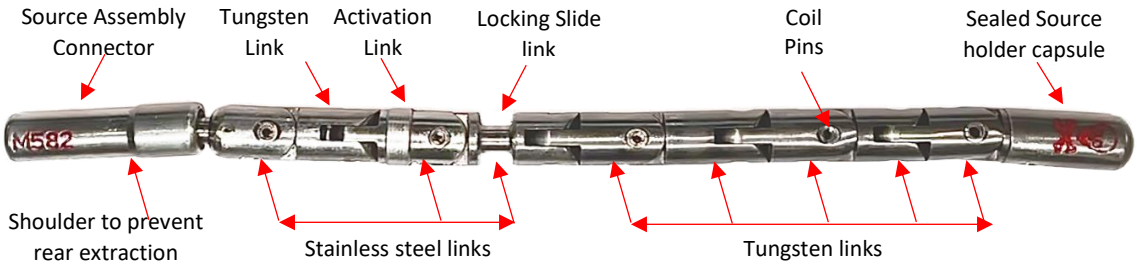
Exertus Fortes Exposure container

Emergency Source Retrieval

The Exertus Fortes is a Depleted Uranium D(U) shielded exposure container which accepts Ir.192 and Se.75 sources. It has a straight source channel with a helicoidal design labyrinth to prevent forward “shine”.

The source assembly is an articulated link-type design with tungsten links strategically placed behind the source holder capsule to prevent rear “shine”.



The source assembly locking mechanism is designed to be triggered by the “Activation Link” at the rear section of the source assembly. Failure of the locking mechanism to engage immediately alerts the radiographer to a potential problem with the source assembly and possibly the source itself.

This Work Instruction deals with:

1. Failure of the locking mechanism to engage – Source Assembly under control
2. Locking mechanism engaged – Source Assembly uncontrolled – Guide Tube

NB!! The following procedures are based on the use of standard Gamma equipment supplied by Gammatec NDT Supplies SOC Ltd only. We shall not be responsible for any injury or loss resulting from any modification, lack of maintenance, foreign or non-standard parts used in conjunction with our equipment, or lack of understanding of the operating procedures of the Exertus Fortes exposure container by the radiographer and relevant personnel.

In any emergency situation remain calm – DO NOT PANIC. Remember, radiation dose is measured in micro Sieverts per hour, so high doses over short periods can be tolerated without being overdosed.

1. Failure of the locking mechanism to engage – Source Assembly under control.

In this scenario the radiographer has retracted the source assembly into the exposure container and the locking mechanism has failed to engage.

1.1 Using the remote control crank handle move the source assembly forward and pull

back sharply back two or three times in an attempt to activate the locking slide.

1.2 If this is unsuccessful have your assistant keep “retract” pressure on the winding mechanism crank handle.

1.3 Approach the exposure container, from the rear, with a survey meter. The survey meter will measure approximately **550µSv/hr (55mR/hr)** at the rear locking mechanism when a 4.44TBq (120Ci) Ir.192 source is in use.

1.4 Carefully measure radiation levels at the front of the exposure container and around the radiography setup to determine whether the sealed source is in or out of the exposure container.

1.5 Having determined that the sealed source has indeed returned to the safe position inside the exposure container, proceed as follows:

1.5.1 The failure of the locking slide to engage with the source assembly locking slide link may be due to a broken spring. Tilt the exposure container to the right and tap the locking mechanism to see if the locking slide will move to the **GREEN** (Closed) position and secure the source assembly.

1.5.1.1 If this is successful immediately rotate the selector ring to the **GREEN** (Closed) position and lock the exposure container. Disconnect the guide tube and winding mechanism, replace all dust caps, and notify your **Radiation Safety Officer** of the problem. **Do not continue to operate the exposure container.**

1.5.1.2 **If this was unsuccessful the emergency shipping plug must be fitted.**

1.5.1.3 Disconnect the guide tube and remove the emergency shipping plug from its housing in the exposure container Jacket Handle by rotating the connector 90° clockwise and withdrawing the plug (Photos 1.5.1a, b & c).

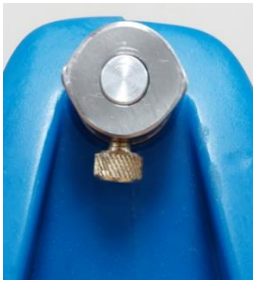


Photo 1.5.1a

Photo 1.5.1b

Photo 1.5.1c

1.5.1.4 Loosen the thumbscrew and remove the plug from the connector (Photo 1.5.1d).

Photo 1.5.1d

1.5.1.5 Now insert the connector in the projection port, rotate the connector 90°, and swivel the projection port dust cover to the 5-o-clock position (Photos 1.5.1e, f and g).

Photo1.5.1e

Photo1.5.1f

Photo1.5.1g

1.5.1.6 Insert the emergency shipping plug through the connector and push it in until it makes solid contact with the source assembly. Tighten the thumbscrew to hold the plug in place (Photos 1.5.1h, i & j). The plug will now hold the source assembly/sealed source in place in the safe position.

Photo 1.5.1h

Photo 1.5.1.i

Photo 1.5.1j

1.5.1.7 Carry out a confirmatory survey to check surface and 1m radiation levels around the exposure container in preparation to transport it to a maintenance facility.

NB!! Remember to reverse the sequence from Photo 1.5.1j to Photo 1.5.1e in order to remove the emergency shipping Plug.

1.5.1.8 Disconnect the winding mechanism from the exposure container.

1.5.1.9 Secure the exposure container and notify your **Radiation Safety Officer**. **Contact Gammatec or approved service centre for further instructions if necessary**.

1.5.1.10 Observe all local health and safety regulations and incident reporting requirements.

2. Locking mechanism engaged – Source Assembly uncontrolled – Guide Tube

In this scenario the source holder capsule has become detached from the source assembly. The radiographer has retracted part of the source assembly into the exposure container and the locking mechanism has engaged. A guide tube and directional collimator are in use.

2.1 The radiographer has conducted a radiation survey and established that the sealed source is not inside the exposure container in the safe position.

2.2 Having determined that the source has **NOT** returned to the safe position inside the Exposure container, proceed as follows:

2.2.1 Wind out the source assembly again and make sure that the source holder capsule is pushed forward into the collimator.

2.2.2 Have your assistant keep “expose” pressure on the winding mechanism crank handle. This will reduce “shine” from the rear of the source holder capsule.

2.2.3 Shield the projection port and the collimator with lead sheets / lead shot / mats and move the guide tube onto a flat surface (Photo 2.2a). Keep “expose” pressure on the winding mechanism crank handle.

Photo 2.2a

2.2.4 Keeping the collimator shielded on the flat surface tilt the exposure container backwards as far as possible (Photo 2.2b).

Photo 2.2b

2.2.5 Carefully retract the drive cable from the guide tube whilst monitoring radiation levels (Photo 2.2c).

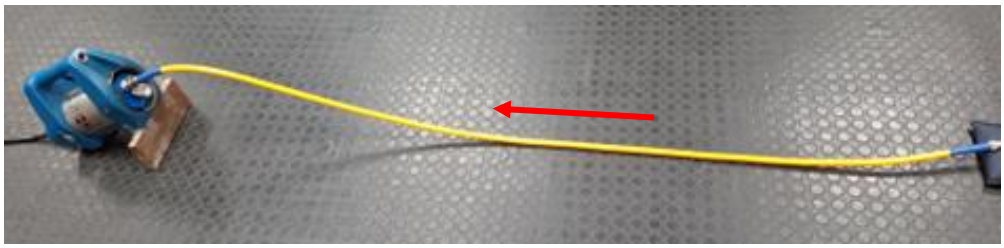


Photo 2.2c

2.2.6 Remove the shielding from the collimator and, using tongs, lift the collimator and guide tube causing the source holder capsule to slide into the exposure container source channel (Photos 2.2d & e).

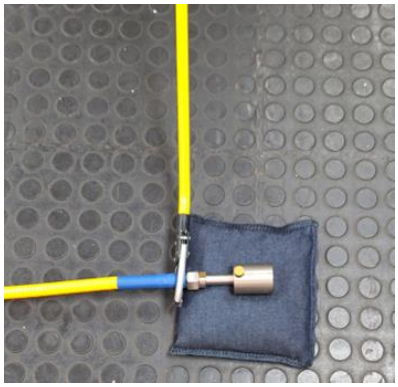


Photo 2.2d

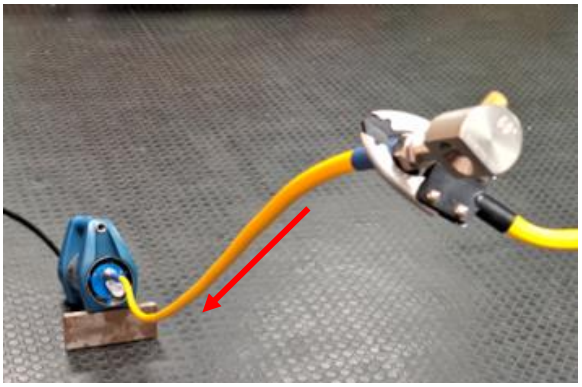


Photo 2.2e

2.3 Having determined that the sealed source has indeed returned to the safe position inside the exposure container, proceed as follows:

2.3.1 Disconnect the guide tube from the exposure container.

2.3.2 Insert the emergency shipping plug as shown in 1.5.1.

2.3.3 Disconnect the winding mechanism from the exposure container and replace the

rear dust cover.

2.3.4 Secure the exposure container and notify your **Radiation Safety Officer**. **Contact Gammatec or approved service centre for further instructions if necessary**.

2.3.5 Observe all local health and safety regulations and incident reporting requirements.