Guideline for Design and Validation of Shielding of Dental X-ray Facility

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Department of Health

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Design and Validation of Shielding of Dental X-ray Facility

Radiation shielding specifications and certification[1] is carried out by accredited persons. Once certification has been granted an application to register the room(s) may be made by the person seeking to register the place.

The requirements in this document are those that must be used by accredited persons when calculating the structural shielding specifications for rooms where dental intra oral, Orthpantomograph and cone beam volume CT units are used. The document also contains the requirements for validating and certifying rooms where these X-ray units are used.

This document draws on internationally recognised methodologies based on the work of the National Council for Radiation Protection and Measurements (NCRP 145) and the work of the British Institute of Radiology (BIR), Radiation Shielding for Diagnostic Radiology, 2012 (BIR 2012).

The details of shielding calculation methods for intra oral dental radiography are taken from BIR 2012 10.2.1 while those for panoramic radiology are from BIR 2012 10.2.2 and Dental Cone Beam CT are from BIR 2012 10.2.4.

Requirement 1 - Method

The radiation shielding design report must state whether it has been designed following the methods and assumptions of NCRP 145 ***or*** BIR 2012. ***Using a mixture of these methods is not permitted***.

Requirement 2 - X-ray Attenuation/Transmission Calculations

The attenuation of broad beam radiation through materials used for shielding must be calculated using the empirical model of Archer BR, Thornby JI, and Bushong SC (1983) Diagnostic x-ray shielding design based on an empirical model of photon attenuation, Health Phys 44, 507-17.

Three phase and constant potential X-ray transmission through a variety of materials may be found at:

- Archer BR, Fewell TR, Conway BJ, and Quinn PW (1994) Attenuation properties of diagnostic x-ray shielding materials, Med Phys, 21, 1499-507
- Christensen R, and Sayeg JA (1979) Attenuation characteristics of gypsum wallboard, Health Phys, 36,595-600
- Simpkin DJ (1989) Shielding requirements for constant potential diagnostic X-ray beams determined by a Monte-Carlo calculation, Health Phys, 56, 151-64
- Simpkin DJ (1995) Transmission data for shielding diagnostic X-ray facilities, Health Phys 68, 7049.
- Rossi RP, Ritenour R, Christodoulou E (1991) Broad beam transmission properties of some common shielding materials used in diagnostic radiology, Health Phys, 61, 601-8

[1] The place has been issued a certificate of compliance issued by a person accredited under the *Radiation Protection Act 2005*

Software used to determine shielding thicknesses must also make use of these models and attenuation data.

Requirement 3 - Accepted Densities of Common Shielding Material

The data in Table B 1.0 are the acceptable densities of certain building materials often used as shielding.

The plasterboard densities in Table B 2.0 are from the manufacture's data sheets. These plasterboard thicknesses and densities may be useful when some shielding is required, and it can be achieved by using more than two sheets on a wall or choosing sheets that are thicker than the commonly used 10mm and 13 mm plasterboard sheets.

Requirement 4 - Dosimetric Quantities

The dosimetric quantity used in shielding designing[2] is Kerma in air (also called air Kerma) [3] (Gy) (BIR 1.2[4]).

Requirement 5 - X-ray Workload and Kerma

Intra oral radiography is normally carried out at 60-75 kV and dependent on the image receptor (fast film, CR or DR) . Typical exposures are of the order of 1 – 3 mGy entrance surface dose (ESD). Given the primary beam for intra oral exposures are intercepted by the patient it can be assumed that primary transmission is no more than 0.03% of the ESD (BIR 2012 10.2.1). It is also reasonable to assume the scatter air Kerma for an intra oral exposure is 0.2 µGy per exposure. The BIR 2012 uses these assumptions together with the weighting on the orientation of the exposure to derive an air Kerma of 0.5µGy per exposure at 1 m (BIR 2012 10.2.2). This isotropic air Kerma value can be used to determine shielding requirements for intra oral radiography.

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[2] It should be recognized that radiation protection measurements are often performed in terms of International Commission on Radiation Units and Measurements operational quantities (ICRU). For example, individual doses, as recorded on a personal dose monitor, are assessed in terms of the operational quantity personal dose equivalent Hp(d) (d=7 mm or 10 mm). Radiation protection instruments are often calibrated in terms of another operational quantity, the ambient dose equivalent H*(d) (d = 0.07, or 10mm – 10 mm is used for strongly penetrating radiating). The relationship between derived quantities and air-kerma is complex, depending on the radiation spectrum and in the case of effective dose, distribution of photon fluence and posture of the exposed individual. Nevertheless, in the energy range used for diagnostic radiology air kerma generally represents an overestimate of the effective dose.

3 According to the International Commission on Radiation Units and Measurements (ICRU), the relationship between effective dose and incident air-kerma is complex and depends on the attenuation of x-rays in the body. Therefore, it is not practical to use this quantity for shielding design purposes. This correlation is adopted in practical situations by using conversion coefficients calculated using validated mathematical models by the ICRU. The ambient dose equivalent, H*(10), is a quantity adopted by the IAEA for monitoring external exposure.

[4] The assumption of equivalence between air kerma and effective dose will result in conservative shielding models. It should be noted that because Hp(10) and H*(10) overestimate the effective dose by more than kerma does, caution should be taken if instruments calibrated in these quantities are used to determine, for example, levels of scattered radiation around a room as part of a shielding assessment exercise.

NCRP 145 uses a different approach to specify air Kerma for intra oral radiography, with patient and image receptor attenuation leading to different of 'Use' factors for the primary beam. If using the methodology of NCRP 145 then sections F2.1.3 and F2.1.3.1must be followed.

The air Kerma used for determining the shielding requirements for panoramic radiology is specified as 0.65 µGy per examination at 1 m (BIR 2012 10.2.2). Given the panoramic unit is usually mounted closer than 1m to at least one wall the air Kerma at that wall is taken to be 1 - 2 µGy per examination. Cephalometric radiography is also carried out on panoramic radiography equipment with the appropriate attachment. In this mode the patient's head intercepts the useful X-ray beam and so the air Kerma for shielding purposes can be taken to be 0.2µGy per examination at 1 m.

NCRP 145 uses a different approach to specify air Kerma for panoramic radiography, which leads to only the need to consider secondary barriers. If using the methodology of NCRP 145 then section F2.1.3.2 must be followed.

Air Kerma from the operation of dental cone beam CT has been reported in the literature (BIR 2012 10.2.4). Surveys have reported secondary air Kerma per scan of between 2.3 µGy to 40 µGy at 1 m. Other surveys have yielded lower values at 1 m of between 6 µGy to 13 µGy. The first preference is to use the manufacturer's secondary radiation data for the unit to be installed. However, given units may change over time it may be more reasonable to consider the worst case secondary kerma and to design protection on that basis.

Workload for determining air Kerma is taken to be the number of exposures the shielding is designed to protect against for intra oral and cephalometric radiography, or in the case of panoramic and Dental Cone Beam CT, the number of scans.

Requirement 6 - Occupancy

Occupancy adjusted air Kerma is used to calculate the required attenuation to meet the shielding design goal. The occupancy assigned is based on the fraction of time spent in a location by the person who is there the longest (BIR 1.5). When determining the air Kerma for a shielded barrier the distance to the occupied area of interest is taken to be from the source to the nearest likely approach of the sensitive organs of a person to the barrier. For a wall this is not less than 0.3 m. For a source located above potentially occupied spaces the sensitive organs of the person below is taken to be not more than 1.7 m above the lower floor, while for ceiling transmission the distance of at least 0.5 m above the floor of the room above is used. (NCRP 147 4.1.2).

In the absence of actual occupancy data for a particular situation, the following occupancy weighting factors may be used:

Table 1.1 - Occupancy Factors (BIR 2012)

Occupancy	Area Type	Occupancy factor
Full	Control rooms, reception areas, nurses stations, offices, shops, living quarters, children's indoor play areas, occupied space in nearby buildings	1 (100%)
Partial	Staff rooms, adjacent wards, clinic rooms, reporting areas	1/5-1/2 (20% - 50%)
Occasional	Corridors, storerooms, Stairways, changing rooms, unattended car parks, unattended waiting rooms, toilets, bathrooms	1/40-1/8 (5% - 12.5%)

Table 1.2 - Occupancy Factors (NCRP 145)

Area type	Occupancy factor
Offices, labs, pharmacies, receptionist areas, attended waiting rooms, kids' play areas, X-ray rooms, film reading areas, nursing stations, X-ray control rooms	1 (100%)
Patient exam rooms and treatment rooms	1/2 (50%)
Corridors, patient rooms, employee lounges, staff rest rooms	1/5 (20%)
Corridor doors	1/8 (12.5%)
Public toilets, vending areas, storage rooms, outdoor areas with seating, unattended waiting rooms, patient holding	1/20 (5%)
Outdoors, unattended parking lots, attics, stairways, unattended elevators, janitor's closest	1/40 (2.5%)

Requirement 7 - Use Factor

The air Kerma used for shielding designs following BIR 2012 assumes isotropic secondary radiation at 1 m. Primary radiation 'Use' factors have been considered in developing those data. NCRP 145 uses a different methodology see Table F.2 NCRP 145 for intraoral radiography. Using NCRP 145 only secondary barriers need be considered for panoramic radiography.

Requirement 8 - Design Goal[5]

If using BIR 2012 methodology, then

- 0.3 mGy/year in situations where a member of the public may be exposed
- 6 mGy/year for occupational exposure

If using NCRP 145 methodology, then

- 0.25 mGy/year in situations where a member of the public may be exposed (NCRP 116 multiple sources)
- 5 mGy/year for occupational exposure

Requirement 9 - Calculations in Support of the Shielding Design

Annexe A Tables A 1.0 and A 2.0 provide information on situations where a combination of workload and distance means no structural shielding is required to meet the design goal for public exposure given in Requirement 9.

Table A 1.0 shows situations where no additional structural shielding is required for intraoral radiography based on a design goal of 0.3 mGy per year and an occupancy of 1 for surrounding areas.

Table A 2.0 shows situations where no additional structural shielding is required for panoramic radiography based on a design goal of 0.3 mGy per year and an occupancy of 1 for surrounding areas.

A3 discusses shielding requirements for dental cone beam CT.

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[5] These represent dose constraints, not limits, therefore using either BIR 2012 or NCRP 145 will achieve the same level of optimization and safety and ensure dose limits are met.

When calculations are required to determine the shielding thicknesses the air Kerma per exposure (or scan) at 1 meter is scaled to the required distance of the barrier using $1/d^2$ attenuation. At that point the desired transmission or attenuation, taking account of the occupancy of the protected area, is calculated using the methods of Requirement 2. Any software being used for these purposes, especially custom spreadsheets used by a shielding designer must be subject to regular quality assurance. This may best be achieved by benchmarking the software against worked examples in BIR 2012 or NCRP 145. Records of these checks must be kept and be available for inspection by regulators who authorise X-ray rooms based on their shielding designs.

Requirement 10 - Practical Assessment of Shielding

Visual inspection of shielding and building certificates and orders should be carried out by the shielding designer as the shielding is installed. Lead glass commonly has a glazier's certificate and must be indelibly labelled with a lead equivalence at a specified kV.

Visual inspection also provides an opportunity to perform physical measurements of lead plaster and sometimes concrete thicknesses. Voids and gaps in the shielding may be readily identified during construction. Photographic records form a useful resource. (BIR 2012 5.2)

Checks may also be carried out using radioactive sources and mobile X-ray units (BIR 2012 5.3). The use of radioactive materials can require careful interpretation of the results as the spectrum of radiation from the materials is often different to that of X-rays. The most suitable radioactive material for checking shielding is Am241 whose 60 keV gamma peak represents the upper part of photon energy range of typical diagnostic X-ray beam. Tc-99m is an alternative to Am241, however there are limitations that need to be accounted for (BIR 2012 5.3). BIR 2012 5.3.2 is a useful discussion regarding the attenuation of barriers made from various materials.

Measurements may also be made using diagnostic X-ray equipment. This has the advantage of testing the barrier against the radiation for which it was designed (BIR 2012 5.6).

If a visual assessment and examination of building documentation indicates the shielding has been installed as per the design requirements, then further testing is not necessary.

Requirement 11 - Advice Regarding Doors, Windows and Penetrations

As part of the shielding design advice must be provided, on how to ensure continuity of shielding at windows and doors (including the frames and hardware), and joins in the shielding materials, and on how to address penetrations to the shielding materials, such as for light switches, power points, electrical cabling and plumbing. This advice must include consideration of the distance between the original layer of material and the additional material installed, to ensure the shielding of glancing angle X-rays. The shielding requirement for a door or window (including the frame) must be the same as the requirement for the wall it forms part of. The occupancy factor assigned to all parts of a barrier which forms the operator shield must be 1 (i.e. 100%).

The shielding height requirements depend on the nature of the equipment and the following height requirements must be incorporated within the shielding design. The default position is that when required shielding needs to extend to no less than 2.1m above the finished floor for intraoral. panoramic and CBCT. However, individual assessments may need to take account of occupancies above or below CBCT equipment where the ceiling and floor must also be considered.

Annexe A - Maximum Workload for which No Added Shielding is Required

A 1.0 Dental Intra Oral Radiography

The primary radiation beam is intercepted by the patient during intraoral radiography. Assuming an occupancy of 1 for areas around the intraoral x-ray unit, and a design goal of 0.3 mGy per year for a member of the public, then no added shielding is required for the number of exposures per week at the specified distances shown in Table A 1.0.

Table A 1.0

Distance (metres)	Exposures per week
1	10
1.5	25
2	50
2.5	75
3	110

While Table A 1.0 provides details on situations where no added shielding is required, most interior partition walls are clad with two sheets of plasterboard.

Table C 1.0 shows that only 20% of the scattered radiation will be transmitted through 26 mm of plasterboard and 25 % of the scattered radiation will be transmitted through 20 mm of plasterboard.

BIR 2012, Table 10.3 provides information on situations when plasterboard shielding may be required. These situations are typically for high numbers of weekly exposures and distances of around 1 to 1.5 meters.

A 2.0 Panoramic Radiography

The primary radiation beam is intercepted by the patient during panoramic radiography and essentially stopped by the image receptor and its holder (BR 2012 10.2.2).

Assuming an occupancy of 1 around the panoramic X-ray unit, and the occupied area applies a dose constraint of 0.3 mGy per year for a member of the public, then the number of 70 kV panoramic scans per week at the specified distances shown in Table A 2.0, will not result in the need for any additional shielding in a dental surgery where panoramic radiography alone is carried out.

Table A 2.0

Distance (metres)	Exposures per week
1	10
1.5	20
2	40
2.5	60
3	80

BIR 2012, Tables 10.4 and 10.5 provide information plasterboard shielding for panoramic radiography at 70 kVp. Given panoramic X-ray equipment can also perform cephalometric radiography those exposures need to be added into the workload and scatter for the room.

A 3.0 Dental Cone Beam CT Radiography

Dental cone beam CT can be assessed in a manner similar to that of panoramic radiography using the appropriate air kerma in Requirement 5. However, the higher scatter air kerma and the higher x-ray tube potential for Dental Cone Beam CT means that even for a relatively modest number of scans per week (20) some shielding will be required. Table 10.6 of BIR 2012 provides useful information regarding lead equivalent shielding for a variety of workloads and distances.

Annexe B - Accepted Densities of Common Shielding Material

Table B 1.0 - Accepted densities of common shielding materials from BIR 2021

Material density (kg/m3)

Material	Density (kg/m3)
Lead	11350
Concrete	2350
Steel	7400
Gypsum Wall Board	705
Plate Glass	2560
Brick	1650
Wood	550

Material density (g/m3)

Material	Density (g/m3)
Lead	11.35
Concrete	2.35
Steel	7.40
Gypsum Wall Board	0.705
Plate Glass	2.56
Brick	1.65
Wood	0.55

Table B 2.0 - Gypsum Based Wall Board Densities from Manufacturer's Data and Lead Equivalent Calculated using the method of Archer (1994)

Plus™

Thickness (mm)	Mass Per Unit Area (kg/m2)	Density g/cm3	kg/m2 relative to Plus™	Equivalent thickness of Plus™ (mm)	mm Pb & Transmission @70 kVp	mm Pb & Transmission @100 kVp
10	5.7	0.57	1.00	10.00	0.03/0.46	0.03/0.62

Aquachek™

Thickness (mm)	Mass Per Unit Area (kg/m2)	Density g/cm3	kg/m2 relative to Plus™	Equivalent thickness of Plus™ (mm)	mm Pb & Transmission @70 kVp	mm Pb & Transmission @100 kVp
10	6.1	0.61	1.07	10.70	0.03/0.44	0.03/0.6
10	7.9	0.79	1.39	13.86	0.04/0.37	0.04/0.53
13	9.8	0.75	1.72	17.19	0.05.0.31	0.06/0.47

Supaceil™

Thickness (mm)	Mass Per Unit Area (kg/m2)	Density g/cm3	kg/m2 relative to Plus™	Equivalent thickness of Plus™ (mm)	mm Pb & Transmission @70 kVp	mm Pb & Transmission @100 kVp
10	6.1	0.61	1.07	10.70	0.03/0.44	0.03/0.6

Standard 13mm

Thickness (mm)	Mass Per Unit Area (kg/m2)	Density g/cm3	kg/m2 relative to Plus™	Equivalent thickness of Plus™ (mm)	mm Pb & Transmission @70 kVp	mm Pb & Transmission @100 kVp
13	8.5	0.65	1.49	14.91	0.05/0.35	0.05/0.51

Soundchek™

Thickness (mm)	Mass Per Unit Area (kg/m2)	Density g/cm3	kg/m2 relative to Plus™	Equivalent thickness of Plus™ (mm)	mm Pb & Transmission @70 kVp	mm Pb & Transmission @100 kVp
10	9.3	0.93	1.63	16.32	0.05/0.32	0.05/0.48
13	13	1	2.28	22.81	0.07/0.23	0.07/0.39

Impactchek™

Thickness (mm)	Mass Per Unit Area (kg/m2)	Density g/cm3	kg/m2 relative to Plus™	Equivalent thickness of Plus™ (mm)	mm Pb & Transmission @70 kVp	mm Pb & Transmission @100 kVp
13	10.5	0.81	1.84	18.42	0.06/0.29	0.06/0.45

Fyrchek™

Thickness (mm)	Mass Per Unit Area (kg/m2)	Density g/cm3	kg/m2 relative to Plus™	Equivalent thickness of Plus™ (mm)	mm Pb & Transmission @70 kVp	mm Pb & Transmission @100 kVp
13	10.5	0.81	1.84	18.42	0.06/0.29	0.06/0.45
16	12.5	0.78	2.19	21.93	0.07/0.24	0.07/0.4

Fyrcheck™ MR

Thickness (mm)	Mass Per Unit Area (kg/m2)	Density g/cm3	kg/m2 relative to Plus™	Equivalent thickness of Plus™ (mm)	mm Pb & Transmission @70 kVp	mm Pb & Transmission @100 kVp
13	10.8	0.83	1.89	18.95	0.06/0.28	0.06/0.44
16	12.9	0.81	2.26	22.63	0.07/0.23	0.07/0.39

EC08™ Impact

Thickness (mm)	Mass Per Unit Area (kg/m2)	Density g/cm3	kg/m2 relative to Plus™	Equivalent thickness of Plus™ (mm)	mm Pb & Transmission @70 kVp	mm Pb & Transmission @100 kVp
13	12.1	0.93	2.12	21.23	0.07/0.25	0.07/0.41

EC08™ Impact MR

Thickness (mm)	Mass Per Unit Area (kg/m2)	Density g/cm3	kg/m2 relative to Plus™	Equivalent thickness of Plus™ (mm)	mm Pb & Transmission @70 kVp	mm Pb & Transmission @100 kVp
13	12.4	0.95	2.18	21.75	0.07/0.24	0.07/0.40

EC08™ Complete

Thickness (mm)	Mass Per Unit Area (kg/m2)	Density g/cm3	kg/m2 relative to Plus™	Equivalent thickness of Plus™ (mm)	mm Pb & Transmission @70 kVp	mm Pb & Transmission @100 kVp
13	12.4	0.95	2.18	21.75	0.07/0.24	0.07/0.40
16	14.8	0.93	2.60	25.96	0.08/0.2	0.08/0.35

Shaft Liner™

Thickness (mm)	Mass Per Unit Area (kg/m2)	Density g/cm3	kg/m2 relative to Plus™	Equivalent thickness of Plus™ (mm)	mm Pb & Transmission @70 kVp	mm Pb & Transmission @100 kVp
25	19.8	0.79	3.47	34.74	0.11/0.13	0.11/0.27

Flexible

Thickness (mm)	Mass Per Unit Area (kg/m2)	Density g/cm3	kg/m2 relative to Plus™	Equivalent thickness of Plus™ (mm)	mm Pb & Transmission @70 kVp	mm Pb & Transmission @100 kVp
6.5	4.3	0.66	0.75	7.54	0.02/0.55	0.02/0.69

Glasroc F

Thickness (mm)	Mass Per Unit Area (kg/m2)	Density g/cm3	kg/m2 relative to Plus™	Equivalent thickness of Plus™ (mm)	mm Pb & Transmission @70 kVp	mm Pb & Transmission @100 kVp
30	25.5	0.85	4.47	44.74	0.14/0.09	0.15/0.21

Gyproc (British Gypsum)

Thickness (mm)	Mass Per Unit Area (kg/m2)	Density g/cm3	kg/m2 relative to Gyproc	Equivalent thickness of Gyproc (mm)	mm Pb & Transmission @70 kVp	mm Pb & Transmission @100 kVp
9.5	6.3	0.66	1.00	9.50	0.03/0.48	0.03/0.63
12.5	8	0.64	1.27	12.06	0.04/0.41	0.04/0.57
15	9.8	0.65	1.56	14.78	0.05/0.35	0.05/0.51

Gyproc Soundbloc™ (British Gypsum)

Thickness (mm)	Mass Per Unit Area (kg/m2)	Density g/cm3	kg/m2 relative to Gyproc	Equivalent thickness of Gyproc (mm)	mm Pb & Transmission @70 kVp	mm Pb & Transmission @100 kVp
12.5	10.6	0.85	1.68	15.98	0.05/0.33	0.05/0.49
15	12.6	0.84	2.00	19.00	0.06/0.28	0.06/0.44

Gyproc Fireline™ (British Gypsum)

Thickness (mm)	Mass Per Unit Area (kg/m2)	Density g/cm3	kg/m2 relative to Gyproc	Equivalent thickness of Gyproc (mm)	mm Pb & Transmission @70 kVp	mm Pb & Transmission @100 kVp
12.5	9.8	0.78	1.56	14.78	0.05/0.35	0.05/0.51
15	11.7	0.78	1.86	17.64	0.06/0.30	0.06/0.46

Manufacturer's Data for GIB X-BLOCK[6]

X-BLOCK® is listed separately to other plasterboard due to the addition of Barium Sulphate.

13 mm GIC X-BLOCK®	1 Layer Pb equivalence (mm)	2 Layers Pb equivalence (mm)	3 Layers Pb equivalence (mm)	4 Layers Pb equivalence (mm)
80 kVp	0.7	1.6	2.4	3.0
100 kVp	0.7	1.5	2.2	2.8
125 kVp	0.5	1.0	1.4	1.8
150 kVp	0.4	0.7	1.0	1.3

[6] Taken from Information Published by Boral. X-Block® is a lead-free plasterboard developed to provide protection against X-ray radiation such as X-ray diagnostic rooms within medical facilities and dental clinics. With the barium sulphate core, the X-Block® Radiation Shielding System forms an effective barrier against X-ray radiation

Annexe C - Transmission of Scattered Radiation

Table C 1.0 - Transmission of Scattered Radiation at 70 kVp[7]

Material	Thickness	Transmission
Gypsum	26mm	20%
Gypsum	20mm	25%
Concrete	9mm	20%
Steel	0.5mm	20%
Plate Glass	11mm	20%

[7] Calculated using XRAYBARR - Simpkin

Annexe D - Form of the Shielding Report and Certificate of Compliance

The accredited person must produce a shielding report containing:

- A scaled floor plan of the place to which the shielding report applies.
  - The floor plan must include all occupied locations around the X-ray unit(s).
  - The floor plan must assign the numerical occupancies from NCRP or BIR to the locations around the X-ray units (including areas outside the place) and dimensions from the source of exposure to these locations.
- X-ray workload and technique for each X-ray unit in the place
- Unambiguous markings or legend on the plan that identify the thickness and type of any additional structural shielding required, or of existing structural materials that will provide sufficient shielding (e.g. existing block work or plaster)
- Any manufacturer's radiation scatter diagrams that were used to estimate exposure

When the accredited person is satisfied the place complies with the specification in the shielding report a 'Certificate of Compliance' for the place may be issued.

A certificate of compliance for a radiation place must contain at least the following information:

- Address and room number(s) sufficient to uniquely identify the place.
- The date that compliance was finally determined.
- The name and signature of the holder of the certificate of accreditation under which the certificate of compliance is being issued.
- The title of the Code of Practice the radiation place was assessed against.
- A statement to the effect that the certificate of compliance is being issued in accordance with the requirements of the Tasmanian Radiation Protection Act 2005.
- A certificate of compliance identification number, which must be of the form:

The final date, as year (YYYY), month (MM) and day (DD), on which the assessment of the radiation place demonstrated that the place was in compliance with the relevant Code of Practice and any other prescribed specifications followed by a four-digit Radiation Place Identification Number (RPIN provided by the regulator).

For example: **2010 07 31 0251** means that the place with identification number **0251** was shown to comply with the relevant Code of Practice and any other prescribed specifications on 31 July 2010.