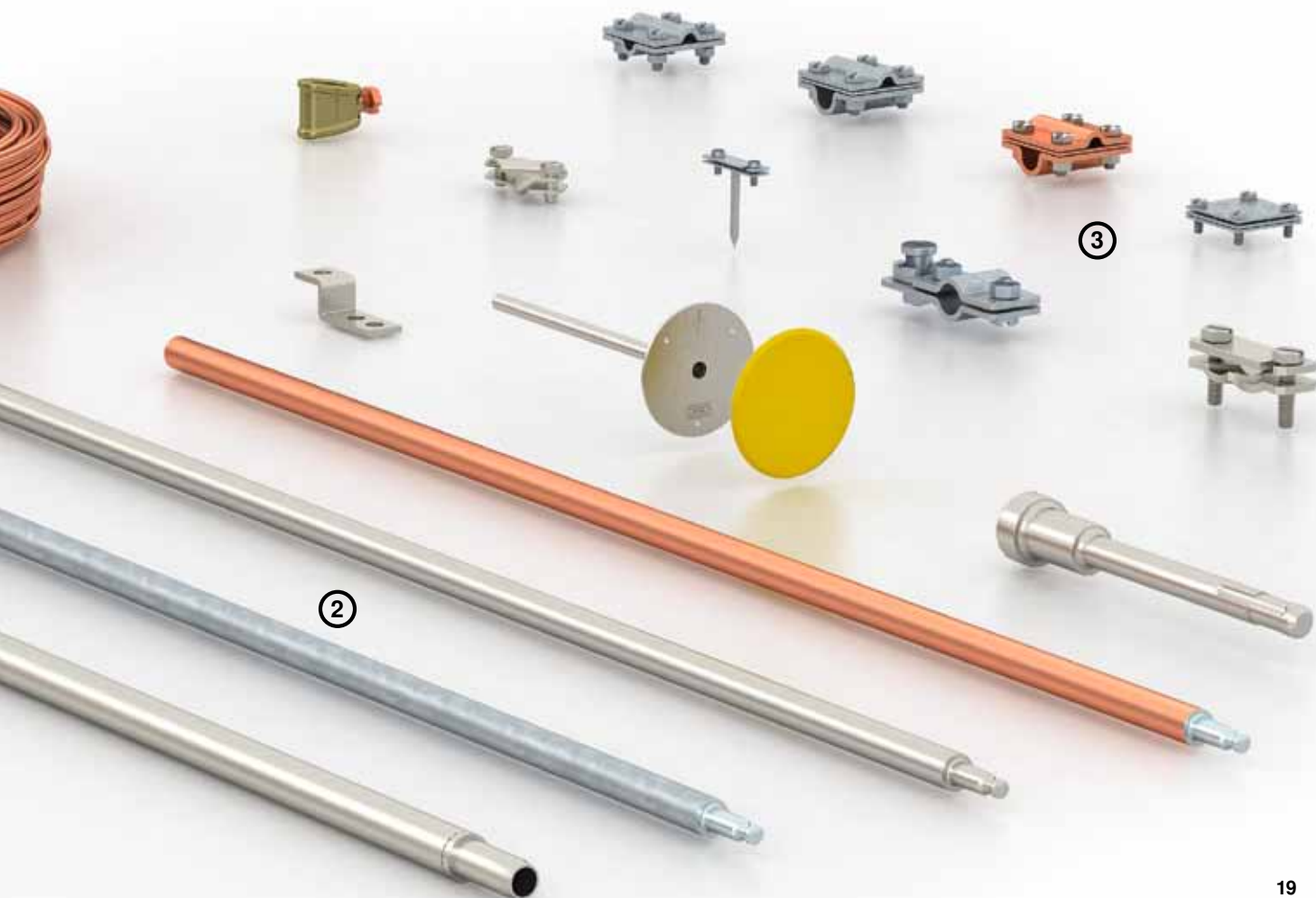
- Solid, safe installation
- Stainless steel screws in cross-connectors



Protected

50 years

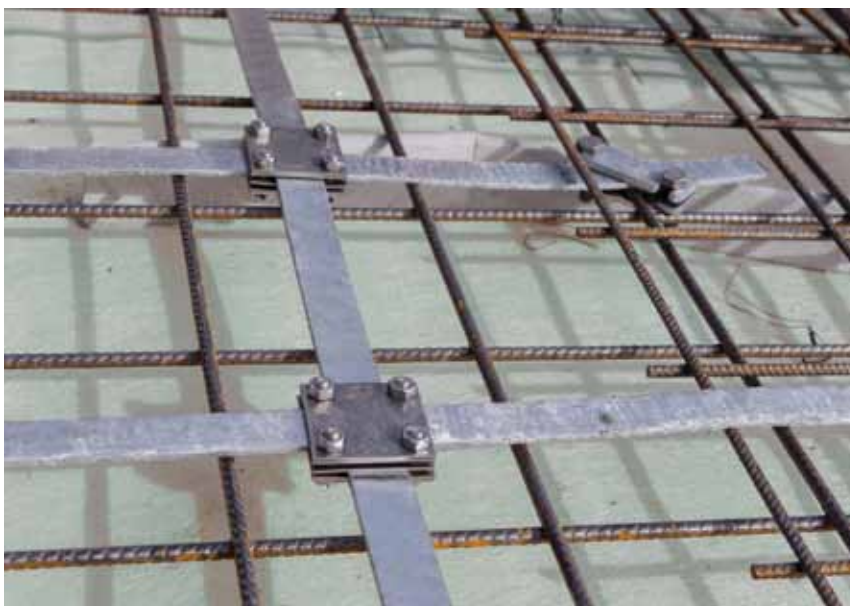
Experts reckon on an average useful life of 50 years for buildings. During that time, the earthing must be sure to keep working properly, since its position deep in the ground or in the foundations means that replacing components can involve considerable effort and expense.



Application examples: earthing systems

Foundation earthing systems are easy to integrate into new buildings. Their corrosion-protected conductor material is designed to last for 50 years of use. OBO connection

and linking materials allow you to install conductors safely and reliably, drawing on components such as stainless steel screws for cross-connectors.



Protected



3

Dependable protection against voltage differences: Equipotential bonding systems

Equipotential bonding systems ensure the safe distribution of lightning energy, but they also protect people and electrical equipment against electric shock in a building in the event of other types of voltage overloads.

In the event of a lightning strike, approximately 50 per cent of the lightning's energy is carried into the earthing system. The remaining 50 per cent is distributed around

the equipotential bonding system (internal lightning protection). This can lead to dangerous sparking. Electrical power and IT equipment requires particularly careful protection.

An equipotential bonding system must be installed in every building according to IEC 60364 (VDE 0100-534) / IEC 62305 (VDE 0185-305), and it is also a requirement in every new installation or alteration.

Operators of commercial properties are obliged to install one by the Ordinance on Industrial Safety and Health.

OBO supplies standard-compliant systems. Looped equipotential bonding and the inclusion of natural metal building parts such as reinforcement steel and metal facades provides optimum protection against potential differences and inductive coupling.

1. Interior

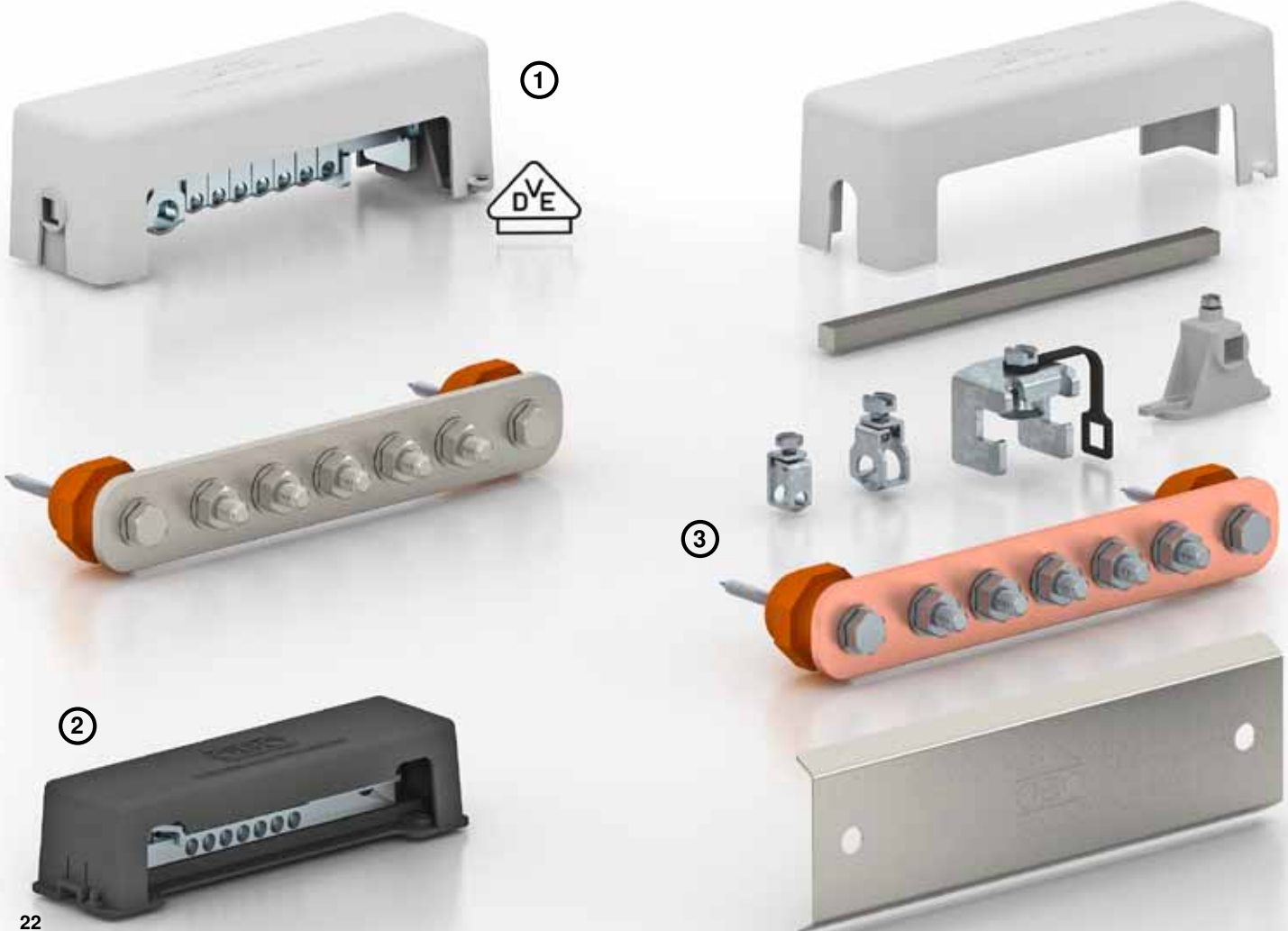
- Equipotential bonding rail 1801 VDE-tested
- With brass clamping rail, nickel-plated
- Safe contacts: series terminals made from steel, electrogalvanised, screw-secured tension clips (a requirement in industrial and explosionprone areas)
- Screws protected against self-loosening (as required in industrial and explosive areas)

2. Exterior

- Highly corrosion-resistant
- UV-proof
- Screws and crossbars made from stainless steel

3. Industrial

- Cross-sections up to 200 mm²
- Quick and easy to install
- Screws secured against self-loosening (a requirement in industrial and explosion-prone areas)
- Copper and stainless steel versions



OBO equipotential bonding systems:

- VDE/BET-tested
- From residential installation to industry
- Pre-assembled or modular
- Current carrying capacity up to 100 kA

4. Environmentally aware

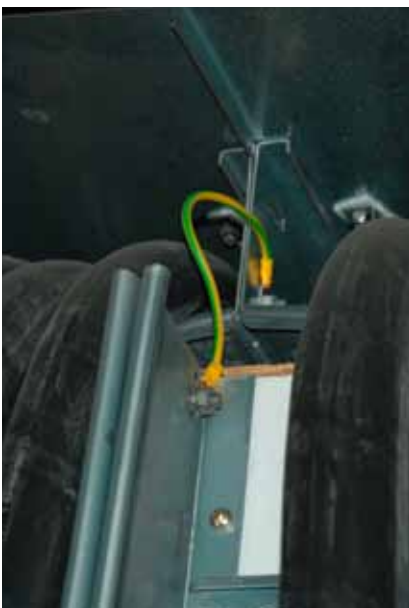
- Plastic material made from renewable sources
- Lead-free brass rail
- Stainless steel screws and crossbars



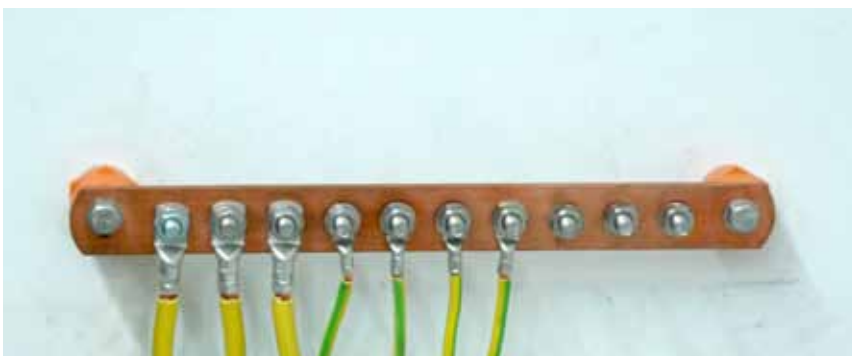
Application examples: equipotential bonding systems

Equipotential bonding connects together different parts of a structure, such as metal frameworks in a build-

ing, metal installations, conductive external parts, and electrical power and IT equipment.



Protected



4

Effective protection: Surge protection systems for power equipment

Voltage surges are caused by direct and indirect lightning strikes, and by switching operations within power networks. That is why surge protection guards not only against lightning, but also against other power line interference.

Surge protection equipment ensures that power lines under voltage are properly equipotentially bonded. It responds before the insulation in electrical and electronic appliances can be irreparably damaged by surges.

Tested safety

All of OBO's surge protection equipment is tested in compliance with the standards in our own BET Test Centre, and comes with a five-year guarantee. A whole series of national and international test symbols testify to the quality of our products.



1. Lightning arrestor / type 1

- Up to 150 kA (10/350) conductivity
- Industrial solutions pre-protected up to 500 A
- Patented high-performance carbon spark gap technology
- Special arrestors for wind turbines
- Fail-safe operation through patented quick release

2. Combination arrestor / type 1+2

- Up to 50 kA (10/350) conductivity
- Lightning current and surge arrestor in one device, ideal for use in residential buildings
- High-performance varistor systems

3. Surge arrestor / type 2

- Up to 40 kA (8/20) conductivity
- Protective equipment for equipotential bonding in main and secondary distribution boards
- High-performance varistor systems



Protected

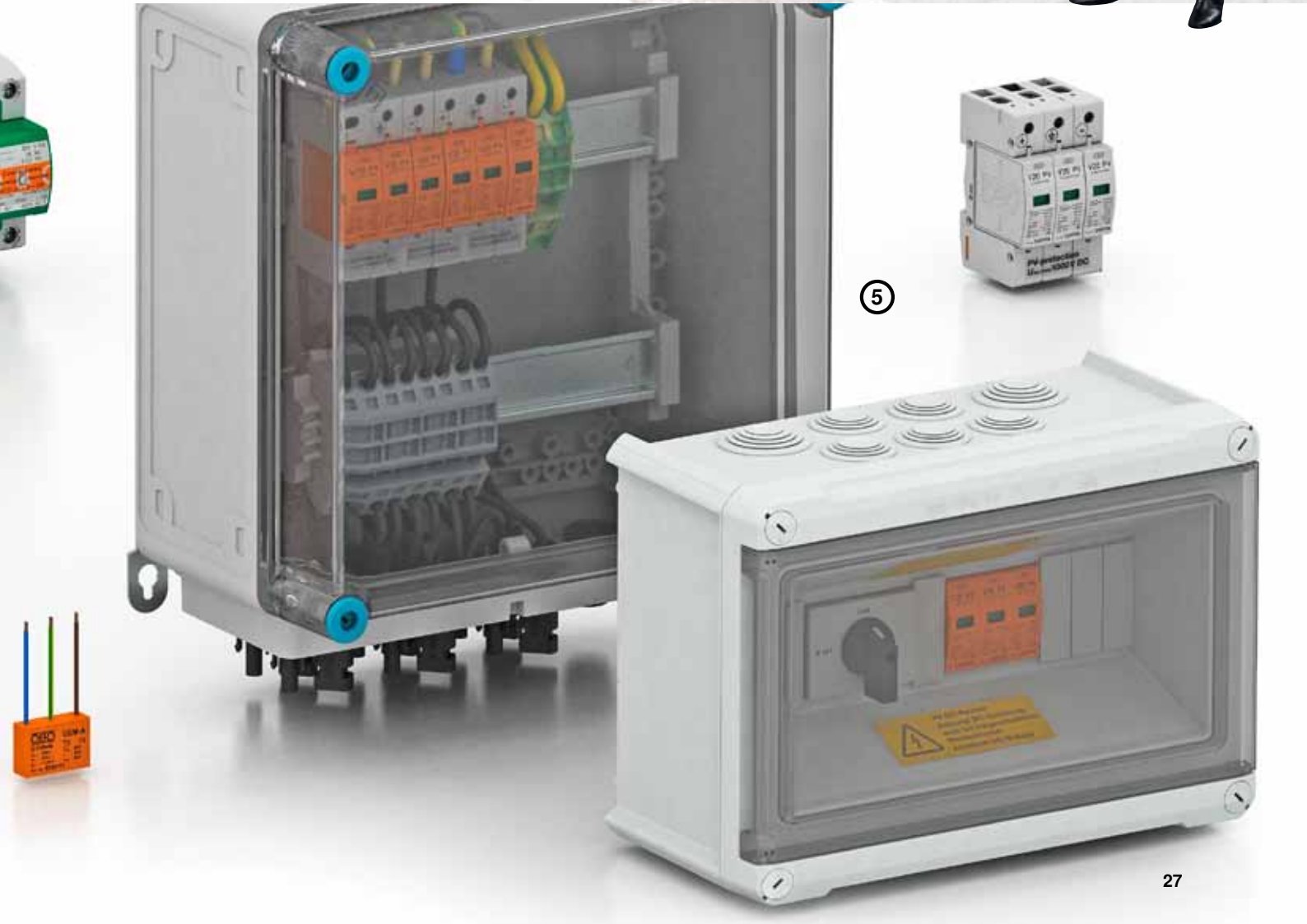


4. Surge arrester / type 3

- Up to 10 kA (8/20) conductivity
- Series installation in secondary distribution systems
- Fixed installation
- Plug-in protective devices
- Combined protective devices with additional telecommunications and data line protection

5. Photovoltaic system solutions

- Fault-resistant Y-wiring compliant with VDE 0100-712 (IEC 60364-7-712)
- Type 2 surge protection or type 1+2 combination arrester
- Low DC protection level: < 4.0 kV (Uoc max. = 1,000 V DC)
- Optionally available with DC connection with plug-in connector or connection terminals
- Pre-installed in IP65 casing
- Other system solutions including fuses, switches, etc. on request
- Tested to EN 50539-11



4

Protecting sensitive devices: Surge protection systems for telecommunications and data equipment

Similar to power equipment, telecommunications and data technology is extremely sensitive to voltage surges. Nowadays, businesses and private households are dependent on fast, reliable data transmission through networks in order to communicate.

It is therefore important to protect telecommunications systems and data centres against surges.

OBO surge protection equipment ensures that telecommunications and data lines under voltage are properly equipotentially bonded. It responds before the insulation in electrical and electronic appliances is irreparably damaged by surges.

Tested safety

All of OBO's surge protection equipment is tested in compliance with the standards in our own BET Test Centre, and comes with a five-year guarantee. A whole series of national and international test symbols testify to the quality of our products: VDE, UL, KEMA, ÖVE, EX, CCCR.



1. Surge protection for data equipment

- Transmission at up to 10 GBit
- Pluggable protection devices for all common interfaces
- High-quality aluminium cases with adapters

2. Surge protection for ICA equipment

- Protection devices for multi-core systems
- Installed widths of 8 to 17.5 mm
- Extremely large frequency bandwidths of up to 100 MHz

3. Surge protection for telecommunications equipment

- Easy installation
- Low protection level, high conductivity
- Broadband-compatible



Protected



Application examples: surge protection systems



Small device, big effect: upstream surge protection can protect business systems against failures caused by voltage surges.



Protected



Protection against voltage surges is essential in the field of instrumentation, control and automation equipment, but also for power equipment. Products specially developed by OBO offer ideal protection for automated systems, wind power and photovoltaic systems.



Where we develop and test the product of the future



The BET Test Centre

Lightning is on the menu at OBO Bettermann's own test centre. The lightning protection experts here test lightning and surge protection components, lightning protection structures and surge protection systems. Scientific studies are also conducted to investigate the effect of lightning events.

High-end equipment

The BET Test Centre has a test generator that can conduct lightning current tests at up to 200 kA, and a hybrid generator for surge voltage tests at up to 20 kV. Both generators were developed in conjunction with Soest University of Applied Sciences.

Standard-compliant testing

Top of the agenda at the Test Centre is the expert testing of OBO's transient and lightning protection. This includes testing newly developed products, modifying existing products and comparing lightning protection components, surge protection equipment and lightning arrestors. Surge arrestors and all of our protective equipment for data and telecommunications lines are tested in accordance with IEC and national standards.





Ultra-modern production for the utmost quality



Flexibility and efficiency

At OBO Bettermann we are always looking for ways to optimise production processes. Every single OBO employee in production uses his or her expertise to help develop the company. Our considerable production depth and high level of process automation give us exceptional flexibility and efficiency, and our production facilities are clearly segmented.

Transparency and effectiveness

At the same time, OBO strives for a maximum of transparency for its staff and customers. To this end, all of the company's objectives, processes and data are continuously measured, depicted and, if possible, improved on. The constant development and modernisation of production facilities represents the foundation of OBO's success.





ZERTIFIKAT

Hiermit wird bescheinigt, dass das Unternehmen

OBO Bettermann GmbH & Co. KG
 Hülseger Ring 52, 58718 Menden, Deutschland

mit dem Standard **ISO 9001** sowie Anlagen
OBO Bettermann Hungary Rt., 2347 Buda, Ungarn
OBO Bettermann GmbH & Co. KG, 91048 Garmersbach, Deutschland
OBO Bettermann GmbH & Co. KG, 58738 Menden, Deutschland

an Management-Systemen in
 Übereinstimmung mit dem Standard
DIN EN ISO 9001:2009

geprüft hat und anerkennt.

Der Geltungsbereich umfasst
 Entwicklung, Herstellung und Vertrieb von
 - VSD Verteilungs- und Befestigungssystemen,
 - TSD Transmissions- und Mittelspann-Systemen,
 - RTS Kabeltrag-Systemen,
 - ISG Brandschutz-Systemen,
 - LFS Leitungsführungs-Systemen,
 - SSS Erdbelegungs-Systemen,
 - UFS Unterfuß-Systemen

Dieses Zertifikat ist gültig bis 2013-03-14
 und wird bei Bedarf jährlich überprüft.

Registrier-Nummer: 2480001.MBC7.06
 Audit-Nr.: 248000-9100-000-1150273

Prüfung durch Zertifizierungsstelle: **Geotest**

Geotest ist ein Mitglied der **TAF**

ZERTIFIKAT
 des Unternehmens
OBO Bettermann GmbH & Co. KG
 Menden, Deutschland
 siehe Anlage:
OBO Bettermann Hungary Rt., 2347 Buda, Ungarn
OBO Bettermann GmbH & Co. KG, 91048 Garmersbach, Deutschland
OBO Bettermann GmbH & Co. KG, 58738 Menden, Deutschland
 gemäß dem Standard
ISO 9001:2009
 bescheinigt.

We can support you in every phase of your project.





Customer service and credibility

Friendliness, reliability and competence create acceptance, credibility and lasting working relationships. These shared values arise from OBO's consistent orientation around the wishes and needs of its customers. Close partnerships with customers is OBO's foremost priority.

Help and advice

Answers to questions about products and installation, planning advice for complex projects – OBO's staff will help you through every phase of your project, no matter what field it is in. We are constantly improving the support we provide in every phase of collaboration, laying the foundations for genuine partnerships.

Speed and reliability

Optimised procedures and highly developed logistics ensure that OBO products are in the right place at the right time, anywhere in the world. OBO offers comprehensive support for large-scale projects, from planning all the way to installation.



Safety needs experience.

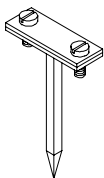


Experience and innovation

OBO is one of the world's most experienced manufacturers of lightning and surge protection systems. Since the 1920s, OBO has been de-

veloping and producing standard-compliant lightning protection components. Countless new – such as the first pluggable type 2 protection device to receive a VDE test sym-

bol, and the first pluggable type 1 protection device to feature carbon technology – have created the foundations for our unique overall range.



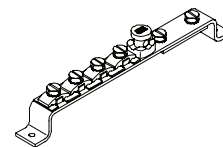
1920

OBO begins to produce lightning protection holders



1930

OBO adds earthing equipment to its product range



1932

The first ever OBO equipotential bonding rails are produced



1981

The V15 arrester sets new standards in surge protection



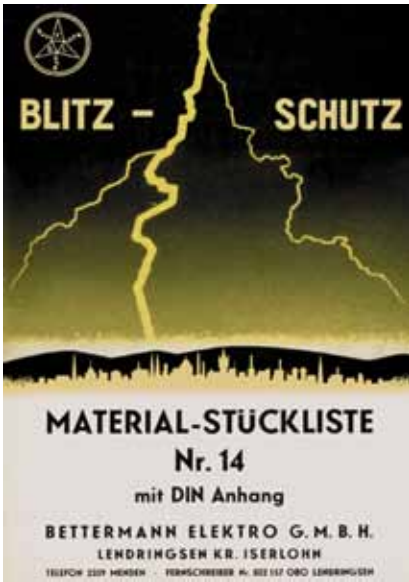
1987

OBO launches the first pluggable arrester onto the market, the V20



1995

OBO establishes its own testing centre



16,256,225

A number speaks a thousand words: more than 16 million of our 1809 equipotential bonding rails have been produced to date.



2000

The MC50 represents a milestone featuring carbon technology



2010

The NetDefender combines maximum speed with maximum security



2010

The isCon® system opens up completely new possibilities in external lightning protection



2011

OBO continues to expand its range of complete photovoltaic solutions



2012

The MCF arrester is developed specially for the demands of wind power



2013

The Tele-Defender offers lightning and surge protection for incoming telecommunications lines

www.obo-bettermann.com



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