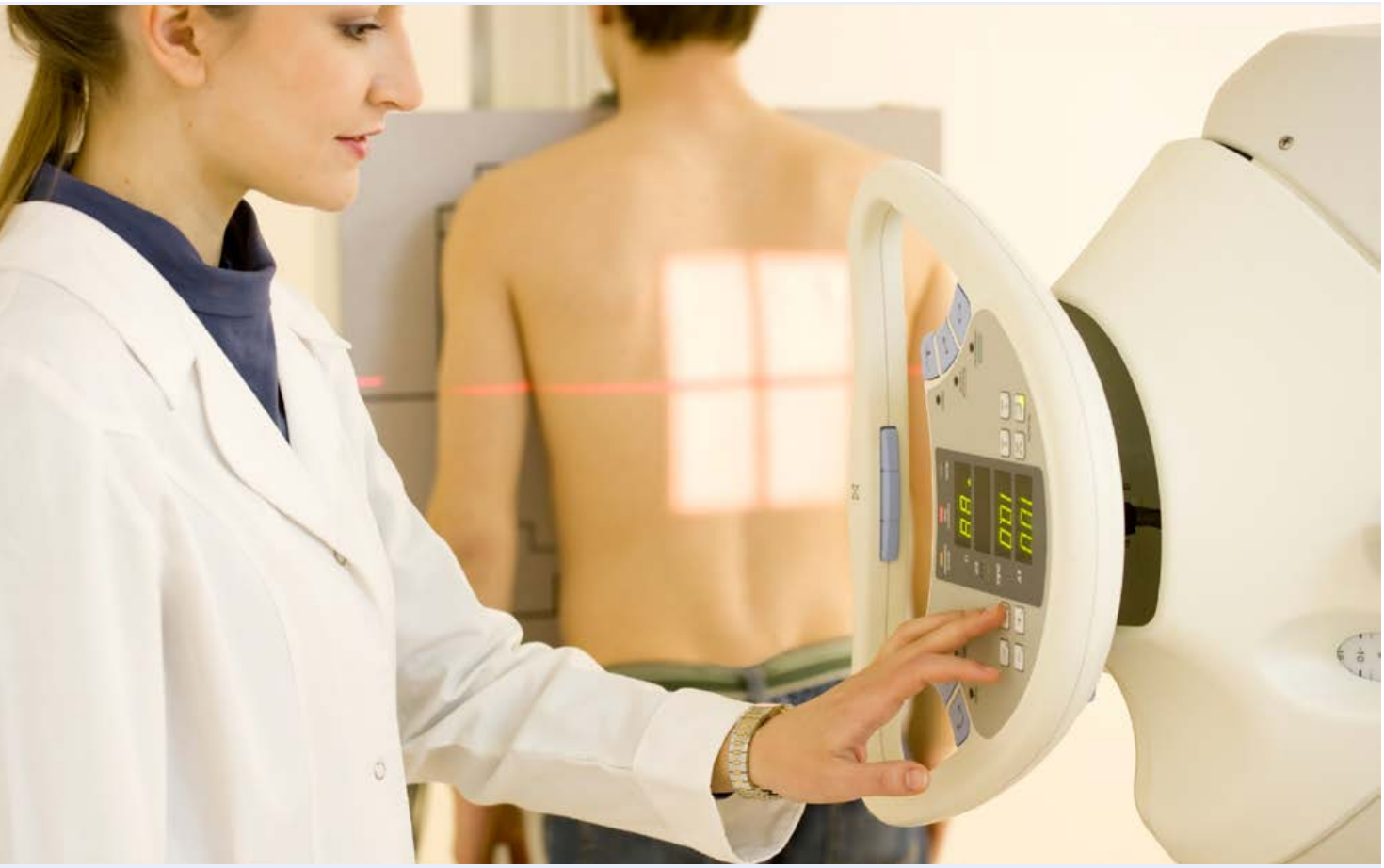
Radiation protection.
Electrical installation in radiation protection walls.

KAISER

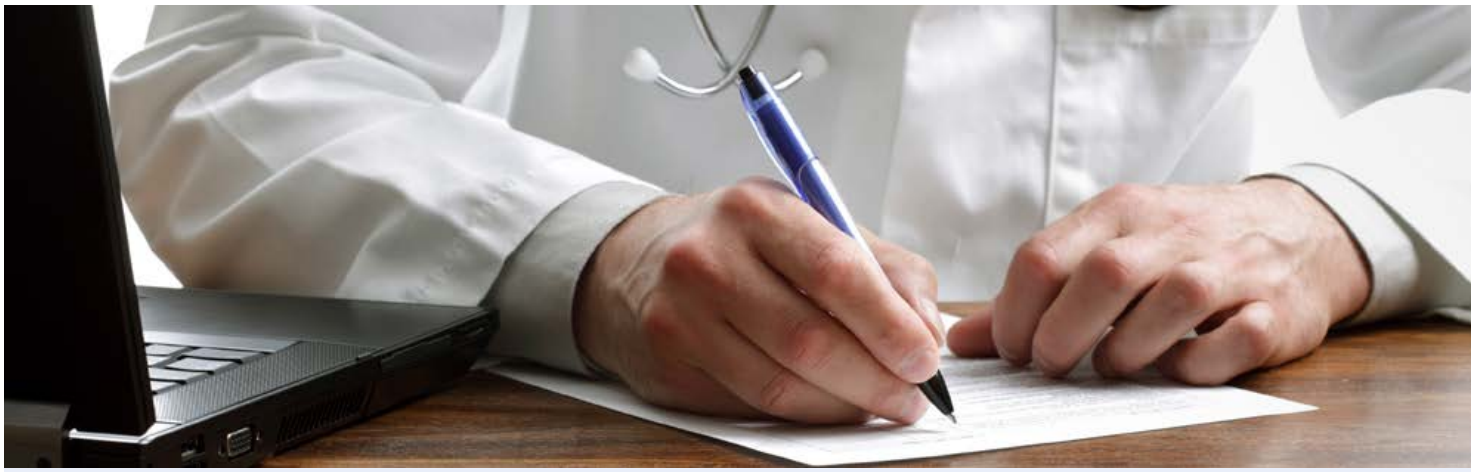


For screened X-ray rooms.
Radiation protection technology.

Radiation protection in connection with electrical installation in radiation protection walls presents a real challenge. Secure radiation protection must be ensured by means of special building construction measures. In particular, this affects hospitals, doctors' practices and all medical facilities in which X-rays and gamma radiation equipment are used.

The ionising radiation which is emitted by the X-ray devices is extremely hazardous for people in the vicinity. This means that adjacent rooms must be screened. Every installation opening in radiation protection walls interrupts the wall's radiation protection function. Elaborate screening methods are needed in order to restore this function.

In many cases, screening is fitted in the form of lead encasing around traditional electrical installation boxes. The planning of the necessary electrical installation in these walls is a major problem. It is extremely important that this is carried out in advance, because it is no longer possible to retrofit screening to installation boxes using this traditional method in radiation protection walls whose manufacture has already been completed.



Regulations and standards.
RöV and DIN 6812.

National and international laws and decrees have been passed, and standards specified, in order to protect people who are constantly or occasionally exposed to X-rays against the dangers from ionising radiation. In Germany, these include the Radiation Protection Act (StrlSchV) and the X-ray Ordinance (RöV). The latter describes the ordinance relating to protection against harm caused by X-rays, and this also applies to diagnostic radiology and radiation protection therapy.

Radiation protection in buildings is regulated in DIN 6812 for medical X-ray equipment up to 300 kV. In general a distinction is made in respect of the type of radiation between useful radiation and stray radiation. Useful radiation occurs in the direction specified for that purpose in the X-ray device; stray radiation displays a scattering effect and occurs in different directions and strengths.

Technical basics.
Radiation protection walls.

Calculation of the necessary structural screening (thickness of the lead layer) is dependent on the type of radiation, the category of the room which is determined by the amount of time people spend there, and on the output of the radiation equipment (tube voltage) and its proximity to the adjacent occupied area.

The screening effect of materials other than lead is stated as an equivalent lead layer thickness (lead equivalent value). The higher the tube voltage, the greater is the necessary lead layer thickness. Details of the necessary lead layer thicknesses or their equivalents are specified in DIN 6812.

An X-ray room must be radiation-protected on all sides, and special radiation protection walls are used for this purpose. In many cases these are lightweight walls which are lead-lined on the boarding side which faces the X-ray room. **However, because of difficulty in processing, radiation-protection wall construction systems without lead (e.g. Knauf Safeboard) are increasingly used in building and extension practice.**

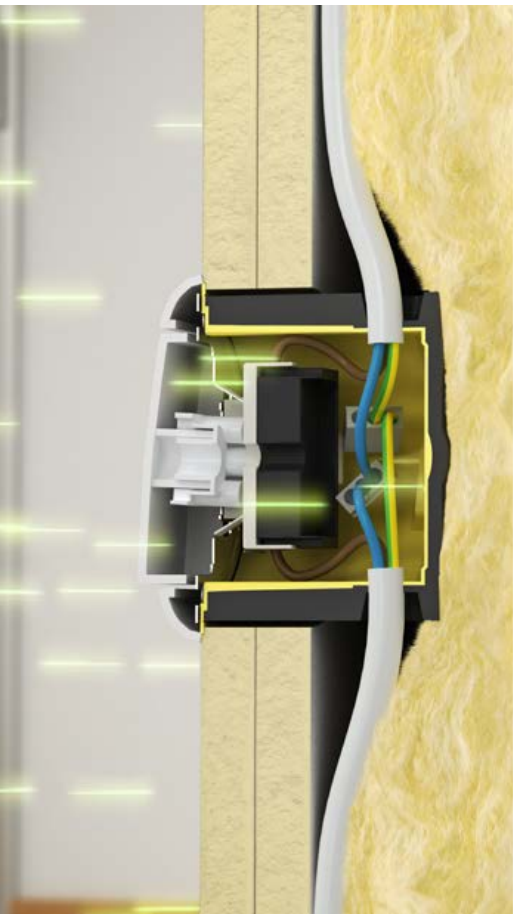
Safety for X-ray rooms.
One-gang junction box for radiation protection walls.

KAISER's innovative radiation protection box protects against radiation used for medical purposes, e.g. in X-ray facilities. The high density of the radiation protection compound absorbs soft and hard X-rays. The box is especially suitable for **lead-free radiation protection walls** (e.g. Knauf Safeboard) and - because of its dose-reducing effect in the tube voltage range between 40 - 150 kV - guarantees a lead-equivalent value for the wall up to 3 mm Pb even with opposing installation.

- Protection against X-rays
- Suitable for lead-free radiation protection walls
- Lead-free - no health risks
- Retrofitting is possible
- Fast installation without additional screening measures
- Opposing installation is possible

The radiation protection box is very easily fitted in a Ø 74 mm installation opening in the same way as a traditional cavity wall box. Use the universal opening cutter to make the exact cable entry. For combinations with the standardised distance of 71 mm, simply remove the marked edge strip. Use the support connector to create fully-insulated through-wiring. By using the universal VDE cover (Art. No. 1184-90), the box can also be used as a junction box. Increasing existing installation openings from Ø 68 mm to Ø 74 mm, for example during refurbishing, is also possible by using the centering insert 68/74 (Art. No. 1083-99).

The certificate can be downloaded as a PDF file from our website at www.kaiser-elektro.org/gutbleifrei

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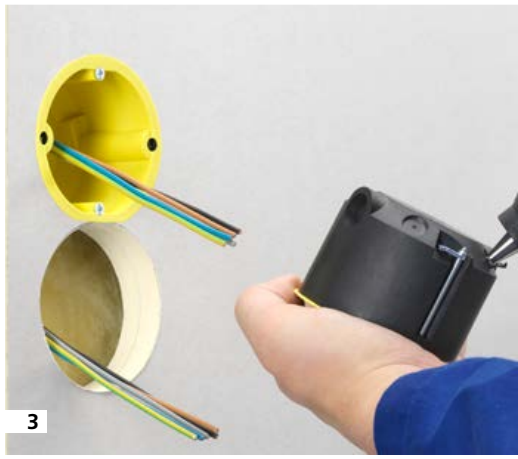
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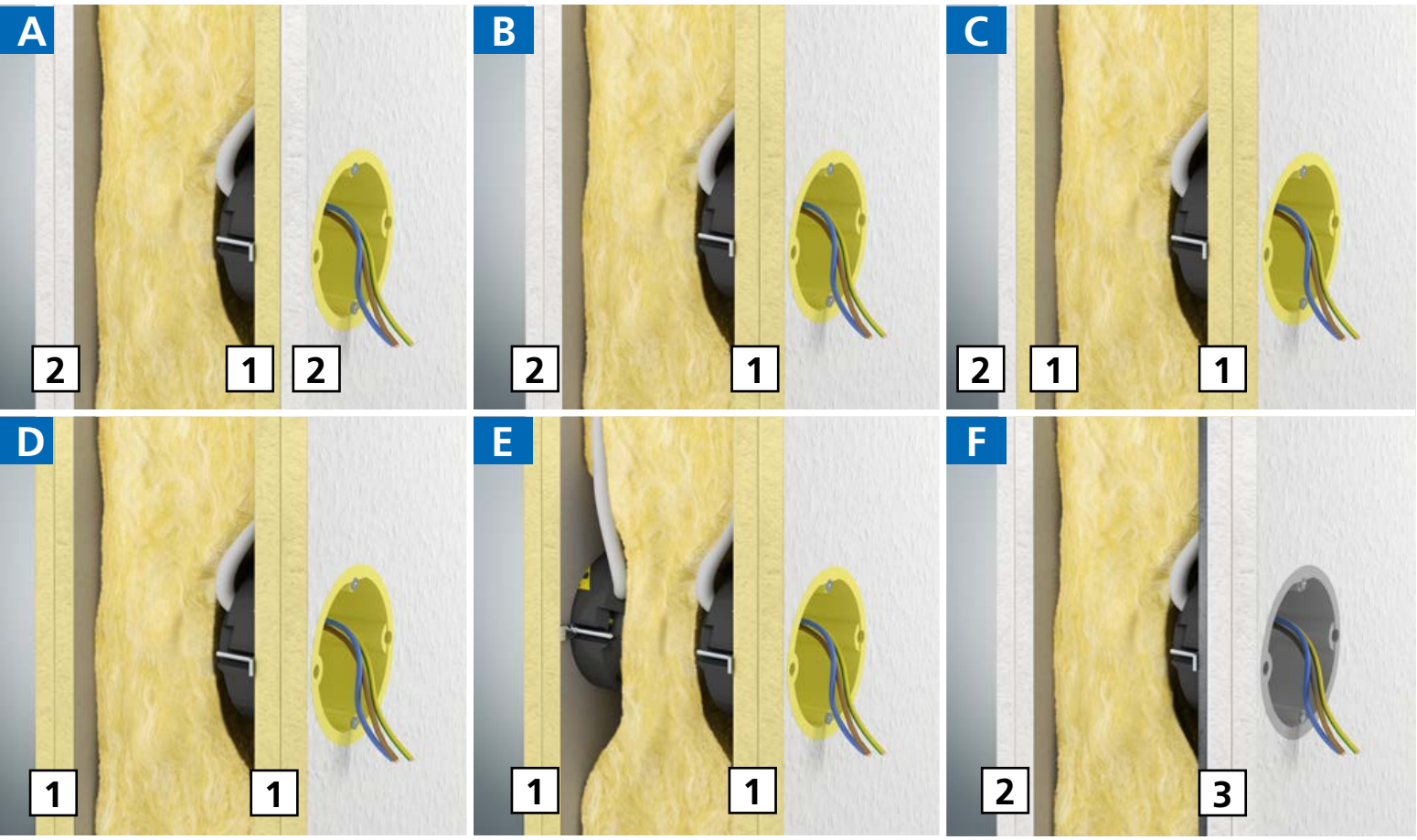
The wall's radiation protection is maintained even when installation boxes are fitted.

1 Multiple combinations are possible without any negative effects on the radiation protection.
2 Use a cutter (e.g. Multi 4000 1084-10) to cut the installation opening.
3 Exact opening by using universal opening cutter.

Radiation protection one-gang junction box
Art. No. 9074-01

Support connector
Art. No. 9060-74



Wall constructions for lead-free and lead-lined radiation protection panels.

The following describes different wall constructions in connection with the required number of lead-free and lead-lined radiation protection panels and a plasterboard panel in accordance with the lead equivalents specified in DIN 6812. Details of the relevant lead equivalent are shown in the table below with the matching illustration.

Lead equivalent value in mm Pb / illustration

0,3 - 0,6	A
1,0 - 1,1	B
≤ 1,75	C
≤ 2,75	D
≤ 3,0	E
≤ 2,5	F

Use in lead-free radiation protection walls
(e.g. Knauf Safeboard):

A Lead equivalent: up to 0.6 mm Pb
Wall construction: 2 layers of boarding on both sides

B Lead equivalent: up to 1.1 mm Pb
Wall construction: 2 layers of boarding on both sides

C Lead equivalent: up to 1.75 mm Pb
Wall construction: 2 layers of boarding on both sides

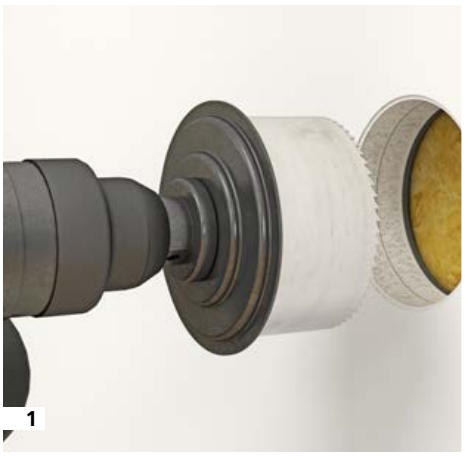
D Lead equivalent: up to 2.75 mm Pb
Wall construction: 2 layers ofboarding on both sides

E Two opposing radiation protection boxes achieve a lead equivalent of 3 mm Pb

Use in lead-lined radiation protection walls:

F Up to 2.5 mm Pb, 2 layers of boarding on both sides, lead-lined on one side

1 Lead-free radiation protection panel (e.g. Knauf Safeboard)
2 Plasterboard panel
3 Lead-lined plasterboard panel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Fast installation of the **one-gang junction box for radiation protection walls.**

Installation

1. Use a cutter (e.g. MULTI 4000 or Multi 2000 HM) to cut a Ø 74 mm installation opening.
2. Use an HSS drill to prepare for the matching cable entry.
3. Use the universal opening cutter (Art. No. 1085-80) to make the cable entry match the specified cable retention.
4. Feed the cables in, then insert the box into the installation opening.

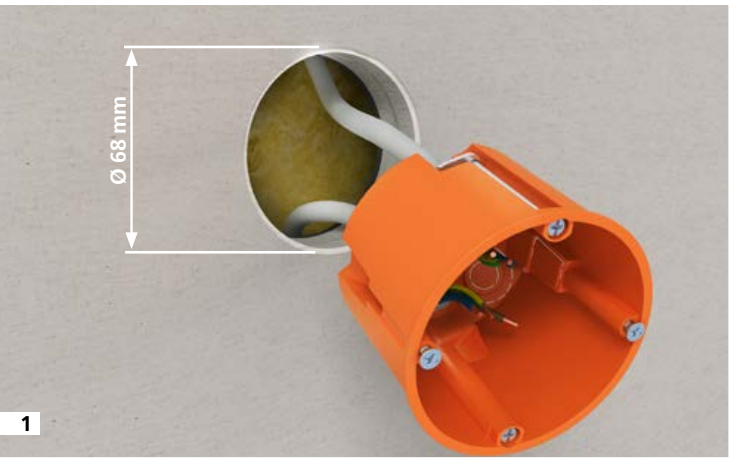
Turbo cutter MULTI 4000
Art. No. 1084-10

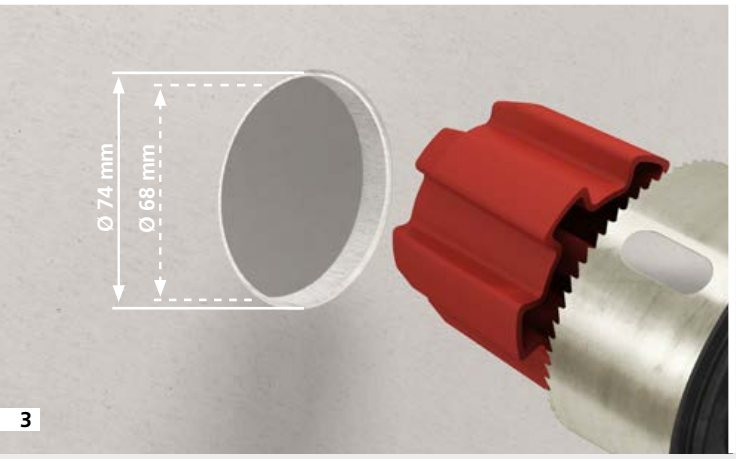
MULTI 2000 HM
Art. No. 1084-70

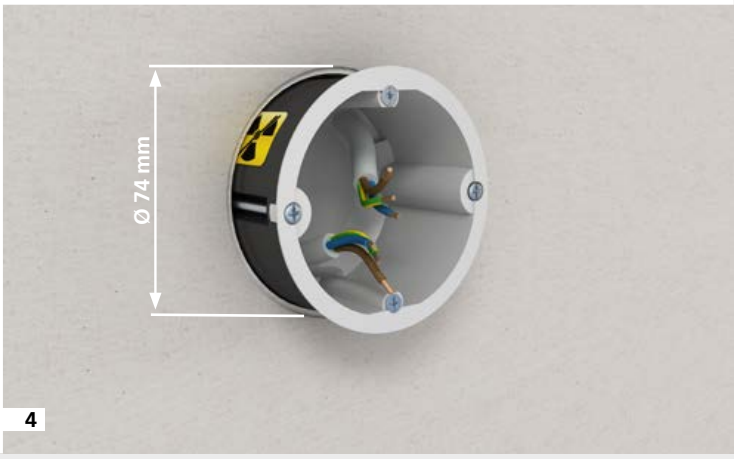
Universal opening cutter
Art. No. 1085-80

Centering insert 68/74
Art. No. 1083-99

For extending existing installation openings from Ø 68 mm to Ø 74 mm exact guide for cavity wall cutter MULTI 4000.







1 Remove the traditional box from the Ø 68 mm installation opening

2 Insert the centering insert 68/74 (Art. No. 1083-99) together with the Ø 74 mm cutter (e.g. Multi 4000, Art. No. 1084-10 or Multi 2000 HM, Art. No. 1084-70) into the existing opening

3 Now it is easy to enlarge the existing opening (Ø 68 mm) to Ø 74 mm

4 The radiation protection box can now be retrofitted in the Ø 74 mm installation opening

Refurbishing.
Centering insert 68/74 for retrofitting.

The centering insert 68/74 makes it easy to enlarge existing installation openings from Ø 68 mm to Ø 74 mm. This can be with lightweight walls with single or multiple-layer boarding consisting of lead-free radiation protection panels (e.g. Knauf Safeboard) and of lead-lined plasterboard panels. This makes it much easier to replace existing traditional cavity wall boxes with radiation protection boxes. The centering insert 68/74 mm is an easy-to-use tool aid for Ø 74 mm cavity wall cutters (e.g. Multi 4000 or Multi 2000 HM) and provides the exact guide for expanding the installation opening.

Assignment table for cutting an opening for the **radiation protection one-gang junction box.**

Universal opening cutter
1085-80

HSS drill

Cavity wall installation for radiation protection boxes 9074-01 (lead-free)		**Universal opening cutter Ø**
NYM cables	3 x 1.5 mm²	9.5 mm
	5 x 1.5 mm²	9.5 mm
	3 x 2.5 mm²	10.5 mm
Support connector	9060-74	**Cut up to the marking of the connector entry.**

Cavity wall installation forradiation protection boxes 9074-03 (lead-lined)		**HSS drill Ø**	**Universal opening cutter Ø**
NYM cables	3 x 1.5 mm²	8.0 mm	9.5 mm
	5 x 1.5 mm²	9.5 mm	9.5 mm
	3 x 2.5 mm²	9.5 mm	9.5 mm
	5 x 2.5 mm²	9.5 mm	connector
Support connector	9060-88	12 mm	**Cut up to the marking of the connector entry.**

KAISER radiation protection system. **At a glance.**

www.kaiser-elektro.org/Strahlenschutz

Installation in walls.

Radiation protection boxes

Radiation protection box
9074-01 | S. 4

Radiation protection box, lead-lined
9074-03 | S. 6

Support connector
9060-74

Support connector
9060-88

Universal VDE cover
1184-90

Tools

Turbo cutter
MULTI 4000
1084-10

MULTI 2000 HM
1084-70

Universal
opening cutter
1085-80

Centering insert
1083-99

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.

Building.

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.
KAISER Tel.: +49(0)2355.809.61 · KAISER Email: technik@kaiser-elektro.de

KAISER GmbH & Co. KG
Ramsloh 4 · 58579 Schalksmühle
GERMANY
Tel. +49 (0) 23 55 / 809-0 · Fax +49 (0) 23 55 / 809-21
www.kaiser-elektro.de · info@kaiser-elektro.de

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