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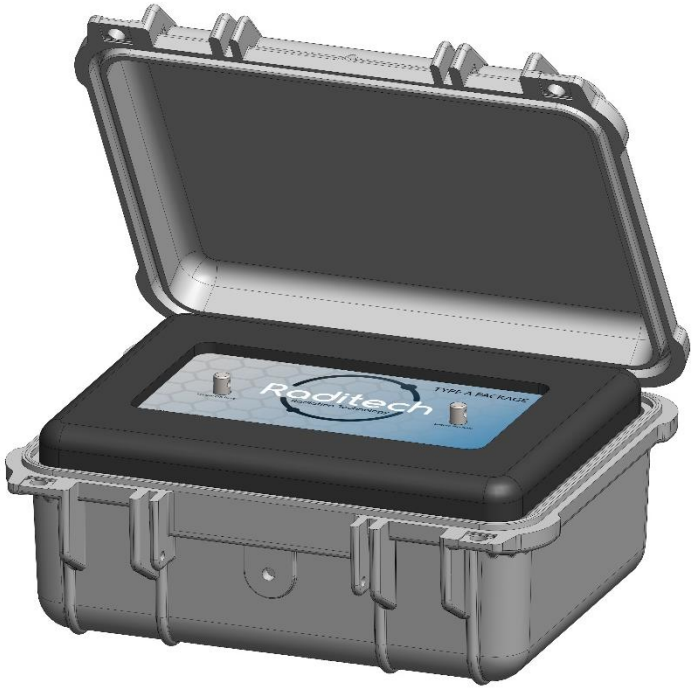
# Safe Use and Care Manual – ViCad

Radi-tech Ltd




## 1 Document Edition

| | | | |
|---|---|---|---|
| **Document title** | VIC001 Op Manual | **Published date** | 20 August 2023 |
| **Revision** | 0 | **Last reviewed date** | 20 August 2023 |

## 2 Contents



## 3 Scope and Safety

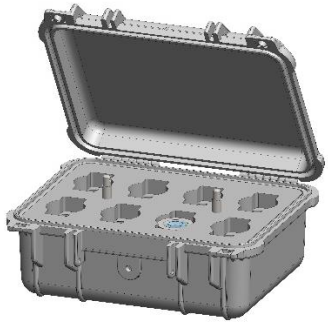
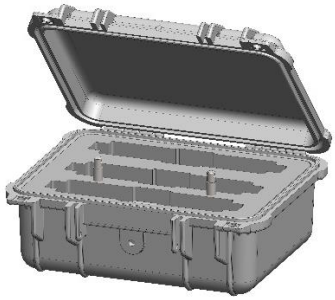
This manual describes the safe use and care for the ViCad – The Vial Caddy system.

The ViCad can be used to transport liquid radioactive material. Care should be taken to ensure items are free of contamination before being assumed so. Governing regulations are to be observed.

The package has been designed, tested and is manufactured and maintained in accordance with governing regulations and quality assurance systems. Only manufacturer approved components are to be used in the package, this includes the contents.

# 4 Attributes

## 4.1 ViCad - Outer case

| VIC001 | | |
|---|---|---|
|  | Mass - Empty (kg) | 3.3 |
| | Mass – maximum (kg) | 13 |
| | Dimensions W x D x H (mm) | 340 x 295 x 140 |
| | Construction materials | ABS Polymer<br>Medium density foam |
| | For transporting: | Vials |
| VIC201 | | |
|  | Mass - Empty (kg) | 3.3 |
| | Mass – maximum (kg) | 13 |
| | Dimensions W x D x H (mm) | 340 x 295 x 140 |
| | Construction materials | ABS Polymer<br>Medium density foam |
| | For transporting: | Syringes |

### 4.2 Approved contents (pigs):

The pigs are a stainless steel structure encasing a lead shield. The pig is in three parts which screw together with an O-rings installed in the joints. The pig provides double containment for the contents. The pig is available with two different lead thickness to balance radiation shielding with total weight.

| | | | |
|---|---|---|---|
|  | Model | VIC010 | VIC020 |
| | Mass (kg) | 0.9 | 0.8 |
| | Lead thickness (mm) | 5 | 3.25 |
| | Dimensions Dia x High (mm) | 47 x 75 | 47 x 75 |
| | Construction materials | Stainless steel<br>Lead shielding | Stainless steel<br>Lead shielding |
| | Internal void – dia x high (mm) | 23 x 57 | 26.5 x 60 |
| | Typical acceptable vial (ml) | 10 | 10 |
| | Indicative radionuclides | Tc-99m | Tc-99m |
|  | Model | SYC101 | SYC201 |
| | Mass (kg) | Up to 3.5 | Up to 3.3 |
| | Lead thickness (mm) | Up to 12mm | Up to 10mm |
| | Dimensions Dia x High (mm) | 55 x 231 | 55 x 231 |
| | Construction materials | Stainless steel<br>Lead shielding | Stainless steel<br>Lead shielding |
| | Internal void – dia x high (mm) | 16 x 183 | 19.2 x 191 |
| | Typical acceptable syringe (ml) | Up to 5ml | Up to 10ml |
| | Indicative radionuclides | Tc-99m<br>I-131<br>FDG | Tc-99m<br>I-131<br>FDG |

## 5 Consigning the package

### 5.1 Loading the contents

For transporting Vials ViCad is capable of being loaded with up to 8 pigs made up of either acceptable variety.

When transporting loaded syringes up to 3 syringes can be shipped each individually shielded and contained in the appropriate pig.

Care should be taken when selecting the Pig model to be used. The lead equivalent values should be consulted to ensure there will be sufficient shielding in place before the dose is loaded. Also the cavity should be of an appropriate size to the contained vial. If too must movement is allowed for the vial – as the cavity is too large it is possible the vial could be damaged in transit. For such instances cotton pads can be used to prevent undesired movement.

The gasket on the inside of the Peli case should be inspected ensuring it is in a good state of repair.

An activity limitation is placed on the package to ensure it resides within Type A limits. When a single radionuclide is shipped (even in multiple doses) the total activity of the package must not exceed the isotopes A2 value. For the most common isotopes the A2 value is shown in the table below. For isotopes not listed the A2 value can be found in the governing regulation set.

| Isotope | A2 (GBq) |
|---|---|
| Tc-99m | 4000 |
| I-131 | 700 |
| FDG (F-18) | 600 |

Where the contents of the ViCad comprise of more than one isotope the following formula calculation should be preformed.

$$\sum \frac{B(i)}{A_2(i)}$$

If the answer is less than or equal to 1 the contents are permitted as a Type A package.

## 5.2 Radiation Levels

The package should be free from surface contamination. This should be demonstrated by an appropriate method.

There are no individual activity limits placed on the pigs. When the ViCad package is fully loaded the exterior radiation levels should be monitored to demonstrate they are less than **2.0 mSv/hr** surface dose rate. If this limit is breached the contents of the package could be rearranged – increasing the spacing between pigs containing a higher activity– or some activity/pigs can be removed from the package. The package must not be transported if the surface dose rate is above 2 mSv/hr.

The transport index of the package should be determined by finding the maximum radiation level in microsieverts per hour 1 m from the external surface. The value determined shall be divided by 10 and the resulting number is the TI.

Category stickers are to be attached to the case detailing the radioactive contents. The shipping category is dictated by the surface dose rate and transport index in accordance with the table below:

| Transport Index | Maximum radiation level at any point on external surface | Category |
|---|---|---|
| 0 | Not more than 5 uSv/hr | I-White |
| More than 0 but not more than 1 | More than 5 uSV/hr but not more than 500 uSv/hr | II-Yellow |
| More than 1 but not more than 10 | More than 500 uSv/hr but not more than 2 mSv/hr | III-Yellow |

The following information is applicable for shipping the ViCad package as a Type A Package only. If the package is to be shipped as a different package classification these instructions should be adjusted as required.

- The proper shipping name: Radioactive Material, Type A Package
- The UN number: UN 2915
- Category labels: As shown above, with the radionuclide, activity in Bq and the transport index.
- Name and address: Of both the consignor and consignee
- Type A
- The VRI code: GB
- Manufacturer details: Radi-tech Ltd

Labels should be marked in a legible and durable manner in a size of font appropriate to the package, 12mm letters.

A tamper evident seal should be installed on the package. When the lid is closed and the hasp secured the seal should be installed in the aligning holes in the hasp.

## 6 ViCad Care

It is paramount the ViCad is properly maintained throughout its working life. The working life of the ViCad package is set to 20 years however this is dependant on the package being regular inspected through use and periodically inspected by a competent, trained person. Regular inspection covers

both the outer case and the ViCad pigs – the entire package. During both regular and periodic inspection all components should be cleaned and, if required, repaired or replaced. Best working practice is for that prior to every use all components of the ViCad system are visually inspected for anomalies and any anomalies found are addressed at that point.

The ViCad system should be periodically inspected, by a competent and appropriately trained person, **every 18 months**.

If the working life of the package is expired it should not be used. As all components of the package are replaceable however it is possible for a package of given serial number to be formed from all new components. When the package is nearing the end of the working life an estimation should be taken by the consignor as to the suitability for the working life of the package to be extended. If deemed appropriate by the owner/consignor of the package a three year extension to working life should be made prior to re-evaluation. Radi-tech hold records for parts replaced for each package and could be consulted as part of this process. This evaluation should be made in writing and records made and retained.

## 7 Periodic maintenance

The ViCad system should be periodically inspected every 18 months by a competent and appropriately trained person. The following instruction should be followed for both the outer case and all pigs to be transported. Labels should be affixed to the outer case showing the test date and date of expiry. Appropriate records should be kept for the serialised pigs detailing the date of inspection and the date of the next inspection.

### 7.1 Outer case

Any radioactive contents of the package should be removed by an appropriate person before the service is undertaken. The internal foam should be removed from the polymer case. The outer case should be free from dents, dirt and damage. All labels affixed should be removed when not required. Any dirt and water should be wiped from the package before use. The polymer case should be inspected inside and out for damage. Light dents are acceptable, these are dents no deeper than 5 mm, made by a blunt impact and with no cracking surrounding the dents. Severe denting, greater than 5mm, cracking, splits in the package and sharp impacts – pointed dents caused by sharp objects – are cause for failure. If failed the outer package should be replaced.

The package should be loaded with approximately 1 ltr of water. The lid closed with the both catches. The case should be inspected as the orientation is altered. The case should be capable of holding the water with no leaking. Any leakage is cause for replacement of the case or the gasket in the case.

The liquid should be removed and the case thoroughly dried.

The foam should be inspected. Severe wear on the pig pockets, sufficient to allow movement of the pig, is cause for failure.

When the outer package is dry the foam can be reinstalled.

### 7.2 ViCad pigs

The ViCad pigs are the principle level of containment for the ViCad package and it is paramount they are inspected as part of the periodic inspection.

The Pig should be emptied of any radioactive contents and verified to be free from radioactive contamination by an appropriate person. The Pig should be inspected for surface damage. It is possible to dress out light surface damage using a very fine grit sandpaper (240 grit) however this is not required to pass the inspection. The O-rings should be replaced.

## 8 Contingency Planning

It is unlikely the package will release its contents even under a severe accident. If you believe the package has been involved in an incident where the contents have, or you believe they could, have been released from containment your first priority is to lower the potential exposure to radiation to yourself and any other person. The package should be isolated. The maximum volume of liquid contained in the package is 80 ml, a relatively small amount. From a single dose the maximum liquid is 10 ml, 2 tablespoons, a very small amount. If liquid is witnessed pooling around the package a radiation monitor should be used to verify package leakage.

The liquid should be prevented from entering the environment and contained around the package. Expert advice in clearing the package and contents should be sought from an appropriate person, typically an RPA. The appropriate person should ensure the conveyance, the package and any other contaminated areas have been cleaned

The damaged package should not be transported further until it has been assessed by the consignor or their agent. Only when this inspection has been passed, and the results are recorded in writing can the onward journey of the package commence. If the package is not suitable for onward progression the contents should be moved to a different appropriate package to complete the journey.

## 9 Disposal

As the ViCad could have been used to store and transport radioactive material all components should be verified to be free from contamination before any parts are disposed of. The ViCad case and pigs are not manufactured from any hazourdous material and therefore all components could be easily disposed of at the end of life. Preferably most parts of the outer case and Pigs should be recycled. While this is possible some separation of parts is required. The entire system can be sent to Radi-tech for free end of life recycling.

## 10 Version Control

| Revision | Date published | Comments |
|---|---|---|
| 0 | 20 August 2023 | First Issue |