

Radiation Protection Act 2005 – Section 17

**CERTIFICATE OF COMPLIANCE:
STANDARD FOR SEALED RADIATION SOURCE-
GAS CHROMATOGRAPH**

SECTION 1: REQUIREMENTS FOR CERTIFICATES OF COMPLIANCE FOR CLASSES OF RADIATION SOURCE

SECTION 2: PARTS OF STANDARDS AND CODES OF PRACTICE ADOPTED BY THIS STANDARD

This information can also be accessed at
http://www.dhhs.tas.gov.au/peh/radiation_protection

Section I – REQUIREMENTS FOR CERTIFICATES OF COMPLIANCE FOR CLASSES OF RADIATION SOURCE.

This Standard is to be used when assessing Radiation Sources, classified by Radiation Protection Act 2005 licences as “Gas Chromatograph”, for the purpose of issuing a certificate of compliance.

In order for a certificate of compliance to be issued the Radiation Source must be shown to fully comply with the requirements in Section 2.

† Where an item was demonstrated to comply at the time of manufacture or supply, ongoing compliance for that item may be stated only if it is reasonable to assume there has been no change, modification, damage or unacceptable wear and tear to that item since the time of manufacture.

The requirements in Section 2 are taken from the following:

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| RPS 13 | <i>Code of Practice for Safe Use of Fixed Radiation Gauges (2007).</i> |
| RAR | <i>Regulatory Authority Requirements – Department of Health and Human Services</i> |
| ISO | <i>ISO 9978: 1992 (E) International Standard. Radiation protection – Sealed radioactive sources – Leakage test methods</i> |

Section 2 – PARTS OF STANDARDS AND CODES OF PRACTICE ADOPTED BY THIS STANDARD

| ITEM | Requirements |
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| Radioactive Sources | |
| Only appropriate sources † | Radioactive material used in a gas chromatograph must be appropriate for the particular application, with regard to its activity, half-life, energy and type of radiations emitted. RPS 13 B 1.1 (a) |
| Toxicity † | The radioactive source must not be a radioactive material of high committed effective dose per unit of intake activity (Sv Bq ⁻¹), such as those listed below, unless: (i) it is necessary for the production of neutron radiation for the particular gauging use; or (ii) a radioactive material of low committed effective dose per unit of intake activity, that produces radiation of the required type and energy for the particular gauging application, is unavailable or is otherwise impracticable for use as the source. Radioactive materials of high committed effective dose per unit of intake: 210Pb, 210Po, 226Ra, 228Ra, 227Ac, 228Th, 230Th, 231Pa, 232U, 233U, 234U, 237Np, 238Pu, 239Pu, 240Pu, 241Pu, 242Pu, 241Am, 243Am, 242Cm, 243Cm, 244Cm, 245Cm, 246Cm, 249Cf, 250Cf, 252Cf RPS 13 B 1.1 (b) |
| Chemical and physical form † | The radioactive material must be in a chemical and physical form that, throughout the projected useful life of the gas chromatograph in which it is used, will minimise: (i) corrosion and build up of internal pressure; and (ii) dispersal and solubility of the radioactive material if the source capsule is ruptured. RPS 13 B 1.1 (c) |
| Minimum activity † | The radioactive material must not have an activity that is greater than necessary to ensure that the gas chromatograph operates effectively during its projected useful life and the activity will depend on the: (i) effective radiation path length between the source and detector; and (ii) detector sensitivity and the proposed conditions of its use, where an allowance may be made for a 25% loss of detection sensitivity during the lifetime of the gas chromatograph; and (iii) shielding effects of intra-beam material; and (iv) half-life of the radioactive material used. RPS 13 B 1.1 (d) |

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| Radioactive source construction † | <p>Each radioactive source used in a gas chromatograph must be:</p> <p>(a) a sealed source of durable design and construction; and (b) readily identifiable by use of appropriate markings and documentation.</p> <p>RPS 13 B 2.1</p> <p>The form and working life of each source used a gas chromatograph must be suitable for:</p> <p>(a) the particular application; and (b) the useful life of the gas chromatograph; and (c) environmental conditions of its use.</p> <p>RPS 13 B2.2</p> <p>The outermost capsule of a radioactive source that is used in a gas chromatograph must satisfy the American National Standard N 452.1977 (NBS Handbook 126) if the source pre dates 2000.</p> <p>RPS 13 B 2.4</p> <p>For radioactive sources post 2000 they must satisfy ISO (International Standard) 2919-1999(E); Note: A radioactive source that complies with the 'special form' design and test requirements of the IAEA (International Atomic Energy Agency) would satisfy the ISO test requirements.</p> <p>RAR</p> |
| Construction requirements for instrument | |
| Exposure rates | <p>When the instrument is loaded with the source of greatest activity for which it is designed, the radiation level must not exceed 10 micro Sv/h ambient dose equivalent rate at any point 5 cm from the external surface.</p> <p>RAR</p> |
| Compatibility of materials used in constructing the instrument † | <p>The source container must be constructed of materials that:</p> <p>(a) are physically and chemically compatible with each other and, where applicable, the materials of the radioactive sources that it is designed to contain; and (b) can withstand the effects of prolonged irradiation without significant deterioration of any physical properties necessary for the safety of the gas chromatograph; and (c) are resistant to corrosion or other physical or structural damage which may occur during the use, transport and storage of the gas chromatograph.</p> <p>RPS 13 C 1.10</p> |
| Labels and markings | |
| Information required on the instrument | <p>Radionuclide Activity and date measured Name and address of source manufacturer</p> <p>RAR</p> |
| Marked with trefoil and CAUTION or WARNING | <p>The instrument must be durably marked with a legibly stamped or engraved label incorporating the trefoil radiation hazard symbol followed by words of the general form: "Radiation Source"</p> <p>RPS 13 C 1.12</p> <p>The symbol and markings on the label specified above must be black on a yellow background.</p> <p>RPS 13 C 1.13RAR</p> |
| Information required on the durable label on a gas chromatograph | <p>The durable label on the gas chromatograph must contain the following information:</p> <p>(a) manufacturer name, model and serial number of the gas chromatograph and/or container; and (b) name and address of the source supplier and/or manufacturer; and (c) name of the radioactive material; and (d) model and serial number of the radioactive source; and (e) ISO class number of the radioactive source; and (f) original activity of the radioactive source and date the activity was measured; and (g) maximum radiation dose rate at one metre from the surface of the source container (with all shutters closed) and date this measurement was made.</p> |

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| | RPS 13 C2.5 |
| Test for non fixed contamination | The instrument is to be wipe ¹ tested for the presence of non-fixed contamination. ² |
| | Non-fixed contamination levels ¹ must not exceed those specified in ISO 9978 RAR |
| Preventative maintenance | All control mechanisms must operate properly. RAR |

¹ **Wipe test** is based on taking with wet or dry tissue possible radioactive contamination from source surface. The tissue may be wetted with water, diluted nitric acid or another solution inactive for capsule material but actively removing radioactive contamination. If measured activity of tissue does not exceed 185 Bq (5 nCi) the source surface proves to be non-contaminated.

² Electroplated sources (such as Ni63) should not be tested for leakage by wiping the foil directly. An indication of leakage can be obtained by checking the storage container for radioactivity or by checking the exhaust ports of items such as gas chromatography devices (ICRP 1977).