Safety Instructions
Source Container
FQG60, FQG61/62, FQG63, FQG66

Radiometric level measurement

Supplementary safety instructions for radioactive sources and source containers approved for use in Canada

Endress+Hauser
People for Process Automation

Table of contents

Introduction

Scope of application

The safety instructions contained in this document apply to radioactive sources and source containers which have been approved by the CNSC for the use in Canada.
This document does not substitute the Operating Instructions TI00445F (FQG60), TI00435F (FQG61/62), TI00446F (FQG63), BA01327F and Technical Information TI01171F (FQG66).
When operating a source container within Canada, the respective Operating Instructions have to be strictly observed as well as the procedures described in this document.

Leak test procedure

Equipment to be tested

A leak test is required if the source activity is greater than 50 MBq.

Frequency of leak testing

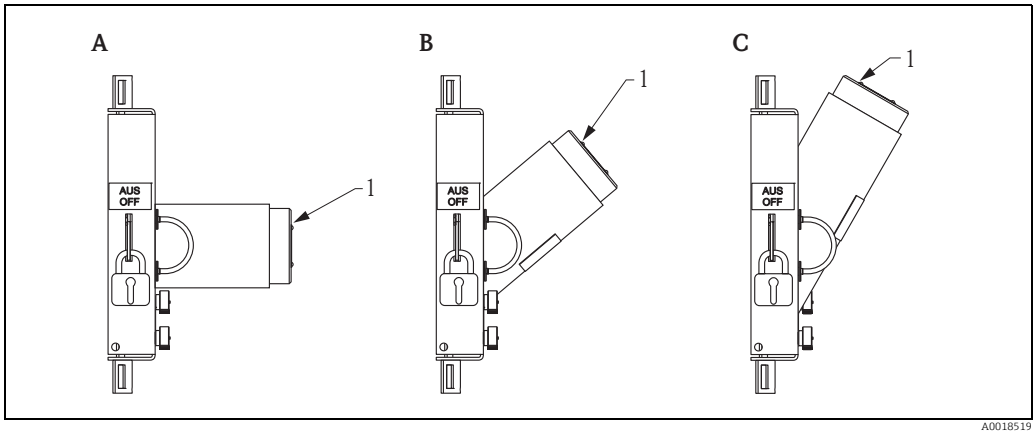
Subject to other regulations by CNSC the device has to be tested
- once every 12 months for sources in continuous operation
- once every 24 months if the source is placed into continuous storage
- immediately, if the source is placed back into operation after being stored for 12 or more consecutive months (replaces any previous test that may have been done during the previous 12 months while in storage).

Leak tests are required whenever an incident occurs that may damage the sealed source or shielding. The leak test must be performed as soon as possible after the incident.

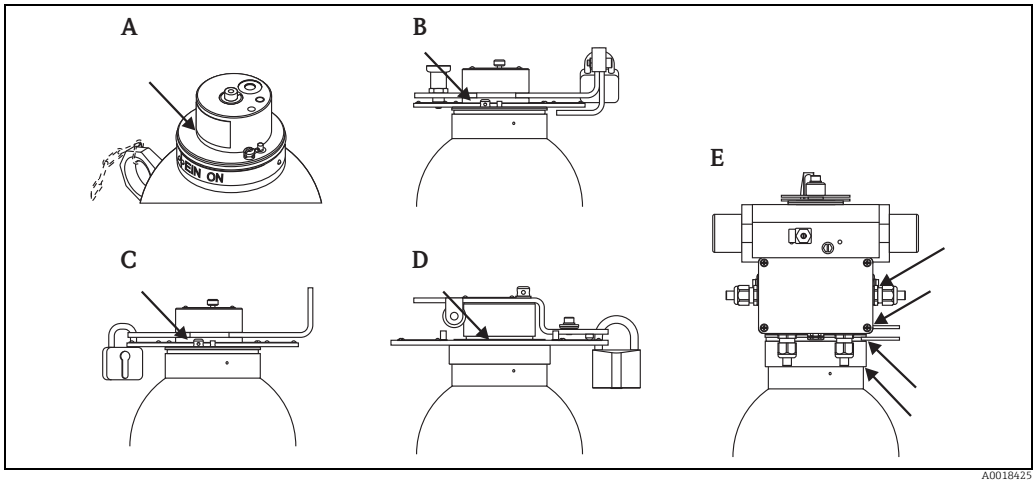
Leak test procedure

Ensure that the person collecting the leak test samples has:
- access to and follows approved leak test procedures
- received radiation safety training to control any associated radiation hazard
- sufficient sampling materials and leak test sampling certificates.

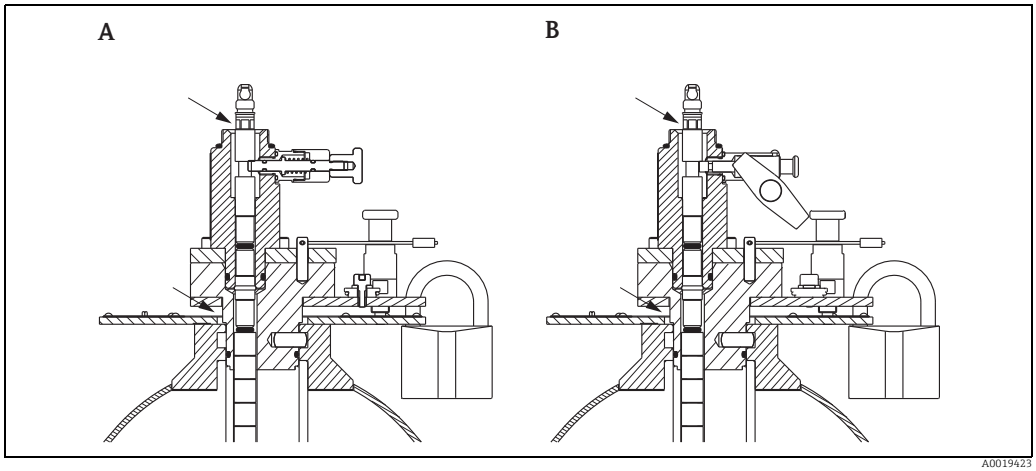
1. Proceed as follows for FQG60, FQG61/62 and FQG63:



1 Wiping surface for the leak test along the edge of the nameplate
A FQG60; Ordering feature 240 "Emission Angle; Application", option 3 "20deg; limit switch + density"
B FQG60; Ordering feature 240 "Emission Angle; Application", option 5 "40deg; level"
C FQG60; Ordering feature 240 "Emission Angle; Application", option 4 "20deg; density 30deg diagonal radiation"



A FQG61/62; Ordering feature 020 "Version", option A "Cylinder lock fixation ON/OFF + covering cap"
B FQG61/62; Ordering feature 020 "Version", option B "Padlock fixation OFF + locking bolt ON + rotary bracket"
C FQG61/62; Ordering feature 020 "Version", option C "Padlock fixation ON/OFF + rotary bracket"
D FQG61/62; Ordering feature 020 "Version",
option D "Padlock fixation ON/OFF + o-ring seal double > higher protection dust/humidity + rotary bracket"
E FQG61/62; Ordering feature 020 "Version",
option K "Pneumatic cutoff, non Ex + padlock fixation OFF",
option L "Pneumatic cutoff, ATEX + padlock fixation OFF ATEX II 2 G c IIB T4 X",
option M "Pneumatic cutoff, non Ex + o-ring seal double > higher protection dust/humidity + padlock fixation OFF" or
option N "Pneumatic cutoff, ATEX + o-ring seal double > higher protection dust/humidity + padlock fixation OFF + ATEX II 2 G c IIB T4 X"

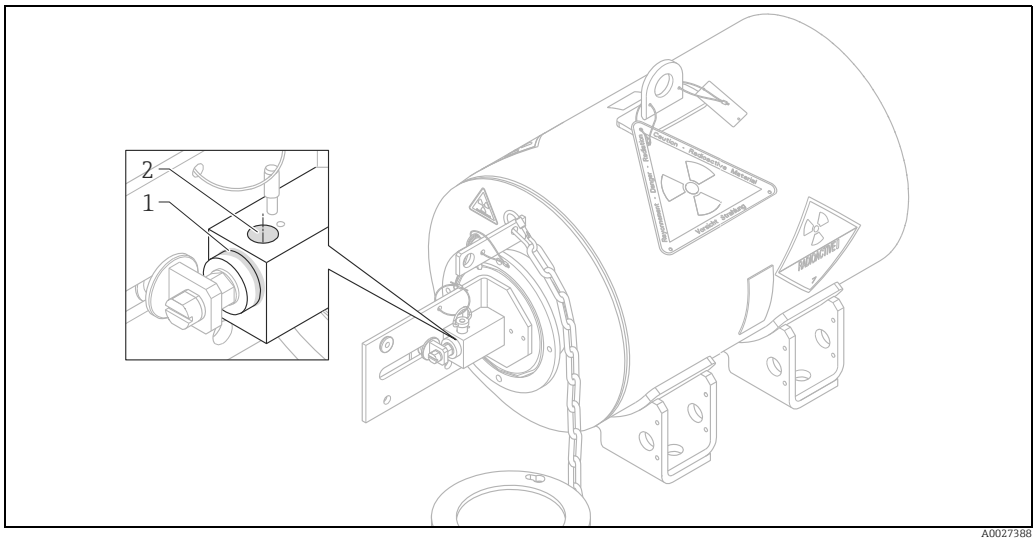


A FQG63, Ordering feature 020 "Version", option B "Rotary bracket + locking bolt ON + padlock fixation OFF"
B FQG63, Ordering feature 020 "Version", option C "Padlock fixation ON/OFF + rotary bracket"

2. Have the samples analysed by a CNSC approved laboratory. A source is to be considered leaking if more than 200 Bq is detected on a leak test sample.
3. In case of an indeed leaking source:
   - immediately discontinue use of the device
   - contact the responsible radiation protection officer for instructions
   - take appropriate measures to control a potential spread of radioactive contamination from the source
   - secure the source
   - notify CNSC that a leaking source has been detected

1. Proceed as follows for FQG66, ordering feature 020 "Version", option A "Manual operation":

   The wipe test can be performed when the source holder is in either the "EIN/ON" or "AUS/OFF" position.



1 Wiping surface at border between source holder and housing block
2 Wiping surface in the bore hole of the locking bolt

2. The wipe sample must at least be taken at the border between the source holder and the housing block, or in the bore hole of the locking bolt if necessary.
3. Have the samples analysed by a CNSC approved laboratory. A source is to be considered leaking if more than 200 Bq is detected on a leak test sample.
4. In case of an indeed leaking source:
   - immediately discontinue use of the device
   - contact the responsible radiation protection officer for instructions
   - take appropriate measures to control a potential spread of radioactive contamination from the source
   - secure the source
   - notify CNSC that a leaking source has been detected

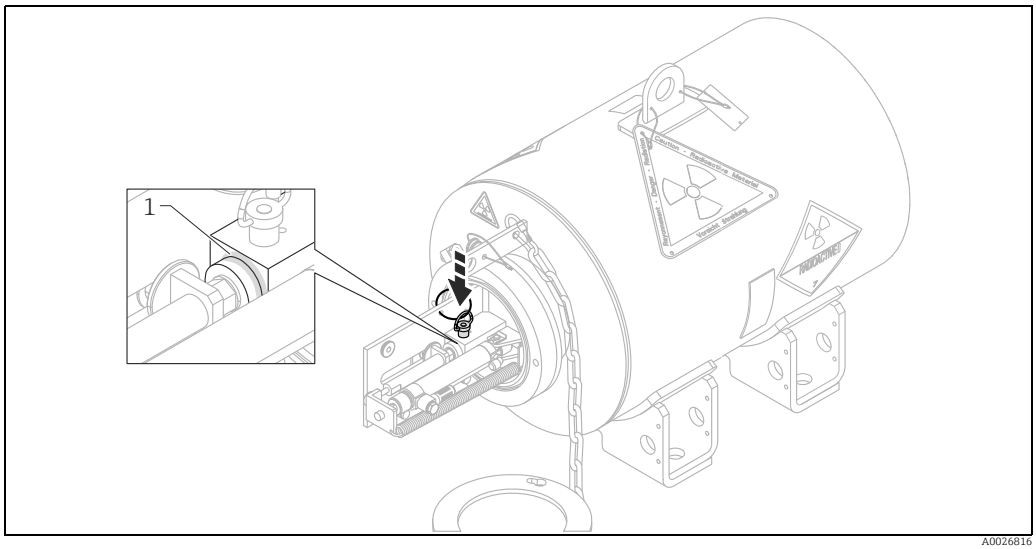
1. Proceed as follows for FQG66, ordering feature 020 "Version", option L "Pneumatic cutoff + proximity switch":

⚠ CAUTION

Risk of injury when cover is open

▶ Make sure that the pneumatic drive is unpressurized for the entire time the cover is removed!

Before performing the wipe test, disconnect the pneumatic drive drom the compressed air supply and fix it in place in the "AUS/OFF" position with the locking bolt.



1 Wiping surface

2. The wipe sample must at least be taken at the border between the source holder and the housing block.
3. Have the samples analysed by a CNSC approved laboratory. A source is to be considered leaking if more than 200 Bq is detected on a leak test sample.
4. In case of an indeed leaking source:
   - immediately discontinue use of the device
   - contact the responsible radiation protection officer for instructions
   - take appropriate measures to control a potential spread of radioactive contamination from the source
   - secure the source
   - notify CNSC that a leaking source has been detected

Visual check

If considerable corrosion is visible at the housing (**FQG60:** especially in the area of the shutter plate; **FQG61/62:** especially at the cover plate of the radiation channel) measure the radiation level around the device. If values occur exceeding the normal operation level, cordon off the area and contact immediately the responsible radiation safety officer for instructions. In any case corroded devices or corroded parts of devices shall be exchanged as soon as possible.
For FQG63: Source containers with corroded extension element, interlocks or source holder rods require immediate exchange.
For FQG66: especially at the cover plate of the radiation channel and at the welding seams of the device base.

Emergency procedure

Objective and overview

This emergency procedure should be put into effect immediately to secure an area in the interests of protecting personnel where an exposed source is known, or suspected, to exist.
Such an emergency exists when a radioisotope is exposed either by it becoming separated from the source container or the source container shutter cannot be closed or if available, the extension element or the shutter cannot be moved to OFF position or a possible damage on fire has occurred.
This procedure will safeguard an area until an appropriate radiation protection officer can attend site and advise on corrective action.
The custodian of the radioactive source (the customer's designated "authorized person") is responsible for observing this procedure.

Procedure

1. Determine the unsafe area by measurement (on site) or by calculation knowing the size and type of source installed from the records.
2. Cordon off the area at the boundary where the radiation level exceeds 2.5 μSv/h (0.25 mR/h) by yellow tape or rope and post international radiation warning signs.

In case a fire has occurred:
- Assume that some of the lead shielding has melted.
- Examine the source container environment for any damage to the mounting structure (bolts, brackets, etc.).
- Survey the damaged source container and compare results with initial installation survey.
- In case the housing of the source container is heavily damaged, leak test the source container for removable contamination.
- For FQG61, FQG62, FQG63, FQG66: Check the shutter mechanism for proper function.

In case of a shutter that will not closed:

FQG60:
- If part of the area is accessible (e.g. a vessel in the event of a level gauge installation where there is a possibility that a person might enter), the source housing should be unbolted from its mounting and laid face down on the ground or put emission channel towards a thick wall. The weight of approx. 18 kg (39.7 lbs) allows manual handling.
- Personnel should at all times be behind the source housing, not in front of the emission channel (rectangular shutter plate).

FQG61/62:
- If part of the area is accessible (e.g. a vessel in the event of a level gauge installation where there is a possibility that a person might enter), the source housing should be unbolted from its mounting and laid face down on the ground or put emission channel towards a thick wall. The ring-eyelet on the housing should facilitate safe handling.
- Personnel should at all times be behind the source housing, not in front of the emission channel (flange).

In case of a shutter that will not close due to failure of the pneumatic drive:
Switch off or disconnect compressed air, remove supply lines if necessary. Open lower padlock, unscrew the allen screws adjacent to the pneumatic drive and remove the complete drive unit to get access to the source holder. Turn source holder manually to the marked off position.

FQG63:
In case the extension element is retracted but the swivel insert does not close:
- If part of the area is accessible (e.g. a vessel in the event of a level gauge installation where there is a possibility that a person might enter), the source housing (extension element in OFF position) should be unbolted from its mounting and laid face down on the ground or put emission channel towards a thick wall. The ring-eyelet on the housing should facilitate safe handling.
- Personnel should at all times be behind the source housing, not in front of the emission channel (flange).

In case the extension element is not retractable:
If part of the area is accessible (e.g. a vessel in the event of a level gauge installation where there is a possibility that a person might enter), the source container should be unbolted, removed together with the inner proctection pipe from its mounting and laid down on the ground. The protection pipe should be immediately completely covered with a suitable shielding.

Personnel should at all times keep maximum possible distance from the protection pipe and should at all times be behind the source container, not in front of the emission channel (flange of the source container) or near the extension element or near the protection pipe. The eye bolts on the housing should facilitate safe handling.

FQG66:

- If part of the area is accessible (e.g. a vessel in the event of a level gauge installation where there is a possibility that a person might enter), the source housing should be unbolted from its mounting and
  > in case the radiation emission channel is located horizontally: put the emission channel towards a very thick wall, or
  > in case the radiation emission channel is located vertically: put the source container on its device base on the ground.

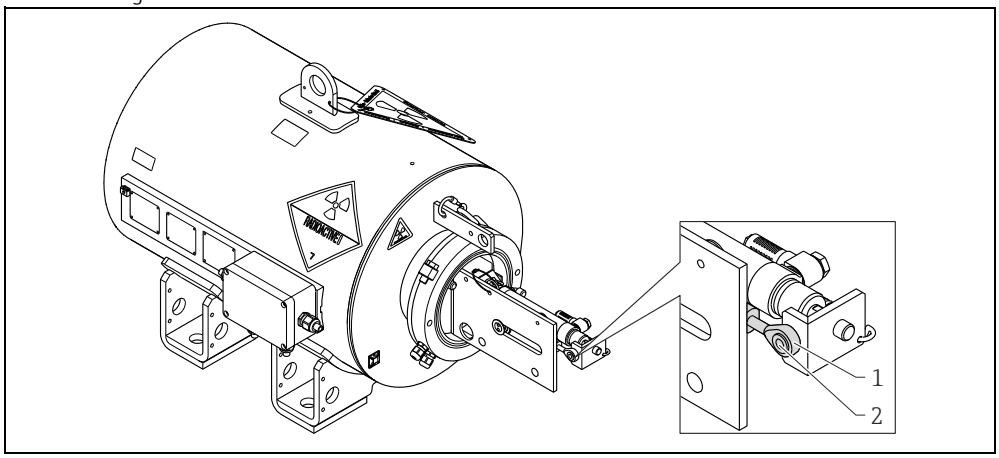
⚠ CAUTION

Risk of injury

▶ Use lifting tools due to the weight of approx. 435 kg (959.18 lb).

- Personnel should at all times be behind the source housing, not in front of the emission channel (flange).

In case of a shutter that will not close due to failure of the pneumatic drive:
Switch off or disconnect compressed air, remove supply lines if necessary. Remove the protection cap. Unscrew the connection screw between the eye bolt at the end of the source holder rod and the pneumatic drive. Move the source holder rod to "AUS/OFF" position and secure it by the means of the locking bolt.



1 Eye bolt
2 Connection screw

3. If it is not practical to cordon off the entire area or if the source is in immediate danger of moving, it may be necessary to secure the source by relocating it or adding shielding. Here, the inverse square law should be observed, i.e. radiation reduces with distance quadratically. The source should only be handled via pliers or tongs and held as far away from the body as possible. The time taken to fulfill the exercise should be minimized by rehearsal prior to execution.
4. Inform the local Canadian Nuclear Safety Commission Duty Officer responsible for the area in which the incident has occured, and ask for immediate action.

   Telephone number: (613) 995-0479 (Ottawa)

   This is to be done as soon as possible and not later than 24 hours of the incident being discovered.

5. After thorough assessment of the damage, the CNSC Inspector, in conjunction with Endress+Hauser, will agree a remedy to the specific problem.

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