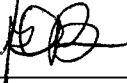
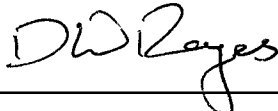


Operating and Maintenance Instructions for the 3746A

	Name	Signature	Date
Author	J Benn		18-10-12
Reviewer	D Rogers		19/10/2012

CONTENTS

Section

1. General
2. Description
3. Contents specification
4. Loading with new sources
5. Dispatching a loaded container
6. Dispatching an empty container
7. Shippers notes
8. Unloading directly to a projector
9. Unloading in a shielded cell
10. Return of spent sources to QSA Global

Appendix

- A Turnround inspection
- B Annual maintenance
- C Insert illustrations

Figures

- 1 Ready for shipment
- 2 The lead pot
- 3 Typical security seals
- C.1 Insert J11
- C.2 Inserts J19 (a & b)
- C.3 Insert Q0001
- C.4 Inserts Q0014 (a & b)

1. General

- 1.1 This document provides the minimum information to operate this container. Operators are advised to create their own procedures and checklists to ensure they comply with all internal and external safety and regulatory requirements.
- 1.2 This document must be available to all personnel operating this container.
- 1.3 This document must be read in conjunction with 'Safety Information and Instructions' HI 018, a copy of which must accompany each shipment.
- 1.4 The container may only be handled by personnel who are so authorised.
- 1.5 The container may only be used for purposes agreed in writing by QSA Global.
- 1.6 Any modifications or repairs without the written permission of QSA Global will invalidate the transport license.
- 1.7 Do not lift the drum or pot manually. Use mechanical assistance such as a crane, hoist or fork-truck.

2. Description

- 2.1 The container comprises drum, cork packing and lead pot. The drum and cork protect the pot which provides the radiation shielding.
- 2.2 The pot will contain one of the insert assemblies in Appendix C. Two of these have depleted uranium (DU) core shields.
- 2.3 The drum with pot weighs 54 kg and is 325 mm diameter by 405 mm high. The pot weighs 43 kg and is 160 mm diameter by 200 mm high.



Figure 1: Ready for shipment

3. Contents

3.1 The 3746A carries sources or up to 3 source holders for industrial radiographic devices depending on the pot insert assembly. The Type B transport license specifies the maximum allowable total activity. The table below gives the approximate surface dose rate to expect with each insert.

Insert	Contents	Length (mm)	Maximum Surface Dose Rate (mSv/h)	
			Ir-192 (7.4TBq*)	Se-75 (12TBq)
J11	Sources	N/A	2.19	<0.005
J19(a)			1.28	<0.005
J19(b)			0.58	<0.005
Q0001	Up to 3 source holders	90-110	2.64	<0.005
Q0014(a)		138-158	1.28	<0.005
Q0014(b)			0.58	<0.005

* Output activity.

Notes:

- The J11 or Q0001 inserts could be required to be shipped “Exclusive Use” with high Ir-192 activities.
- Should both radionuclides be carried, the sum of the proportions of each with respect to the maximum licensed activity must not exceed one.

3.2 Only sources licensed as Special Form material may be carried.

3.3 Non-fixed contamination levels must not exceed 4Bq/cm² (beta-gamma) or 0.4Bq/cm² (alpha).

3.4 Pots with a DU core shield will be labelled to that effect. The shield must not be damaged, cut into or disposed of in any way.



Figure 2: The lead pot

4. Loading with new sources

- 4.1 Check container has completed turnaround inspection and annual maintenance is not due before shipment is completed.
- 4.2 Remove clamp-band, drum lid and cork cap.
- 4.3 For projector source holders select appropriate insert for holder length (see Table in 3.1).
- 4.4 Select components for insert required (see Figures C.1-4) and check they are serviceable. If core shield contains DU check that the casing is not swollen.
- 4.5 Assemble insert components into pot.
- 4.6 Check pot carries a warning label if core shield contains DU.
- 4.7 Move pot into shielded cell.
- 4.8 Load source(s) or holder(s). Check each source holder is fully inserted and the top of the connector is not underflush with the top.
- 4.9 Note each source number against insert hole if using loading chart.
- 4.10 Replace shield plug or cap(s), if fitted.
- 4.11 Replace lid and securing screws.
- 4.12 Remove pot from cell and tighten screws to 10 N.m (1.0 kgf. m)
- 4.13 Label pot describing contents and date.
- 4.14 Check pot for contamination (see paragraph 3.3 for acceptance levels).
- 4.15 Replace pot in drum.
- 4.16 Replace cork cap and place any relevant documentation (including HI 018) on top.
- 4.17 Replace drum lid and fit clamp band, with wider flange on top. Tighten clamp screw, whilst gently tapping around the rim, to a torque of 8 to 10 Nm.
- 4.18 Check radiation level on drum. If there are any unusually high readings (see Table in 3.1) check pot has been correctly assembled (unloading may be necessary). If any reading exceeds 2 mSv/h, shipment must be split into more than one consignment or be shipped as "Exclusive Use".
- 4.19 Attach temporary label describing contents.
- 4.20 Fit non-reusable security seal through holes in clamp band end bosses, or hole in clamp screw, so drum cannot be opened without breaking seal (see Figure 3).
- 4.21 Move container to designated area to await dispatch. See Section 5 for shipment instructions.

5. Dispatching a loaded container

- 5.1 Check drum for contamination (see paragraph 3.3 for acceptance levels).
- 5.2 Measure highest surface dose rate. Determine transport category from table below. Note that Se-75 contents should never generate a surface dose rate exceeding 0.005 mSv/h (0.5mrem/h) and therefore should always be Category I.
- 5.3 Measure highest dose rate at one metre in mSv/h. Multiply value obtained by 100 and round up to 1 decimal place. This is the Transport Index (TI). If less than 0.05 it may be taken as zero. Determine transport category from the table below.
- 5.4 The transport category is the higher of the two determined above.

Maximum Surface Dose Rate (5.2)	Transport Index (5.3)	Transport Category
0.005 mSv/h (0.5 mrem/h)	0	I
0.5 mSv/h (50 mrem/h)	1.0	II
2 mSv/h (200 mrem/h)	10.0	III

- 5.5 If the dose rate on the drum exceeds 2 mSv/hr it must be shipped as Exclusive Use. Exclusive Use shipment conditions are detailed in IAEA Regulations, TS-R- 1.
- 5.6 Mark nuclide, activity and TI on two category labels and attach to opposite sides of the drum.
- 5.7 If it is a Type A shipment cover over the “TYPE B” markings on the stainless steel identity plate with “TYPE A” labels but do not obscure the weight markings.
- 5.8 Attach a ‘Goods To’ address label and any other applicable transport labels.
- 5.9 Prepare shipment documentation according to the requirements of the shipment mode and the shipping agent to be used (consult specialist freight forwarders for advice if necessary). Note:
- If the total activity exceeds 1.0 TBq (27Ci) of Ir-192 or 3.0 TBq (81Ci) Se-75 the UN number and proper shipping name are “UN 2916 – RADIOACTIVE MATERIAL, TYPE B(U) PACKAGE”.
 - If the total activity does not exceed 1.0 TBq (27Ci) of Ir-192 or 3.0 TBq (81Ci) Se-75 the UN number and proper shipping name are “UN 3332 – RADIOACTIVE MATERIAL, TYPE A PACKAGE”.

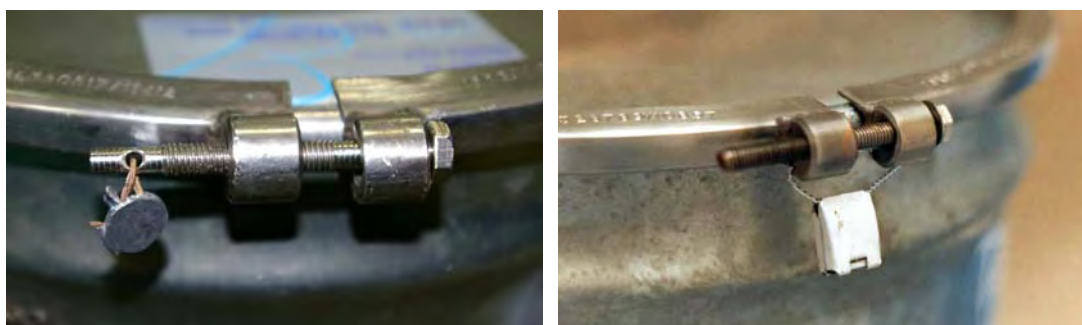


Figure 3: Typical security seals

6. Dispatching an empty container

6.1 An unloaded container may be described as an Excepted Package when:

- The radiation level on the drum is less than 5 $\mu\text{Sv/h}$;
- Internal contamination levels do not exceed 400Bq/cm² (beta-gamma) or 40Bq/cm² (alpha);
- External levels do not exceed 0.4Bq/cm² (beta-gamma) or 0.04Bq/cm² (alpha);

6.2 The UN number and proper shipping name with a lead or tungsten core shield are: “UN 2908 – RADIOACTIVE MATERIAL, EXCEPTED CONTAINER – EMPTY PACKAGING”.

6.3 The UN number and proper shipping name with a DU core shield (pot will be labelled) are “UN 2909 – RADIOACTIVE MATERIAL, EXCEPTED CONTAINER – ARTICLES MANUFACTURED FROM DEPLETED URANIUM”.

For further details on dispatch see Safety Information and Instructions, HI 018.

7. Shippers notes

7.1 Tie-down: The container must be adequately restrained from movement within the conveyance. Straps must have a working load limit at least 100 kg or a breaking load of at least 650 kg. They must be attached to the drum handles and strong points on the vehicle. Chocks should also be used to prevent movement. Cargo netting may be used as an alternative method of tying down.

7.2 Stowage: The container may be stowed with general non-hazardous cargo with no special precautions provided it is not prohibited by other regulations.

7.3 Emergency Instructions. The consignor must ensure that the carrier is provided with appropriate emergency instructions. In the event of an emergency during consignment follow the instructions but in any event notify the police in the first instance together with such other emergency services are appropriate.

8. Unloading directly into a projector

8.1 Follow the Safety Information and Instructions, HI 018. If you do not have a copy contact QSA Global or their agent.

8.2 Empty returns: Reassemble pot into drum and securely tighten clamp band screw. See Section 6 for shipment instructions.

8.3 Source returns: Go to Section 10.

9. Unloading in a shielded cell

- 9.1 Check shipping documentation has correct details for expected contents.
- 9.2 Use audible personal gamma alarms as well as a package monitor.
- 9.3 Check security seal shows no signs of tampering – if it does report to supervisor and consignor.
- 9.4 Remove security seal, clamp band and drum lid.
- 9.5 Confirm any paperwork inside the drum complies with shipping documentation. If there is any discrepancy notify consignor.
- 9.6 Remove cork cap. Monitor for contamination and radiation.
- 9.7 Move pot to the handling cell (do not tip drum on side to remove pot).
- 9.8 Undo screws and remove lid.
- 9.9 Remove spacer if fitted. Depending upon the insert assembly it may also be necessary to remove a shield cap or threaded cap nuts or both.
- 9.10 If supplied use source loading record to identify holes containing sources.
- 9.11 Transfer source(s) into storage.
- 9.12 Check insert is empty.
- 9.13 Remove pot from cell.
- 9.14 Check pot for contamination (see paragraph 3.3 for acceptance levels).
- 9.15 Replace lid and tighten screws finger tight.
- 9.16 Replace pot and cork cap in drum.
- 9.17 Replace lid and clamp band (check wider flange is on top).
- 9.18 Tighten clamp band screw.
- 9.19 Remove all temporary labels and affix an 'Empty' label.
- 9.20 Move container to designated area for turnround inspection. It may not be used for further shipment until it has cleared this.

10. Returning spent sources

- 10.1 Do not dismantle beyond that described below.
- 10.2 Remove clamp-band, drum lid and cork cap.
- 10.3 Move pot to loading area.
- 10.4 Monitor pot during the following actions in case it contains a source.
- 10.5 Remove screws and pot lid.
- 10.6 Remove lead cap and, if fitted, shield plug and/or cap nut from source hole(s) being loaded.
- 10.7 Check with a dummy source hole(s) is/are empty.
- 10.8 Transfer source(s) into pot following instructions in Safety Instruction booklet, HI 018.
- 10.9 Replace cap nut(s) and shield plug(s), if fitted..
- 10.10 Replace lead cap, pot lid and screws and washers and tighten to 10 N.m (1.0 kgf.m).
- 10.11 Attach label to pot describing contents and loading date.
- 10.12 Check pot for contamination (see paragraph 3.3 for acceptance levels).
- 10.13 Replace pot in drum.
- 10.14 Replace cork cap and lay any relevant shipping or packaging documentation on top.
- 10.15 Fit drum lid and clamp band with wider flange on top. Tighten screw to a torque of 10 N.m (1 kgf.m) at the same time gently tapping around rim.
- 10.16 Attach temporary label describing contents.
- 10.17 Thread non-reusable security seal through holes in end bosses, or hole in clamp screw, so drum cannot be opened without breaking seal, see Figure 3.
- 10.18 See Section 5 for shipment instructions.

Appendix A

Turnround Inspection

A.1 General

- 1) Turnround inspection must be completed before a container may be used for a shipment.
- 2) The inspection is primarily visual and must be carried out by a competent person at QSA Global or by a person or organisation approved by QSA Global as an agent.
- 3) A written record, such as a checklist, signed and dated by the inspector, must be made. It must include the principal inspection actions and the serial numbers of the drum and the pot.
- 4) Replacement components must be obtained from QSA Global or their approved agent. Repairs may only be carried out by QSA Global or their approved agent.
- 5) Any doubts regarding component compliance or serviceability must be resolved by QSA Global or their approved agent.
- 6) Inspection must be carried out in a clean, well lit area.

A.2 Procedure

- 1) Monitor for contamination before and as dismantling proceeds (see paragraph 3.3 for acceptance levels).
- 2) Check documentation that container is empty.
- 3) Check stainless steel drum label is securely attached.
- 4) Check drum and lid for damage.
- 5) Check clamp-band screw operates smoothly.
- 6) Check clamp band is not damaged and end welds are not cracked.
- 7) Check lid fits cleanly on drum.
- 8) Check drum handles are not damaged and are securely attached.
- 9) Check cork cap lifts out freely and is dry and free from damage.
- 10) Check by monitoring pot does not contain a source then confirm by inspection.
- 11) Check pot lifting links are not damaged and are securely attached.
- 12) Check lifting lugs welds are not cracked.
- 13) Check, if there are cap nuts, they screw freely onto the tubes.
- 14) Remove all temporary labels from drum and pot except “Empty”, “Maintenance Due” and DU warning, if fitted.
- 15) Reassemble container and label as having passed turnround inspection.
- 16) Sign off inspection record, distribute as necessary and file.

Appendix B

Annual Maintenance

B.1 General

- 1) Scheduled inspection must be carried out at intervals not exceeding twelve calendar months.
- 2) The inspection is primarily visual and must be carried out by a competent person at QSA Global or by a person or organisation approved by QSA Global as an agent.
- 3) A written record, such as a checklist, signed and dated by the inspector, must be made. It must include principal inspection actions and drum and pot serial numbers. A copy must be kept by QSA Global.
- 4) If there is any doubt concerning the serviceability of a component it must be replaced or repaired. Replacement components must be obtained from QSA Global or their approved agent. Repairs may only be carried out by QSA Global or their approved agent.
- 5) Inspection must be carried out in a clean, well lit area.

B.2 Procedure

- 1) Notes:
 - Container must first be completely dismantled and checked for contamination (see paragraph 3.3 for acceptance levels).
 - Check with documentation pot does not contain a source. As dismantling proceeds confirm by monitoring pot is empty then finally confirm by inspection.
 - Remove all temporary labels from drum and pot except “Empty”, “Maintenance Due” and DU warning, if fitted.
 - Remove all adhesive residue, spirit pen markings, discoloration and surface dirt.
- 2) Drum and lid:
 - Check stainless steel label is legible and secure.
 - Check lid fits freely.
 - Check reinforcing bars beneath base are securely attached.
 - Check base is not split.
 - Check handles are not distorted and are firmly secured. If there is any doubt use liquid penetrant.
 - Check for corrosion. If plating is no longer effective prepare surface and apply nominal 70µm coat of silver grey polyester powder (e.g. Interpon 610) in accordance with manufacturer’s instructions.
- 3) Clamp band:
 - Check batch marking is legible.
 - Check end welds are not cracked. If there is any doubt use liquid penetrant.
 - Check screw is not worn or damaged.

- 4) Cork:
 - Check identity markings are legible.
 - Check base and cap fit freely together in drum and around pot.
 - Check they are not wet, mouldy, crumbling or cracked.
- 5) Pot:
 - Check identity marking “3018/nn” is legible.
 - Check internal cavity is clean and free from damage.
 - Check lifting links are not damaged.
 - Check base and lug welds are not cracked. If there is any doubt use liquid penetrant.
- 6) Pot lid:
 - Check identity marking is legible.
 - Check components fit together freely and are not damaged or distorted.
 - Check screw threads are not worn or damaged.
 - Check fit onto the pot lugs.
- 7) Insert:
 - Check identity marking is legible.
 - Check insert fits pot freely.
 - Check components are not damaged or corroded.
 - Check tube and cap nut threads are not worn or damaged.
 - Check tubes are clean and clear inside.
- 8) Core shield:
 - Check identity marking is legible.
 - Check shield fits pot and insert freely.
 - Check shield is not damaged or corroded.
 - DU shields:
 - Wipe-test to confirm absence of alpha contamination.
 - Confirm absence of distortion or swelling.
 - Check welds for cracks. If there is any doubt use liquid penetrant.
- 9) Re-assembly:
 - Replace core shield and insert.
 - Check pot carries a warning label if core shield contains DU.
 - Replace cap nuts, if fitted.
 - Replace lid and screws ensuring threads are lightly coated with anti-seize lubricant and tighten securely.
 - Replace base cork and pot in drum.

- Replace cork cap, drum lid, clamp band and screw ensuring thread is lightly coated with anti-seize lubricant.
- Update “Maintenance Due” label on drum and move container to storage area.
- Sign off inspection record, send a copy to QSA Global and file.

Appendix C

Insert Illustrations

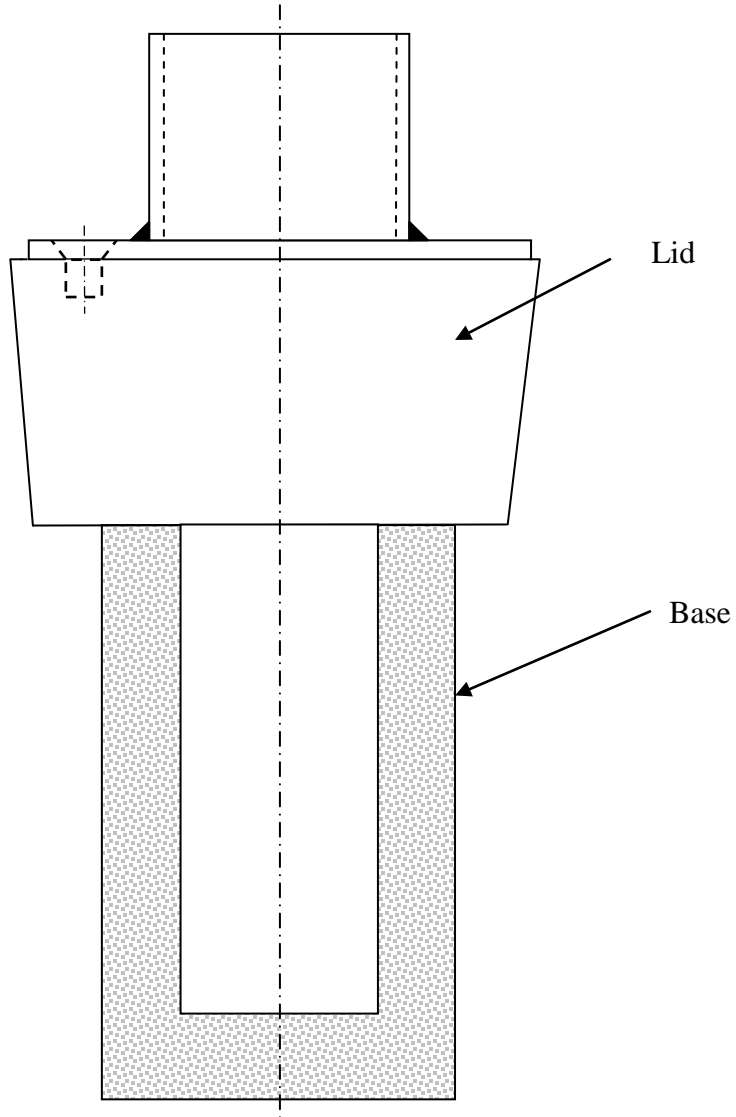


Figure C.1: Insert J11

NAME	DRG No	SHIELDING	PART No
LID	JB132/031	LEAD	P3375
BASE	JB132/032	TUNGSTEN	P534

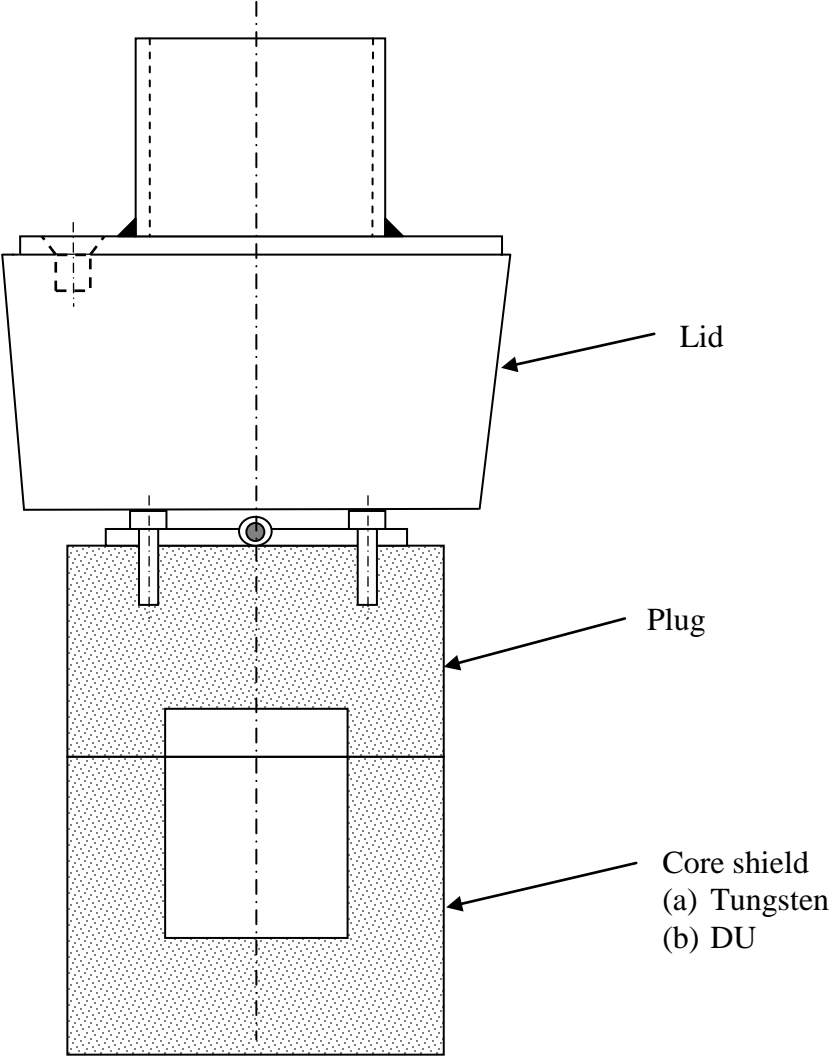


Figure C.2: Inserts J19(a) & (b)

NAME	DRG No	SHIELDING	PART No
LID	JB132/031	LEAD	P3375
PLUG	JB132/041	LEAD	P502
CORE SHIELD	JB132/042	TUNGSTEN	P558
CORE SHIELD	JB132/043	DU	P954

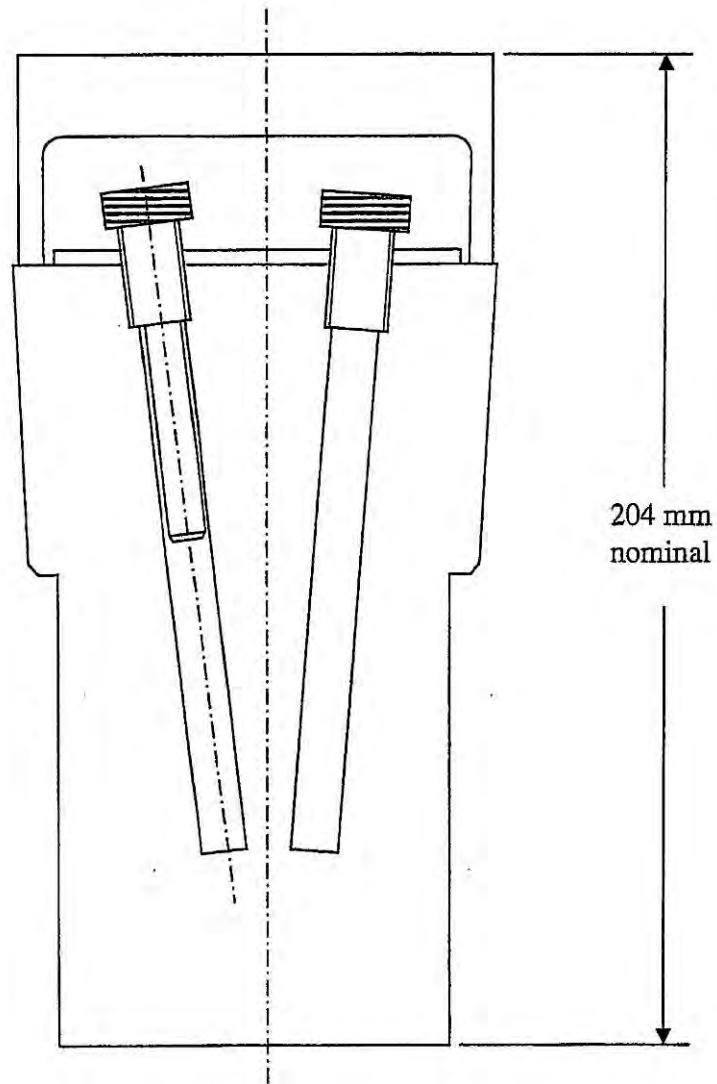


Figure C.3: Insert Q0001

NAME	DRG No	SHIELDING	PART No
INSERT ASSY	JB132/050	-	-
BODY	JB132/051	LEAD	-
CAP	JB132/052	LEAD	-
CAP & SHIELD	JB132/053/4	ST/ST	-
CAP	JB132/056	ST/ST	-

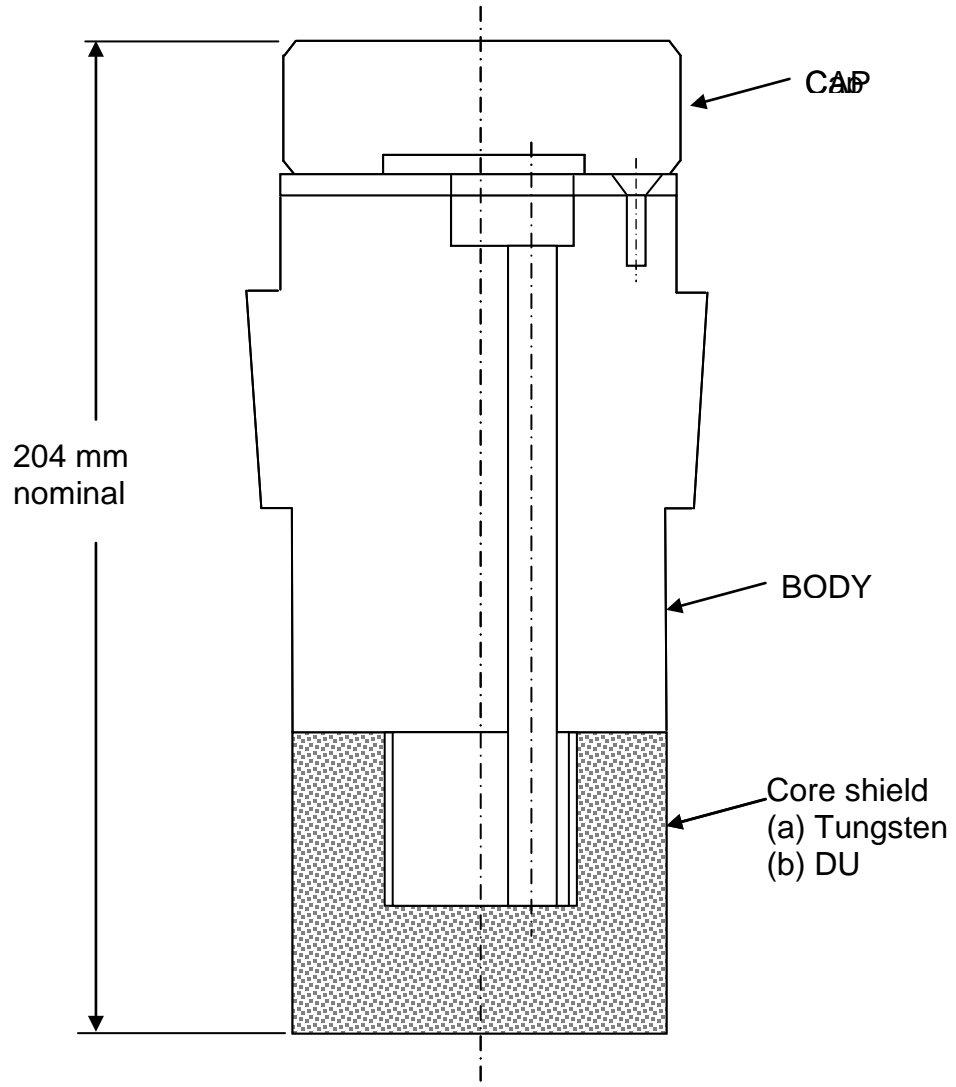


Figure C.4: Inserts Q0014(a) & (b)

NAME	DRG No	SHIELDING	PART No
CAP	JB132/065	LEAD	-
BODY	JB132/061	LEAD	-
CORE SHIELD	JB132/042	TUNGSTEN	P558
CORE SHIELD	JB132/043	DU	P954