Shieldings for flange mounting

Operating Manual
44192BA2

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1 About this operating manual

1.1 Some Prior Remarks

The product is handed over to you by the manufacturer BERTHOLD TECHNOLOGIES GmbH & Co. KG in a complete and functionally reliable condition.

This operating manual illustrates how to:
- set up/install the product
- operate the product
- carry out maintenance on the product
- disassemble the product
- dispose of the product

Read these instructions thoroughly and completely before working with the product. We have tried to compile all the information for safe and proper operation for you.

However, should questions arise which are not answered in this manual, please contact BERTHOLD TECHNOLOGIES GmbH & Co. KG.

Store the instructions where they are accessible for all users at all times.

1.2 Storage

This operating manual as well as all product-related documentation relevant to the respective application must be accessible at all times during the life cycle near the device.

1.3 Target Group

The product may only be installed, operated, maintained and repaired by trained personnel.

This manual is directed at qualified specialist personnel who are familiar with handling radioactive sources and heavy system components.

Specialist personnel refers to those who can assess the work assigned to them and recognise possible dangers through their specialist training, knowledge and experience as well as knowledge of the relevant regulations.
1.4 Validity of the Manual

The manual is valid from the delivery of the Berthold product to the user until its disposal. Version and release date of this operating manual can be found in the bottom of each page. An alteration service is not provided by the manufacturer BERTHOLD TECHNOLOGIES GmbH & Co. KG.

The manufacturer reserves the right to make changes to this operating manual at any time without stating reasons.

**NOTICE**

The current revision of this operating manual replaces all previous versions.

1.5 Structure of the Manual

This manual has been divided into chapters. The order of the chapters should help you to familiarise yourself quickly and properly with the operation.

1.6 Copyrights

This manual contains copyright-protected information. None of the chapters may be copied or reproduced in any other form without prior authorisation from the manufacturer.

1.7 Representation

<table>
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<th>Identifier</th>
<th>Meaning</th>
<th>Example</th>
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<td>Round brackets</td>
<td>Image reference</td>
<td>Connect the plug (fig. 1, item 1)</td>
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1.8 Symbols Used

1.8.1 Structure of Warnings

⚠️ Signal word

- Source and consequence
- Explanation, if required
- Measure
- In case of emergency

- Warning symbols: (warning triangle) draws attention to the hazard
- Signal word: states the severity of the hazard
- Source: states the type and source of the hazard
- Consequence: describes the consequences if warning is ignored
- Measure: states how one can avoid the hazard
- In case of emergency: states how to react in case of direct danger.

Warning levels used

In this manual, warning instructions in front of instructions for action refer to risks of injury or damage to property. The hazard-prevention measures described must be observed.

⚠️ DANGER

Indicates an **imminent** major hazard, which will certainly result in serious injuries or even death if the hazard is not avoided.

⚠️ WARNING

Indicates a **potential** hazard, which can result in serious injuries or even death if the hazard is not avoided.

⚠️ CAUTION

Refers to a **potentially dangerous** situation, which can result in medium or minor physical injuries or damages to property, if it is not avoided.

NOTICE

If this information is not observed, deterioration in the operation and/or property damage may occur.

IMPORTANT

Sections marked with this symbol point out important information on the product or on handling the product.
1.8.2 Symbols on the device

**Nuclear radiation**

The shielding is equipped with a radioactive source. Please note the handling instructions. Please observe the transport instructions in this operating manual.
2

Safety manual

2.1 Proper use

The source with shielding is used in connection with a detector and a suitable evaluation unit provided by BERTHOLD TECHNOLOGIES to measure the radiation intensity occurring during a radiometric measurement.

The shielding was developed as shielding/protective vessel for radioactive sources and may be used exclusively for this purpose.

Usually, the shielding contains a radioactive source. The notes on radiation protection contained in the present manual as well as any statutory requirements in this respect are to be strictly adhered to.

The following constitutes proper use:

- Adhering strictly to the instructions and operation sequences and not undertaking any different, unauthorised practices which could put your safety and the operational reliability of the shielding at risk!
- Observing the provided safety instructions!
- Carrying out the prescribed maintenance measures or having them carried out for you!

The following constitutes improper use and is to be avoided:

- Any non-compliance with the present operating manual for the supplied products
- Applying conditions and requirements which do not conform to those stated in the technical documents, data sheets, operation and assembly instructions and other specific guidelines of the manufacturer.
- Using the product after any repair carried out by employees who have not been authorized by BERTHOLD TECHNOLOGIES GmbH & Co. KG.
- Using the product in a damaged or corroded condition.
- Dismounting the unit while the radiation beam outlet is open (except for situations in which the locking mechanism is defective and the beam outlet can no longer be closed).
- Operation without the safety precautions provided by the manufacturer.
- Any modification to design and function, except for any activities provided for and described in the present manual.
- Restructuring or changing the system components.
- Manipulation or avoidance of existing safety equipment.

BERTHOLD TECHNOLOGIES GmbH & Co. KG shall only accept liability for / guarantee the correspondence of the product to its publicised specifications.
If the product is used in a way which is not described in this manual, the product's protection is compromised and the warranty becomes void.

2.2 Ambient conditions during operation and storage

The shielding was specifically designed for use in rough ambient conditions. The compliance with the operating conditions specified below contributes to guaranteeing the permanent functionality of the shielding and the prevention of damage.

Shieldings containing radioactive substances and sources are to be stored in a lockable storage room complying with the national requirements as regards the storage of radioactive substances.

Furthermore, the following prescribed ambient conditions are to be observed:

- The minimum admissible operating/storage temperature is -40°C. Below this temperature, the sealing rings of the shielding may become brittle. In such case, the leakproofness of the shielding can no longer be guaranteed.
- The maximum admissible operating/storage temperature is +100°C. Above this temperature, the sealing rings of the shielding may be destroyed. In such case, the leakproofness of the shielding can no longer be guaranteed.
- The higher the dust and dirt content of the environment, the more likely stiffness or an entire blockage of the locking mechanism is. For this reason, the functional test intervals (see chapter 6) should be adjusted to the ambient conditions.
- Highly combustible or explosive substances must not be kept in the vicinity of shieldings in order to prevent a fire from spreading to the radioactive substances.

2.3 Qualification of the Personnel

NOTICE

A minimum requirement for all work on or with the product would be employees with general knowledge who are instructed by an expert or authorised person.

At different parts in this manual, reference is made to personnel with certain qualifications who can be entrusted with different tasks during the installation, usage and maintenance.

The four groups this refers to are:

- Employees with general knowledge
- Experts
- Authorised Persons
- Radiation Safety Officer
Employees with General Knowledge

**NOTICE**

Employees with general knowledge must always be guided by an expert at the very least. When dealing with radioactive substances, a radiation safety officer must also be consulted.

Employees with general knowledge are e.g. technicians or welders who can undertake different tasks during the transportation, assembly and installation of the product under the guidance of an authorised person. This may also refer to construction site personnel. The persons in question must have experience in handling the product.

Experts

Experts are persons who have sufficient knowledge in the required area due to their specialist training and who are familiar with the relevant national health and safety regulations, accident prevention regulations, guidelines and recognised technical rules.

Expert personnel must be capable of safely assessing the results of their work and they must be familiar with the content of this manual.

Authorised Persons

Authorised persons are those who are either designated for the corresponding task due to legal regulations or those who have not been authorised by BERTHOLD TECHNOLOGIES for particular tasks. When dealing with radioactive materials, a radiation safety officer must also be consulted.

Radiation Safety Officer

In order to ensure proper handling and compliance with the statutory requirements, the company has to appoint a radiation safety officer in accordance with the applicable national law (in Germany: Strahlenschutzverordnung [German radiation protection regulation]). The radiation safety officer must implement the statutory radiation protection requirements in order to protect employees against damage to their health caused by handling radioactive materials.
2.4 Radiation Protection

2.4.1 Basic principles and regulations

The amount of radiation absorbed by the body (exposure to radiation) is determined by three parameters from which the basic radiation protection regulations can be derived:

**Distance**

If work close to equipment containing radioactive substances is required, the largest distance possible is to be kept. In particular, this shall apply for employees which do not immediately participate in such work.

**Time**

Any work required in the vicinity of radiometric measuring systems is to be prepared carefully and to be organised in a way that the work can be executed as quickly as possible. Here, providing the correct tools and aids is particularly important.

**Shielding**

When mounting and dismounting the shielding, it is to be ensured in advance that the radiation beam outlet is closed.
2.4.2 Exposure of employees to radiation

During installation, maintenance and decommissioning of the shielding, employees may be exposed to radiation.

In order to keep such exposure as low as possible, the shielding with the source may only be mounted and/or dismounted by authorized employees. Such authorised staff is to be instructed as regards all rules of behaviour when handling radioactive substances in advance.

It is to be ensured that the locking mechanism of the shielding is closed and secured in order to prevent the emission of unshielded radiation. Modification or damage to the shielding must be avoided at all times.

Work may only be executed according to the instructions and under the supervision of the radiation safety officer, who furthermore has to calculate or estimate the exposure of the employees to radiation in order to ensure that the statutory dose rate limits are not exceeded.

2.4.3 Theft protection

Radioactive substances or equipment containing radioactive substances must be secured in a way that they are protected against access by unauthorized persons. In the case of firmly installed equipment containing radioactive substances, the protection against unauthorized access is generally provided by the firmly attached installation.

Shieldings with radioactive sources which are decommissioned for a certain period of time must be dismounted and securely stored in a storage room complying with the national regulations as regards the storage of radioactive substances.

Portable measuring systems must never be left unsupervised. When this equipment is out of use, it is to be protected against access by unauthorised persons.

2.4.4 In the case of fire

The shielding material can melt and leak from the shielding if exposed to very high temperatures for an extended period of time. During and after a fire, there is a risk of major long-time consequences for your health due to the incorporation of lead as well as a risk of increased radiation exposure.

When planning the use of radiometric measuring systems, constructional measures ensuring fire prevention are to be provided.

- In the case of fire, these measures limit the access to this area.
- Avoid the incorporation by keeping sufficient distance.
- Notify BERTHOLD TECHNOLOGIES of the situation; you will promptly receive information on immediate measures.
2.5 **Operator's Obligations**

The operator of the product must regularly train his personnel in the following topics:

- Observation and use of the operating manual and the legal provisions.
- Proper use of the product.
- Observation of the plant security instructions and the operating instructions of the operator

2.6 **Type plate of the source**

![Type plate of the source diagram](image)

**Fig. 1** Type plate of the source

1 Date of manufacture of the source  
2 Isotope  
3 Activity [MBq]  
4 Dose rate within 1 m distance [$\mu$Sv/h]  
5 Manufacturer of the shielding  
6 Dose rate within 1 m distance [mrem/h]  
7 Activity [mCi]  
8 Source number
System Description

Shieldings for flange mounting are used as shielding and protective vessel for radioactive sources. The radioactive substance is contained in a tightly welded source capsule within the shielding.

Shieldings for flange mounting are available as shieldings for rod or point sources in different versions. These variants also differentiate with respect to the number of sources which can be included. There are shieldings for one, three or five sources. You can find an overview of all variants in the appendix.

![Fig. 2 Top view, shielding head with 1 / 3 / 5 sources](image)

Shieldings for flange mounting are used with measurement arrangements for which the radioactive sources are stored inside a vessel during the measurement. The sources can be moved from the shielding into the measuring position by means of a steel rope or a flexible shaft. The shielding is mounted at a dip tube, which protrudes into the vessel from above, from below or at the side, depending on the constructive circumstances.

In addition to the sources and the shielding, additional system components such as detectors and evaluation units are required for a complete measuring system. Usage of these system components is not subject of this operating manual. Please refer to the individual manuals of the respective system components.

The shielding vessel consists of a robust stainless steel housing filled with lead. In order to close the shielding, a rotatable locking cylinder is installed. The locking cylinder can be rotated by means of a locking lever and be secured with a padlock.

The shielding is mounted at the dip tube by means of the fastening flange.

**The shielding has the following functions:**

- Shielding radiation to a level that is non-hazardous for the operating personnel
- Locking the radiation beam outlet channel for transport and during installation
- Protecting the integrated source capsule from mechanical damage and the effects of the surrounding environment
3.1 View

1 Coupling element of the source holder
2 Source holder
3 Source
4 Locking cylinder with locking lever
5 Housing
6 Shielding material
7 Clamping screw
8 Shielding head with cover

Fig. 3 Sectional view, example: Point source shielding with 1 source
Fig. 4  View, point source shielding, LB 8115 / 8120

Fig. 5  View, point source shielding, LB 8125

1 Shielding head with cover
2 Padlock
3 Sling gear
4 Fastening flange
5 Padlock
6 Locking cylinder with locking lever
7 Housing with shielding material
3 System Description

Shieldings for flange mounting

Fig. 6 View, rod source shielding, DN 160

1 Padlock
2 Shielding head with cover
3 Sling gear
4 Fastening flange
5 Padlock
6 Locking cylinder with locking lever
7 Housing with shielding material
4 Installation

4.1 Safety Instructions

⚠️ WARNING

Danger of injury by falling loads

- Never stand underneath a lifted or suspended load, keep at a safe distance.
- Only use tested sling gear components appropriate for the transport weight.
- Exclusively use the provided fixing possibilities (lifting brackets) for attaching the sling gear.
- Observe the marking for the centre of gravity on the outer packaging, if applicable.
- Wear head protection and safety shoes.

⚠️ CAUTION

Danger of injury caused by heavy and bulky system components

- Heavy and bulky system components should only be handled using aids and by at least 2 persons.
- Observe the guidelines for safe handling of heavy loads.
- Ensure stability and use the provided fixing possibilities.

⚠️ CAUTION

Danger caused by nuclear radiation

Shieldings usually contain radioactive sources. An increased exposure to radiation may lead to damage to health.

- Consult the radiation safety officer responsible for your company.
- Transport the source exclusively inside the closed and secured shielding.

IMPORTANT

The applicable national regulations of the country of use have to be observed.
4.2 Packaging

The shielding with radioactive source is supplied in a package which corresponds to the regulations for the transport of radioactive substances (type A packaging).

4.3 Intermediate storage of the source

If the source must be intermediately stored at the site of use between delivery and installation, please observe the following notes:

- Store the source exclusively inside a closed and secured shielding.
- Store the shielding in a lockable and properly marked room. The storage room must comply with the national requirements regarding the storage of radioactive substances.
- Accessible areas of increased radiation exposure must be marked and closed off, if required.

4.4 Preparing the Installation

**IMPORTANT**

Size and position of the applicable measuring range are specified in the project planning phase and determined by means of drawings, sketches or written notes. During installation, these specifications must be strictly observed since deviations may lead to malfunction of the measuring system.

To avoid an unnecessary exposure to radiation, the handling period of the source (even if it is shielded) must be kept as short as possible during installation. It is therefore recommended to perform the following steps prior to delivery of the source:

- Installation planning (incl. estimation of radiation exposure)
- Instruction of the employees
- Organising and cleaning the installation site
- Preparing the required tools and hoisting devices
- Removing all obstacles which might hinder the installation of the shielding or the source

4.5 Checking the delivery

1. Check the delivery for completeness using the packing list.
2. Clean the parts, if required
3. In the case of damage, immediately notify the forwarding agent and the manufacturer.
4.6 Installation of the shielding

To avoid unnecessary exposure to radiation, install the shielding as final system component.

**Tip**

If the shielding contains a radioactive source, the measurement of the background count rate of the detector should take place before the shielding is installed.

---

1. Ensure that the shielding has been closed and secured:
   - The locking cylinder is turned to the CLOSED position.
   - The padlock (2) is attached.

**IMPORTANT**

For some specific applications, it is important to identify any damage to the dip tube in order to secure the radioactive source before it is damaged. Figures 8 and 9 show installation proposals which meet the most stringent safety requirements. For this purpose, a double-walled protection tube whose interspace is filled with shielding gas is used. Via a pressure switch, any damage or leak is recognized immediately.
2. Position the shielding (1) in its installation position at the fastening flange (2) on the dip tube (8) of the vessel. The operator has to attach the dip tube to the vessel from above or from below or on the side, depending on the constructive circumstances. The required flange dimensions can be obtained from the dimensional drawings in chapter 10.
**Tip**

Various versions of flange adapters are available from BERTHOLD TECHNOLOGIES GmbH & Co. KG Further information can be found in chapter 7.

3. Install the shielding in the final position using the fastening screws.

**NOTICE**

The shielding as well as the sources must **not** be subjected to process pressure!
5 Usage

5.1 Safety instructions

⚠️ CAUTION

Danger caused by nuclear radiation
Shieldings usually contain radioactive sources. An increased exposure to radiation may lead to damage to health.

- Consult the radiation safety officer responsible for your company.
- Ensure that the shielding does not show any signs of damage or functional limitations.
- Please observe the instructions on regular maintenance.

5.2 Moving the source into its measurement position

Depending on the respective measurement arrangement, either a steel rope or a flexible shaft is included in the scope of delivery of each source. By means of the steel rope or the flexible shaft, the radioactive source can be moved into its measurement position within the dip tube in the vessel.

The locking mechanism is used for opening and closing the beam path.
5.2.1  Latching the steel rope or flexible shaft into place

1. If applicable, remove the padlock (2) on the shielding head cover.
2. Remove the cover (1) by pulling it upwards.
   ▶ By doing so, the coupling element of the source holder (4) and the clamping screw (3) become accessible.

**NOTICE**

Upon delivery, the sources are fixed in the shielding by means of clamping screws.
Open the clamping screw on an open shielding only if the source is fixed to the steel rope or the flexible shaft.
3. Latch (1) one steel rope or one flexible shaft (2) at each source holder.

4. Ensure that all steel ropes or flexible shafts are correctly latched in place. A snapping mechanism prevents the connection from detaching on its own. Open the locking mechanism.
5.2.2 Open the locking mechanism

**IMPORTANT**

During transport and installation of the shielding, the locking cylinder must be set to CLOSED and be secured.

**IMPORTANT**

The locking mechanism may only be operated by persons who are at least employees with general knowledge and were instructed by an expert or authorized person. If the shielding includes a radioactive source, the responsible radiation safety officer must be consulted.

Proceed as follows to open the shielding:

1. Remove the padlock at the locking cylinder.

**NOTICE**

Ensure that all sources are secured by means of the clamping screws and that all steel ropes or flexible shafts are latched in place. Unsecured sources will fall into the dip tube when opening making a high-effort recovery operation under the supervision of the radiation safety officer necessary.

1. Manually turn the locking cylinder (1) to the OPEN position.

Fig. 12 Shielding open (OPEN position)
5. Usage Shieldings for flange mounting

**IMPORTANT**

In some countries, securing the shielding in the open position is prohibited for reasons of radiation protection. The applicable national regulations of the country of use have to be observed.

2. Secure the locking cylinder in the new position, if applicable by means of the padlock.
   - The sources can now be moved to their measurement position.

5.2.3 Inserting the source into the dip tube

Use the steel rope or the flexible shaft to move all sources into the desired measurement position subsequently:

**Tip**

The sources are marked with numbers. Use these numbers for stipulating the order in which the individual sources are inserted into the dip tube.

Example for shieldings for 3 sources:

- Source 1 for measurement position at the bottom of the dip tube.
- Source 2 for measurement position in the centre of the dip tube.
- Source 3 for measurement position at the top of the dip tube.

1. **When using a steel rope:** Via the supplied positioning screw at the steel rope, set the desired depth of immersion into the dip tube.

2. **When using a steel rope:** Tighten the steel rope, open the respective clamping screw and lower the source on the steel rope until it reaches the set depth of immersion into the dip tube.

   **When using a flexible shaft:** Open the respective clamping screw and move the source into the desired measurement position. Via the clamping screw, set the desired depth of immersion into the dip tube.
3. Close the shielding head by means of the cover (1).
4. Secure the cover using the padlock (2).

► The commissioning has now been completed.
5.3 Moving the source into its shielding position

In order to implement maintenance work, it might be necessary to move the source back into its shielding.

5.3.1 Moving the source back into its shielding

Fig. 14  Removing the cover, example: Point source shielding with 1 source

1. Remove the padlock (2) at the shielding head.
2. Remove the cover (1) at the shielding head by pulling it upwards.
3. Use a steel rope or flexible shaft to subsequently retract all sources into the shielding and secure all sources with the respective clamping screw (3). Here, the correct order is to be strictly observed: The uppermost source is to be retracted first!
4. Close the locking mechanism, see chapter 5.3.2.
5. Reattach the cover of the shielding head (1). Here, it might be required to unlatch the steel ropes or the flexible shafts.

6. Secure the cover using the padlock (2).
5.3.2 Closing the locking mechanism

**NOTICE**

Ensure that all sources are retracted into the shielding and secured by means of the clamping screws. If sources remain in the measurement position, the steel rope is sheared off when the shielding is closed and the source falls into the dip tube.

Fig. 16 Shielding closed (CLOSED position)

1. If applicable, remove the padlock.
2. Move the locking cylinder (2) to the CLOSED position.
3. Secure the locking cylinder in its new position by means of the padlock (1).
6 Maintenance and Repair

6.1 Safety Instructions

⚠️ CAUTION

Danger caused by nuclear radiation
Shieldings usually contain radioactive sources. An increased exposure to radiation may lead to damage to health.

- Consult the radiation safety officer responsible for your company.
- Ensure that no one is in the radiation beam during operation.
- Longer repair and maintenance work on shieldings must not be carried out with the source installed. If a removal of the source is not possible, please contact the manufacturer.

❗️ IMPORTANT

The applicable national regulations of the country of use have to be observed.

❗️ IMPORTANT

Document the results of the tests you conducted using the check list in the appendix. This documentation as well as the seal test certificates must be kept during the entire life cycle of the shielding.

❗️ NOTICE

Adjust the intervals of the visual inspection and the functional check to the ambient conditions. If the ambient conditions are especially rough, the atmosphere is corrosive and / or there is a serious threat of contamination, the intervals should be shortened accordingly.

❗️ NOTICE

If any damage affecting the secure function of the shielding is detected during handling, maintenance or regular checks, the damage is to be repaired after consultation with BERTHOLD TECHNOLOGIES GmbH & Co KG before the system is used again. Only spare parts specified by BERTHOLD TECHNOLOGIES GmbH & Co. KG may be used and required repair work may be carried out by authorized persons only.
6.2 Visual inspection

The visual inspection must be carried out by persons who are at least employees with general knowledge at the following intervals:

- before initial commissioning
- with every repair that may be required
- regularly at least every six months
- before dispatch

When determining the intervals for the visual inspection, the following conditions are to be considered:

- ambient conditions (outdoors, rain, sunlight, wind)
- operating conditions (degree of utilisation of the plant, misuse)

Performing the visual inspection:

1. Check the shielding for obvious damage (dents, cracks, holes etc.) and corrosion.

2. Before dispatch only: Ensure that all sources are inside the shielding and that the shielding is closed and secured with the padlock.

Tip

If there is any doubt whether or not the sources are in the shielding: Check the dose rate at the shielding using a dose rate measuring device.

When the sources are in the shielding, the dose rate at the shielding must be measurably higher than the dose rate which is generated by the natural background radiation.

3. If any defects are identified during visual inspection, inform the radiation safety officer who will initiate the measures required for repairing the defects.

For further information, please contact the manufacturer.
6.3 Leak test

Depending on the supervisory authority responsible for the area where the source is used, regular leak tests must be carried out. These tests are to be carried out at the discretion of the competent supervisory authority either by an authorized expert or by the manufacturer. For this test, the corresponding source documentation must be made available.

Required documents

- Inventory list of the sources to be tested including indication of previous leak tests.
- **Source certificates containing the following information:** Nuclide, activity, procurement date, physical/chemical form, description of the enclosure and type of sealing, resistance against mechanical and thermal influences or classification of the source design. The source certificate is provided together with the source.
- Information on the location, application as well as on the maximum customary mechanical and thermal strains.
- If the source is installed in a device, a drawing is to be provided. In the drawing, the position of the source and of all parts intended to protect the source against external influences must be clearly indicated. Recommendations regarding the most appropriate test method should be given, e.g. by indicating alternative test areas. If required, recommendations should be present on how the necessary tests can be conducted without affecting the functionality of the system or device.
Alternative test areas:

Alternative test areas are areas of a shielding which will most likely be contaminated if a source is leaking.

The following alternative test areas are available at the shielding:
- the area marked in grey at the shielding head (1)
- the area marked in grey at the locking mechanism (2)

1. Conduct the contamination test at one of the alternative test areas.

**IMPORTANT**

During the leak test, it is to be taken into consideration that the normal operating position of the radioactive sources is the measurement position outside of the shielding in the dip tube.
6.4 Checking the source position and locking mechanism

The functional test of the locking mechanism must be carried out by a person who is at least an employee with general knowledge. We recommend conducting the test of the locking mechanism at the same intervals as the visual inspection if the operating condition of the system allows.

**NOTICE**

Only close the locking mechanism when all sources are retracted into the shielding and secured by means of the clamping screws.

If sources remain in the measurement position, the steel rope is sheared off when the shielding is closed and the source falls into the dip tube.

**NOTICE**

Only open the locking mechanism when all sources are fixed to the steel rope or the flexible shaft and secured by means of clamping screws.

Non-secured sources will fall down into the dip tube when opening the shielding.

1. Move all sources into the shielding position, see chapter 5.3. When all sources are located inside the shielding, the measurement value must roughly correspond to the maximum value.

2. All steel ropes or flexible shafts as well as the related coupling elements of the source holders have to be undamaged. If corrosion occurs, it must not affect the function and stability of these elements. In the event of damage and/or corrosion, the affected elements are to be replaced.

3. Close and open the locking mechanism several times. The locking mechanism functions properly when it can be moved manually and without the need for aids.

**Tip**

Additionally, the dose rate can be measured at the shielding. When the sources are in the shielding, the dose rate at the shielding must be measurably higher than the dose rate which is generated by the natural background radiation.

4. Move the source back into the starting position, see chapter 5.

5. Immediately report any malfunction or stiffness of the locking mechanism to the competent radiation safety officer.
6.5 Removing and installing the source

Before conducting extended maintenance work at the shielding, you have to remove the source. After the maintenance work is finished, you can reinstall the source. This does require the direct handling of the unshielded source.

You must clarify with the responsible supervisory authority in advance whether your license for handling radioactive substances comprises handling unshielded sources.

In any case, the source may only be installed/removed by authorised persons. The competent radiation safety officer is responsible for planning and monitoring the work.

**NOTICE**

In order to keep the exposure to radiation during the removal / installation of the source as low as possible, all persons involved should familiarise themselves with the exact procedure in advance.

**NOTICE**

Only remove and/or install the sources in areas with closed floors. Any apertures which are larger than the external diameter of the source (7mm for rod sources and 15mm for point sources) are to be securely covered before commencing any work.

6.5.1 Removing the source

For removing the source, the following tools are required:

- pliers to securely grip the source
- a rod for sliding the source with a diameter of 7 mm

**Dismounting the shielding**

1. Prepare the transport shielding for the sources and open the transport shielding.
2. Move all sources into the shielding position, see chapter 5.3.
3. Dismount the entire shielding from the dip tube.
4. Place the shielding on a level surface.
1. Remove the cover of the shielding head by pulling it upwards.
   - By doing so, the source holder and the clamping screws become accessible.

2. Unlatch the steel rope or the flexible shaft at the source holder.

3. If applicable, open the clamping screw (1).

4. With the rod (3), slide the source at the coupling piece of the source holder (2) out of the shielding until it protrudes at the bottom of the fastening flange.
   - From the flange side, the source can now be completely pulled out of the shielding.
Inserting the source into the transport shielding

1. Use the pliers to pull the source completely out of the shielding from the flange side.

2. Insert the source into the prepared transport shielding as quickly as possible.

3. Close the transport shielding.
6.5.2 Installing the source

To install the source, the following tools are required:

- pliers to securely grip the source
- rod for sliding the source (diameter 7mm)

To install the source, proceed as follows:

1. Position the shielding in which the source is to be installed in a way that the bottom side of the fastening flange is accessible and open the locking mechanism.
2. Prepare the transport shielding with the source to be installed.
3. Open the transport shielding.
4. Pull the source out of the transport shielding using the pliers.
5. Insert the source into the shielding as quickly as possible, with the coupling element of the source holder first.

6. By means of the rod (3), carefully continue to slide the source in the direction of the shielding head until the stop end.

7. Secure the source with the respective clamping screw.

8. Close the locking mechanism, see chapter 5.3.2.

9. Remount the shielding at the dip tube, see chapter 4.6.

10. Move the source into its measurement position, see chapter 5.2.
6.6 Replacing the source

When to replace the source
Generally, the radioactive source used enables a service life between 5 and 10 years. A replacement of the source is only required if the statistical fluctuations of the output signal are inadmissibly large and compensation by increasing the time constant is no longer possible, e.g. for control-technical reasons.

Manufacturer’s number for reordering
When reordering, always indicate the manufacturer’s number of the source used since the new source must correspond to the original version.

The manufacturer’s number consists of three number groups, e.g.:

1234 – 11 – 09

The first number group is a consecutive number, the second group refers to the month of manufacture (here: November) and the third one refers to the year of manufacture (here: 2009).

The manufacturer’s number can be found on the type plate of the shielding as well as on the individual seal test certificate of each source.

Replacing the source
Replacing the source does require the direct handling of the unshielded source.

You must clarify with the responsible supervisory authority in advance whether your license for handling radioactive substances comprises handling unshielded sources.

In any case, the source may only be installed/removed by authorised persons. The competent radiation safety officer is responsible for planning and monitoring the work.

NOTICE
In order to keep the exposure to radiation during the removal / installation of the source as low as possible, all persons involved should familiarise themselves with the exact procedure in advance.

NOTICE
Only remove and/or install the sources in areas with closed floors. Any apertures which are larger than the external diameter of the source (7mm for rod sources and 15mm for point sources) are to be securely covered before commencing any work.
To replace the source, the following tools are required:

- pliers to securely grip the source
- a rod for sliding the source with a diameter of 7 mm

To replace the source, proceed as follows:

1. Prepare the transport shielding and open it.
2. Remove the old source from the shielding and insert the old source in the transport shielding, see chapter 6.5.1.
3. Check the shielding for damage and wear and repair it if required (see chapter 6.2).
4. Remove the type plate of the old source from the shielding and rivet on the new type plate.
5. Install the new source in the shielding, see chapter 6.5.2.
## Accessories

### Available accessories

<table>
<thead>
<tr>
<th>Part number</th>
<th>Accessory part</th>
</tr>
</thead>
<tbody>
<tr>
<td>41351</td>
<td>Stainless steel rope (1.4404) for positioning the source</td>
</tr>
<tr>
<td>41352</td>
<td>Stainless steel flexible shaft (1.4404) for positioning the source</td>
</tr>
<tr>
<td></td>
<td>Flange adapter, available in different versions</td>
</tr>
</tbody>
</table>

**IMPORTANT**

If you have any questions regarding accessories or spare parts, please contact the service department of **BERTHOLD TECHNOLOGIES GmbH & Co. KG**, Calmbacher Str.22, 75312 Bad Wildbad, Germany, [www.berthold.com](http://www.berthold.com), Tel.: +49 7081-177-0, Fax: +49 7081-177-100, industry@berthold.com.
7 Accessories

Shieldings for flange mounting

7.1 Steel rope

![Steel rope diagram]

Fig. 22 Steel rope for positioning the source

7.2 Flexible shaft

![Flexible shaft diagram]

Fig. 23 Flexible shaft for positioning the source

7.3 Flange adapter

![Flange adapter diagram]

Fig. 24 Flange adapter

The figure shows an example for a flange adapter. Various versions of flange adapters are available at BERTHOLD TECHNOLOGIES GmbH & Co. KG.
8 Decommissioning

8.1 Safety instructions

⚠️ WARNING

Danger of injury by falling loads

- Never stand underneath a lifted or suspended load, keep at a safe distance.
- Only use tested sling gear components appropriate for the transport weight.
- Exclusively use the provided fixing possibilities (lifting brackets) for attaching the sling gear.
- Wear head protection and safety shoes.

⚠️ CAUTION

Danger of injury caused by heavy and bulky system components

- Heavy and bulky system components should only be handled using aids and by at least 2 persons.
- Observe the guidelines for safe handling of heavy loads.
- Ensure stability and use the provided fixing possibilities.

⚠️ CAUTION

Danger caused by nuclear radiation

Shieldings usually contain radioactive sources. An increased exposure to radiation may lead to damage to health.

- Consult the radiation safety officer responsible for your company.
- Transport the source exclusively inside the closed and secured shielding.

⚠️ IMPORTANT

The applicable national regulations of the country of use have to be observed.
8 Decommissioning

8.2 Decommissioning the shielding

For decommissioning, proceed as follows:

1. Ensure that the shielding has been closed and secured
   ▶ the arrow on the locking cylinder points in the CLOSED direction
   ▶ the transport securing device is mounted

2. Dismount the shielding.

8.3 Disposal of radioactive substances

**NOTICE**

Should you have any questions regarding the transportation or disposal of sources, please contact the manufacturer.

Generally, each country has a depot where radioactive material is accepted and can be disposed of.

8.4 Dispatch of radioactive substances

If you wish to dispatch radioactive material, you must observe the international regulations for the transport of dangerous goods and for radiation protection as well as any applicable national regulations. It is the full responsibility of the sender to comply with these regulations.

Please also note the following:

- Dose rate at the surface of the packaging must be lower than 2000 μSv/h.
- Dose rate at a distance of 1m from the surface of the packaging must be lower than 100 μSv/h.
- The packaging must be marked with the UN number and a sign indicating dangerous goods.
- Furthermore, transport documents with the correct description of the content as well as an accident procedures sheet according to the ADR regulations are required.
- Packaging must comply with the current ADR regulations (European Agreement concerning the International Carriage of Dangerous Goods by Road).
- The cargo must be secured in the transport vehicle according to the applicable national and international regulations.
- Before dispatch, each shielding containing a source must be subjected to a visual inspection by the user (chapter 6.2). The shieldings may only be dispatched if the test requirements are met.
- At the time of dispatch, a valid certificate concerning the leakproofness of the source must be available.
Preconditions for the return to BERTHOLD TECHNOLOGIES GmbH & Co. KG:

- Radioactive substances and their shieldings must not be damaged in any way and a respective, valid seal test certificate must be provided. The seal test certificate issued before the arrival of the radioactive substances in Germany may not be older than 6 months.
- If radioactive sources with isotope Am-241 or Cm-244 are returned, the special form certificate must be attached.
- At all times, any radioactive material sent to us must be sufficiently labelled with your name and address. If we have sent you a quotation in advance, our quotation number must be indicated, as well.
- Radioactive substances may only be returned after the respective approval by BERTHOLD TECHNOLOGIES GmbH & Co. KG. We are pleased to send you a quotation regarding the costs.
- Radioactive substances must be sent to Bad Wildbad, Germany, carriage paid. BERTHOLD TECHNOLOGIES GmbH & Co. KG will not assume any costs for customs clearance or transportation.
- BERTHOLD TECHNOLOGIES GmbH & Co. KG is to be informed about any return transport in advance. BERTHOLD TECHNOLOGIES GmbH & Co. KG will reject any radioactive substances sent to Berthold without prior notice. Any storage costs accrued in such case shall be borne by the sender.
- A copy of the attached notice form and the seal test certificate must be attached to each shielding that includes a radioactive source. The original is to be included in the transport documents. Beforehand, the documents are to be sent to our department for the disposal of sources and repairs.

Use the following notice form to return sources or shieldings to us:
## Technical Information

### 9.1 Technical data DN 100

<table>
<thead>
<tr>
<th>Variant</th>
<th>Number of sources</th>
<th>Housing</th>
<th>Shielding</th>
<th>Operational temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN 100 (1)</td>
<td>1</td>
<td>1.4301</td>
<td>44 mm lead</td>
<td>-40°…+100°C</td>
</tr>
</tbody>
</table>

### 9.2 Technical data DN 127

<table>
<thead>
<tr>
<th>Variant</th>
<th>Number of sources</th>
<th>Housing</th>
<th>Shielding</th>
<th>Operational temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN 127 (3)</td>
<td>3</td>
<td>1.4301</td>
<td>37 mm lead</td>
<td>-40°…+100°C</td>
</tr>
</tbody>
</table>

### 9.3 Technical data DN 140

<table>
<thead>
<tr>
<th>Variant</th>
<th>Number of sources</th>
<th>Housing</th>
<th>Shielding</th>
<th>Operational temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN 140 (1)</td>
<td>1</td>
<td>1.4301</td>
<td>59 mm lead</td>
<td>-40°…+100°C</td>
</tr>
</tbody>
</table>

### 9.4 Technical data DN 160

<table>
<thead>
<tr>
<th>Variant</th>
<th>Number of sources</th>
<th>Housing</th>
<th>Shielding</th>
<th>Operational temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN 160 (5)</td>
<td>5</td>
<td>1.4301</td>
<td>48 mm lead</td>
<td>-40°…+100°C</td>
</tr>
<tr>
<td>DN 160 (1)</td>
<td>1</td>
<td>1.4301</td>
<td>69 mm lead</td>
<td>-40°…+100°C</td>
</tr>
</tbody>
</table>

### 9.5 Technical data DN 200

<table>
<thead>
<tr>
<th>Variant</th>
<th>Number of sources</th>
<th>Housing</th>
<th>Shielding</th>
<th>Operational temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN 200 (5)</td>
<td>5</td>
<td>1.4301</td>
<td>76 mm lead</td>
<td>-40°…+100°C</td>
</tr>
<tr>
<td>DN 200 (3)</td>
<td>3</td>
<td>1.4301</td>
<td>81 mm lead</td>
<td>-40°…+100°C</td>
</tr>
<tr>
<td>DN 200 (1)</td>
<td>1</td>
<td>1.4301</td>
<td>97 mm lead</td>
<td>-40°…+100°C</td>
</tr>
</tbody>
</table>
## 9.6 Technical data DN 270

<table>
<thead>
<tr>
<th>Variant</th>
<th>Number of sources</th>
<th>Housing</th>
<th>Shielding</th>
<th>Operational temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN 270 (5)</td>
<td>5</td>
<td>1.4301</td>
<td>104 mm lead</td>
<td>-40°...+100°C</td>
</tr>
<tr>
<td>DN 270 (3)</td>
<td>3</td>
<td>1.4301</td>
<td>110 mm lead</td>
<td>-40°...+100°C</td>
</tr>
<tr>
<td>DN 270 (1)</td>
<td>1</td>
<td>1.4301</td>
<td>126 mm lead</td>
<td>-40°...+100°C</td>
</tr>
</tbody>
</table>

## 9.7 Technical data LB 81xx

<table>
<thead>
<tr>
<th>Variant</th>
<th>Number of sources</th>
<th>Housing</th>
<th>Shielding</th>
<th>Attenuation factor</th>
<th>Operational temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>LB 8115-01</td>
<td>1</td>
<td>1.4301</td>
<td>69 mm lead</td>
<td>approx. 30 (Co-60) approx. 700 (Cs-137)</td>
<td>-40°...+100°C</td>
</tr>
<tr>
<td>LB 8115-02</td>
<td>1</td>
<td>1.4301</td>
<td>69 mm lead</td>
<td>approx. 30 (Co-60) approx. 700 (Cs-137)</td>
<td>-40°...+100°C</td>
</tr>
<tr>
<td>LB 8115-20</td>
<td>2</td>
<td>1.4301</td>
<td>50 mm lead</td>
<td>approx. 21 (Co-60) approx. 420 (Cs-137)</td>
<td>-40°...+100°C</td>
</tr>
<tr>
<td>LB 8120-01</td>
<td>1</td>
<td>1.4301</td>
<td>99 mm lead</td>
<td>approx. 180 (Co-60) approx. 16000 (Cs-137)</td>
<td>-40°...+100°C</td>
</tr>
<tr>
<td>LB 8120-02</td>
<td>1</td>
<td>1.4301</td>
<td>99 mm lead</td>
<td>approx. 180 (Co-60) approx. 16000 (Cs-137)</td>
<td>-40°...+100°C</td>
</tr>
<tr>
<td>LB 8120-20</td>
<td>2</td>
<td>1.4301</td>
<td>80 mm lead</td>
<td>approx. 100 (Co-60) approx. 11000 (Cs-137)</td>
<td>-40°...+100°C</td>
</tr>
<tr>
<td>LB 8120-30</td>
<td>3</td>
<td>1.4301</td>
<td>79 mm lead</td>
<td>approx. 100 (Co-60) approx. 11000 (Cs-137)</td>
<td>-40°...+100°C</td>
</tr>
<tr>
<td>LB 8125-01</td>
<td>1</td>
<td>1.4301</td>
<td>151 mm lead</td>
<td>approx. 4000 (Co-60) approx. 3x10^6 (Cs-137)</td>
<td>-40°...+100°C</td>
</tr>
</tbody>
</table>
9.8 Maximum permissible activities during transport

**NOTICE**

The activities indicated here are the maximum activities with which the individual shieldings can be loaded according to the international dose rate limit for the transport of radioactive substances (2000 μSv/h at the surface of the package and 100 μSv/h at a distance of one meter from the surface). National dose rate limits for the operation of measurement systems are usually significantly lower and only allow loading with significantly lower activities. The national provisions must be complied with.

**NOTICE**

For rod source shieldings, the maximum activity for each mm of source length is indicated and is applicable to an equal activity distribution. In addition to the maximum activity per mm, the limit values for type A, packages 399 GBq / 10,8 Ci (Co-60) and/or 600 GBq / 16 Ci (Cs-137) must not be exceeded. If a shielding contains several source (or source parts), the sum of the activities of all source (or source parts) is relevant for the compliance with all limit values.

<table>
<thead>
<tr>
<th>Shielding model</th>
<th>Maximum activity (Co-60)</th>
<th>Maximum activity (Cs-137)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rod source shieldings</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DN 100 (1)</td>
<td>1.48 MBq / 0.04 mCi per mm</td>
<td>85 MBq / 2.3 mCi per mm</td>
</tr>
<tr>
<td>DN 127 (3)</td>
<td>0.925 MBq / 0.025 mCi per mm</td>
<td>37 MBq / 1 mCi per mm</td>
</tr>
<tr>
<td>DN 140 (1)</td>
<td>5.55 MBq / 0.15 mCi per mm</td>
<td>592 MBq / 16 mCi per mm</td>
</tr>
<tr>
<td>DN 160 (5)</td>
<td>2.22 MBq / 0.06 mCi per mm</td>
<td>166.5 MBq / 4.5 mCi per mm</td>
</tr>
<tr>
<td>DN 160 (1)</td>
<td>11.1 MBq / 0.3 mCi per mm</td>
<td>592 MBq / 16 mCi per mm</td>
</tr>
<tr>
<td>DN 200 (5)</td>
<td>18.5 MBq / 0.5 mCi per mm</td>
<td>592 MBq / 16 mCi per mm</td>
</tr>
<tr>
<td>DN 200 (3)</td>
<td>22.2 MBq / 0.6 mCi per mm</td>
<td>592 MBq / 16 mCi per mm</td>
</tr>
<tr>
<td>DN 200 (1)</td>
<td>55.5 MBq / 1.5 mCi per mm</td>
<td>592 MBq / 16 mCi per mm</td>
</tr>
<tr>
<td>DN 270 (5)</td>
<td>92.5 MBq / 2.5 mCi per mm</td>
<td>592 MBq / 16 mCi per mm</td>
</tr>
<tr>
<td>DN 270 (3)</td>
<td>129.5 MBq / 3.5 mCi per mm</td>
<td>592 MBq / 16 mCi per mm</td>
</tr>
<tr>
<td>DN 270 (1)</td>
<td>370 MBq / 10 mCi per mm</td>
<td>592 MBq / 16 mCi per mm</td>
</tr>
<tr>
<td><strong>Point source shieldings</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LB 8115-01</td>
<td>555 MBq / 15 mCi</td>
<td>24 GBq / 650 mCi</td>
</tr>
<tr>
<td>LB 8115-02</td>
<td>555 MBq / 15 mCi</td>
<td>24 GBq / 650 mCi</td>
</tr>
<tr>
<td>LB 8115-20</td>
<td>222 MBq / 6 mCi</td>
<td>7.4 GBq / 200 mCi</td>
</tr>
<tr>
<td>LB 8120-01</td>
<td>5.9 GBq / 160 mCi</td>
<td>133 GBq / 3.6 Ci</td>
</tr>
<tr>
<td>LB 8120-02</td>
<td>5.9 GBq / 160 mCi</td>
<td>133 GBq / 3.6 Ci</td>
</tr>
<tr>
<td>LB 8120-20</td>
<td>2.9 GBq / 80 mCi</td>
<td>37 GBq / 1.0 Ci</td>
</tr>
<tr>
<td>LB 8120-30</td>
<td>2.9 GBq / 80 mCi</td>
<td>37 GBq / 1.0 Ci</td>
</tr>
<tr>
<td>LB 8125-01</td>
<td>399 GBq / 10,8 Ci</td>
<td>600 GBq / 16 Ci</td>
</tr>
</tbody>
</table>
## 10 Appendices

### 10.1 Check lists for tests

#### Visual inspection

<table>
<thead>
<tr>
<th>Requirement</th>
<th>met</th>
<th>not met</th>
</tr>
</thead>
<tbody>
<tr>
<td>The shielding must be free from damage.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The type plates must be legible.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If there is corrosion, it must not affect the function and stability of the shielding.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Only before dispatch: All sources must be located in the shielding.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Only before dispatch: The locking mechanism must be closed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Only before dispatch: The padlock must be installed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name of inspector: Date: Signature:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Checking the source position and locking mechanism

<table>
<thead>
<tr>
<th>Requirement</th>
<th>met</th>
<th>not met</th>
</tr>
</thead>
<tbody>
<tr>
<td>It must be possible to easily slide all sources into the shielding.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>When the sources are located inside the shielding, the measurement signal of the related measurement system must roughly correspond to the maximum value.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>When the dose rate is measured at the shielding, the dose rate at the shielding must be measurably higher than the dose rate which is created by the natural background radiation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All steel ropes or flexible shafts as well as the related coupling elements of the source holders have to be undamaged. If there is corrosion, it must not affect the function and stability of these elements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>It must be possible to move the locking mechanism completely back and forth between the two positions (OPEN / CLOSED).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>It must be possible to turn the locking mechanism with one hand and without needing aids.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Name of inspector:**

**Date:**

**Signature:**
## Variant overview Rod source shieldings

<table>
<thead>
<tr>
<th>Variant</th>
<th>Part number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN 100</td>
<td>40876-01</td>
<td>Nominal diameter: 100 mm, length: 976 mm, maximum source length: 640 mm, weight: approx. 85 kg, flange: DN 125 / PN 16, for 1 source</td>
</tr>
<tr>
<td></td>
<td>40876-02</td>
<td>Nominal diameter: 100 mm, length: 1176 mm, maximum source length: 840 mm, weight: approx. 104 kg, flange: DN 125 / PN 16, for 1 source</td>
</tr>
<tr>
<td></td>
<td>40876-03</td>
<td>Nominal diameter: 100 mm, length: 1376 mm, maximum source length: 1040 mm, weight: approx. 122 kg, flange: DN 125 / PN 16, for 1 source</td>
</tr>
<tr>
<td></td>
<td>40876-04</td>
<td>Nominal diameter: 100 mm, length: 1576 mm, maximum source length: 1240 mm, weight: approx. 142 kg, flange: DN 125 / PN 16, for 1 source</td>
</tr>
<tr>
<td></td>
<td>40876-05</td>
<td>Nominal diameter: 100 mm, length: 1776 mm, maximum source length: 1440 mm, weight: approx. 164 kg, flange: DN 125 / PN 16, for 1 source</td>
</tr>
<tr>
<td></td>
<td>40876-06</td>
<td>Nominal diameter: 100 mm, length: 1976 mm, maximum source length: 1640 mm, weight: approx. 182 kg, flange: DN 125 / PN 16, for 1 source</td>
</tr>
<tr>
<td></td>
<td>40876-07</td>
<td>Nominal diameter: 100 mm, length: 2176 mm, maximum source length: 1840 mm, weight: approx. 201 kg, flange: DN 125 / PN 16, for 1 source</td>
</tr>
<tr>
<td>DN 127</td>
<td>40864-01</td>
<td>Nominal diameter: 127 mm, length: 1075 mm, maximum source length: 640 mm, weight: approx. 127 kg, flange: DN 125 / PN 16, for 3 sources</td>
</tr>
<tr>
<td></td>
<td>40864-02</td>
<td>Nominal diameter: 127 mm, length: 1275 mm, maximum source length: 840 mm, weight: approx. 154 kg, flange: DN 125 / PN 16, for 3 sources</td>
</tr>
<tr>
<td></td>
<td>40864-03</td>
<td>Nominal diameter: 127 mm, length: 1475 mm, maximum source length: 1040 mm, weight: approx. 181 kg, flange: DN 125 / PN 16, for 3 sources</td>
</tr>
<tr>
<td></td>
<td>40864-04</td>
<td>Nominal diameter: 127 mm, length: 1675 mm, maximum source length: 1240 mm, weight: approx. 207 kg, flange: DN 125 / PN 16, for 3 sources</td>
</tr>
<tr>
<td></td>
<td>40864-05</td>
<td>Nominal diameter: 127 mm, length: 1875 mm, maximum source length: 1440 mm, weight: approx. 234 kg, flange: DN 125 / PN 16, for 3 sources</td>
</tr>
<tr>
<td></td>
<td>40864-06</td>
<td>Nominal diameter: 127 mm, length: 2075 mm, maximum source length: 1640 mm, weight: approx. 261 kg, flange: DN 125 / PN 16, for 3 sources</td>
</tr>
<tr>
<td></td>
<td>40864-07</td>
<td>Nominal diameter: 127 mm, length: 2275 mm, maximum source length: 1840 mm, weight: approx. 288 kg, flange: DN 125 / PN 16, for 3 sources</td>
</tr>
<tr>
<td></td>
<td>39673</td>
<td>Nominal diameter: 127 mm, length: 1690 mm, maximum source length: 1240 mm, weight: approx. 211 kg, flange: ASA 150 / 4&quot;, for 3 sources</td>
</tr>
<tr>
<td>DN 140</td>
<td>40325-01</td>
<td>Nominal diameter: 140 mm, length: 1042 mm, maximum source length: 640 mm, weight: approx. 158 kg, flange: DN 125 / PN 16, for 1 source</td>
</tr>
<tr>
<td></td>
<td>40325-02</td>
<td>Nominal diameter: 140 mm, length: 1242 mm, maximum source length: 840 mm, weight: approx. 173 kg, flange: DN 125 / PN 16, for 1 source</td>
</tr>
<tr>
<td></td>
<td>40325-03</td>
<td>Nominal diameter: 140 mm, length: 1442 mm, maximum source length: 1040 mm, weight: approx. 204 kg, flange: DN 125 / PN 16, for 1 source</td>
</tr>
<tr>
<td></td>
<td>40325-04</td>
<td>Nominal diameter: 140 mm, length: 1642 mm, maximum source length: 1240 mm, weight: approx. 250 kg, flange: DN 125 / PN 16, for 1 source</td>
</tr>
<tr>
<td></td>
<td>40325-05</td>
<td>Nominal diameter: 140 mm, length: 1842 mm, maximum source length: 1440 mm, weight: approx. 283 kg, flange: DN 125 / PN 16, for 1 source</td>
</tr>
<tr>
<td></td>
<td>40325-06</td>
<td>Nominal diameter: 140 mm, length: 2042 mm, maximum source length: 1640 mm, weight: approx. 316 kg, flange: DN 125 / PN 16, for 1 source</td>
</tr>
<tr>
<td></td>
<td>40325-07</td>
<td>Nominal diameter: 140 mm, length: 2242 mm, maximum source length: 1840 mm, weight: approx. 349 kg, flange: DN 125 / PN 16, for 1 source</td>
</tr>
</tbody>
</table>
### Shieldings for flange mounting

<table>
<thead>
<tr>
<th>Variant</th>
<th>Part number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN 160</td>
<td>40975-01</td>
<td>Nominal diameter: 160 mm, length: 1085 mm, maximum source length: 640 mm, weight: approx. 196 kg, flange: DN 125 / PN 16, for 5 sources</td>
</tr>
<tr>
<td></td>
<td>40975-02</td>
<td>Nominal diameter: 160 mm, length: 1285 mm, maximum source length: 840 mm, weight: approx. 238 kg, flange: DN 125 / PN 16, for 5 sources</td>
</tr>
<tr>
<td></td>
<td>40975-03</td>
<td>Nominal diameter: 160 mm, length: 1485 mm, maximum source length: 1040 mm, weight: approx. 280 kg, flange: DN 125 / PN 16, for 5 sources</td>
</tr>
<tr>
<td></td>
<td>40975-04</td>
<td>Nominal diameter: 160 mm, length: 1685 mm, maximum source length: 1240 mm, weight: approx. 316 kg, flange: DN 125 / PN 16, for 5 sources</td>
</tr>
<tr>
<td></td>
<td>40975-05</td>
<td>Nominal diameter: 160 mm, length: 1885 mm, maximum source length: 1440 mm, weight: approx. 365 kg, flange: DN 125 / PN 16, for 5 sources</td>
</tr>
<tr>
<td></td>
<td>40975-06</td>
<td>Nominal diameter: 160 mm, length: 2085 mm, maximum source length: 1640 mm, weight: approx. 407 kg, flange: DN 125 / PN 16, for 5 sources</td>
</tr>
<tr>
<td></td>
<td>40975-07</td>
<td>Nominal diameter: 160 mm, length: 2285 mm, maximum source length: 1840 mm, weight: approx. 450 kg, flange: DN 125 / PN 16, for 5 sources</td>
</tr>
<tr>
<td></td>
<td>51992-01</td>
<td>Nominal diameter: 160 mm, length: 1085 mm, maximum source length: 640 mm, weight: approx. 196 kg, flange: similar to ASA 300 / 6”; for 5 sources</td>
</tr>
<tr>
<td></td>
<td>51992-02</td>
<td>Nominal diameter: 160 mm, length: 1285 mm, maximum source length: 840 mm, weight: approx. 240 kg, flange: similar to ASA 300 / 6”; for 5 sources</td>
</tr>
<tr>
<td></td>
<td>51992-03</td>
<td>Nominal diameter: 160 mm, length: 1485 mm, maximum source length: 1040 mm, weight: approx. 283 kg, flange: similar to ASA 300 / 6”; for 5 sources</td>
</tr>
<tr>
<td></td>
<td>51992-04</td>
<td>Nominal diameter: 160 mm, length: 1685 mm, maximum source length: 1240 mm, weight: approx. 326 kg, flange: similar to ASA 300 / 6”; for 5 sources</td>
</tr>
<tr>
<td></td>
<td>51992-05</td>
<td>Nominal diameter: 160 mm, length: 1885 mm, maximum source length: 1440 mm, weight: approx. 370 kg, flange: similar to ASA 300 / 6”; for 5 sources</td>
</tr>
<tr>
<td></td>
<td>51992-06</td>
<td>Nominal diameter: 160 mm, length: 2085 mm, maximum source length: 1640 mm, weight: approx. 413 kg, flange: similar to ASA 300 / 6”; for 5 sources</td>
</tr>
<tr>
<td></td>
<td>51992-07</td>
<td>Nominal diameter: 160 mm, length: 2285 mm, maximum source length: 1840 mm, weight: approx. 456 kg, flange: similar to ASA 300 / 6”; for 5 sources</td>
</tr>
<tr>
<td></td>
<td>56081-01</td>
<td>Nominal diameter: 160 mm, length: 1085 mm, maximum source length: 640 mm, weight: approx. 196 kg, flange: similar to ASA 300 / 8”; for 5 sources</td>
</tr>
<tr>
<td></td>
<td>56081-02</td>
<td>Nominal diameter: 160 mm, length: 1285 mm, maximum source length: 840 mm, weight: approx. 240 kg, flange: similar to ASA 300 / 8”; for 5 sources</td>
</tr>
<tr>
<td></td>
<td>56081-03</td>
<td>Nominal diameter: 160 mm, length: 1485 mm, maximum source length: 1040 mm, weight: approx. 283 kg, flange: similar to ASA 300 / 8”; for 5 sources</td>
</tr>
<tr>
<td></td>
<td>56081-04</td>
<td>Nominal diameter: 160 mm, length: 1685 mm, maximum source length: 1240 mm, weight: approx. 326 kg, flange: similar to ASA 300 / 8”; for 5 sources</td>
</tr>
<tr>
<td></td>
<td>56081-05</td>
<td>Nominal diameter: 160 mm, length: 1885 mm, maximum source length: 1440 mm, weight: approx. 370 kg, flange: similar to ASA 300 / 8”; for 5 sources</td>
</tr>
<tr>
<td></td>
<td>56081-06</td>
<td>Nominal diameter: 160 mm, length: 2085 mm, maximum source length: 1640 mm, weight: approx. 413 kg, flange: similar to ASA 300 / 8”; for 5 sources</td>
</tr>
<tr>
<td>Variant</td>
<td>Part number</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
<td>-------------</td>
</tr>
<tr>
<td>DN 160 (continued)</td>
<td>56081-07</td>
<td>Nominal diameter: 160 mm, length: 2285 mm, maximum source length: 1840 mm, weight: approx. 456 kg, flange: similar to ASA 300 / 8&quot;; for 5 sources</td>
</tr>
<tr>
<td></td>
<td>41534-01</td>
<td>Nominal diameter: 160 mm, length: 1085 mm, maximum source length: 640 mm, weight: approx. 196 kg, flange: similar to ASA 600 / 8&quot;; for 1 sources</td>
</tr>
<tr>
<td></td>
<td>41534-02</td>
<td>Nominal diameter: 160 mm, length: 1285 mm, maximum source length: 840 mm, weight: approx. 240 kg, flange: similar to ASA 600 / 8&quot;; for 1 sources</td>
</tr>
<tr>
<td></td>
<td>41534-03</td>
<td>Nominal diameter: 160 mm, length: 1485 mm, maximum source length: 1040 mm, weight: approx. 283 kg, flange: similar to ASA 600 / 8&quot;; for 1 sources</td>
</tr>
<tr>
<td></td>
<td>41534-04</td>
<td>Nominal diameter: 160 mm, length: 1685 mm, maximum source length: 1240 mm, weight: approx. 326 kg, flange: similar to ASA 600 / 8&quot;; for 1 sources</td>
</tr>
<tr>
<td></td>
<td>41534-05</td>
<td>Nominal diameter: 160 mm, length: 1885 mm, maximum source length: 1440 mm, weight: approx. 370 kg, flange: similar to ASA 600 / 8&quot;; for 1 sources</td>
</tr>
<tr>
<td></td>
<td>41534-06</td>
<td>Nominal diameter: 160 mm, length: 2085 mm, maximum source length: 1640 mm, weight: approx. 413 kg, flange: similar to ASA 600 / 8&quot;; for 1 sources</td>
</tr>
<tr>
<td></td>
<td>41534-07</td>
<td>Nominal diameter: 160 mm, length: 2285 mm, maximum source length: 1840 mm, weight: approx. 456 kg, flange: similar to ASA 600 / 8&quot;; for 1 sources</td>
</tr>
<tr>
<td>Variant</td>
<td>Part number</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
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</tr>
<tr>
<td>DN 200</td>
<td>58458-01</td>
<td>Nominal diameter: 200 mm, length: 1059 mm, maximum source length: 640 mm, weight: approx. 372 kg, flange: DN 200 / PN 16, for 1 source</td>
</tr>
<tr>
<td></td>
<td>58458-02</td>
<td>Nominal diameter: 200 mm, length: 1259 mm, maximum source length: 840 mm, weight: approx. 457 kg, flange: DN 200 / PN 16, for 1 source</td>
</tr>
<tr>
<td></td>
<td>58458-03</td>
<td>Nominal diameter: 200 mm, length: 1459 mm, maximum source length: 1040 mm, weight: approx. 532 kg, flange: DN 200 / PN 16, for 1 source</td>
</tr>
<tr>
<td></td>
<td>58458-04</td>
<td>Nominal diameter: 200 mm, length: 1659 mm, maximum source length: 1240 mm, weight: approx. 607 kg, flange: DN 200 / PN 16, for 1 source</td>
</tr>
<tr>
<td></td>
<td>58458-05</td>
<td>Nominal diameter: 200 mm, length: 1859 mm, maximum source length: 1440 mm, weight: approx. 692 kg, flange: DN 200 / PN 16, for 1 source</td>
</tr>
<tr>
<td></td>
<td>58458-06</td>
<td>Nominal diameter: 200 mm, length: 2059 mm, maximum source length: 1640 mm, weight: approx. 792 kg, flange: DN 200 / PN 16, for 1 source</td>
</tr>
<tr>
<td></td>
<td>58458-07</td>
<td>Nominal diameter: 200 mm, length: 2259 mm, maximum source length: 1840 mm, weight: approx. 873 kg, flange: DN 200 / PN 16, for 1 source</td>
</tr>
<tr>
<td></td>
<td>59051-01</td>
<td>Nominal diameter: 200 mm, length: 1118 mm, maximum source length: 640 mm, weight: approx. 372 kg, flange: DN 200 / PN 16, for 3 sources</td>
</tr>
<tr>
<td></td>
<td>59051-02</td>
<td>Nominal diameter: 200 mm, length: 1320 mm, maximum source length: 840 mm, weight: approx. 457 kg, flange: DN 200 / PN 16, for 3 sources</td>
</tr>
<tr>
<td></td>
<td>59051-03</td>
<td>Nominal diameter: 200 mm, length: 1520 mm, maximum source length: 1040 mm, weight: approx. 532 kg, flange: DN 200 / PN 16, for 3 sources</td>
</tr>
<tr>
<td></td>
<td>59051-04</td>
<td>Nominal diameter: 200 mm, length: 1720 mm, maximum source length: 1240 mm, weight: approx. 607 kg, flange: DN 200 / PN 16, for 3 sources</td>
</tr>
<tr>
<td></td>
<td>59051-05</td>
<td>Nominal diameter: 200 mm, length: 1920 mm, maximum source length: 1440 mm, weight: approx. 692 kg, flange: DN 200 / PN 16, for 3 sources</td>
</tr>
<tr>
<td></td>
<td>59051-06</td>
<td>Nominal diameter: 200 mm, length: 2120 mm, maximum source length: 1640 mm, weight: approx. 792 kg, flange: DN 200 / PN 16, for 3 sources</td>
</tr>
<tr>
<td></td>
<td>59051-07</td>
<td>Nominal diameter: 200 mm, length: 2320 mm, maximum source length: 1840 mm, weight: approx. 873 kg, flange: DN 200 / PN 16, for 3 sources</td>
</tr>
<tr>
<td></td>
<td>43215-01</td>
<td>Nominal diameter: 200 mm, length: 1118 mm, maximum source length: 640 mm, weight: approx. 372 kg, flange: DN 200 / PN 16, for 5 sources</td>
</tr>
</tbody>
</table>
### Variant

<table>
<thead>
<tr>
<th>Part number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>43215-02</td>
<td>Nominal diameter: 200 mm, length: 1320 mm, maximum source length: 840 mm, weight: approx. 457 kg, flange: DN 200 / PN 16, for 5 sources</td>
</tr>
<tr>
<td>43215-03</td>
<td>Nominal diameter: 200 mm, length: 1520 mm, maximum source length: 1040 mm, weight: approx. 532 kg, flange: DN 200 / PN 16, for 5 sources</td>
</tr>
<tr>
<td>43215-04</td>
<td>Nominal diameter: 200 mm, length: 1720 mm, maximum source length: 1240 mm, weight: approx. 607 kg, flange: DN 200 / PN 16, for 5 sources</td>
</tr>
<tr>
<td>43215-05</td>
<td>Nominal diameter: 200 mm, length: 1920 mm, maximum source length: 1440 mm, weight: approx. 692 kg, flange: DN 200 / PN 16, for 5 sources</td>
</tr>
<tr>
<td>43215-06</td>
<td>Nominal diameter: 200 mm, length: 2120 mm, maximum source length: 1640 mm, weight: approx. 792 kg, flange: DN 200 / PN 16, for 5 sources</td>
</tr>
<tr>
<td>43215-07</td>
<td>Nominal diameter: 200 mm, length: 2320 mm, maximum source length: 1840 mm, weight: approx. 873 kg, flange: DN 200 / PN 16, for 5 sources</td>
</tr>
<tr>
<td>51994-01</td>
<td>Nominal diameter: 200 mm, length: 1118 mm, maximum source length: 640 mm, weight: approx. 372 kg, flange: similar to ASA 300 / 8&quot;; for 5 sources</td>
</tr>
<tr>
<td>51994-02</td>
<td>Nominal diameter: 200 mm, length: 1320 mm, maximum source length: 840 mm, weight: approx. 457 kg, flange: similar to ASA 300 / 8&quot;; for 5 sources</td>
</tr>
<tr>
<td>51994-03</td>
<td>Nominal diameter: 200 mm, length: 1520 mm, maximum source length: 1040 mm, weight: approx. 532 kg, flange: similar to ASA 300 / 8&quot;; for 5 sources</td>
</tr>
<tr>
<td>51994-04</td>
<td>Nominal diameter: 200 mm, length: 1720 mm, maximum source length: 1240 mm, weight: approx. 607 kg, flange: similar to ASA 300 / 8&quot;; for 5 sources</td>
</tr>
<tr>
<td>51994-05</td>
<td>Nominal diameter: 200 mm, length: 1920 mm, maximum source length: 1440 mm, weight: approx. 692 kg, flange: similar to ASA 300 / 8&quot;; for 5 sources</td>
</tr>
<tr>
<td>51994-06</td>
<td>Nominal diameter: 200 mm, length: 2120 mm, maximum source length: 1640 mm, weight: approx. 792 kg, flange: similar to ASA 300 / 8&quot;; for 5 sources</td>
</tr>
<tr>
<td>51994-07</td>
<td>Nominal diameter: 200 mm, length: 2320 mm, maximum source length: 1840 mm, weight: approx. 873 kg, flange: similar to ASA 300 / 8&quot;; for 5 sources</td>
</tr>
<tr>
<td>56142-01</td>
<td>Nominal diameter: 200 mm, length: 1118 mm, maximum source length: 640 mm, weight: approx. 372 kg, flange: similar to ASA 600 / 8&quot;; for 5 sources</td>
</tr>
<tr>
<td>56142-02</td>
<td>Nominal diameter: 200 mm, length: 1320 mm, maximum source length: 840 mm, weight: approx. 457 kg, flange: similar to ASA 600 / 8&quot;; for 5 sources</td>
</tr>
</tbody>
</table>
## Shieldings for flange mounting

<table>
<thead>
<tr>
<th>Variant</th>
<th>Part number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN 200 (continued)</td>
<td>56142-03</td>
<td>Nominal diameter: 200 mm, length: 1520 mm, maximum source length: 1040 mm, weight: approx. 532 kg, flange: similar to ASA 600 / 8”; for 5 sources</td>
</tr>
<tr>
<td>56142-04</td>
<td>Nominal diameter: 200 mm, length: 1720 mm, maximum source length: 1240 mm, weight: approx. 607 kg, flange: similar to ASA 600 / 8”; for 5 sources</td>
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</tr>
<tr>
<td>56142-05</td>
<td>Nominal diameter: 200 mm, length: 1920 mm, maximum source length: 1440 mm, weight: approx. 692 kg, flange: similar to ASA 600 / 8”; for 5 sources</td>
<td></td>
</tr>
<tr>
<td>56142-06</td>
<td>Nominal diameter: 200 mm, length: 2120 mm, maximum source length: 1640 mm, weight: approx. 792 kg, flange: similar to ASA 600 / 8”; for 5 sources</td>
<td></td>
</tr>
<tr>
<td>56142-07</td>
<td>Nominal diameter: 200 mm, length: 2320 mm, maximum source length: 1840 mm, weight: approx. 873 kg, flange: similar to ASA 600 / 8”; for 5 sources</td>
<td></td>
</tr>
<tr>
<td>Variant</td>
<td>Part number</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
<td>-------------</td>
</tr>
<tr>
<td>DN 270</td>
<td>42075-01</td>
<td>Nominal diameter: 270 mm, length: 1062 mm, maximum source length: 640 mm, weight: approx. 606 kg, flange: DN 300 / PN 16, for 1 source</td>
</tr>
<tr>
<td></td>
<td>42075-02</td>
<td>Nominal diameter: 270 mm, length: 1262 mm, maximum source length: 840 mm, weight: approx. 736 kg, flange: DN 300 / PN 16, for 1 source</td>
</tr>
<tr>
<td></td>
<td>42075-03</td>
<td>Nominal diameter: 270 mm, length: 1462 mm, maximum source length: 1040 mm, weight: approx. 864 kg, flange: DN 300 / PN 16, for 1 source</td>
</tr>
<tr>
<td></td>
<td>42075-04</td>
<td>Nominal diameter: 270 mm, length: 1662 mm, maximum source length: 1240 mm, weight: approx. 993 kg, flange: DN 300 / PN 16, for 1 source</td>
</tr>
<tr>
<td></td>
<td>42075-05</td>
<td>Nominal diameter: 270 mm, length: 1862 mm, maximum source length: 1440 mm, weight: approx. 1121 kg, flange: DN 300 / PN 16, for 1 source</td>
</tr>
<tr>
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<td>42075-06</td>
<td>Nominal diameter: 270 mm, length: 2062 mm, maximum source length: 1640 mm, weight: approx. 1249 kg, flange: DN 300 / PN 16, for 1 source</td>
</tr>
<tr>
<td></td>
<td>42075-07</td>
<td>Nominal diameter: 270 mm, length: 2262 mm, maximum source length: 1840 mm, weight: approx. 1378 kg, flange: DN 300 / PN 16, for 1 source</td>
</tr>
<tr>
<td></td>
<td>42075-21</td>
<td>Nominal diameter: 270 mm, length: 513 mm, maximum source length: 100 mm, weight: approx. 267 kg, flange: DN 300 / PN 16, for 1 source</td>
</tr>
<tr>
<td>48102</td>
<td>48102-01</td>
<td>Nominal diameter: 270 mm, length: 1136 mm, maximum source length: 640 mm, weight: approx. 601 kg, flange: DN 300 / PN 16, for 5 sources</td>
</tr>
<tr>
<td></td>
<td>48102-02</td>
<td>Nominal diameter: 270 mm, length: 1336 mm, maximum source length: 840 mm, weight: approx. 730 kg, flange: DN 300 / PN 16, for 5 sources</td>
</tr>
<tr>
<td></td>
<td>48102-03</td>
<td>Nominal diameter: 270 mm, length: 1536 mm, maximum source length: 1040 mm, weight: approx. 858 kg, flange: DN 300 / PN 16, for 5 sources</td>
</tr>
<tr>
<td></td>
<td>48102-04</td>
<td>Nominal diameter: 270 mm, length: 1736 mm, maximum source length: 1240 mm, weight: approx. 988 kg, flange: DN 300 / PN 16, for 5 sources</td>
</tr>
<tr>
<td></td>
<td>48102-05</td>
<td>Nominal diameter: 270 mm, length: 1936 mm, maximum source length: 1440 mm, weight: approx. 1116 kg, flange: DN 300 / PN 16, for 5 sources</td>
</tr>
<tr>
<td></td>
<td>48102-06</td>
<td>Nominal diameter: 270 mm, length: 2136 mm, maximum source length: 1640 mm, weight: approx. 1244 kg, flange: DN 300 / PN 16, for 5 sources</td>
</tr>
<tr>
<td></td>
<td>48102-07</td>
<td>Nominal diameter: 270 mm, length: 2336 mm, maximum source length: 1840 mm, weight: approx. 1373 kg, flange: DN 300 / PN 16, for 5 sources</td>
</tr>
<tr>
<td>51912</td>
<td>51912-01</td>
<td>Nominal diameter: 270 mm, length: 1116 mm, maximum source length: 640 mm, weight: approx. 601 kg, flange: similar to ASA 300 / 10&quot;; for 5 sources</td>
</tr>
<tr>
<td></td>
<td>51912-02</td>
<td>Nominal diameter: 270 mm, length: 1316 mm, maximum source length: 840 mm, weight: approx. 730 kg, flange: similar to ASA 300 / 10&quot;; for 5 sources</td>
</tr>
</tbody>
</table>
10 Appendices

Shieldings for flange mounting

<table>
<thead>
<tr>
<th>Variant</th>
<th>Part number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN 270</td>
<td>51912-03</td>
<td>Nominal diameter: 270 mm, length: 1516 mm, maximum source length: 1040 mm, weight: approx. 858 kg, flange: similar to ASA 300 / 10&quot;; for 5 sources</td>
</tr>
<tr>
<td></td>
<td>51912-04</td>
<td>Nominal diameter: 270 mm, length: 1716 mm, maximum source length: 1240 mm, weight: approx. 988 kg, flange: similar to ASA 300 / 10&quot;; for 5 sources</td>
</tr>
<tr>
<td></td>
<td>51912-05</td>
<td>Nominal diameter: 270 mm, length: 1916 mm, maximum source length: 1440 mm, weight: approx. 1116 kg, flange: similar to ASA 300 / 10&quot;; for 5 sources</td>
</tr>
<tr>
<td></td>
<td>51912-06</td>
<td>Nominal diameter: 270 mm, length: 2116 mm, maximum source length: 1640 mm, weight: approx. 1244 kg, flange: similar to ASA 300 / 10&quot;; for 5 sources</td>
</tr>
<tr>
<td></td>
<td>51912-07</td>
<td>Nominal diameter: 270 mm, length: 2316 mm, maximum source length: 1840 mm, weight: approx. 1373 kg, flange: similar to ASA 300 / 10&quot;; for 5 sources</td>
</tr>
<tr>
<td></td>
<td>41652-21</td>
<td>Nominal diameter: 270 mm, length: 560 mm, maximum source length: 70 mm, weight: approx. 300 kg, flange: DN 300 / PN 16, for 3 sources</td>
</tr>
</tbody>
</table>

10.3 Variant overview, point source shieldings

<table>
<thead>
<tr>
<th>Variant</th>
<th>Part number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LB 8115-01</td>
<td>44192</td>
<td>Nominal diameter: 150 mm, weight: approx. 60 kg, for 1 source</td>
</tr>
<tr>
<td>LB 8115-02</td>
<td>47052</td>
<td>Nominal diameter: 150 mm, weight: approx. 60 kg, for 1 source, with installation pad</td>
</tr>
<tr>
<td>LB 8115-20</td>
<td>54025</td>
<td>Nominal diameter: 150 mm, weight: approx. 60 kg, for 2 sources</td>
</tr>
<tr>
<td>LB 8120-01</td>
<td>44173</td>
<td>Nominal diameter: 200 mm, weight: approx. 137 kg, for 1 source</td>
</tr>
<tr>
<td>LB 8120-02</td>
<td>47057</td>
<td>Nominal diameter: 200 mm, weight: approx. 137 kg, for 1 source, with installation pad</td>
</tr>
<tr>
<td>LB 8120-20</td>
<td>58569</td>
<td>Nominal diameter: 200 mm, weight: approx. 137 kg, for 2 sources</td>
</tr>
<tr>
<td>LB 8120-30</td>
<td>61655</td>
<td>Nominal diameter: 200 mm, weight: approx. 137 kg, for 3 sources</td>
</tr>
<tr>
<td>LB 8125-01</td>
<td>45859</td>
<td>Nominal diameter: 300 mm, weight: approx. 334 kg, for 1 source</td>
</tr>
</tbody>
</table>
10.4 Dimensional drawings Rod source shieldings

Variants DN 100

Fig. 25 40876-0x, 1 source (dimensions in mm)
Variants DN 127

Fig. 26 40864-0x, 3 sources (dimensions in mm)
Variants DN 140

Fig. 27  40325-0x, 1 source (dimensions in mm)
Variants DN 160

Fig. 28  40975-0x, 5 sources (dimensions in mm)
Fig. 29  51992-0x, 5 sources (dimensions in mm)
Fig. 30  56081-0x, 5 sources (dimensions in mm)
Fig. 31  56127-0x, 5 sources (dimensions in mm)
Variants DN 200

Fig. 32  58458-0x, 1 source (dimensions in mm)
Fig. 33  59051-0x, 3 sources (dimensions in mm)
Fig. 34  43215-0x, 5 sources (dimensions in mm)
Fig. 35  51994-0x, 5 sources (dimensions in mm)
Fig. 36  56142-0x, 5 sources (dimensions in mm)
Variants DN 270

Fig. 37  42075-0x, 1 source (dimensions in mm)
Fig. 38  48102-0x, 5 sources (dimensions in mm)
Fig. 39  51912-0x, 5 sources (dimensions in mm)
10.5 Dimensional drawings, point source shieldings

LB 8115-01

Fig. 40  44192, 1 source (dimensions in mm)
Fig. 41  47052, 1 source (dimensions in mm)
Fig. 42  54025, 2 sources (dimensions in mm)
Fig. 43  44173, 1 source (dimensions in mm)
Fig. 44  47057, 1 source (dimensions in mm)
Fig. 45  58569, 2 sources (dimensions in mm)
LB 8120-30

Fig. 46  61655, 3 sources (dimensions in mm)
Fig. 47  45859, 1 source (dimensions in mm)
Modifications due to technical advancement reserved.