



**Queensland
Government**

Radiation Safety Act 1999

RADIATION SAFETY STANDARD

NM007:2020

***Standard for sealed radioactive substances incorporated in sealed source apparatus
used to carry out industrial radiography***

Preface

Under section 17 of the *Radiation Safety Act 1999*, a possession licensee who, under a licence, possesses a sealed source apparatus to carry out a radiation practice, must ensure that the apparatus is not used for this purpose, unless the sealed source apparatus complies with the relevant standard.

This radiation safety standard NM007:2020 *Standard for sealed radioactive substances incorporated in sealed source apparatus used to carry out industrial radiography* is made under section 16 of the *Radiation Safety Act 1999*.

This standard sets the minimum safety criteria for sealed source apparatus used to carry out industrial radiography. Compliance with this standard will assist in ensuring that public and occupational exposure to radiation is minimised.

Queensland Health has prepared this standard based on information derived from reputable sources such as the National Health and Medical Research Council.

The standard will be reviewed periodically to re-evaluate its currency and its appropriateness as the standard for sealed source apparatus used for industrial radiography.

By ensuring compliance with this radiation safety standard, the standard of sealed source apparatus used for industrial radiography in Queensland will be significantly enhanced.

I, Steven Miles, Deputy Premier and Minister for Health and Minister for Ambulance Services, pursuant to section 16(1) of the *Radiation Safety Act 1999*, make the radiation safety standard NM007:2020 *Standard for sealed radioactive substances incorporated in sealed source apparatus used to carry out industrial radiography*, for the purposes of the Act, and repeal the previous standard NM007:2010 *Standard for sealed radioactive substances incorporated in sealed source apparatus used to carry out industrial radiography*.

STEVEN MILES MP
Deputy Premier and
Minister for Health and
Minister for Ambulance Services

25 May 2020

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Standard for sealed radioactive substances incorporated in sealed source apparatus used to carry out industrial radiography

Section 1 – General

1.1 Scope

This radiation safety standard sets out the minimum requirements for sealed radioactive substances incorporated in sealed source apparatus that is used to carry out industrial radiography.

1.2 Expiry

This radiation safety standard expires on 1 September 2021.

1.3 Documents

Documents which may provide a useful reference are listed in Appendix A.

1.4 Definitions

In this standard –

“**control cable**” means a component of a mechanical source control mechanism which, for shutter type source containers, controls the shutter from a location remote from the radioactive substance or, for a projection type source container, is a windout cable.

“**guide tube**” means a tube, typically of flexible construction, designed to provide an enclosed path along which a radioactive substance may be moved from its sealed source apparatus to its exposure position and back again.

“**ISO**” means the International Organization for Standardization.

“**industrial radiography**” means the use of the penetrating power of gamma-rays to obtain information non-destructively on the internal state of objects and materials.

“**projection type container**” means a sealed source apparatus which retains the radioactive substance in a shielded position except during exposure, when it is propelled from the container along a guide tube to its exposure position.

“**radiation dose rate**” means the amount of energy from radiation absorbed by the person or thing exposed to the radiation during a particular time.

Section 2 - Standard – Industrial radiography apparatus

Test	Compliance Test	Criteria for Passing the Test
Radioactive substance details		
1	Radioactive substance certification	<p>The sealing of the radioactive substance must:</p> <p>(a) satisfy the requirements of ISO2919-1980(E) <i>Sealed Radioactive Sources – Classification</i>¹, or equivalent; and</p> <p>(b) satisfy the ‘special form’ design and test requirements specified in the <i>Code of Practice for the Safe Transport of Radioactive Substances 1990</i>² issued under the <i>Environmental Protection (Nuclear Codes) Act 1978</i> (Cwth), or equivalent.</p>
Radiation dose rate		
2	Radiation dose rate	<p>When the sealed source apparatus is locked in the “beam off” position, the radioactive substance in the fully shielded position, and the appropriate port plugs fitted, the radiation dose rates must not exceed:</p> <p>(a) 2000µSv in one hour at any point 5 centimetres from the external surface of the sealed source apparatus; and</p> <p>(b) 100µSv in one hour at any point 1 metre from the external surface of the sealed source apparatus.</p>
Warning signs		
3	Radiation warning sign	<p>The sealed source apparatus must be durably and legibly marked with a metal label, incorporating:</p> <ul style="list-style-type: none"> • the radiation warning sign (trefoil) • the word “caution” or “warning” • words to the general form of “radioactive material” <p>The trefoil and markings must be black on a yellow background.</p>

¹ The standard is available from Standards Australia, 232 St Pauls Terrace, Fortitude Valley, Brisbane.

² The document is available from Australian Government Publishing Service, City Plaza, corner Adelaide and George Streets, Brisbane.

Test	Compliance Test	Criteria for Passing the Test
4	Labels relating to the sealed source apparatus	<p>The sealed source apparatus must be legibly marked with a metal label(s) containing the following information:</p> <ul style="list-style-type: none"> • name and address of the supplier or manufacturer • identification number of the container • the type of radioactive substance, its activity and the date of measurement of that activity • maximum radiation dose rate at 1metre from the surface of the sealed source apparatus (with shutters closed) and the date the measurement was made • name, address and telephone number of the owner. <p>The lettering must be black (or dark).</p> <p>The latter three items may be firmly fixed to the container by a metal ring or chain or other robust attachment.</p>
Shutter mechanism		
5	Shutter or source control mechanism	<p>The sealed source apparatus must be provided with a radiation source control mechanism or shutter.</p> <p>If power operated, the shutter or source control mechanism must be fail safe, i.e. if a power failure occurs, the return of the source to the fully shielded condition must be automatic.</p> <p>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:</p> <ul style="list-style-type: none"> (a) closed with an end cap that can be screwed or otherwise firmly fixed into position; and (b) secured with a locking pin or similar device.
6	Shutter lock	<p>The shutter or source control mechanism must be provided with an effective key-operated lock which:</p> <ul style="list-style-type: none"> (a) can be locked only when the radioactive substance is in the fully shielded position, and (b) will secure the radioactive substance in that position.
Handling		
7	Handling features	<p>The sealed source apparatus must be provided with a handle or handles, lifting lugs or brackets, or other means as appropriate, to facilitate safe handling.</p>

Test	Compliance Test	Criteria for Passing the Test
<i>Handling equipment</i>		
8	Guide tube	<p>A guide tube through which the radioactive substance can move freely must be provided. The guide tube must be sealed to prevent ingress of material (e.g. dirt, grit, moisture).</p> <p>The end cap at the exposure end of the guide tube must be such as to prevent inadvertent release of the radioactive substance when fully projected.</p> <p>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 radioactive substance.</p>
9	Control cable	The control cable must be not less than 10 metres in length.
10	Movement of radioactive substance	<p>When the radioactive substance is moved pneumatically, the guide tube must have damping mechanisms at both ends to protect the radioactive substance from damage.</p> <p>Where the radioactive substance is moved by electro-mechanical or pneumatic means, a mechanical device must be provided that can be used to return the radioactive substance to its container in the event of an electrical fault or electrical power failure, or pneumatic failure.</p>
<i>Additional requirements for projection-type apparatus</i>		
11	Flexible source holder	A projection-type container which is designed to hold the radioactive substance near the centre of a “dog-leg” or “S-bend” conduit in a shielded 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.

Appendix A

Documents

National Health and Medical Research Council. *Code of practice for the safe use of industrial radiography equipment (1989)*. NHMRC Publication No. 31, 1989.