Fire protection.

Box, housing and sealing systems for fire-protection walls and ceilings.

KAISER

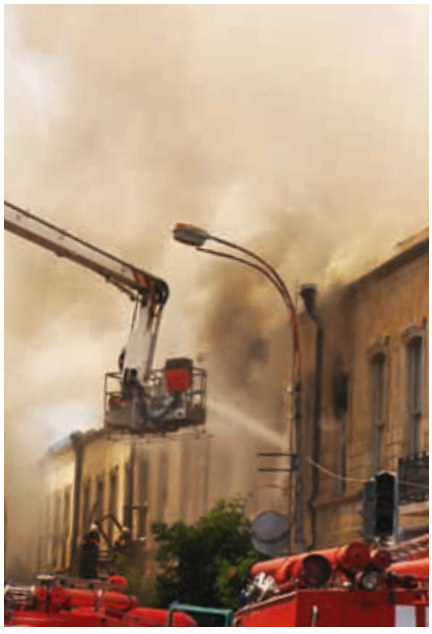
For safe functions, rooms and escape routes.
Fire-protection technology.

When it comes to protecting buildings against danger from fire, planners and installers of building technology play a vital role. Experience shows that fires can start at any time and anywhere. Even strict fire regulations provide no guarantee against fire. The greatest risk is not caused by the fire itself, but by technical and electrical equipment.

For 90% of fire victims and approximately 70% of property damage, not the fire itself, but the hazardous and toxic smoke produced by the fire was the main cause. So, in addition to avoiding and combating fire, the main aim is to prevent the formation and dispersion of smoke gas.

The most important tasks of preventative fire protection are saving human lives and minimising property damage. To do this, above all it is necessary to guarantee the functional integrity of the fire-protection equipment, the usability of the escape routes, and access by the emergency services.

KAISER fire-protection systems offer you reliable solutions for electrical installations in fire protection ceilings and walls. These solutions also ensure the required fire-protection classes if a fire starts. Intelligent products for active and preventative fire-protection are produced in halogen-free and fire-resistant materials which correspond to the current statutory and technical requirements. Products for walls and ceilings in buildings and for shipbuilding walls. Products whose reliability can save lives and prevent catastrophes.



Anforderungen	Produktlösungen	
Installation in walls.		
Professional and standardised.	**Fire-protection box flush-mounting.**	10
For fire-protection wall up to EI120.	**Fire-protection boxes HWD 90.**	12
Installation shafts and ducts.	**Fire-protection boxes HWD 90.**	14
Easy-to-use installation compartment.	**Electronics box HWD 90.**	15
Safe and secure in cavity walls.	**HWD 68 fire-protection boxes.**	16
Installation for walls. Feed-through and entry.		
Feed-throughs and entries in cavity walls, masonry and concrete.	**Fire sealings.**	18
Secure feed-through and entry. Also for retrofitting.	**Cable sealing system LS 90. Conduit sealing system.**	19
Installation also in concrete and masonry.	**Cable and conduit sealing systems LS 90 / RS 90.**	19
Bundled through any wall. Securely, also retrofitting.	**Box sealing system DS 90 and DS 90 / 74 mm.**	20
Installation also in concrete and masonry.	**Box sealing system DS 90 and DS 90 / 120 mm.**	21
Easy closing. Permanently tight.	**Sealing plug.**	22
Installation in ceilings.		
For fire protection walls EI30-EI120	**Ceiling box HWD 30.**	24
For luminaires and loudspeakers.	**Fire-protection one-gang boxes FlamoX®.**	26
Sealings in fire-protection sealings.	**Ceiling seal system DS 90/74 mm and DS 90/120 mm.**	28
Protection against latent fire risk.	**Installation housing ThermoX®.**	32
Airtight installation and preventative fire protection.	**Installation housing ThermoX® LED.**	34
Installation in ships' wallsen		
Fire-proof and smokeproof walls in ships' cabins.	**Fire protection technology in shipbuilding.**	36
For cabin walls in shipbuilding.	**Fire-protection boxes HWD B15.**	36

Legal requirements.
Fire-protection technology.

As a result of federalism, **building law in Germany** is the responsibility of the Federal States. In a joint working group (ARGEBAU), the Federal ministries responsible for the building industry draw up sample draft laws which can, depending on the Federal State, and with more or fewer amendments, become valid as a law, regulation or guideline for that State. §14* of the standard building regulations (MBO) defines the basis for fire protection:

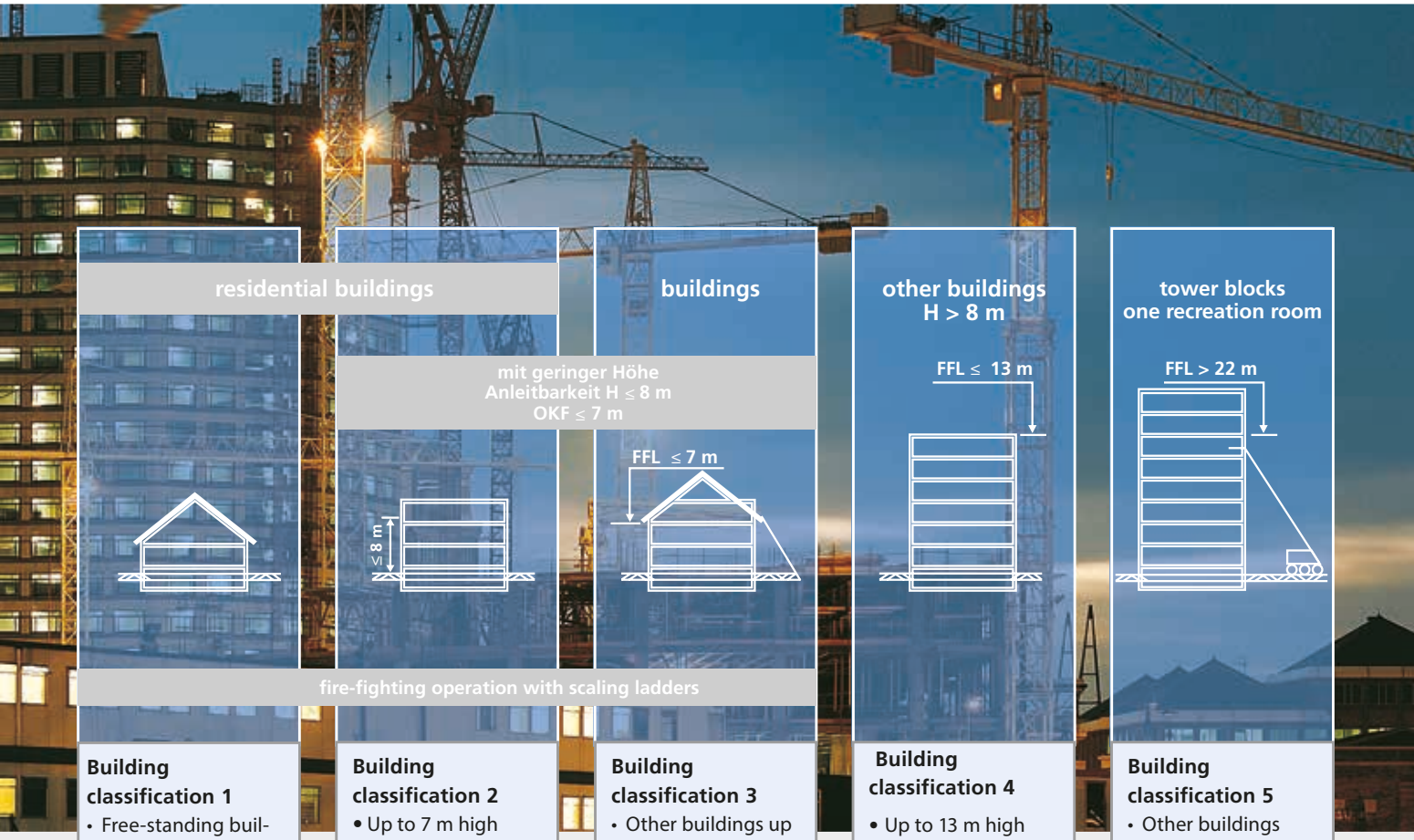
The requirements of the building regulations and Federal State building regulations are supplemented by various decrees, by-laws, technical building regulations and general technical standards. In addition, defective fire protection is considered to be an intentionally concealed defect with a 30-year term of liability. Furthermore, planners and contractors have a legal duty to implement safety precautions during the entire period of use of a building. In the event of physical injuries (fatality), the full extent of §319* (endangerment in construction) of the German Criminal Code applies, and substantial fines or even imprisonment can be imposed on those responsible.

***§14 MBO fire protection** Nov. 2002

Building installations are to be laid out, built, altered and maintained in such a way that the occurrence of fire and the spreading of fire and smoke are prevented, and in the event of a fire it will be possible to save people and animals and fight the fire effectively.

The state building regulations (LBO) differentiate between:

- Buildings of normal type or usage
  (residential and buildings of comparable usage)
- Buildings of special type or usage
  (industrial, public assembly or hospitals ...)



Building classification 1
- Free-standing building up to 7 m high max. two usable units (max. 400 m²)

and
- Free-standing building for agricultural or forestry use

Building classification 2
- Up to 7 m high max. two usable units (max. 400 m²)

Building classification 3
- Other buildings up to 7 m high

Building classification 4
- Up to 13 m high Usable units up to max. 400 m²

Building classification 5
- Other buildings including underground structures

DIN 4102 defines the requirements in respect of the quality of walls and ceilings for fire resistance classes. The specified fire resistance class depends on the use and class of the building (see also table below).

Additional ordinances apply to "Buildings of special type or usage" such as the "Versammlungsstättenverordnung" (MVSTätV), the "Krankenhausbauverordnung" for hospitals, (KhBauVO), the "Schulbaurichtlinie" for schools (MschulbauR) or also the "Industriebaurichtlinie" for industry (MidBauRL).

The building regulations (BauO) specify the conditions which all construction projects must observe. The requirements apply to the land and to any buildings erected on it, and include:
- Observation of clearances
- The statics
- Regulations for emergency exits
- Protection against moisture
- Fire protection and heat protection

Fire-protection specifications acc. to MBO

Assignment of fire-protection and fire-resistance classes in building construction

Component	§ MBO § 2 1)	building class 1 h ≤ 7 m	2 h ≤ 7 m	3 h ≤ 7 m	4 h ≤ 13 m	5 h ≤ 22 m
Load-bearing walls	§ 27	F0	F30	F30	F60	F90
Load-bearing walls, supports in basement		F30	F30	F90	F90	F90
Load-bearing walls, supports in attic, if there are recreation rooms above		F0	F30	F30	F 60	F90
Non load-bearing external walls	§ 28	keine			A oder F30	A oder F30
Separator walls	§ 29	F0	F30[2)]	F30	F60	F90
Ceilings	§ 31	F0	F30	F30	F60	F90
Ceilings in attic if there are recreation rooms above		F0	F30	F30	F60	F90
Ceilings in basement		F30	F30	F90	F90	F90

1) The height relates to the top edge of the floor on the top storey over the ground 2) Does not apply to residential buildings

In special buildings (e.g. high-rise building regulation) or fire-protection and complex walls (VdS 2234), the fire-resistance class can be up to F180.

A1 non-combustible materials without organic elements

A2 non-combustible materials with organic elements

B1 combustible materials flame-retardant

B2 combustible materials normal flammability

Building material classes and fire resistance classes. **DIN 4102.**

The fire behaviour of building materials is influenced by the type, design, surface, mass, material combinations and processing technology. Building materials are grouped into classes **A** or **B** according to their fire behaviour:

Building material class A – non-combustible materials
A1 - without organic elements
A2 - with organic elements

Building material class B – combustible materials
B1– flame-retardant building materials
B2– building materials of normal flammability
B3– easily flammable building materials

The fire-resistance period is the minimum time in minutes during which a building component exposed to fire must not exceed an average rise in temperature of 140 K (max. 180 K at individual sites) on the side not exposed to the fire (acc. to DIN 4102-2).

The fire-resistance period is divided into the following classes:

F0/30	**fire-retardant**
F60	**extremely fire-retardant**
F90/120/180	**fire-resistant / extremely fire-resistant**

Fire protection classes acc. to DIN 4102
are designated with abbreviations depending on the component.

Examples of **fire resistance classes:**	
Walls, ceilings, supports	**F30/60/...**
Fire-protection walls	**F90/120/...**
FS closures (doors etc.)	**T30/60/...**
Cable sealings	**S30/60/90/...**
Installation channels	**I30/60/90/...**
Conduit feed-throughs	**R30/60/90/...**
Functional integrity of electr. cables	**E 30/60/90/...**

Examples of **designations**	
F30-A	fire-retardant/non-combustible building materials
F30-B	fire-retardant/combustible building materials
F90-A	fire-resistant/ non-combustible building materials
F30-AB	fire-resistant/non-combustible and combustible building materials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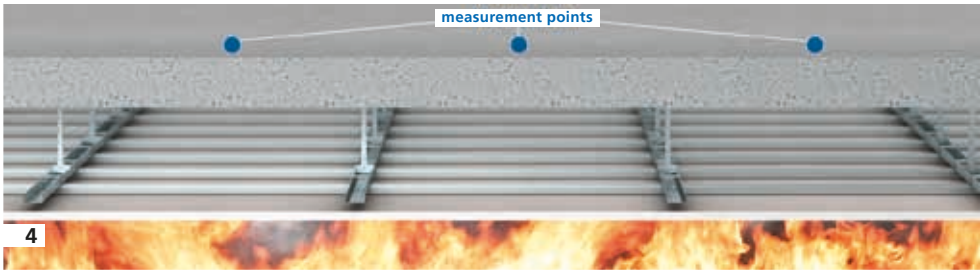

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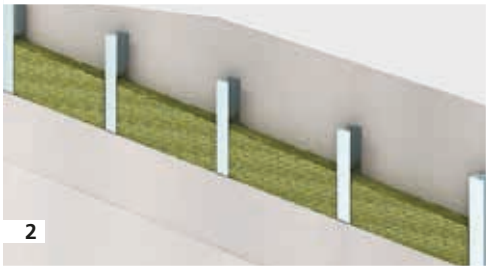
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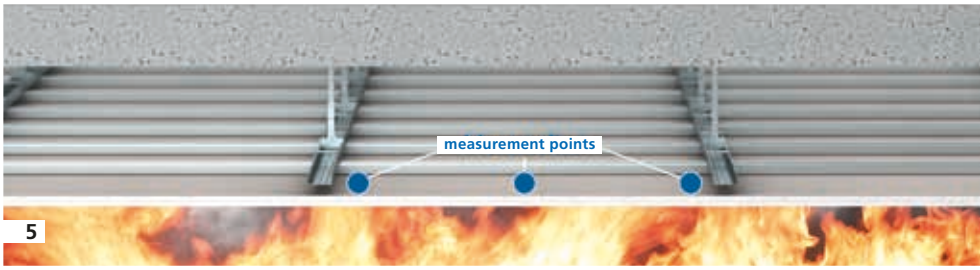

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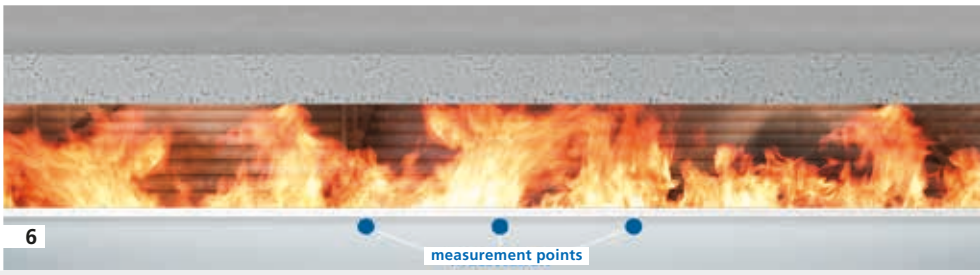

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1 + 2 Construction of F90 metal stud walling acc. to DIN 4102 part 4.

3 Construction of an EI90 solid wall.

4 Sub-ceilings below rough ceilings in accordance with DIN 4102-4 of construction type I, II, III. The ceiling construction - rough ceiling and sub-ceiling – provides the required fire resistance.

5 Independent sub-ceilings. The independent sub-ceiling provides the necessary fire resistance independently of the rough ceiling.

6 Fire load from the ceiling cavity.

Walls and ceilings. **DIN 4102.**

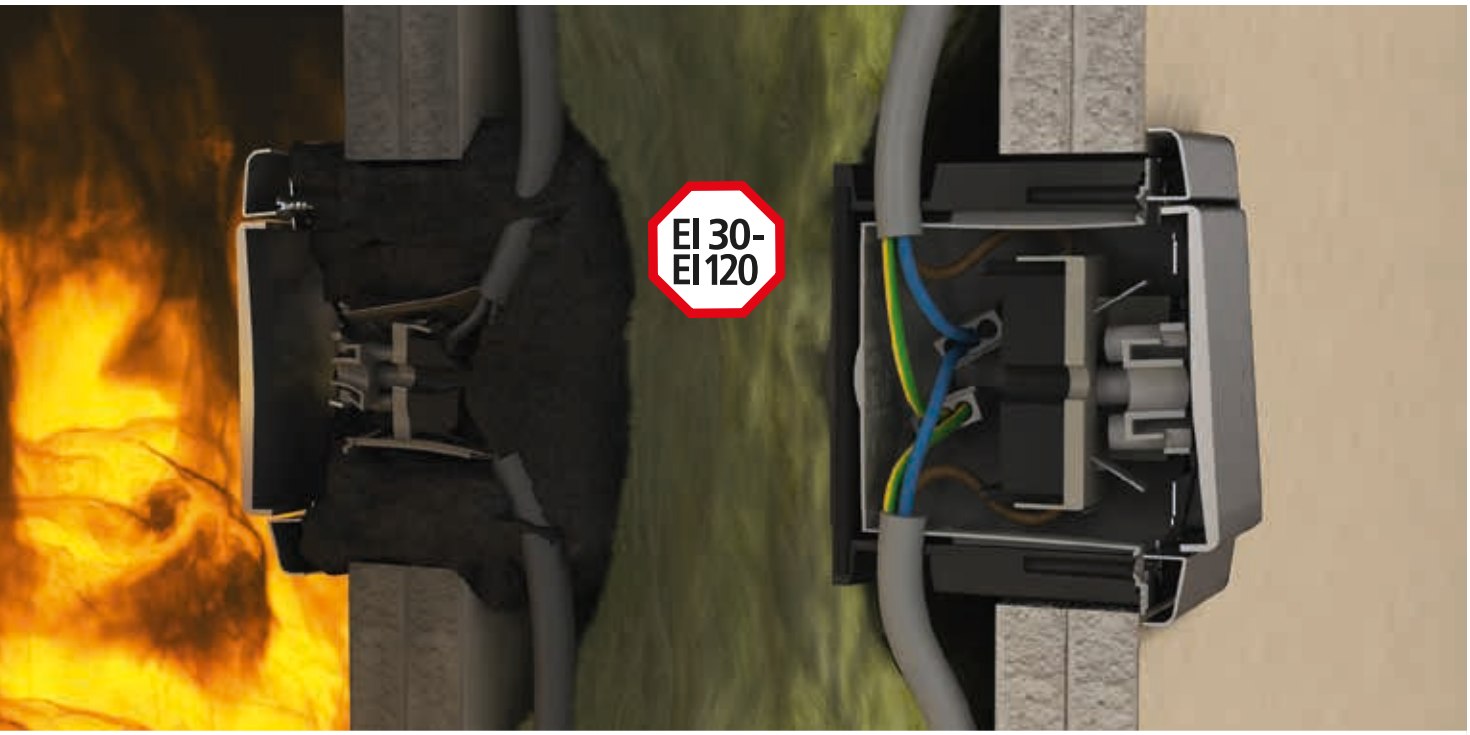
In all cases, **fire-protection walls or ceilings** must not have any openings. However, if these are required to enable the building to be used as specified, covers for windows, channels or installations must be fitted with fire resistance lasting at least 30 to 90 minutes (e.g. F90 / T90 / S90). Incorrectly executed openings would considerably weaken the fire section separation.

Fire-protection walls with fire resistance class F30-F180 acc. to DIN 4102-4 are single or double shell, non load-bearing, internal separator walls with wall thicknesses of 100 mm and above, insulating material acc, to DIN 4102-17, and 2 x 12.5 mm plasterboard panels. According to DIN 4102, the opposing installation of conventional cavity wall boxes is not allowed and the installation of individual boxes is only permitted to a limited extent. The customer must fit some form of sheath, e.g. with plaster, fibre silicate or similar.

KAISER fire-protection boxes and houses fully satisfy these requirements.

Fire-protection ceilings in accordance with DIN 4102 are either independent ceiling constructions or suspended ceilings used with ceilings of construction type I, II or III (concrete ceilings, brick ceilings). From fire-protection class F30 upwards, DIN 4102 requires a closed visible surface. Openings, for example for luminaires, must be equipped with a suitable sealing.

FlamoX® installation housings from KAISER (see page 21) are fire-protection housings specially developed for F30 ceilings



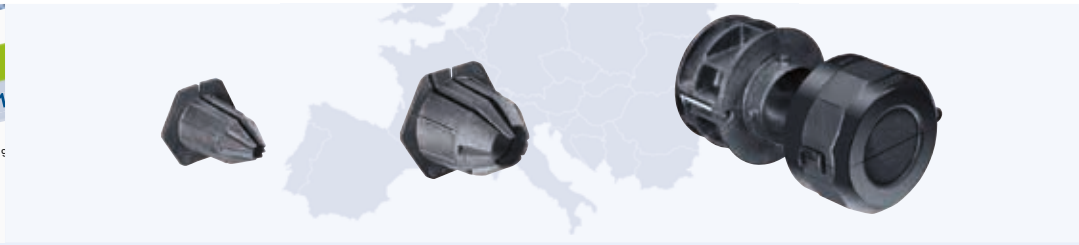
Protects escape routes in emergencies. **KAISER AFS-**TECHNOLOGY.

AFS – Active Fire Stop. This technology guarantees preventative, active fire protection. Whether a fire load comes from above, below, the front or the rear, the fast-acting insulation layer in boxes, housings and sealings reacts immediately, generating foam which reliably seals the installation opening. The fire-protection class of the ceiling is retained up to F30 and of the wall up to F90. This successfully prevents the spread of smoke and fire.

In the event of a fire, **KAISER AFS-technology** maintains the fire-protection class of walls and ceilings, even with opposing installation without encasing. The ready-to-fit systems with AFS-technology guarantee certified security and problem-free installation.

The high level of reliability of the AFS-technology saves lives and prevents catastrophes in buildings and on ships. In cavity wall and ceiling boxes as well as in FlamoX® installation housings, this intelligent technology is already KAISER standard.

Heat generation causes the intumescing material to foam.



KAISER fire-sealing systems – Europe-wide approval!

KAISER's innovative fire-sealings stand for certified, Europe-wide approval that you can rely on! All KAISER fire sealing systems are ideal for integration in expert electrical installations in fire-protection walls and in concrete or cellular concrete ceilings. KAISER's cable, conduit, box and ceiling seals all maintain the fire-resistance class and do not release any hazardous materials. KAISER fire sealings permit fast, expert and in every respect fire-protection sealing.

All approvals are available in the download section at www.kaiser-elektro.de

KAISER – the basis of good installation. **Easy to use, secure and clean.**

KAISER fire protection products are easy to use, secure and clean to install. The fire protection products can be installed using standard tools, with no smoothing and filling at all. Their installation involves very little effort – and there is no need for special training!

You can find informative product animations for installation and function on www.kaiser-elektro.de and on our youtube channel at www.youtube.de/kaiserelektro

Glow wire resistance. Halogen-free products.

The glow wire resistance of cavity wall boxes and casings is tested at 850°C with the aid of a glow wire test (without an open flame). It must be shown that the boxes are self-extinguishing, i.e. if there is a fault in the electrical installation, a fire cannot be caused because of the cavity wall boxes. In addition, it is necessary to comply with all the current fire prevention measures for the wall construction.

For cavity wall boxes with the VDE mark, glow wire resistance is tested and confirmed in accordance with VDE 0471/ EN 60695-T. 2-10.

Halogen-free cavity wall boxes

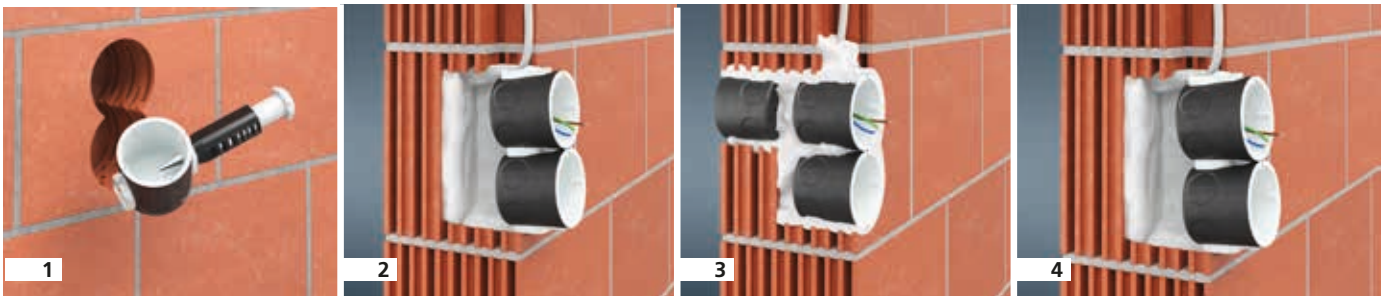
In addition to halogen-free fire-protection products, all other KAISER boxes and casings for cavity wall installation, and many accessory parts, are available in our programme as halogen-free articles. They are also available in white for an individual note.

Professional and standardised.
Fire-protection box flush-mounting.

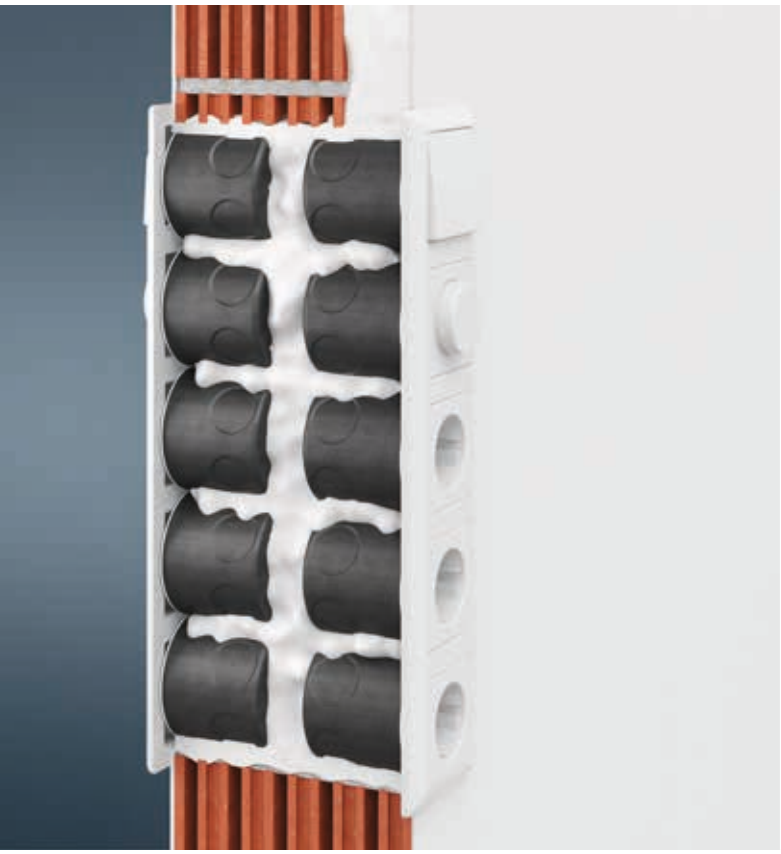
The **innovative fire-protection box** for flush-mounting installation in solid fire-protection walls maintains the fire-resistance duration of the fire-protection wall of EI30 to EI120 in spite of the electrical installation which is embedded in it.

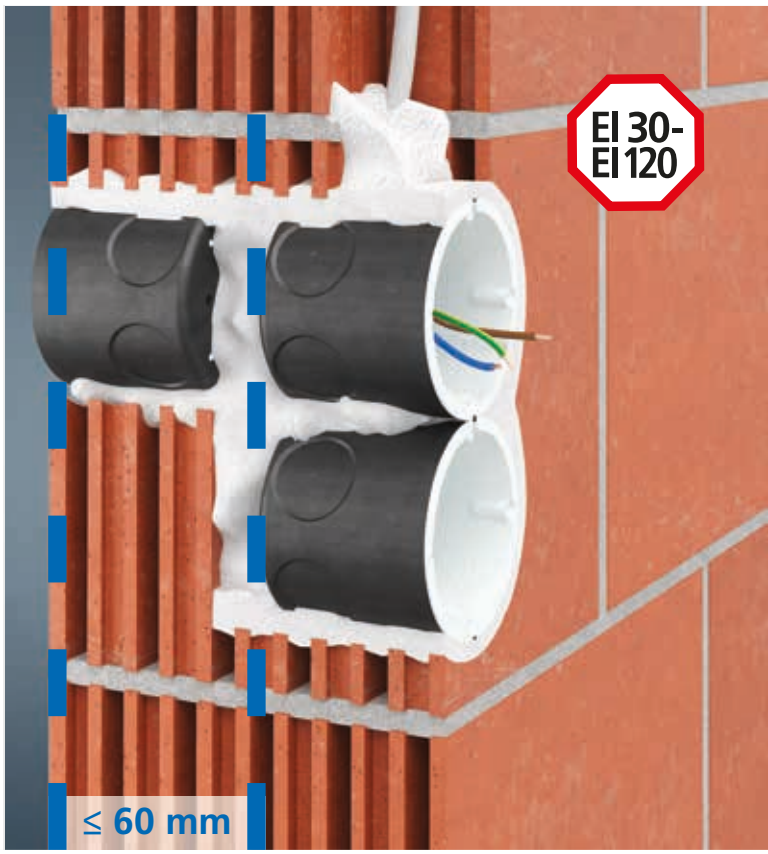
The new **flush-mounting fire-protection box** ensures safe, smokeproof closure of the fire-protection wall, even if in the case of opposing or one-sided installation the minimum remaining wall thickness of 60 mm (as specified by DIN 4102-4) is not present. AFS technology makes this possible. This is an enveloping fire-retardant coating which tumesces within a very short period of time if a fire breaks out. In this way it automatically closes the installation opening and maintains the wall's fire-resistance capability. This reliably prevents the spreading of smoke and fire through the installation openings.

ETA assessment applied for.



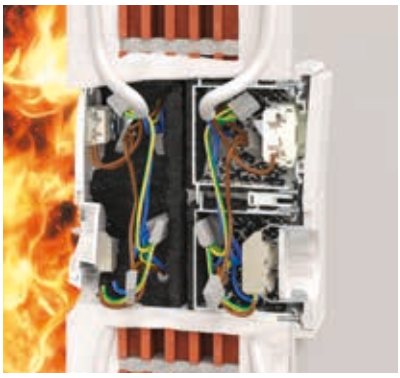
1 Make exact-fitting cable and conduit entries with the universal opening cutter Art. No. 1085-80.
2 Easy fixing using plaster or mortar. No need for special fire-protection mortar.
3 For single-sided (minimum wall thicknesses ≤60 mm) and directly opposing installation.
4 For fire protection walls EI30-EI120.





- For fire protection walls EI30-EI120
- For minimum remaining wall thicknesses ≤ 60 mm
- Also for directly opposing installation
- Installation up to 5-unit combinations
- Variable combination connection piece for conduits up to M25
- With fire-protection cover can be used as a junction box

AFS technology maintains fire protection.



Minimum remaining wall thickness ≤ 60 mm

EI30 - EI120

Flush-mounting fire-protection box
Art. No 1564-01

Fire-protection cover
Art. No. 1184-94

You can find suitable tools such as the universal opening cutter 1085-80 and the diamond grinding head 1088-02 on page 38.

INNOVATION

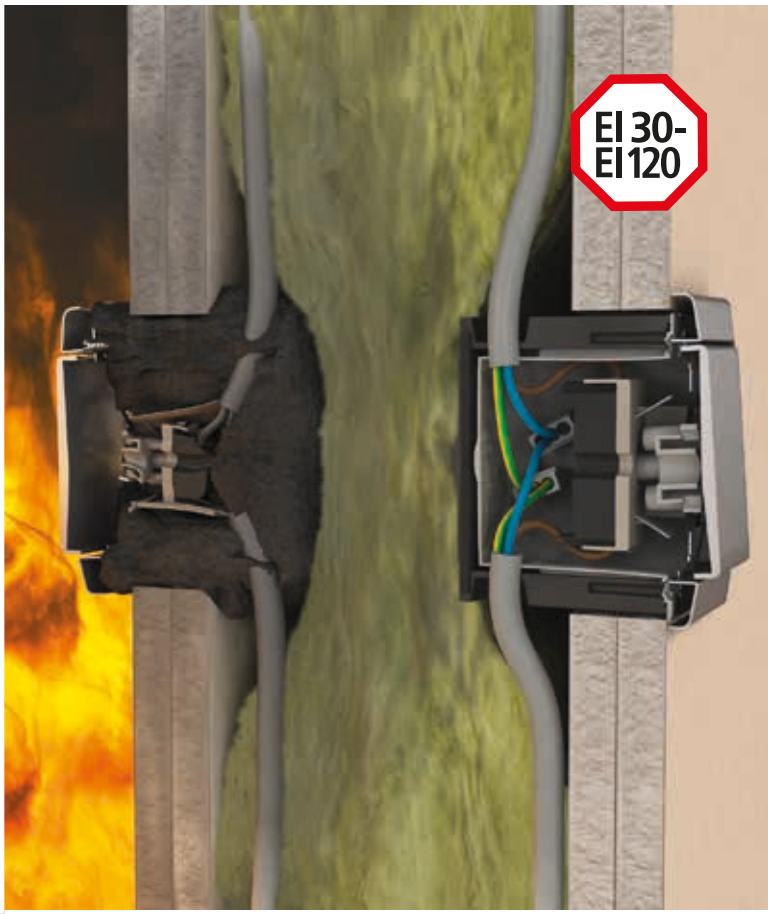
For fire-protection walls up to EI120.
HWD 90 fire-protection boxes.

Around 10 years after the market launch of the first fire-protection box for lightweight walls with a fire protection class of up to 90 minutes, the range of **HWD 90 fire-protection boxes** has been expanded. The ongoing development of AFS technology means that fire-protection boxes now provide fire-resistance duration of up to 120 minutes.

Installation is just as easy as with the previous model. Directly opposing installation up to a 5-way combination maintains protection up to fire-resistance class EI 120 . All HWD 90 type boxes completely retain the sound insulation function up to a level of 77 dB.

In addition, the HWD 90 is found in many general official test certificates of well-known manufacturers of walls or ceilings as part of the approval.

1 For use as a junction box when fitted with a fire-protection cover.
2 Fully-insulated through-wiring of one-gang junction boxes with each other is by means of the support connector (9060-78).
3 The electronics box creates sufficient space for the cable reserve for the installation of communications and network boxes.



- For EI30 - EI20 fire-protection walls
- Maintains the wall's sound insulation protection
- Also suitable for retrofitting
- With fire-protection cover can be used as a junction box
- Also for directly opposing installation

DIBt approval
For components in fire-resistance class F90 acc. to DIN 4102-2

DiBt approval and various awards prove the reliable quality of KAISER HWD 90 one-gang boxes and HWD 90 one-gang junction boxes.

Additional ETA assessment applied for.

The matching Ø 74 mm cutter (Art.-Nr. 1084-10) is shown on page 38.

Installation shafts and ducts.
HWD 90 fire-protection boxes.

In installation shafts and ducts, the HWD 90 one-gang boxes guarantee fire-resistance class I 30 to I 90 for up to 5-unit combinations. Fire resistance class I 30 is achieved without insulation, and even up to I 90 with insulation.

HWD 90 cavity wall boxes are ideal **for front fitting in installation shafts.** They guarantee that fire resistance class I30 is maintained.

HWD 90 boxes can also be retrofitted. Installation takes place via a wall opening through the shaft wall. Insulation is fitted in accordance with the fire resistance class, and the cut-out is closed before installation of the cavity wall box.

The easy fitting of HWD cavity wall boxes in shaft walls and using standard tools is an efficient, secure alternative to complicated, time-consuming encasing from the rear..

- For insulation shafts I30- I 90
- Without encasing
- Certified safety up to 5-unit combinations
- Also for retrofitting
- With a fire-protection cover, also as a junction box
- Easy fitting in just a few steps
- Also for retrofitting




Depending on the required period of fire resistance, the component opening must be backed with a different type of mineral wool (I30 without insulation, I60 insulation material DIN 4102-17, I90 Rockwool/Termarock 100). To fit the mineral wool, a cut-out of at least 300 x 300 mm is needed in order to create space for perfect installation.

Easy-to-use installation compartment. **Electronics box HWD 90.**

The electronics box HWD 90 has the installation space necessary for electronic switch devices, databoxes, cables and terminals. Population with both cables and installation conduits up to M25 is possible.

- For EI30 - EI20 fire-protection walls
- Retrofitting is possible
- Also for use as a double box
- Extra-large terminal area for communications and network technology
- Additional space for electronic components (KNX actuators, relays, radio module, communications technology)

EI30 - EI120

One-gang box HWD 90
Art. No. 9463-01

One-gang junction box HWD 90
Art. No. 9464-01

Electronics box HWD 90
Art. No. 9462-94

Fire-protection cover
Art. No. 1184-94

Support connector
Art. No. 9060-78

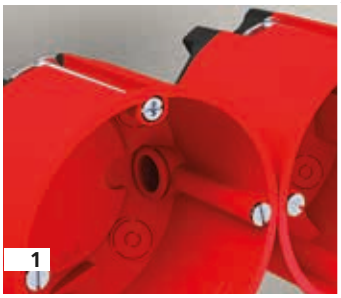
Centering insert 68/74: To expand existing installation openings from Ø 68 mm to Ø 74 mm, use exact guide for cavity wall cutter MULTI 4000.

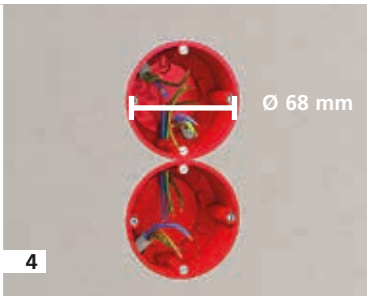
The matching Ø 74 mm cutter is shown on page 38.

Safe and secure in cavity walls.
HWD 68 fire-protection boxes.

The **HWD 68 fire-protection boxes** are at the heart of good fire protection, and their fast and easy installation is very impressive. Both the one-gang box and the one-gang junction box are installed in a 68 mm cut opening and can easily be combined with each other by means of support connectors. The easy insertion of sheathed cables is especially impressive. Without the need for an opening tool, the cables can be inserted into the relevant opening almost without the use of any tools at all.

HWD 68 fire-protection boxes are equipped with AFS technology – a fire-retardant coating – which, in the event of a fire, automatically closes the installation opening, and this is what prevents fire and smoke from spreading.





1 Fully-insulated through-wiring of one-gang boxes and one-gang junction boxes with the support connector (Art. No. 9060-68).

2 Simple break-out cable entry with cable retention acc. to DIN EN 60670

3 Up to 6 opportunities for inserting sheathed wires with an external diameter of 4 – 11.5 mm.

4 The HWD 68 is installed in a standard 68 mm ø opening.

- For fire-protection walls EI30 – EI90
- Retrofitting is possible
- For Ø 68 mm component openings
- For directly opposing installation
- Break-out cable entry
- With fire-protection cover can be used as a junction box

The HWD 68 is suitable for use in EI30 - EI90 fire-protection walls. Even when installed in directly opposing boxes, the fire-protection function is retained.

EI30 - EI90

One-gang box HWD 68
Art. No. 9463-02

Ø 68 mm

One-gang junction box HDW 68
Art. No. 9464-02

Ø 68 mm

Support connector
Art. No. 9060-68

Fire-protection cover
Art. No. 1184-94

The matching cutter (Art. No. 1083-10) is shown on page 38.

Feed-throughs and entries in cavities, masonry and concrete. **Fire sealings.**

Sealings in fire protection walls are needed when cables or conduits must be fed through walls with a specific fire resistance class. In order to maintain the relevant rating, expert sealing of the opening is needed to prevent fire or smoke from spreading..

KAISER solutions guarantee fast and above all absolutely safe and reliable sealing if a fire breaks out. There is no need at all for the time-consuming and messy use of fire protection putty, foam or mortar. Installation is as easy as fitting a KAISER cavity wall box.

- Secure, visible, certified fire sealing
- For wall feed-throughs and entries
- No filling and smoothing
- Automatic sealing of joints and gaps between cables
- Non-destructive later fitting
- For cable bundles or individual installation conduits
- Also for mixed population of cable and conduit bundles

➤ **The cable sealing LS 90 and the conduit sealing RS 90** can easily be fitted in a few simple steps. Use a suitable cutter or drill to make the installation opening and insert the flexible sealing. For retrofitting, open the sealing and push it over the existing cable or conduit. The cable and conduits sealings can be arranged as a group.

ETA-11/0188

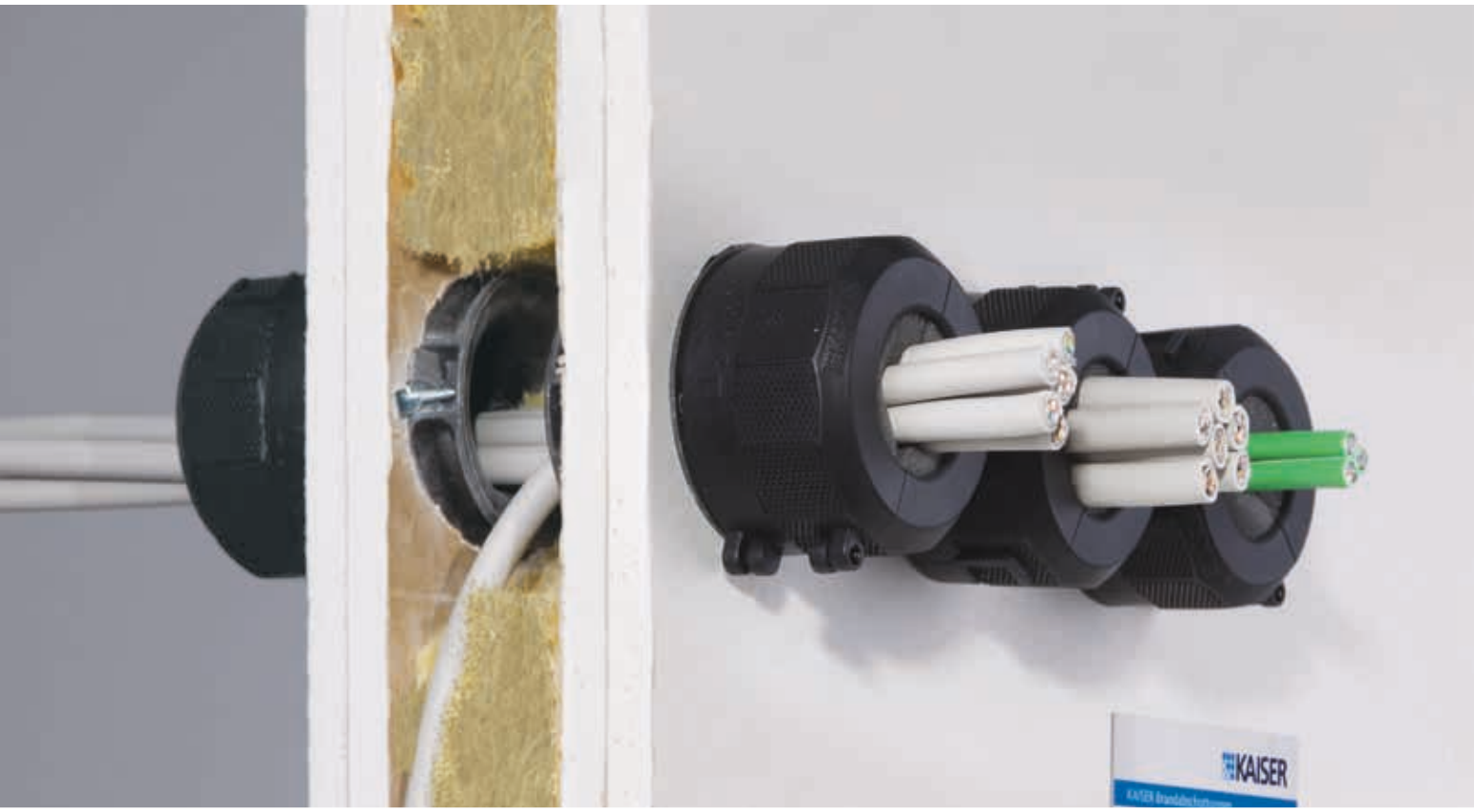

1

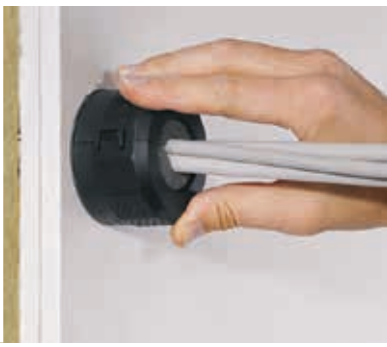
2

3


4

1 Opening the cable and conduit seal makes it easy to fit it around the cables and conduits.
2 Feed-through through a solid masonry wall acc. to DIN 1053.
3 Wall feed-through through a concrete wall acc. to DIN 1054.
4 For component openings smaller than Ø 35 mm, remove the side pull-off lug on the RS90.





▲ **Box sealing systems DS 90 / 74 mm and DS 90 / 120 mm consist** of two parts which are pushed onto each other and locked. Push the sealing cylinder, which uses AFS-technology to close the wall, into a Ø 74 mm or Ø 120 mm cut opening and fix it, exactly like a KAISER cavity wall box. Then place the sealing element round the cables, push it on to the sealing cylinder and close it by turning it to the right until you hear an audible click. This guarantees secure room separation.

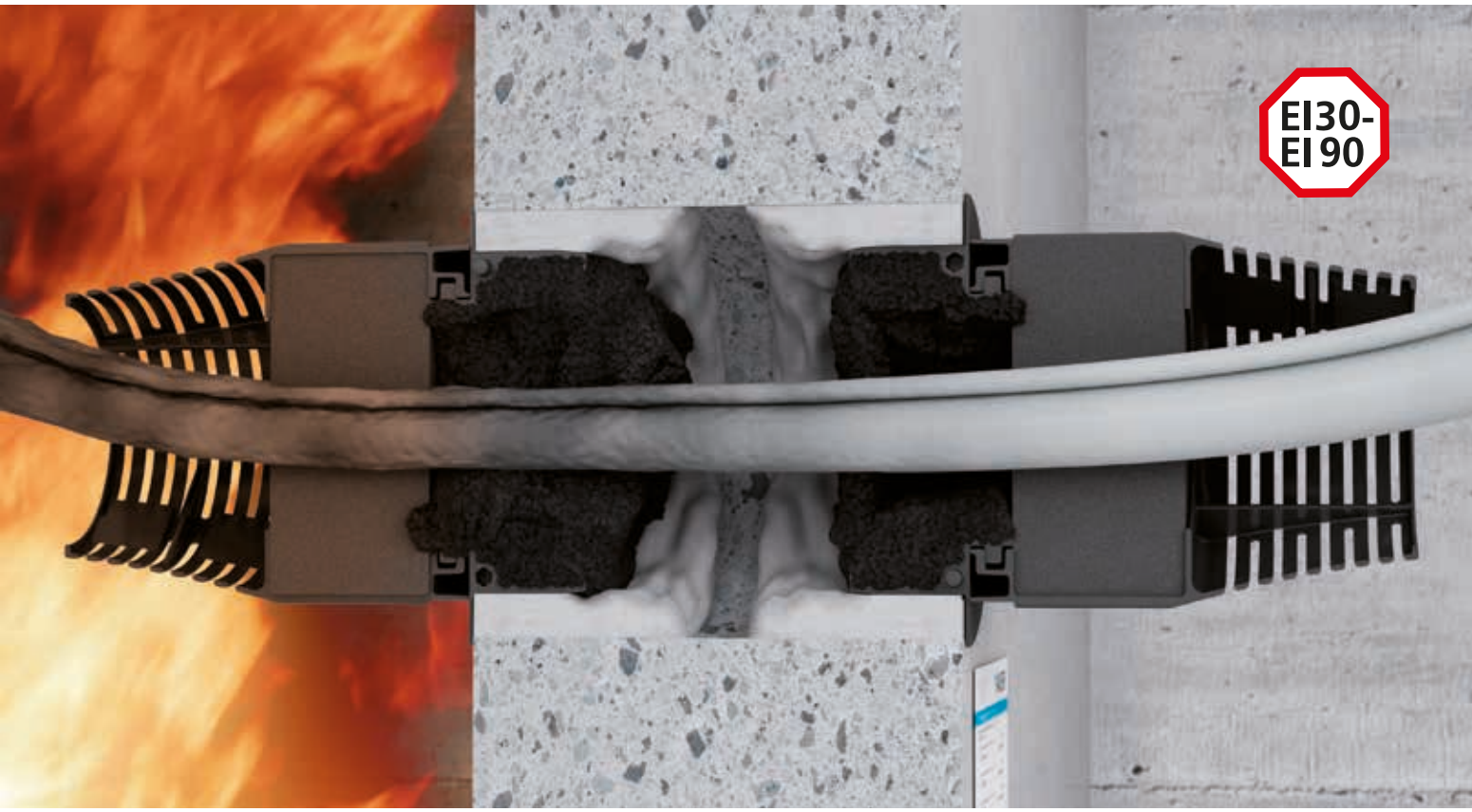
For the non-destructive addition of more cables, open the sealing element and add more cables. The box seal can be closed again without additional sealing.

Maximum cable occupancy!

DS 90 / 74 mm
- Cable bundle Ø ≤ 40 mm **(full occupancy)**
- Biggest individual cable in bundle Ø ≤ 15 mm
- Biggest individual cable Ø ≤ 21 mm
- Electrical installation conduits Ø ≤ 40 mm

DS 90 / 120 mm
- Full occupancy up to Ø 74 mm with cable and/or conduit bundles
- Maximum cable diameter 29 mm
- Electrical installation conduits up to M63

◥ Both box sealing systems DS 90 / 74 mm and DS 90 / 120 mm make possible a secure, visible and certified fire-protection sealing of cable and conduit entries in lightweight fire-protection walls (EI30-EI90) and in solid walls made of concrete and masonry. They permit the sealing of individual cables and cable bundles, and also individual electrical installation conduits and conduit bundles. The two-piece sealing cylinder and the hinged sealing element also make possible installation when cables or conduits are already present. Extending the sealing element with the cooling ribs creates and ensures orderly bundling and optimal sealing for smoke-tight room separation by means of the special foam inserts. The extra-large sealing collar ensures smokeproof room separation even when the openings are not clean. Installation of the box sealing systems in concrete and masonry walls takes place without the use of special fire-protection materials. Drilling holes of Ø 82 mm or Ø 150 mm are sufficient for installation, and also standard materials for fixing, for example plaster, mortar or fast cement.



ETA-14/0159

Approval for box sealing systems DS 90 / 74 mm and DS 90 / 120 mm with all documents for installation and approval documentation are available to download on www.kaiser-elektro.de

Cable sealing system LS 90
Art. No 9459-01

Conduit sealing system RS 90
Art. No 9459-02

Box sealing system DS 90 / 74 mm
Art. No 9459-03

Box sealing system DS 90 / 120 mm
Art. No 9459-04

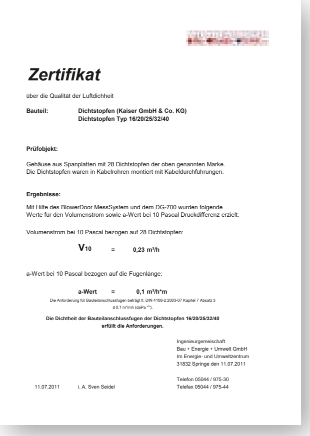
You can find suitable tools and identification plates on page 38.

Easy closing - permanently sealed.
Sealing plugs.

ECON TECHNIK

Sealing plugs with ECON® technology for sealing all standard electrical installation conduits in one-gang boxes or at cable exits. The long sealing plug with three sealing lips and in different widths adapts itself to the installation conduit in use and guarantees an airtight and smoke-tight end even when conduits are cut at an angle. From conduit size M25 upwards, the membrane surfaces are divided with reinforcing ribs which ensure secure cable routing and prevent damage and gaps where the cables pass through.

- For empty conduit installations in an air-tight design or in fire protection areas
- Three sealing lips with different spacing adapt perfectly to the installation conduit
- Guaranteed air-tightness
- Toolless cable entry
- No gaps where cables pass through
- For all M16 - M40, Pg 9 – Pg 36, 3/4" and 5/8" installation conduits



Zertifikat

über die Qualität der Luftdichheit

Bauteil: **Dichtstopfen (Kaiser GmbH & Co. KG)**
Dichtstopfen Typ 16/20/25/32/40

Prüfobjekt:

Gehäuse aus Spanplatten mit 28 Dichtstopfen der oben genannten Marke.
Die Dichtstopfen waren in Kabelrohren montiert mit Kabeldurchführungen.

Ergebnisse:

Mit Hilfe des BlowerDoor MessSystem und dem DG-700 wurden folgende Werte für den Volumenstrom sowie a-Wert bei 10 Pascal Druckdifferenz erzielt:

Volumenstrom bei 10 Pascal bezogen auf 28 Dichtstopfen:

V_{10} = 0,23 m³/h

a-Wert bei 10 Pascal bezogen auf die Fugenlänge:

a-Wert = 0,1 m³/h*m

Die Anforderung für Bauteilanschlussfugen beträgt lt. DIN 4108-2:2003-07 Kapitel 7 Absatz 3
$\leq$ 0,1 m³/mh (daPa $^{2/3}$).

Die Dichtheit der Bauteilanschlussfugen der Dichtstopfen 16/20/25/32/40 erfüllt die Anforderungen.

Ingenieurgemeischaft
Bau + Energie + Umwelt GmbH
Im Energie- und Umweltzentrum
31832 Springe den 11.07.2011

Telefon 05044 / 975-30
Telefax 05044 / 975-44

11.07.2011 i. A. Sven Seidel

Air-tightness certificate

During comprehensive blower door tests, a neutral institute tested and confirmed the air-tightness of the M16 – M40 sealing plugs.

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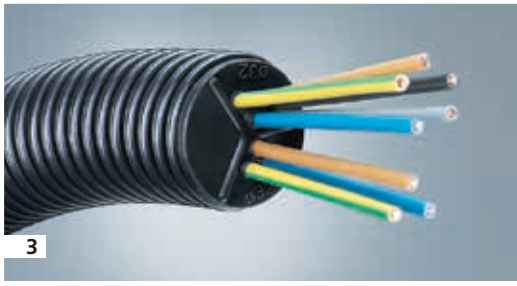
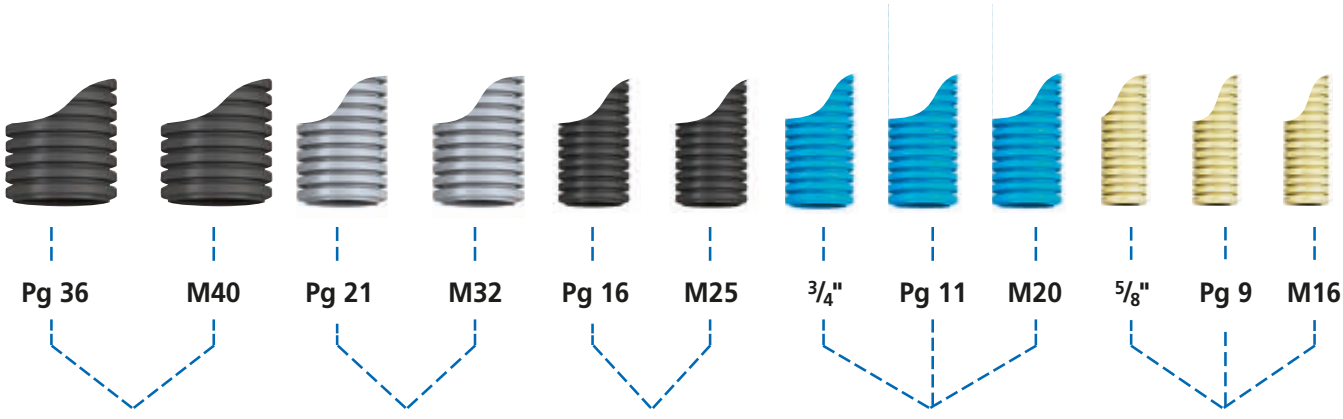


3

1 The long sealing plug with three sealing lips and in different widths adapts itself perfectly to the installation conduit.
2 An airtight closure is created even when the conduits are cut at an angle.
3 Ribs in the membrane surface ensure secure cable routing.



Sealing plug M40
Art. No 1040-40

Sealing plug M32
Art. No 1040-32

Sealing plug M25
Art. No 1040-25

Sealing plug M20
Art. No 1040-20

Sealing plug M16
Art. No 1040-16

For fire protection walls EI30-EI120.

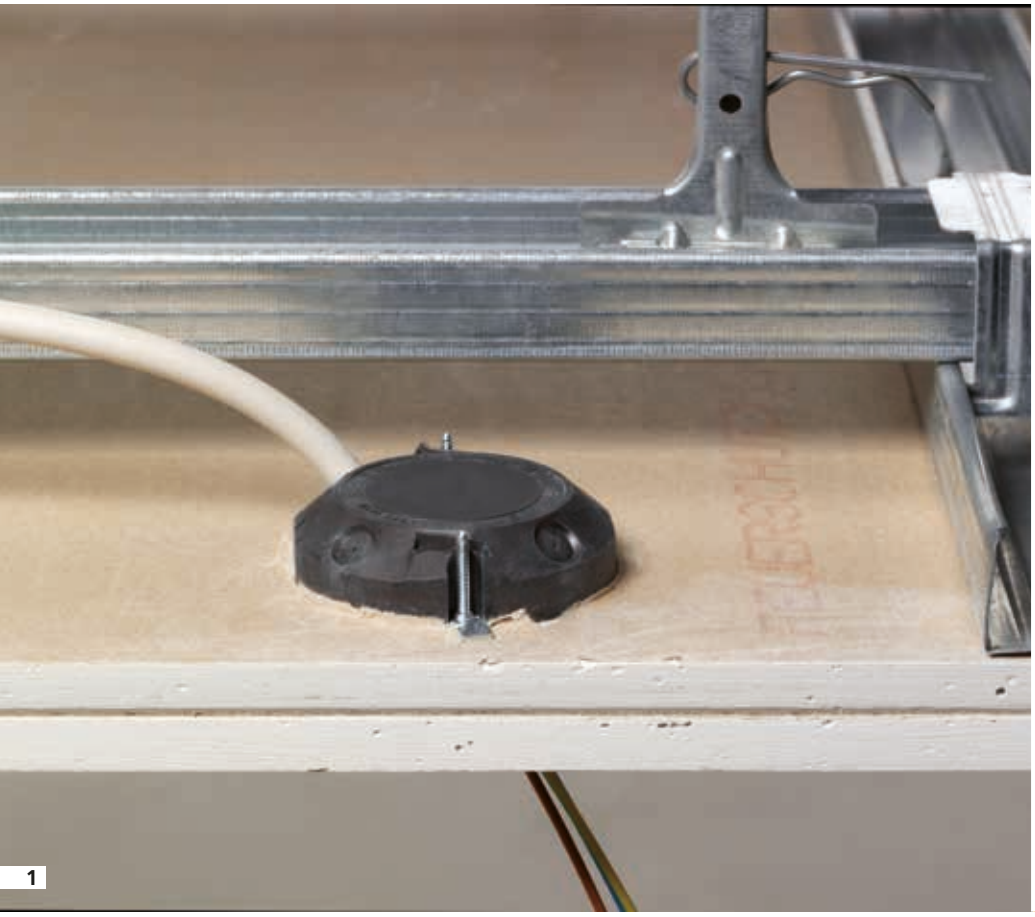
Ceiling box HWD 30.

The HWD 30 installation boxes for fire-protection ceilings guarantee reliable fire protection from EI30 to EI90. KAISER AFS-technology's integrated fire-retardant coating intumesces immediately a fire breaks out and closes the opening in the ceiling. Even when retrofitted, the HWD 30 ensures safety.

DIBt approval
For components in fire-resistance class F90 acc. to DIN 4102-2




Examples of use
The HWD 30 ceiling box also lets you install for example presence or smoke detectors or LED emergency route lighting in fire-protection ceilings without changing the fire resistance class.



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1 Installation of ceiling box HWD 30 without mineral wool corresponds to fire resistance class EI30.

2 Installation of ceiling box HWD 30 with mineral wool corresponds to fire resistance class EI60.

3 Installation of ceiling box HWD 30 with Rockwool Termarock 100 corresponds to fire resistance class EI90.

- For fire-protection ceilings F30-F90
- No encasing required
- Suitable for fitting accessories, e.g. smoke alarms, luminaires, motion detectors etc.
- With fire-protection cover, also for use as a junction box
- Also for retrofitting

EI30 - EI90

Ceiling box HWD 30
Art. No 9463-50

Ø 74 mm

Ceiling junction box HWD 30
Art. No 9464-50

Ø 74 mm

Fire-protection cover
Art. No 1184-94

The matching Ø 74 mm cutter (Art. No 1084-10) is shown on page 39.

For luminaires and loudspeakers. **Fire-stop box FlamoX®.**

The **FlamoX® fire-protection housings** form the new generation of the tried-and-tested housings for the installation of accessories such as luminaires, loudspeakers or other devices in suspended fire-protection ceilings.

For this **new generation** of housings, the dimensions were matched to modern lighting systems, so it is ideal for universal use. Now it is possible to install LED luminaires, luminaires with compact fluorescent lamps, low-voltage and high-voltage halogen lamps, loudspeakers and other devices, including any necessary operating devices. The housings can easily be installed from below in fire-protection ceilings through the installation opening which is made for them. Because of the low weight of the housings, even when luminaires or loudspeakers are fitted, the maximum permitted weight load of 5 kg/m² is not exceeded. This ensures that no additional suspension devices are needed.

Flamox® housings correspond to fire-resistance class F30 (EI30) and withstand fire loads from above and below. This means that electrical installation companies can ensure optimal building construction fire protection for fire-protection ceilings.

Functioning of the fire-retardant coating if a fire breaks out (fire load from above or below)

The effect of the heat causes the fire-retardant coating to tumesce, which prevents the fire and smoke from spreading.


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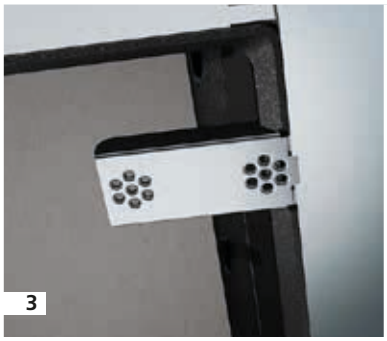
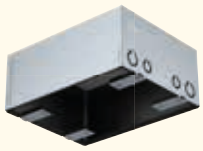

3


4

1 After determining the position of the luminaire, use the template to mark the screw positions and the cut-out.
2 Insert the housing into the component opening and align it.
3 Fixing lugs with hole structure for fast, easy screw fitting to the fire-protection ceiling.
4 Interior consisting of a fire-retardant-forming fire-protection material and, in the event of a fire, automatically closing plate.

FlamoX® fire-protection housing
Art. No. 9435-04



FlamoX® fire-protection housing
Art. No. 9435-03

You can find the range of cutters suitable for the installation of luminaires and loudspeakers on page 39.

Sealings in fire-protection ceilings.

Ceiling seal systems DS 90 / 74 mm and 90 / 120 mm.

KAISER ceiling seal systems DS 90 / 74 mm and DS 90 / 120 mm ensure safe maintenance of the ceiling's fire-resistance class of EI30-EI90. In order to prevent fire and smoke gases from passing through feed-throughs of cables and electrical installation conduits in concrete or cellular concrete ceilings, they must be given fire-protection sealing of the same fire-resistance class as the ceiling. This is guaranteed easily, quickly and securely by ceiling seal systems DS 90.

- Secure, visible, certified fire-sealings
- Sealings especially for ceiling feed-throughs
- Automatic sealing without filling and smoothing
- Non-destructive retrofitting
- Also for mixed population of cable and conduit bundles
- Fast, easy installation from above

ETA-14/0159

Approval for ceiling seal systems DS 90 / 74 mm and DS 90 / 120 mm ETA-14/0159 with all documentation for installation and proof of approval is in the download section on www.kaiser-elektro.de


1


2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Separable mounting sleeve for retrofitting with existing cables and conduits.

1 Separable mounting sleeve with edge protection made of material which forms an insulating layer.

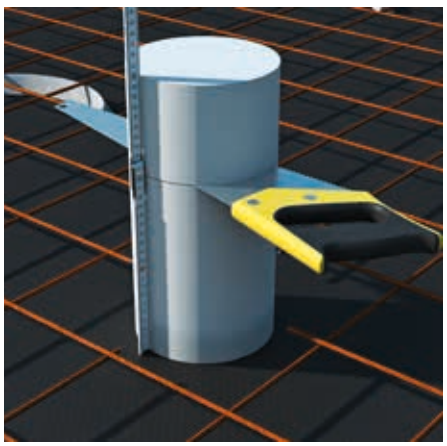
2 Retaining springs for fast, secure installation from above.

3 Punchings for holding the metal plates and for fixing the box sealing system. Marking for the positioning of the screws.

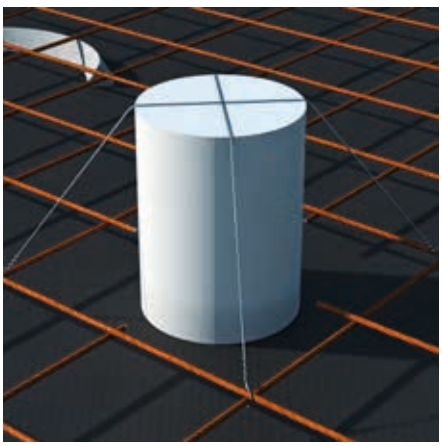
4 Sealing flange ensures clean, smokeproof room separation of the component opening. Separable mounting sleeve for retrofitting with existing cables and conduits.

Formwork unit

For prepared installation in concrete ceilings, KAISER offers a formwork unit for suitable openings.



Shorten the formwork unit to match the ceiling thickness.



Fix the formwork unit to the reinforcement with tie wires.

After striking the formwork, remove the formwork unit without residue from the component opening.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1 Mixed population of sheathed cables and conduits.
2 Also for use as an empty seal.
3 Full occupancy with sheathed cables Ø 29 mm and conduits up to M63.
4 Full occupancy with sheathed cables Ø 15 mm and conduits up to M40.

Easy, fast and secure.
Ceiling seal systems for the ceiling upper surface.

KAISER ceiling seal systems DS 90 / 74 mm and DS 90 / 120 mm are ideal for fire protection sealing of sheathed cables and electrical installation conduits.
Cables and conduits as pure cable or conduit bundles can be fed through them up to full occupancy, but mixed occupancy is also possible. The ceiling seal system can easily be installed, with little need for tools, and completely from one side of the ceiling upper surface. It is not necessary to use additional fire-protection materials. The sealing flange on the mounting sleeve ensures smokeproof and clean room separation. As with the box sealing systems, non-destructive later fitting of additional cables is possible at any time.

Installation takes place easily and quickly from the ceiling upper surface. The ceiling seal system can also be retrofitted around existing cables and conduits. Non-destructive later fitting of additional cables up to full population is possible at any time.

1 Insertion of the mounting sleeve in drilling holes Ø 100 mm or Ø 150 mm from the ceiling upper surface.

2 Feed sheathed cables and/or conduits through the mounting sleeve.

3 Fit the ceiling cylinder around the cables and conduits and insert the mounting sleeve. Then snap the sealing element onto the sealing cylinder.

4 Approved for concrete or cellular concrete ceilings with ceiling thickness from 150 - 300 mm.

Ceiling seal system
DS 90 / 74 mm
Art. No 9459-05

Ceiling seal system
DS 90 / 120 mm
Art. No 9459-06

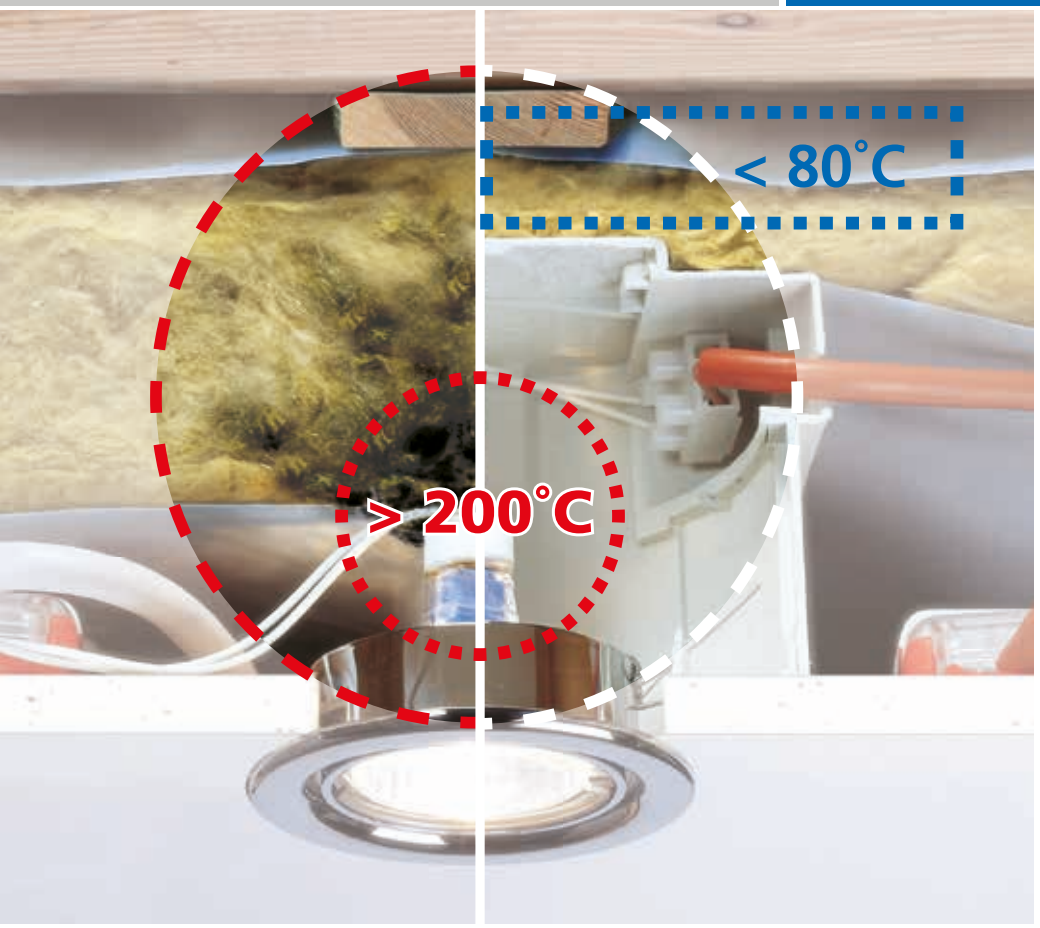
Formwork unit
Art. No 9473-95/96

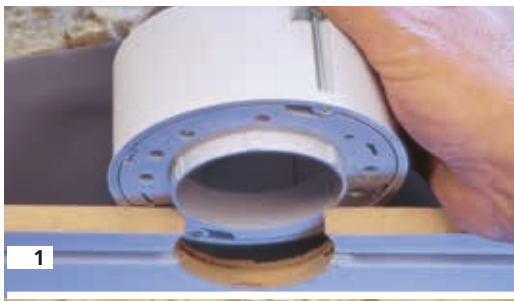
Protection against latent fire risk. **Installation housing ThermoX®.**

The intelligent housing system provides protection against the latent risk of fire caused by the extreme heat from some types of lamps. In suspended ceilings and roof areas, ThermoX® protects the moisture barrier foil and other surrounding materials against heat-generating halogen lamps and LED lamps.

The housing prevents the latest risk of fire and ensures that airtightness is maintained.

- Prevents fires, airtight
- Ceiling exit up to Ø 86 mm
- Installation from above or below
- Also for retrofitting





Latent fire risk caused by temperatures of more than 200°C from halogen lamps can occur very quickly. The Thermox® installation housing prevents the transfer of extreme heat development to all the surrounding materials.

1 Thermox® housing is fitted during ceiling installation.
2 Thermox® housing is retrofitted from below in a plasterboard ceiling.
3 Thermox® housing is retrofitted from below in a slab ceiling.

ThermoX® housing for halogen and swivelling LED luminaires
Art. No 9300-01/02/03

ThermoX® universal housing with mineral fibreboard
Art. No 9300-22

ThermoX® decorative coverings
Art. No 9301-...

ThermoX® front rings
Art. No 9300-41/42/43

ThermoX® universal front part
Art. No 9300-01/02/03

The matching Ø 120 mm cutter (Art. No 1082.20) is shown on page 39.

Protection against latent fire risk.
ThermoX® LED housing.

The Thermox® LED installation housing for fitting rigid and swivelling built-in LED luminaires in various ceiling constructions. The housing protects the surrounding material (moisture barrier foil, insulation, etc.) against the high operating temperatures, and the LED luminaire itself against dirt.

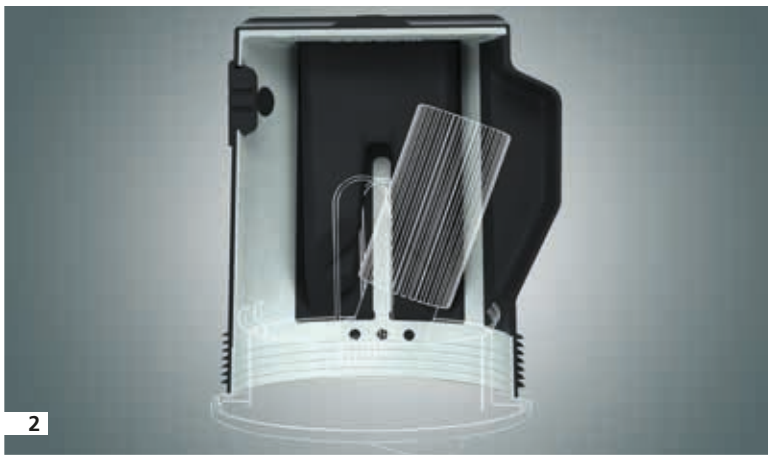
- Air-tight, protects against fire
- For installation in insulated hollow ceilings
- Retrofitting from below
- Toolless installation of the housing
- Rear surface structure ensures optimal heat management
- Permanent and secure fit of the luminaire in the housing

DESIGN PLUS
powered by: light+building

GERMAN DESIGN AWARD SPECIAL 2017

Certificate of quality of air tightness
Guaranteed air-tight housing for the energy-efficient electrical installation of built-in luminaires. The relevant certificate can be obtained


1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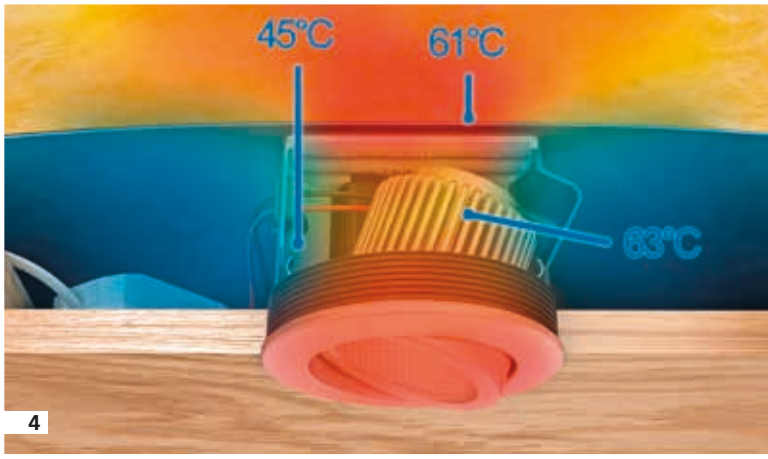
3



4

1 Guaranteed air tightness even with expanded fixing springs, thanks to flexible expanded pockets

2 Swivelling hollow allows targeted alignment of the installation spotlight.

3 Flat housings allow use in low ceiling constructions, e.g. wooden slat construction

4 Temperature profile for installation LED spotlights: The rear surface structure ensures minimal contact of the vapour barrier and optimal heat dissipation.

In addition, the **ThermoX® LED** installation housing has other advantages. Its completely air-tight design ensures that neither dust nor dirt from the intermediate ceiling can penetrate and affect the function of the heat sink. Together with the thermic separation between the luminaire and the operating device, this guarantees maximum operating life.

ThermoX® LED housing.
Art. No. 9320-10

Ø 74 mm
T: 70 mm

ThermoX® LED housing.
Art. No 9320-11

Ø 74 mm
T: 95 mm

ThermoX® LED housing.
Art. No. 9320-20

Ø 86 mm
T: 70 mm

ThermoX® LED housing.
Art. No 9320-21

Ø 86 mm
T: 95 mm

(T: Depth)

Suitable Ø 74 mm cutter and Ø 86 mm countersink hole cutter are shown on page 39.

Fireproof and smokeproof walls in ships' cabins.
Fire-protection technology in shipbuilding.

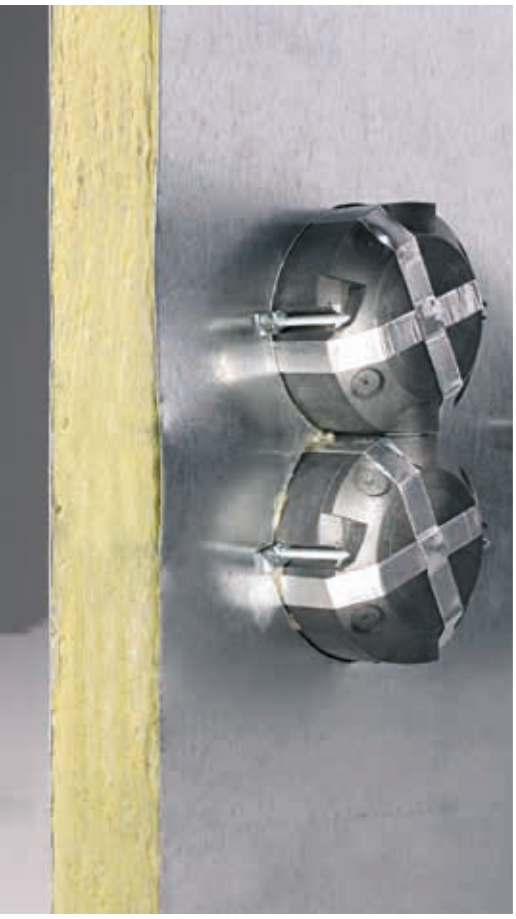
0736/0000

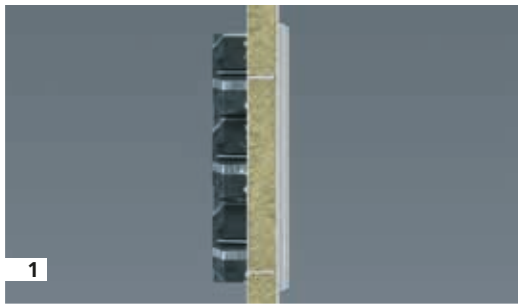
Electrical installations on passenger ships such as cruise ships, ferries or yachts must provide optimal functionality and ensure the safety of the passengers and crew. Our many years of experience of fire-protection technology in buildings are now used to deal with the fast and sophisticated installation needs of shipyards, cabin builders and the shipping industry. The user now has a fire-protection box which is very easy to install and prevents - 100% reliably - the spread of fire and smoke via category B0 to B15 partitions.

The intelligent fire-protection one-gang boxes for B0 to B15 partitions react to a fire very quickly. The HWD B15 cavity wall boxes provide screening on the fire and smoke side of the fire-protection zone and preserve the B15 function of the fire-protection wall for at least 30 minutes of flames.

Combinations of one-gang junction boxes at a standardised combination distance can easily be created by separating the marked area on the holding ring. Installation is as easy as for cavity wall boxes.

- For partitions in categories B0 to B15
- Without encasing
- Also for retrofitting
- When fitted with a fire-protection cover, can be used as a junction box





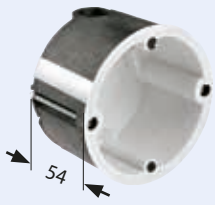
The certified one-gang boxes are suitable for both metal-clad and mineral-based shipbuilding walls. They offer maximum safety and satisfy the requirements of current legislation.

1 For use with panel thicknesses of 0.2 to 40 mm.
2 Multiple combinations possible by removal of the holding ring.
3 One-gang boxes and one-gang junction boxes with zero tension technology are available for thin boarding.

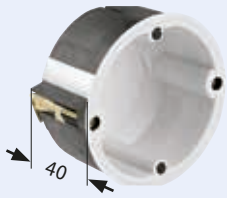
One-gang box HWD B15
Art. No 9463-15

One-gang box HWD B15
Art. No 9461-15

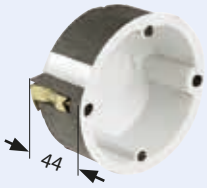
One-gang junction box HWD B15
Art. No 9464-15



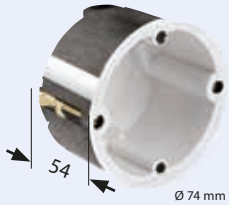
One-gang box HWD B15
Art. No 9463-14



One-gang junction box HWD B15
Art. No 9461-14



One-gang box HWD B15
Art. No 9464-14



The matching Ø 74 mm cutter (Art. No 1083-74) is shown on page 39.

KAISER fire-protection systems. **At a glance.**

Installation in walls.

www.kaiser-elektro.org/bswaende

Fire-protection boxes HWD 90 | EI30 - EI120


Ø 74 mm

One-gang box HWD 90
9463-01 | p.12


Ø 74 mm

One-gang junction box HWD 90
9464-01 | p.12


2 x Ø 74 mm

Electronics box HWD 90
9462-94 | p.12

Flush-mounting fire-protection box | EI30 - EI120


Ø 74 mm

Flush-mounting fire-protection box
1564-01 | p.10

Fire-protection boxes HWD 68 | EI30 - EI90


Ø 68 mm

One-gang box HWD 68
9463-02 | p.16


Ø 68 mm

One-gang junction box HWD 68
9464-02 | p.16

Tools / accessories for HWD 90, HWD 68 and Flush-mounting fire-protection box

Universal opening cutter
1085-80


Ø 74 mm

Turbo cutter MULTI 4000
1084-10


Ø 68 mm

Turbo cutter MULTI 4000
1083-10

Centering insert 68/74
1083-99

Stripping pliers AMZ 2
1190-02


Ø 82 mm

Diamond grinding head with dust extractor
1088-02

Fire-protection cover HWD 30-120
1184-94 | Seite

Support connector
9060-78

Support connector
9060-68

Installation in walls. Feed-through and entry.

www.kaiser-elektro.org/bswaendedue

Cable and conduit seal systems LS 90 and RS 90 | EI30 - EI90


Ø 20 mm

Cable sealing system LS 90
9459-01 | p.18


Ø 35 / 32 mm

Conduit sealing system RS 90
9459-02 | p.18

Box sealing systems DS 90 / 74 mm and DS 90 / 120 mm | EI30 - EI90


Ø 74 mm

Box sealing system DS 90 / 74 mm
9459- 03 | p.18


Ø 120 mm

Box sealing DS 90 / 120 mm
9459-04 | p.18

Tools for seals


Ø 20 mm

Hardened metal cutter Ø 20 mm
1088-06


Ø 35 mm

Turbo cutter MULTI 4000
1082-10


Ø 74 mm

Turbo cutter MULTI 4000
1084-10


Ø 74 mm

Hardened metal cutter
1083-74


Ø 120 mm

Bi-metal cutter Ø 120mm
1082-20

Accessories for seals


DE / GB
F / I

Sealing identification label
9473-91


DE / GB
F / NL

Sealing identification label
9473-92

Sealing plugs.


Ø 16 mm

M16
1040-16 | p.22


Ø 20 mm

M20
1040-20 | p.22


Ø 25 mm

M25
1040-25 | p.22


Ø 32 mm

M32
1040-32 | p.22


Ø 40 mm

M40
1040-40 | p.22

www.kaiser-elektro.org/bsdecke

Installation in ceilings.

Fire-protection ceiling boxes HWD 30 | EI30 - EI90


Ø 74 mm

Ceiling box HWD 30
9463-50 | p.24


Ø 74 mm

Ceiling junction box HWD 30
9464-50 | p.24

Fire-protection cover HWD 30-120
1184-94 | p.24

Fire-protection housings | EI30


Ø 100 mm

FlamoX® fire-protection housing
9435-04 | p.26


Ø 180 mm

FlamoX® fire-protection housing
9435-03 | p.26


Ø 240 mm

Installation housing FlamoX®-S 30 E
9435-01

FlamoX® fire-protection putty
9400-05

Ceiling seal | EI30- EI90

Ceiling seal system DS 90 / 74 mm
9459-05 | p.18

Ceiling seal system DS 90 / 120 mm
9459-06 | p.18


Ø 100 / Ø 150

Formwork unit
9473-95/96 | p.18

Tools for seals


DE / GB
F / I

Sealing identification label
9473-91


DE / GB
F / NL

Sealing identification label
9473-92

Preventative fire protection

ThermoX® housing for halogen lamps and swivelling LED luminaires
9300-01/02/03 | p. 32

ThermoX® universal housing with mineral fibreboard
9300-22 | p 32


Ø 74 mm

ThermoX® LED housing
9320-10 | p. 34


Ø 74 mm

ThermoX® LED housing
9320-11 | p.34


Ø 86 mm

ThermoX® LED housing
9320-20 | p.34


Ø 86 mm

ThermoX® LED housing
9320-21 |p.34

Tools for HWD 30 und Fire-protection housings

Universal opening cutter
1085-80


Ø 68 mm

Turbo cutter MULTI 4000
1083-10


Ø 74 mm

Turbo cutter MULTI 4000
1084-10


Ø 86 mm

Bi-Metall cutter Ø 86 mm
1087-86


Ø 120 mm

Bi-metal cutter Ø 120mm
1082-20

VARIOCUT
1089-10 | 1089-00

Centering insert 68/74
1083-99

Stripping pliers AMZ 2
1190-02

www.kaiser-elektro.org/bsschiff

Installation in shipbuilding walls.

Fire-protection box HWD B15


PS: 7 - 40 mm
T: 40 mm

One-gang box HWD B15
9461-15 | p. 29


PS: 7 - 40 mm
T: 44 mm

One-gang box HWD B15
9463-15 | p. 29


PS: 7 - 40 mm
T: 54,5 mm

One-gang junction box HWD B15
9464-15 | pSeite 3629


PS: 0,2 - 40 mm
T: 40 mm

One-gang box HWD B15
9461-14 | pSeite


PS: 0,2 - 40 mm
T: 44 mm

One-gang box HWD B15
9463-14 | pSeite


PS: 0,2 - 40 mm
T: 54,5 mm

One-gang junction box HWD B15
9464-14 | pSeite

Tools for HWD B15


Ø 74 mm

Hardened metal cutter
1083-74

Universal opening cutter
1085-80

(PS: Panel thickness | T: Depth)

The complete range of products and all technical information can be found in the KAISER catalogue and on our website at www.kaiser-elektro.de

Systems and solutions for professional electrical installation.

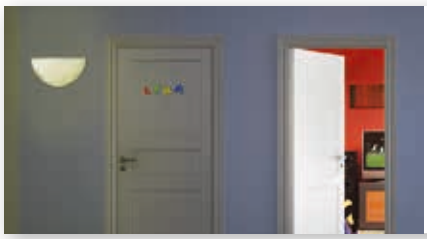
Since 1904, KAISER has developed and manufactured systems and products as a basis for good installation. Planners and users benefit internationally from the practical solutions for their daily operations in all areas of installation.

Energy efficiency.

Innovative KAISER products support you in satisfying the requirements of the EU guidelines and the national regulations such as the Energy Conservation Regulations (EnEV).

Fire protection.

KAISER fire protection systems offer you reliable protection for electrical installations in fire protection walls and ceilings.

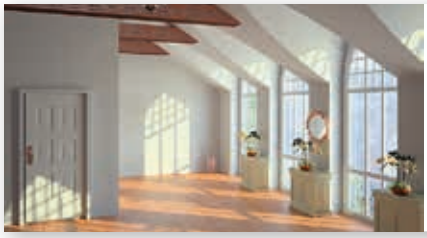


Sound insulation.

KAISER's innovative sound insulation boxes ensure the structural requirements for sound insulation walls, even with pre-fitted installations.

Radiation protection.

The use of the new radiation protection boxes maintains the wall's radiation protection without the need for any additional screening measures.



Refurbishment.

KAISER has matching product system solutions which are used safely, consistently and in accordance with building-site practices for redeveloping, renovating and modernising work.

Technical information and advice

You will find more information about products, system solutions and communication media on our website: www.kaiser-elektro.de and on Youtube at **www.youtube.com/kaiserelektro.**

For additional questions or information, please contact our technical staff.
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