

## Supplementary instructions

### Source loading and exchange

VEGASOURCE 31, 35



Document ID: 39155



**VEGA**

## Contents

<b>1</b>	<b>Safety instructions</b> .....	<b>3</b>
<b>2</b>	<b>Loading or source exchange</b> .....	<b>7</b>
2.1	Version A.....	7
2.2	Version B.....	9
2.3	Version C.....	12
2.4	Version D.....	15
2.5	Version K, L.....	18
2.6	Version M, N.....	21
<b>3</b>	<b>Supplement</b> .....	<b>24</b>
3.1	Technical data .....	24
3.2	Industrial property rights.....	25
3.3	Trademark .....	25

# 1 Safety instructions

## Radiation protection

These supplementary instructions describe the loading and exchanging of the source for source containers VEGASOURCE 31 and 35.

Carefully read this supplementary instructions and the corresponding operating instructions of the source container and carry out the work only after you have completely understood all instructions.

It is absolutely necessary that you take note of all safety instruments, particularly of the instructions concerning radiation safety.

Check if the source capsule fits the existing source holder of the source container. Compare the data in the shipping papers of the source container with the data of the source container.

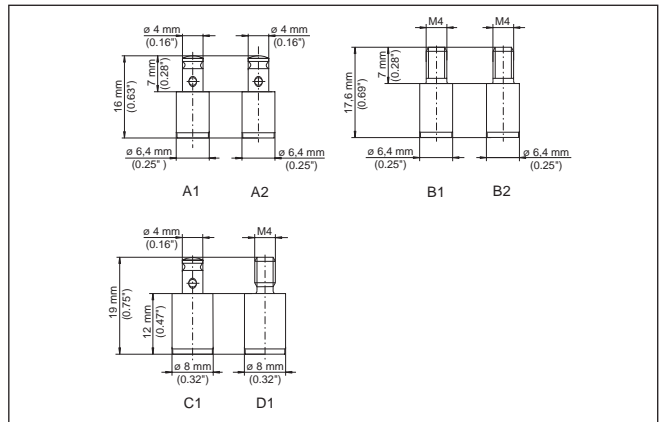


Fig. 1: Different versions of source capsules

- A1 Nipple  $d = 6.4 \times 16$  mm, capsule VZ-79-001 (Cs-137)
- A2 Nipple  $d = 6.4 \times 16$  mm, capsule VZ-64-001 (Co-60)
- B1 Thread M4  $d = 6.4 \times 17.6$  mm, capsule VZ-1508-001 (Cs-137)
- B2 Thread M4  $d = 6.4 \times 17.6$  mm, capsule VZ-1486-001 (Co-60)
- C1 Nipple  $d = 8 \times 19$  mm, capsule VZ-357-001 (Cs-137)
- D1 Thread M4  $d = 8 \times 19$  mm, capsule VZ-3579-001 (Cs-137)

## Safety instructions

- All maintenance work such as dismantling or exchanging the radioactive source must only be carried out by authorized, qualified personnel monitored for radiation exposure according to the local legislation or the handling permit. Take note of the specifications of the present handling permit. All conditions on site must be taken into account.
- All work must only be carried out from a protected location (shielding). Avoid risk to other persons through suitable measures (e.g. safety fence, etc.).
- Make all necessary preparations for exchanging the source to ensure that the work is carried out as fast as possible. Get all required tools and accessories ready before you start work.
- Before starting the work, get a suitable, shielded vessel ready for holding the exchanged source capsule.
- Observe all the instructions of this supplementary instructions manual for source exchange

- Never touch the source capsule directly, but use a suitable gripping device or a manipulator. Keep a distance of at least 10 cm (4 in).
- Check all O-rings and seals when exchanging the source and replace them, if necessary.
- Check the function of the switching facility of the source container before installing or exchanging a source capsule (ON/OFF-switching).
- When system inspections are carried out, always set the source container to position OFF and secure this position with a lock against inadvertent switching on.
- If possible, practice this procedure, especially the handling with the gripping device or suitable manipulator, in advance.

### Scope of delivery

- Pre-printed type label, stainless steel 107 x 17 mm (4.21 x 0.67 in)
- Pre-printed type label, stainless steel 55 x 45 mm (2.17 x 1.77 in)
- Pre-printed adhesive type label, 48 x 30 mm (1.89 x 1.18 in)
- 4 grooved pins
- Sealing wire and seal
- Adhesive label "Radioactive"

### Labelling

When loading a source container or exchanging a source, the corresponding type labels of the source must be permanently lettered, e.g. with punch-type letters.

With sources exceeding a certain level of activity, the warning "Highly radioactive source" must be stated on the type label.

This is the case for Co-60 with an activity  $\geq 4$  GBq (108 mCi) or for Cs-137 with an activity  $\geq 20$  GBq (540 mCi).

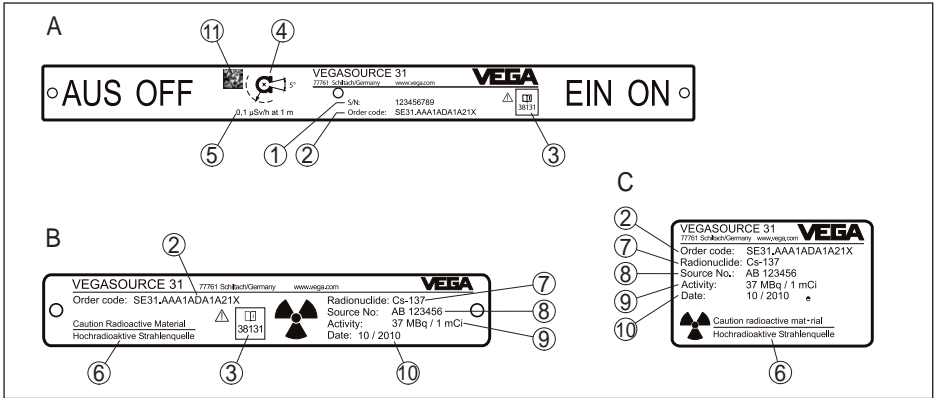


Fig. 2: Type labels - Example (version A)

- A Type label - Source holder
- B Type label - Source
- C Adhesive type label - Source
- 1 Serial number - Source holder
- 2 Order code - Source container
- 3 Number of the corresponding operating instructions
- 4 Beam exit angle
- 5 Local dose rate at defined distance from the surface
- 6 Note: "Highly radioactive source" (if necessary)
- 7 Source: Cs-137 or Co-60
- 8 Serial number of the source capsule (for traceability of the source)
- 9 Activity of the source in MBq or GBq
- 10 Date (mm/yyyy)
- 11 Data matrix code

### Tools and accessories

Make sure that the necessary accessories and tools are available and in technically perfect condition.

Make sure that the key for the lock/locks is available with the source container.

Load the source container or exchange the source capsule with utmost care.

Use a suitable gripping device or a manipulator when inserting or exchanging the source capsule.

To increase the distance to the source capsule, you can make and implement an extension rod according to the following illustration.

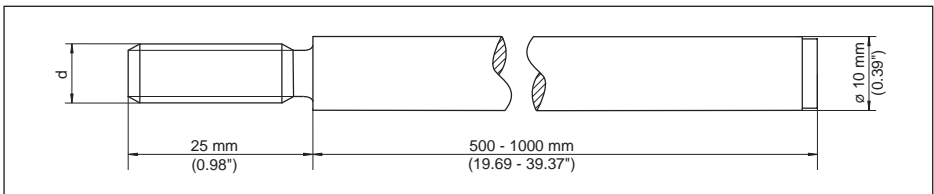


Fig. 3: Auxiliary tool extension rod

- d Version A, B, C, K, L = thread M8
- Version D, M, N = thread M6



**Note:**

To carry out the exchange, you need a new type A container. These containers must not be used more than once.

Contact our specialists before carrying out such work.

## 2 Loading or source exchange

### 2.1 Version A

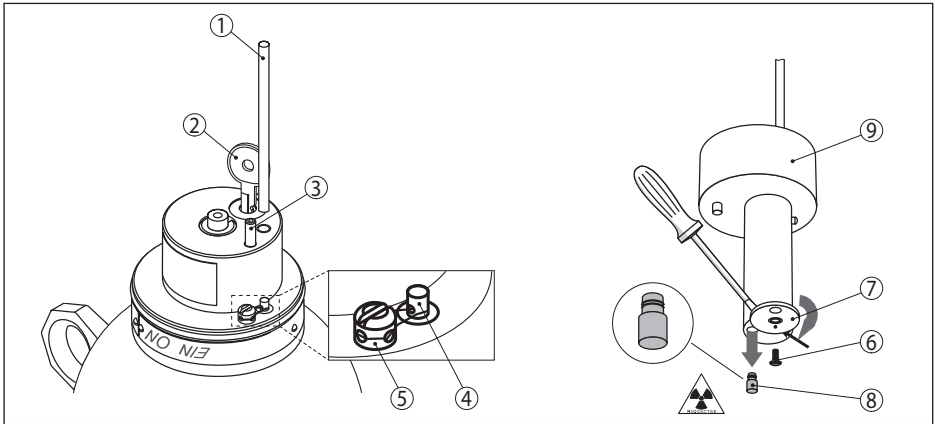


Fig. 4: Exchange of the source - VEGASOURCE version A

- 1 Extension rod M8 (optional)
- 2 Key lock with key
- 3 Threaded pin
- 4 Retaining pin
- 5 Capstan screw (sealable)
- 6 Safety bolt - Source capsule (optional)
- 7 Cover plate
- 8 Source
- 9 Source holder

#### Required tools

You need the following tools when exchanging the source on version A:

- Key for key lock
- Hexagon spanner, size 5
- Allen key, size 2.5 (optional)
- Flat-headed screwdriver, size 1.5 x 10
- Side cutters
- Gripper tool or manipulator for source capsule
- Possibly extension rod M8

#### Remove source holder

- Remove the protective cover - see operating instructions of the source container
- If necessary, screw an extension rod (1) with thread M8 into the socket of the source holder. With this extension you can increase the distance to the source
- Unlock key lock (2) with key
- With the version with density modification: Loosen pin (3) with an Allen key size 5
- Remove the seal between holding pin (4) and capstan screw (5) with side cutting pliers and pull out the seal wire
- Unscrew the capstan screw (5) with a flat headed screwdriver, size 1.5 x 10

- Push in the holding pin (4) and move the source holder (9) over the pin until the arrow mark points to the holding pin (4)
- Pull out the source holder (9)
- Place the protective cover on the source container to protect against pollution until reinstallation of the source holder

### Insert or exchange source

- If available, remove safety bolt (6) with Allen key size 2.5
- Swivel the cover (7) in front on the thin cylinder of the source holder (9) to the side. To do this, lift the cover (7) slightly with a small slotted screwdriver
- Only when exchanging the source: Allow the source capsule (8) to fall out downwards into a shielded vessel
- Insert new source capsule (8) and close cover (7). For insertion use a suitable gripping device or a manipulator
- Screw in the safety bolt (6) (optional)

### Insert source holder

- Completely insert the source holder (9) into the source container and turn it until the holding pin (4) pops out
- Continue turning the source holder (9) up to position OFF
- Insert the key lock (2) with key and lock. Detach the key
- If necessary, remove extension rod (1)
- Screw in capstan screw (5) and secure together with the retaining pin (4) with new seal

### Attach or replace the type labels

- Remove existing type labels (when exchanging the source)
- Unpack the type label set and letter it respectively. You can find further information in chapter "Safety instructions - Labelling"

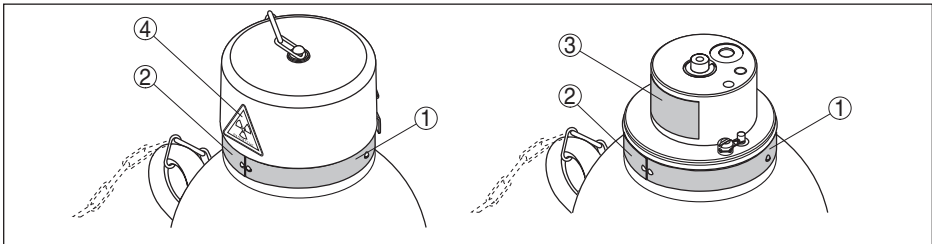


Fig. 5: Fasten type label

- 1 Type label - source container (already on the source container)
- 2 Type label - Source (107 x 17 mm)
- 3 Adhesive type label - Source (48 x 30 mm)
- 4 Adhesive label "Radioactive"

- Letter the adhesive type label (48 x 30 mm)n. Clean the surface provided on the source holder and attach the adhesive type label
- Letter the type label (107 x 17 mm) and fasten it to the neck of the source container with two grooved pins
- Attach the adhesive label "Radioactive" to the protective cover of the source container (if not already present)
- Attach the protective cover
- Insertion or exchange of the source is finished



## 2.2 Version B

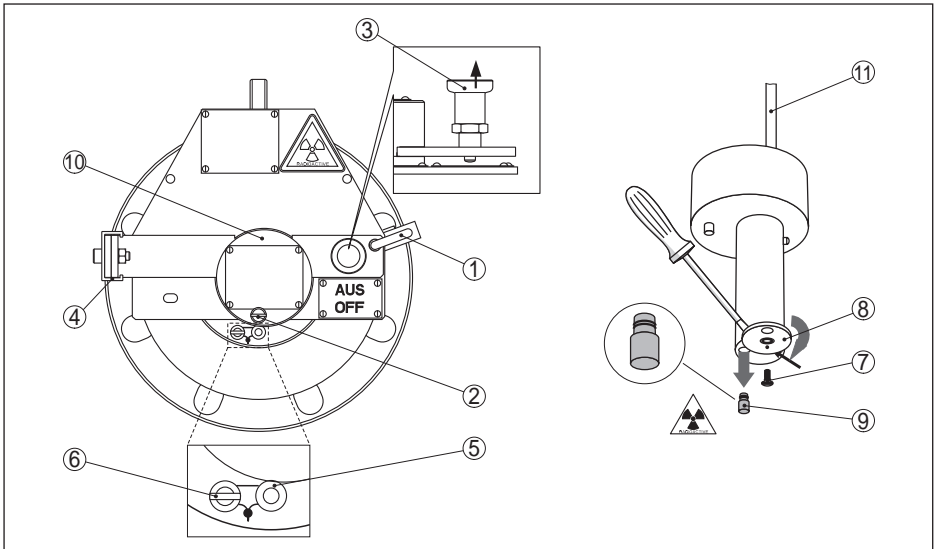


Fig. 6: Exchange of the source - VEGASOURCE version B

- 1 Padlock
- 2 Locking screw
- 3 Fixing pin
- 4 Securing strap
- 5 Retaining pin
- 6 Capstan screw
- 7 Safety bolt - Source capsule (optional)
- 8 Cover plate
- 9 Source capsule
- 10 Source holder
- 11 Extension rod M8 (optional)

### Required tools

You need the following tools when exchanging the source on version B:

- Key for padlock
- Hexagon spanner, size 5
- Allen key, size 2.5 (optional)
- Flat-headed screwdriver, size 1.5 x 10
- Side cutters
- Gripper tool or manipulator for source capsule
- Possibly extension rod M8

### Remove source holder

- Remove padlock (1)
- Loosen locking screw (2) with a flat head screwdriver 1.5 x 10
- Pull out fixing pin (3)
- Remove safety catch (4)
- Remove the seal between holding pin (5) and capstan screw (6) with side cutting pliers and pull out the seal wire

- Unscrew the capstan screw (5) with a flat headed screwdriver, size 1.5 x 10
- Insert the holding pin (5) and move with the stirrup over the pin
- Bring the stirrup to the extraction position

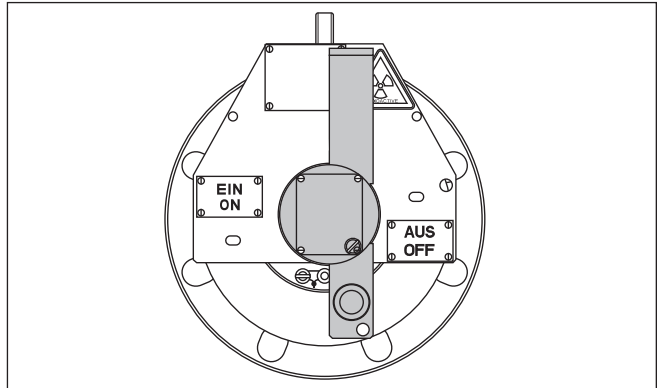


Fig. 7: VEGASOURCE - version B in extraction position

### Insert or exchange source

- If necessary, screw an extension rod (11) with thread M8 into the socket of the source holder (10). With this extension you can increase the distance to the source
- Pull out the source holder (10)
- If it is present, remove the safety bolt (7), Allen key size 2.5
- Swivel the cover (8) in front on the thin cylinder of the source holder (10) to the side. To do this, lift the cover (8) slightly with a small slotted screwdriver
- Only when exchanging the source: Allow the source capsule (9) to fall out downwards into a shielded vessel
- Insert new source capsule (9) and close cover (8). For insertion use a suitable gripping device or a manipulator
- Screw in the safety bolt (7) (optional)

### Insert source holder

- Completely insert the source holder (10) into the source container and turn it until the holding pin (5) pops out
- If necessary, remove extension rod (11)
- Continue turning the source holder (10) up to position OFF
- Fit the padlock (1) and lock
- Let the fixing pin (3) snap in
- Tighten locking screw (2)
- Screw in capstan screw (6) and secure together with the retaining pin (5) with new seal
- Attach safety catch (4)

### Attach or replace the type labels

- Remove existing type labels (when exchanging the source)
- Unpack the type label set and letter it respectively. You can find further information in chapter "Safety instructions - Labelling"

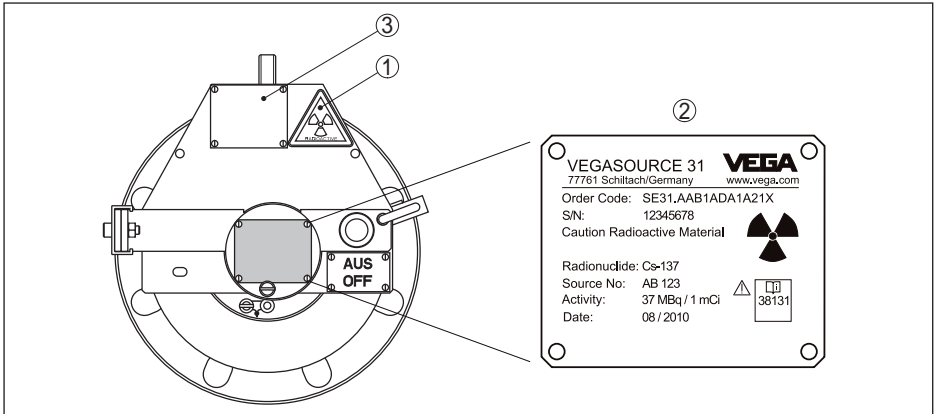


Fig. 8: Fasten type label

- 1 Adhesive label "Radioactive"
- 2 Type label - Source
- 3 Type label - source container (already on the source container)

- Letter the type label (55 x 45 mm) and fasten with four grooved pins to the source holder
- Attach the adhesive label "Radioactive" to the source container (if not already present)
- Insertion or exchange of the source is finished

## 2.3 Version C

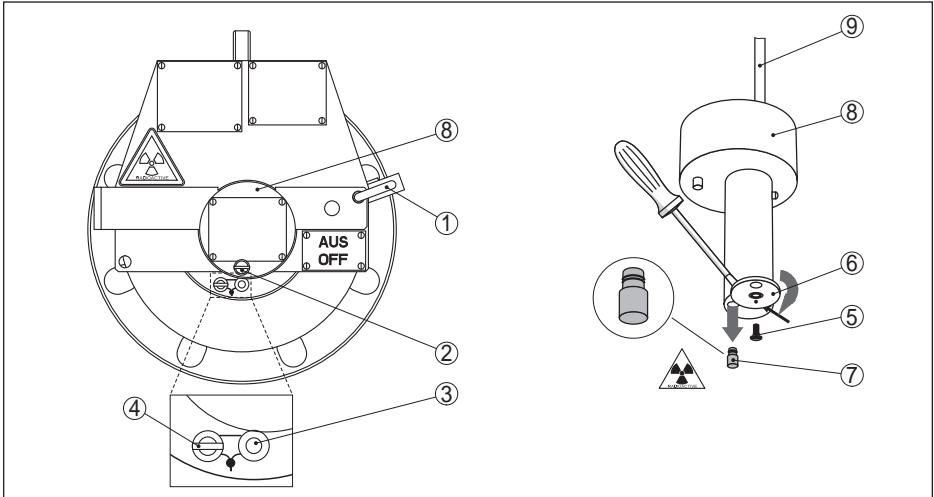


Fig. 9: Exchange of the source - VEGASOURCE version C

- 1 Padlock
- 2 Locking screw
- 3 Retaining pin
- 4 Capstan screw
- 5 Safety bolt - Source capsule (optional)
- 6 Cover plate
- 7 Source capsule
- 8 Source holder
- 9 Extension rod M8 (optional)

**Required tools**

You need the following tools when exchanging the source on version C:

- Key for padlock
- Hexagon spanner, size 5
- Allen key, size 2.5 (optional)
- Flat-headed screwdriver, size 1.5 x 10
- Side cutters
- Gripper tool or manipulator for source capsule
- Possibly extension rod M8

**Remove source holder**

- Remove padlock (1)
- Loosen locking screw (2) with a flat head screwdriver 1.5 x 10
- Remove the seal between holding pin (3) and capstan screw (4) with side cutting pliers and pull out the seal wire
- Unscrew the capstan screw (4) with a flat headed screwdriver, size 1.5 x 10
- Insert the holding pin (3) and slide the stirrup over the pin
- Bring the stirrup to the extraction position

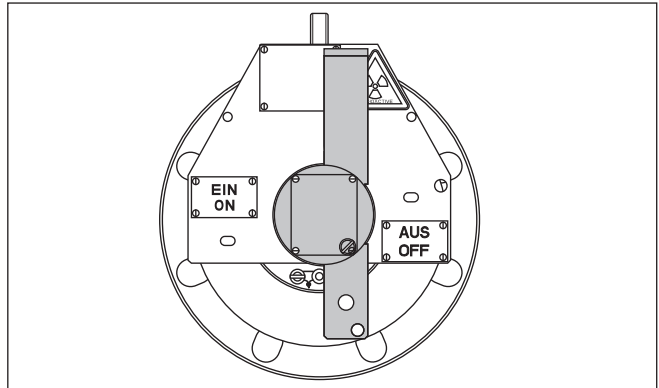


Fig. 10: VEGASOURCE - version C in extraction position

**Insert or exchange source**

- If necessary, screw an extension rod (9) with thread M8 into the socket of the source holder (8). With this extension you can increase the distance to the source
- Pull out the source holder (8)
- If it is present, remove the safety bolt (5), Allen key size 2.5
- Swivel the cover (6) in front on the thin cylinder of the source holder (8) to the side. To do this, lift the cover (6) slightly with a small slotted screwdriver
- Only when exchanging the source: Allow the source capsule (7) to fall out downwards into a shielded vessel
- Insert new source capsule (7) and close cover (6). For insertion use a suitable gripping device or a manipulator
- Screw in the safety bolt (5) (optional)

**Insert source holder**

- Completely insert the source holder (8) into the source container and turn it until the holding pin (3) pops out
- If necessary, remove extension rod (9)
- Continue turning the source holder (8) up to position OFF
- Fit the padlock (1) and lock
- Tighten locking screw (2)
- Screw in capstan screw (4) and secure together with the retaining pin (3) with new seal

**Attach or replace the type labels**

- Remove existing type labels (when exchanging the source)
- Unpack the type label set and letter it respectively. You can find further information in chapter "Safety instructions - Labelling"

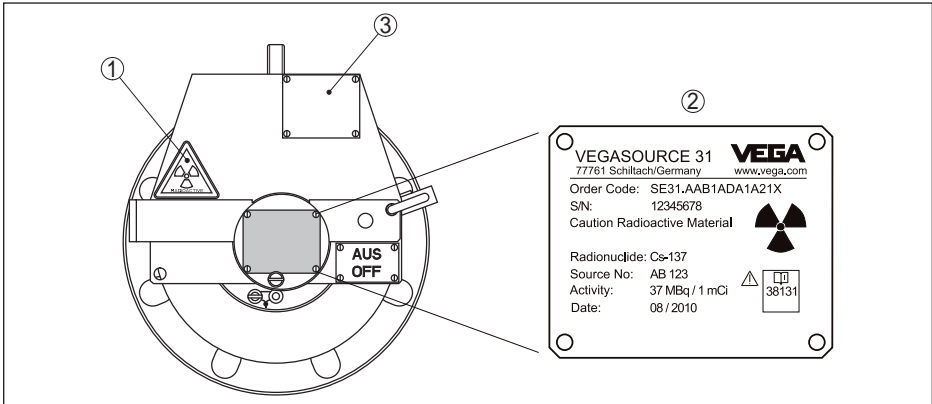


Fig. 11: Fasten type label

- 1 Adhesive label "Radioactive"
- 2 Type label - Source
- 3 Type label - source container (already on the source container)

- Letter the type label (55 x 45 mm) and fasten with four grooved pins to the source holder
- Attach the adhesive label "Radioactive" to the specified position of the source container (if not already present)
- Insertion or exchange of the source is finished

### 2.4 Version D

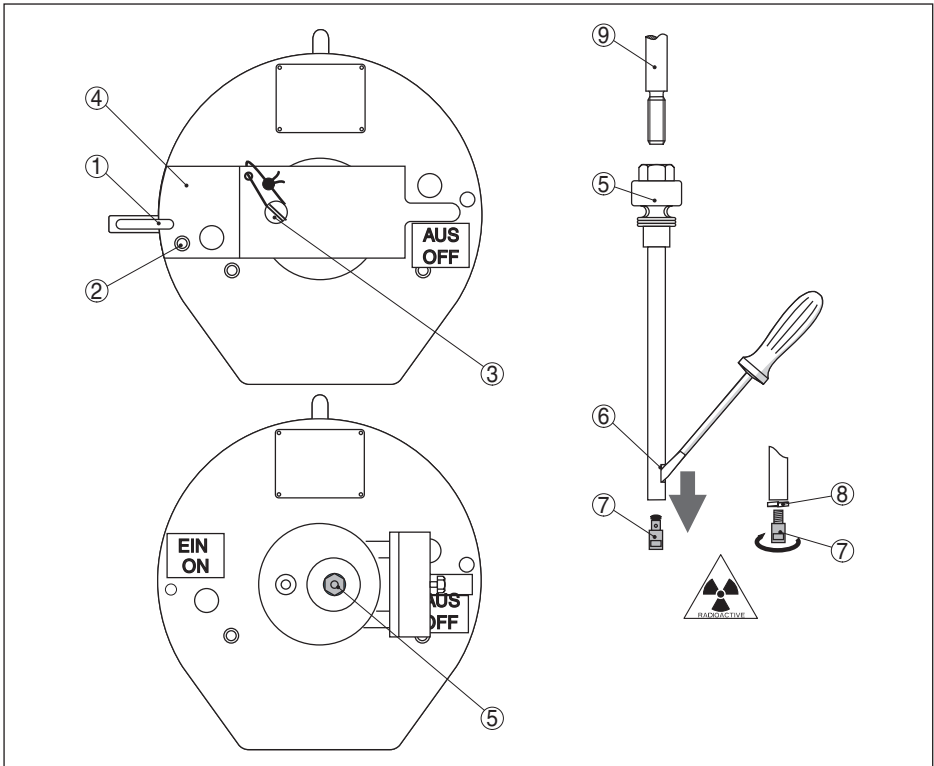


Fig. 12: Exchange of the source - VEGASOURCE version D

- 1 Padlock
- 2 Locking screw
- 3 Capstan screw
- 4 Fixing strap
- 5 Source holder
- 6 Slot
- 7 Source capsule
- 8 Spring ring
- 9 Extension rod M6 (optional)

#### Required tools

You need the following tools when exchanging the source on version D:

- Key for padlock
- Fork wrench, wrench size 13
- Hexagon spanner, size 5
- Allen key, size 2.5 (optional)
- Flat-headed screwdriver, size 1.5 x 10
- Flat-headed screwdriver, size 4 mm
- Side cutters
- Gripper tool or manipulator for source capsule

**Remove source holder**

- Possibly extension rod M6
- Remove padlock (1)
- Loosen locking screw (2) with a flat head screwdriver 1.5 x 10
- Remove the seal of the capstan screw (3) with the side cutting pliers and pull out the seal wire
- Unscrew the capstan screw (3) until the fixing strap (4) can be folded up
- Fold up the fixing strap (4)

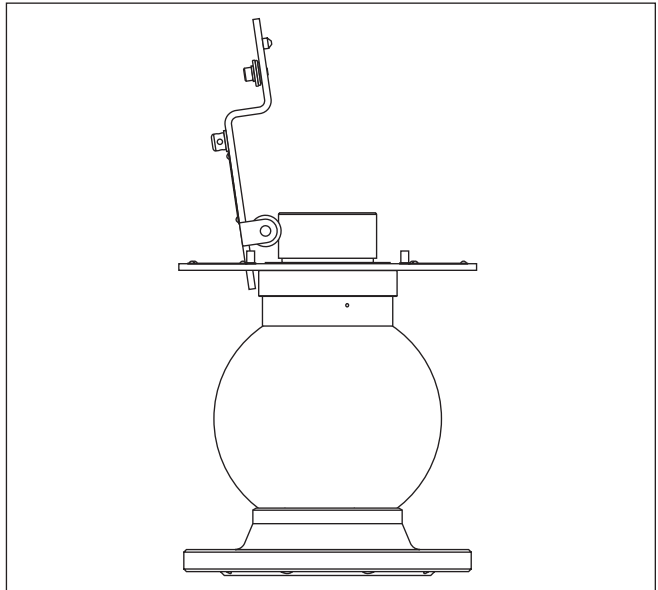


Fig. 13: VEGASOURCE - version D in extraction position

**Insert or exchange source**

- If necessary, screw an extension rod (9) with thread M6 into the thread of the source holder (5). With this extension you can increase the distance to the source
- Unscrew source holder (5) with spanner (size 13) and pull it out of the source container
- Only when exchanging the source: Insert the blade of a screwdriver (4 mm) into the slot (6) on the source holder (5) and press out the source capsule (7) or unscrew the source capsule with a screwdriver (2 mm). Let the source capsule (7) fall into a shielded vessel
- Insert the new source capsule (7) into the source holder (5) until it snaps in or insert the spring ring (8) with the threaded version and screw the source capsule into the source holder (5) (torque  $2 \pm 0.5$  Nm). Use a suitable gripping device or a manipulator for inserting

**Insert source holder**

- Insert the source holder (5) completely into the source container and screw in with a spanner (size 13)



- Tighten the source holder (5)
- If necessary, remove extension rod (9)
- Fold down the fixing strap (4)
- Screw in the capstan screw (3) and tighten it
- Fit the padlock (1) and lock
- Tighten locking screw (2)
- Secure capstan screw (3) with new seal

**Attach or replace the type labels**

- Remove existing type labels (when exchanging the source)
- Unpack the type label set and letter it respectively. You can find further information in chapter "Safety instructions - Labelling"

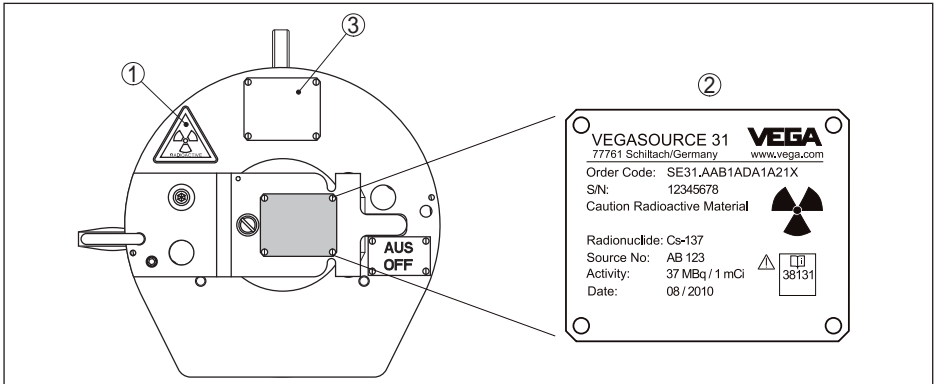


Fig. 14: Fasten type label

- 1 Adhesive label "Radioactive"
- 2 Type label - Source
- 3 Type label - source container (already on the source container)

- Letter the type label (55 x 45 mm) and fasten it on the fixing strap with four grooved pins
- Attach the adhesive label "Radioactive" to the specified position of the source container (if not already present)
- Insertion or exchange of the source is finished

## 2.5 Version K, L

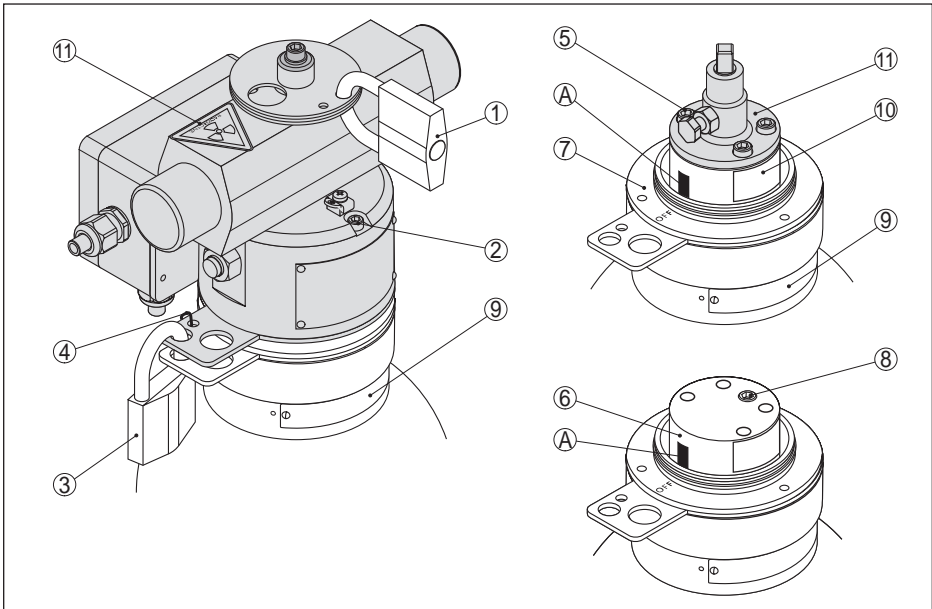


Fig. 15: Exchange of the source - VEGASOURCE version K, L

- 1 Padlock - Switching function
- 2 Fixing screws - Drive unit
- 3 Padlock
- 4 Seal
- 5 Terminal screws
- 6 Source holder
- 7 Adapter disc
- 8 Safety screw
- 9 Type label - Source holder
- 10 Adhesive type label - Source
- 11 Squared adapters with flange
- A Arrow mark

**Required tools**

You need the following tools when exchanging the source on versions K and L:

- Key for padlocks
- Hexagon socket wrench, size 4
- Allen key, size 2.5 (optional)
- Flat-headed screwdriver, size 4 mm
- Side cutters
- Gripper tool or manipulator for source capsule

**Dismount drive unit and squared adapter**

- Switch off compressed air and remove the feed lines. The source container must now be in position OFF
- Off position of the drive unit with padlock - secure switching function (1)
- Remove padlock (3)

- Remove the seal (4) from the strap with side cutting pliers and pull out the seal wire
- Loosen fixing screws - drive unit (2) (3 pcs, hexagon size 4) and remove them. The screws have different lengths
- Lift up the complete drive unit upward
- Only loosen (4 pieces) the terminal screws (5) - do not unscrew the screws
- Detach the squared adaters with flange (11) upward

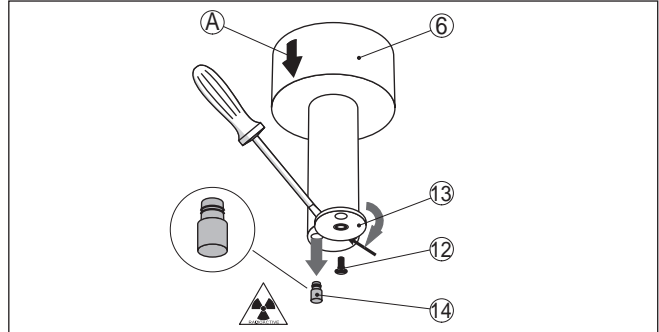


Fig. 16: Exchange of the source - source holder VEGASOURCE version K, L

- 6 Source holder
- 12 Safety bolt - Source capsule (optional)
- 13 Cover plate
- 14 Source capsule
- A Arrow mark

**Insert or exchange source**

- Loosen securing screw (8) with an Allen key size 4
- Turn source holder (6) ¼ turn anticlockwise and pull it out of the source container. The arrow mark (A) is above the OFF mark of the adapter disc (7)
- If it is present, remove the safety bolt (12) with Allen key size 2.5
- Swivel the cover (13) in front on the thin cylinder of the source holder to the side. To do this, lift the cover (13) slightly with a small slotted screwdriver
- Only when exchanging the source: Allow the source capsule (14) to fall out downwards into a shielded vessel
- Insert new source capsule (14) and close cover (13). For insertion use a suitable gripping device or a manipulator
- Screw in the safety bolt (12) (optional)

**Insert source holder**

- Insert the source holder (6) completely into the source container
- Turn the source holder until the arrow mark (A) is above the OFF mark of the adapter disc (7)
- Screw in the safety bolt (8) and tighten it

**Attach or replace the type labels**

- Remove existing type labels (when exchanging the source)
- Unpack the type label set and letter it respectively. You can find further information in chapter "Safety instructions - Labelling"

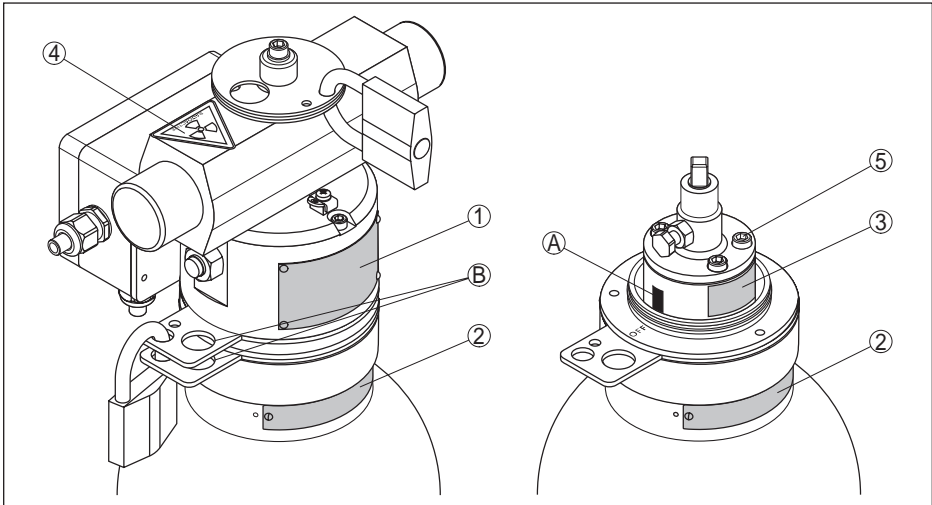


Fig. 17: Fasten type label

- 1 Type label - Source holder
- 2 Type label - Source
- 3 Adhesive type label - Source
- 4 Adhesive label "Radioactive"
- 5 Terminal screws
- A Arrow mark
- B Straps must line up

### Mount squared adapters and drive unit

- Letter the adhesive type label (48 x 30 mm) and attach it to the source holder
- Letter the type label (107 x 17 mm) and fasten it to the neck of the source container with two grooved pins
- Attach the adhesive label "Radioactive" to the specified position of the source container (if not already present)
- Fasten the square adapters with flange (11) with the four clamping screws (5). The arrow mark (A) of the source holder (6) is above the OFF mark of the adapter disc (7)
- Tighten the terminal screws (5)
- Check if the source container is in position OFF. The arrow mark (A) of the source holder (6) must be above the OFF mark of the adapter washer (7)
- Attach the complete drive unit from above - when attaching make sure that the two straps of the adapter disc and the drive unit are on top of the other (B)
- Fasten drive unit with the three fixing screws - drive unit (2)
- Fit the padlock (3) and lock, to protect the source capsule against unauthorized access
- Attach new seal (4)
- Connect the pneumatic and feeding lines - the pneumatic lines must be unpressurized. See operating instructions of the source container
- Remove padlock - Switching function (1)

- Insertion or exchange of the source is finished

## 2.6 Version M, N

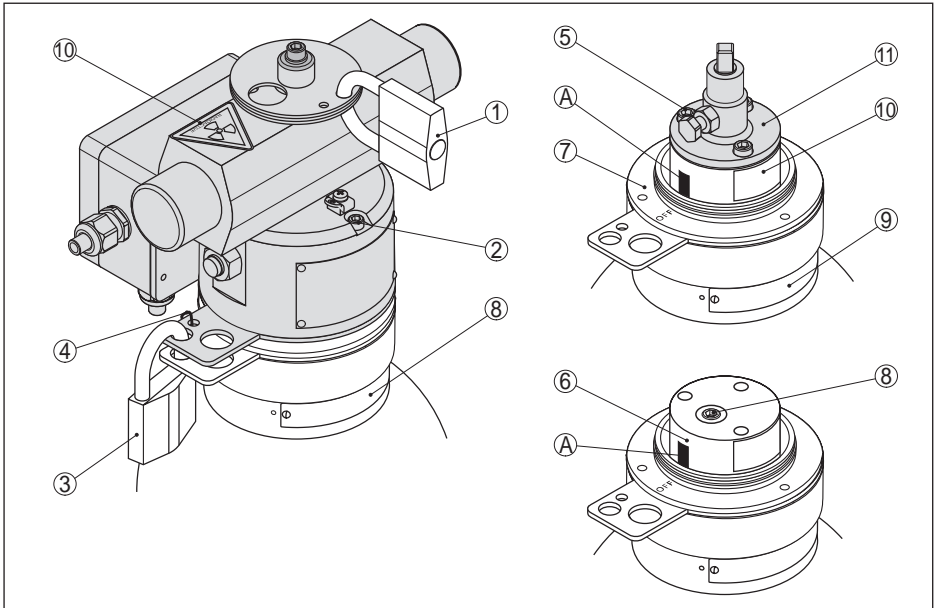


Fig. 18: Exchange of the source - VEGASOURCE version M, N

- 1 Padlock - Switching function
- 2 Fixing screws - Drive unit
- 3 Padlock
- 4 Seal
- 5 Fixing screw
- 6 Reception of the source holder
- 7 Adapter disc
- 8 Source holder
- 9 Type label - Source holder
- 10 Adhesive type label - Source
- 11 Squared adapters with flange
- A Arrow mark

### Required tools

You need the following tools when exchanging the source on versions M and N:

- Key for padlocks
- Hexagon socket wrench, size 4
- Allen key, size 2.5 (optional)
- Flat-headed screwdriver, size 4 mm
- Side cutters
- Gripper tool or manipulator for source capsule

### Dismount drive unit and squared adapter

- Switch off compressed air and remove the feed lines. The source container must now be in position OFF

- Off position of the drive unit with padlock - secure switching function (1)
- Remove padlock (3)
- Remove the seal (4) from the strap with side cutting pliers and pull out the seal wire
- Loosen fixing screws (2) (3 pieces)
- Lift up the complete drive unit upward
- Loosen fixing screws (5) (3 pieces)
- Detach the squared adaters with flange (11) upward

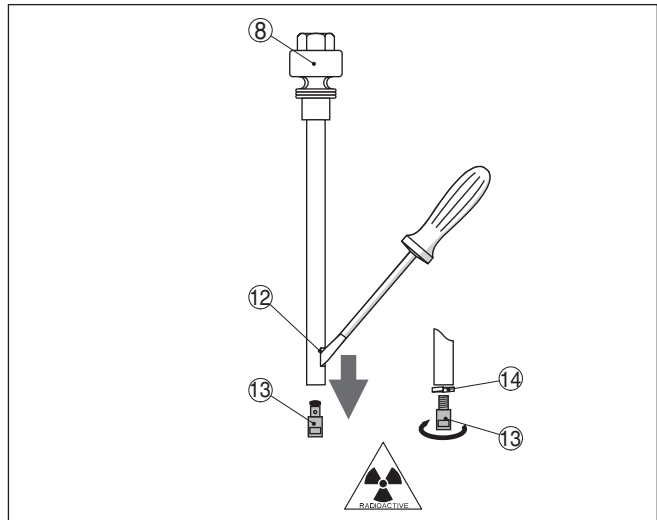


Fig. 19: Exchange of the source - source holder VEGASOURCE version M, N

- 8 Source holder
- 12 Slot
- 13 Source capsule
- 14 Spring ring

### Insert or exchange source

- Unscrew source holder (8) with spanner (size 13) and pull it out of the source container
- Only when exchanging the source: Insert the blade of a screwdriver (4 mm) into the slot (12) on the source holder (8) and press out the source capsule (13) or unscrew the source capsule with a screwdriver (2 mm). Let the source capsule (13) fall into a shielded vessel
- Insert the new source capsule (13) into the source holder (8) until it snaps in or insert the spring ring (14) with the threaded version and screw the source capsule into the source holder (8) (torque  $2 \pm 0.5$  Nm). Use a suitable gripping device or a manipulator for inserting

### Insert source holder

- Insert the source holder (8) completely into the source container and screw in with a spanner (size 13)
- Tighten the source holder (8)

### Attach or replace the type labels

- Remove existing type labels (when exchanging the source)

- Unpack the type label set and letter it respectively. You can find further information in chapter "Safety instructions - Labelling"

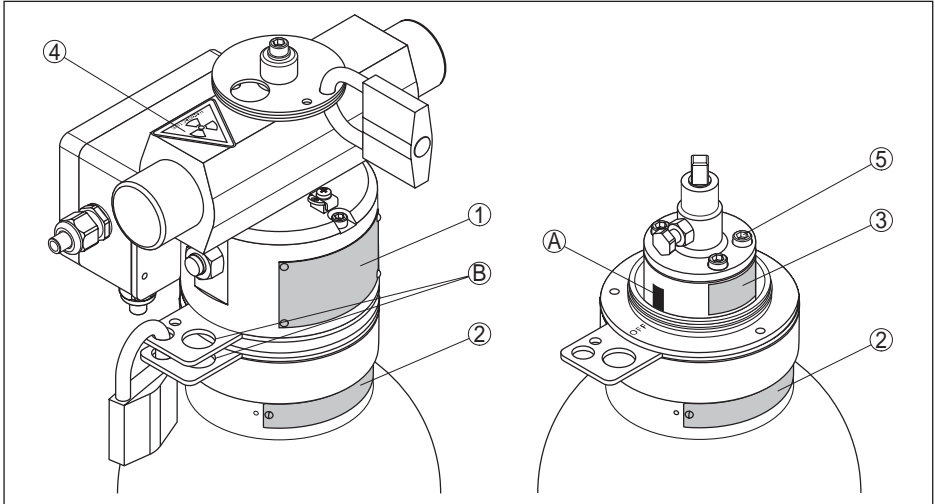


Fig. 20: Fasten type label

- 1 Type label - Source holder
- 2 Type label - Source
- 3 Adhesive type label - Source
- 4 Adhesive label "Radioactive"
- A Arrow mark
- B Straps must line up

- Letter the adhesive type label (48 x 30 mm) and attach it to the source holder
- Letter the type label (107 x 17 mm) and fasten it to the neck of the source container with two grooved pins
- Attach the adhesive label "Radioactive" to the specified position of the source container (if not already present)

**Mount squared adapters and drive unit**

- Fasten the square adapters with flange (11) with the three fixing screws (5). The arrow mark (A) of the source holder is above the OFF mark of the adapter disc (7)
- Tighten fixing screws (5)
- Check if the source holder is in position OFF
- Attach the complete drive unit from above - when attaching make sure that the two straps of the adapter disc and the drive unit are on top of the other (B)
- Fasten drive unit with the three fixing screws - drive unit (2)
- Fit the padlock (3) and lock, to protect the source capsule against unauthorized access
- Attach new seal (4)
- Connect pneumatic and feed lines - see operating instructions of the source container
- Remove padlock - Switching function (1)
- Insertion or exchange of the source is finished

## 3 Supplement

### 3.1 Technical data

#### Source

Take note of the specifications in the operating instructions of the source container VEGASOURCE.

#### Attenuation factor and half-value layers

Source	VEGASOURCE 31		VEGASOURCE 35	
	Co-60	Cs-137	Co-60	Cs-137
Attenuation factor	37	294	181	3100
Number of the half-value layers	5.2	8.2	7.5	11.6

Tab. 1: Attenuation factor and half-value layers

#### Max. activity of the source

	VEGASOURCE 31	VEGASOURCE 35
Co-60	max. 0.74 GBq (20 mCi)	max. 3.7 GBq (100 mCi)
Cs-137	max. 22.2 GBq (600 mCi)	max. 185 GBq (5000 mCi)

Tab. 2: Max. activity of the source

Product-related fluctuations of the source activity and tolerances of the measuring instruments are not taken into account for the above data.



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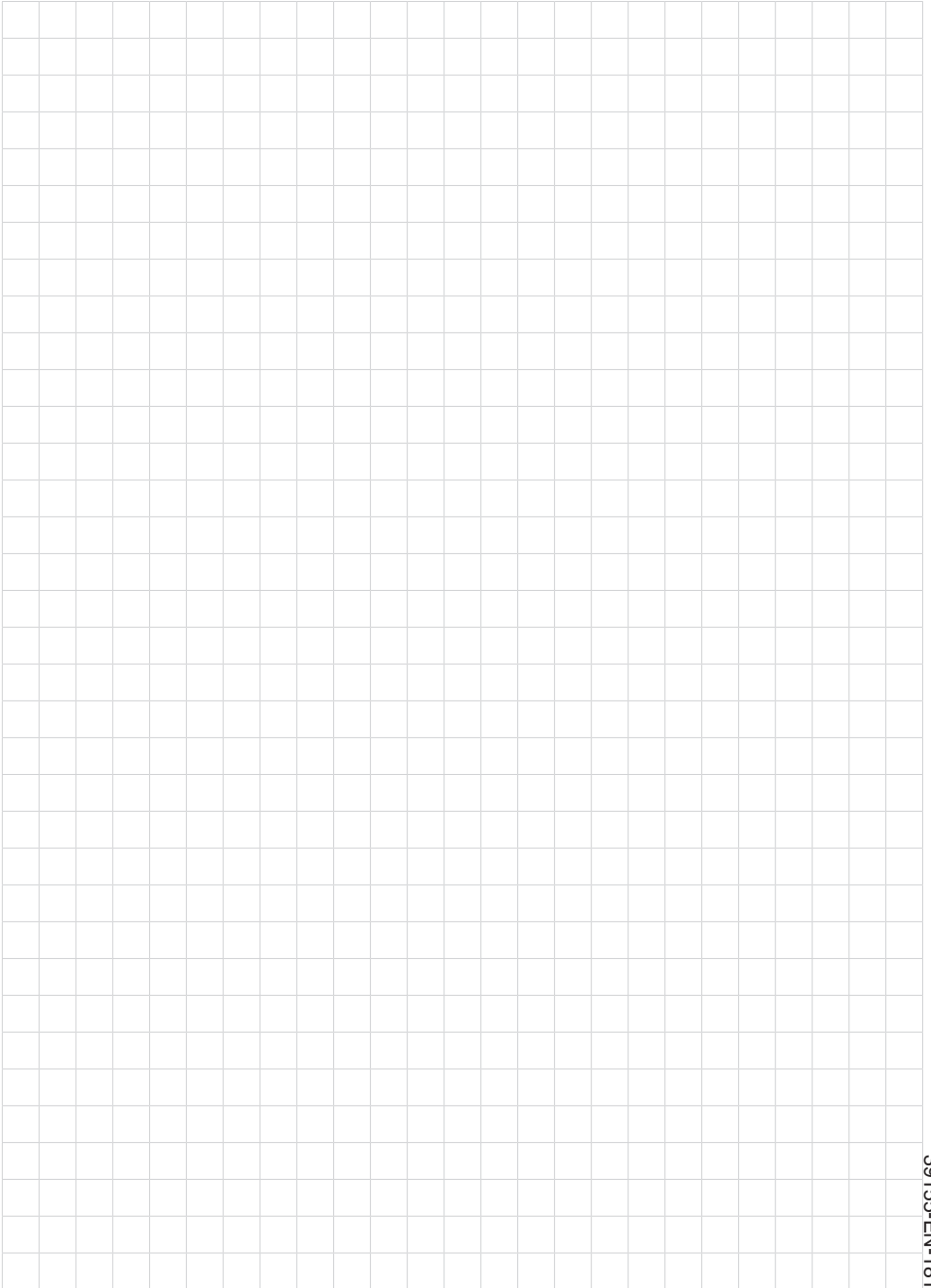
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A large, empty grid of graph paper, consisting of 20 columns and 40 rows of small squares, occupying the majority of the page.

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