Department of Health and Human Services
Population Health

Radiation Protection Act 2005 – Section 17

CERTIFICATE OF COMPLIANCE:

STANDARD FOR SEALED RADIATION SOURCE -

INDUSTRIAL GAMMA RADIOGRAPHY

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

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

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Section 1 – REQUIREMENTS FOR CERTIFICATES OF COMPLIANCE FOR CLASSES OF RADIATION SOURCES.

This Standard is to be used when assessing Radiation Sources, classified by Radiation Protection Act 2005 licences as "Sealed industrial radiography", 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:

RHS 31	National Health and Medical research Council "Code of Practice For the Safe Use of industrial radiography Equipment (1989)"
RPS 2	*Code of Practice - Safe transport of radioactive material*
RPR 2006	Radiation Protection Regulations 2006
RAR	Regulatory Authority Requirement – Department of Health and Human Services

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

Radioactive Sources	
only appropriate sources	The source must be appropriate to the applications for which it is intended with regard to the activity of the radioactive substance contained, the types and energies of the radiations emitted and the need to keep the radiation exposure of all persons as low as practicable. ***RHS 31 2.1.1***
Only particular source	Only the radioactive substances ^{60}Co, ^{192}Ir or ^{169}Yb can be used ***RHS 31 2.1.3 and RAR***
Chemical and physical form	The radioactive substance or substances contained in the source must have a physical and chemical form that will, throughout the intended useful life of the source: • minimise corrosion of the source and the build up of internal pressure within the source, and • minimise dispersal of the radioactive substance or substances should the encapsulation be ruptured. ***RHS 31 2.1.2***
Radioactive source encapsulation	All ^{60}Co, and ^{169}Yb radioactive source used in industrial radiography must be'special form radioactive material' as specified in the Transport Code (***RPS 2***). ***RAR*** The design, construction and markings of ^{60}Co, and ^{169}Yb sources used in industrial radiography must satisfy the applicable requirements of: ISO (International Standard) 2919-1999(E); or be otherwise designed and constructed so that the radioactive material remains enclosed within the capsule so as to prevent escape of the radioactive material during normal use and in the event of an accident. ***RPR – 2006*** The design of the ^{60}Co, and ^{169}Yb capsules must have current unilateral approval as special form radioactive material as required by paragraph 803 of the Transport Code (***RPS 2***) ***RPR – 2006***

Source holder	It must be constructed so as to be demountable for inspection or removal of the radioactive source by an authorised person. ***RHS 31 2.4.1***
Holds the source securely	It must be constructed so as to prevent unintentional release of the radioactive source under the conditions of normal use and of credible misuse. Any screw cap must be silver soldered, brazed or affixed by another method to prevent the release of the cap and source. ***RHS 31 2.4.2***
Source holder not to obscure source markings	If the source holder obscures the marking of the outer capsule of the radioactive source required under 2.2.4, the marking requirement of 2.2.4 must also apply to the source holder. ***RHS 31 2.4.3***
Marking if source holder permanently hold the source	If the source holder fully encloses the source capsule at all times, except when assembled or disassembled by the supplier, the marking requirement of 2.2.4 must apply to the source holder. ***RHS 31 2.4.4***
Used with a pig tail	When used in a projection-type container (see 3.1), the source holder must be secured to a flexible cable or pigtail which meets the requirements of 3.3. ***RHS 31 2.4.5***
Source Containers†	The source container must have current unilateral approval as a type B(U) package as required by paragraph 806 of the Transport Code (***RPS 2***) or only be transported in the relevant approved overpack. ***RPR – 2006*** **3.1 Design and construction of source containers** Each source container must meet the requirements of International Standard ISO 3999 *Apparatus for gamma radiography - specification* (as amended from time to time) (see annexe IX) and, if used as a transport container, must comply with the requirements contained in ***RPS 2*** It must also comply with the following design and construction requirements. A shutter or source control mechanism must be fitted, or provision made for such fitting, to the source container . It may be either manually operated or power operated (that is, electrically or pneumatically operated) but, if power operated, must be designed to be fail-safe. That is, if a power failure occurs, the return to the fully shielded condition must be automatic: for example, the shutter on a shutter-type container should be opened against the pressure of a spring or other positive closing device. For a power operated projection-type container, a mechanical means of returning the source to the fully shielded position must be provided. The design of the source container should be such that the source cannot be removed through the control connection port. ***RHS 31 3.1***

Projection port to be closed when not connected to a source control mechanism	When a source control mechanism is not connected to a source container, the connection port - and for a projection type container, the projection port – must be closed with an end cap that can be screwed or otherwise firmly fixed into position, and that can be secured with a locking pin or similar device. ***RHS 31 3.1.2***
Protection of source control mechanism	A shutter or source control mechanism and the associated mechanism for remote manual or power operation must be designed and constructed or encased in a protective enclosure so that: • they satisfy the test requirements given in 3.2.1; and • their operation is not adversely affected by corrosive substances, dust, grit, moisture, vibration or heat that may be present in the immediate environment of the radiography equipment during its projected useful life. ***RHS 31 3.1.3***
Lockable shutter	The shutter or source control mechanism must be provided with an effective key-operated lock which can be locked only when the source is in the fully shielded position, and which will secure the source in that position. ***RHS 31 3.1.4***
Quality of Locks†	Source container locks must be so designed, constructed and mounted that they resist forcible interference using common hand tools and resist key cylinder picking. ***RHS 31 3.1.5***
Requirement for projection type container	**3.1.6** A projection-type container which is designed to hold the source near the center of a "dog-leg" or "S-bend" conduit in a shielding casing when in the fully shielded position must incorporate a flexible source holder, or pigtail, which can be secured at its cable-coupling end to the control cable port. A flexible cable, similar to but not mistakable for a pigtail, should also be provided which can be inserted into the projection port and be secured, while the source is not in use, to prevent the source from moving from its fully shielded location. ***RHS 31 3.1.6***

Labels and markings required on the source container	**3.1.15** It must be durably marked with a fire resistant label or labels incorporating the radiation hazard symbol (trefoil) and the word CAUTION followed by words to the general form of those given in annexe III. The label or labels must also incorporate the following information: • the name of the radioactive substance, and the maximum activity for which the container has been designed; • the identification number of the container; • the name and address of the supplier or manufacturer; • the activity of the enclosed radioactive source and the date of measurement of that activity; • the maximum radiation level at one metre (with any shutter closed) from the source container and the date this measurement was made; and • the name, address and telephone number of the owner or emergency contact. The latter three items may be incorporated in a changeable metal label which must be firmly fixed to the container by a metal ring or chain or other robust attachment.
Exposure rates	When loaded with the source of greatest activity for which it is approved the radiation level must not exceed 2000 µSv/h at any point 5 cm from the external surface and 100 µSv/h at any point 1 m from its surface. Determinations of these radiation levels are to be made with the shutter or control mechanism in the "beam off" position, the source in the fully shielded position, and the appropriate port plugs fitted. ***RHS 31 3.1.7***
Source container resistant to heat†	It must be so constructed that any primary shielding material, of melting point less than 800°C, must be entirely enclosed within a metal casing, the melting point of which exceeds 800°C, so that effective shielding is maintained in the event of a fire. ***RHS 31 3.1.8***
Temperature variation while source container is in use†	It must be designed to withstand variations of temperature to which it may be subjected in use without deterioration of containment or ease of operation of the shutter or source control mechanism, if fitted. The potential for brittle fracture of materials used must be taken into account. ***RHS 31 3.1.9***

Lifting attachments for source container†	It must be so designed that when any incorporated lifting attachments are used in the intended manner, no damaging stresses are imposed on the structure of the source container. ***RHS 31 3.1.10***
Quality of welding and brazing used in the construction of the source container†	Where welded, brazed and other fusion joints are used, they must be in accordance with appropriate Australian Standards or their equivalent. ***RHS 31 3.1.11***
Damage to the source container from vibration, acceleration and vibrational †	It must be so designed and constructed that it withstands the effects of all vibrations, acceleration and vibration resonance likely to arise during its transport, handling and use, without damage, deterioration in the effectiveness of closing devices or reduction in ease of operation of the shutter or source control mechanism, if fitted. ***RHS 31 3.1.12***
Compatability of materials used in constructing the source container†	It must be constructed of materials that are physically and chemically compatible with each other and with the materials of radioactive source capsules that it is designed to contain. Account must be taken of the behaviour of the various materials under irradiation. ***RHS 31 3.1.13***
Manual and mechanical handling for the source container†	It must be provided with a handle or handles, lifting lugs or brackets, or other means as appropriate, to facilitate safe handling. ***RHS 31 3.1.14***
Tests for structural integrity and endurance of source containers†	A source container housing a radioactive source for use in industrial radiography must meet the test requirements specified in International Standard ISO 3999 *Apparatus for gamma radiography - specification* (as amended from time to time) (see annexe IX) and, if used as a transport container, must meet the test requirements specified ***RPS 2*** ***RHS 31 3.2***
Tests for shutter and source control mechanism†	To test a shutter or source control mechanism, a sample or prototype mechanism must be subjected to 50,000 cycles of operation. A shutter or source control mechanism must be considered to have complied with this test requirement if it has operated for the specified number of cycles of operation without the component failing to operate in the intended manner, and without showing evidence of undue wear. ***RHS 31 3.2.1***
Handling equipment†	For a projection type source container, equipment used to propel a radioactive source between its shielded position and its exposure position must meet the requirements specified in International Standard ISO 3999 *Apparatus for gamma radiography - specification* (as amended from time to time) (see annexe IX) and must comply with the following requirements. ***RHS 31 3.3***

Guide tube testing	A guide tube through which the source can move freely must be provided. The design of the end cap at the exposure end of the guide tube must be such as to prevent inadvertent release of the source when fully projected. The guide tube must be sealed to prevent ingress of dirt, grit and moisture and, if flexible, must be capable of withstanding repeated flexures without suffering permanent distortion. Recovery from any temporary distortion caused by a compressive load or flexure must be rapid. The exposure end of the guide tube must be capable of being clamped in position during exposure without affecting the free movement of the cable and source, and should be capable of being fitted with a collimator. ***RHS 31 3.3.1***
Cable testing†	Where a cable is used to move the source, the coupling must be designed to withstand expected conditions of use such that the source or pigtail does not become detached inadvertently. ***RHS 31 3.3.2***
Control cable length	A control cable must be not less than 10 m and of sufficient length in relation to the exposure conditions to enable the operator to control the source from a location where the dose rate is as low as practicable. The windout mechanism must incorporate a device to indicate the distance through which the source has been projected from its fully shielded position. ***RHS 31 3.3.3***
Pneumatic movement	Where a source is moved pneumatically, the guide tube must have damping mechanisms at both ends to protect the source from damage. ***RHS 31 3.3.4***
Electro-mechanical movement	Where a source is moved by electro-mechanical or pneumatic means, a mechanical device must be provided that can be used to return the source to its container in the event of an electrical fault or electrical power failure, or pneumatic failure. ***RHS 31 3.3.4***
Test for non fixed contamination	
Source container	Wipe tests of source container must be carried out. ***RAR***
	Non fixed contamination levels not to exceed those specified for transport in **RPS 2**
Preventative maintenance	All control mechanisms and the general mechanical soundness of the gauge must have been tested and shown to operate as per the manufacturer's specifications. ***RAR***