

Americium-241

γ and Primary X-ray Sources

Disc Sources, Beryllium Window

Americium-241 incorporated in a ceramic enamel, sealed in a welded monel capsule with brazed beryllium window; the active component is recessed into a stainless steel support with tungsten alloy backing.

These sources are designed for applications where the NpL X-rays are also required.

Nominal activity*		Capsule	Typical photon output in photons/s per steradian		Product code
GBq	mCi		17 keV	59.9 keV	
0.37	10	X.130/4	1.9×10^6	8.6×10^6	AMC13044
1.11	30	X.131/4	7.0×10^6	2.6×10^7	AMC13145
3.7	100	X.131/4	1.0×10^7	6.7×10^7	AMC13146
3.7	100	X.134/4	1.8×10^7	7.8×10^7	AMC13446

Tolerance \pm 10%
(except -10% to +0% for AMC13146 and AMC13446 used in USA)

Recommended working life: 10 years

Quality control

Wipe Test I

Immersion test II

Bubble test III

Np L x-ray emission is measured in narrow beam geometry using a Si(Li) detector.

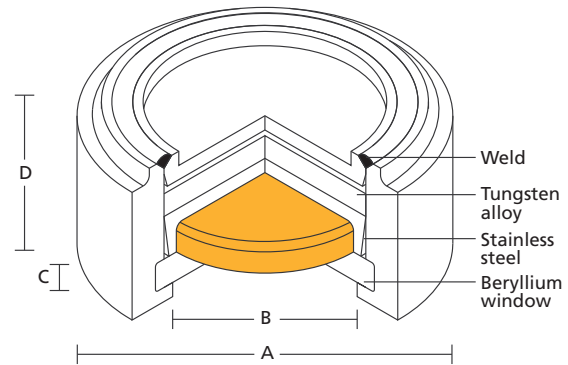
59.5keV γ -ray emission is measured in narrow beam geometry using a thin NaI detector.

Spectral purity is checked using Si (Li), Ge and NaI detectors.

Neutron emission

All Americium-241 sources emit 0.3n/s per MBq ($\sim 10^4$ n/s per Ci) due to (α ,n) reactions with the low atomic number elements (for example, Si, Al, O) in the active material.

X.130, 131, 134



Capsule dimensions and safety performance testing

Capsule	Overall diam.	Active diam.	Window thick.	Overall thick.	Safety perf. class	testing IAEA spec. form	US-Model number
	'A'mm	'B'mm	'C'mm	'D'mm			
X.130/4	8.0	4.2	0.95-1.05	5.0	C64344	YES	AMCL
X.131/4	10.8	7.2	0.95-1.05	5.0	C64344	YES	AMCL
X.134/4	15.0	10.6	0.95-1.05	5.0	C64344	YES	AMCL

Americium-241

γ and Primary X-ray Sources

Disc Sources, Stainless Steel Window

Americium-241 incorporated in a ceramic enamel, sealed in a welded stainless steel capsule.

Nominal activity*		Capsule	Typical photon output in photons/s per steradian 59.5keV	Product code
GBq	mCi			
3.7	100	X.91	53.0×10^6	AMC16
11.1	300	X.92	150.0×10^6	AMC17
18.5	500	X.97	280.0×10^6	AMC18
37.0	1000	X.93	500.0×10^6	AMC19
111.0	3000	X.94	1.2×10^9	AMC30
185.0	5000	X.95	2.0×10^9	AMC50

* Tolerance $\pm 10\%$

Recommended working life: 15 years

Quality control

Wipe Test I
Immersion Test II
Bubble Test III

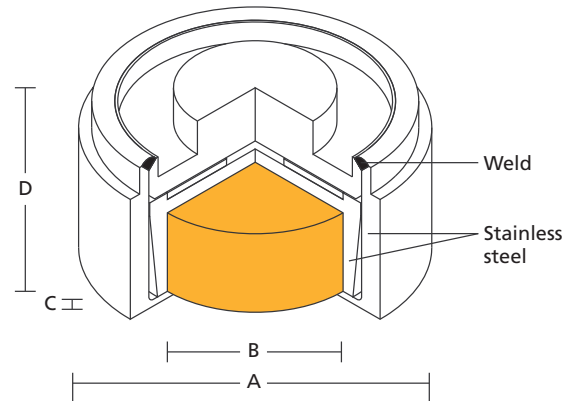
59.5keV γ -ray emission is measured in narrow beam geometry using a thin NaI detector.

Spectral purity is checked using Si (Li), Ge and NaI detectors.

Neutron emission

All Americium-241 sources emit 0.3n/s per MBq ($\sim 10^4$ n/s per Ci) due to (α ,n) reactions with the low atomic number elements (for example, Si, Al, O) in the active material.

X.91-95, 97



Capsule dimensions and safety performance testing

Capsule	Overall diam. 'A'/mm	Active diam. 'B'/mm	Window thick. 'C'/mm	Overall thick. 'D'/mm	Safety perf. class	testing ANSI/ISO IAEA spec. form	US-Model ref.
X.91	10.8	7.5	0.2-0.25	6.0	C64444	YES	AMC.16
X.92	15.0	12.0	0.2-0.25	6.0	C64444	YES	AMC.17
X.93	30.0	25.0	0.2-0.25	6.0	C64444	YES	AMC.19
X.94	36.0	31.0	0.25-0.3	8.0	E64444	YES	AMC.30
X.95	45.0	40.0	0.25-0.3	8.0	E64444	YES	AMC.50
X.97	22.0	18.0	0.2-0.25	6.0	C64444	YES	AMC.18

Americium-241

γ and Primary X-ray Sources

Disc Sources, Stainless Steel Window

Americium-241 incorporated in ceramic enamel, sealed in a welded stainless steel capsule.

Sources codes AMC 62-66 are designed for backscatter applications; the active ceramic is recessed into a tungsten alloy insert.

Nominal activity*		Capsule	Typical photon output in photons/s per steradian 59.5keV	Product code
MBq	mCi			
37	1	X.10/2	$7.2 - 10.0 \times 10^5$	AMC62
111	3	X.10/2	$2.3 - 3.1 \times 10^6$	AMC63
370	10	X.10/2	$7.2 - 10.0 \times 10^6$	AMC64
1110	30	X.11	24.0×10^6	AMC65
3700	100	X.11/1	53.0×10^6	AMC66

* Tolerance $\pm 10\%$

Recommended working life: 15 years

Quality control

Wipe Test I

Immersion Test II

Bubble Test III

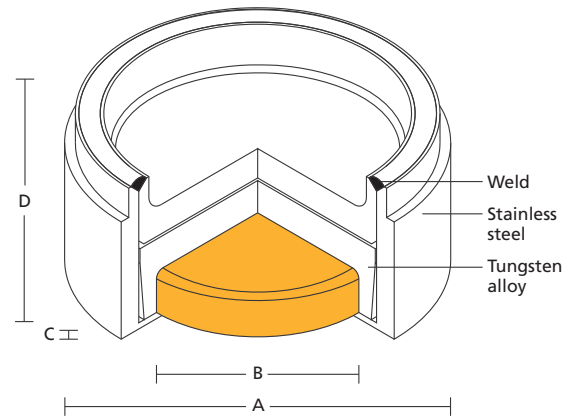
59.5keV γ -ray emission is measured in narrow beam geometry using a thin NaI detector.

Spectral purity is checked using Si (Li), Ge and NaI detectors.

Neutron emission

All Americium-241 sources emit 0.3n/s per MBq ($\sim 10^4$ n/s per Ci) due to (α ,n) reactions with the low atomic number elements (for example, Si, Al, O) in the active material.

X.10, 11



Capsule dimensions and safety performance testing

Capsule	Overall diam. 'A'mm	Active diam. 'B'mm	Window thick. 'C'mm	Overall thick. 'D'mm	Safety perf. testing		US-Model ref.
					ANSI/ISO class	IAEA spec. form	
X.10/2	8.0	4.2	0.2-0.25	5.0	C64545	YES	AMC.D2
X.11	10.8	7.2	0.2-0.25	5.0	C66544	YES	AMC.D3
X.11/1	10.8	8.0	0.2-0.25	5.0	C66544	YES	AMC.D3

Americium-241

γ and Primary X-ray Sources

Point Sources

Americium-241 incorporated in a ceramic bead (AMC21 to AMC25) or cylindrical ceramic pellet (AMC26), sealed in a welded stainless steel capsule.

Nominal activity*		Capsule	Typical photon output in photons/s per steradian 59.5keV	Product code
MBq	mCi			
74	2	X.100	1.0×10^6 **	AMC21
518	14	X.101/2	7.0×10^6	AMC24
1665	45	X.102	$16.2\text{-}21.9 \times 10^6$	AMC25
7400	200	X.108	5.5×10^7	AMC26

* Tolerance $\pm 10\%$

** Tolerance $+25\%$, -10%

Recommended working life: 15 years

Quality control

Wipe Test I

Immersion Test II

Bubble Test III

59.5keV γ -ray emission is measured in narrow beam geometry using a thin NaI detector.

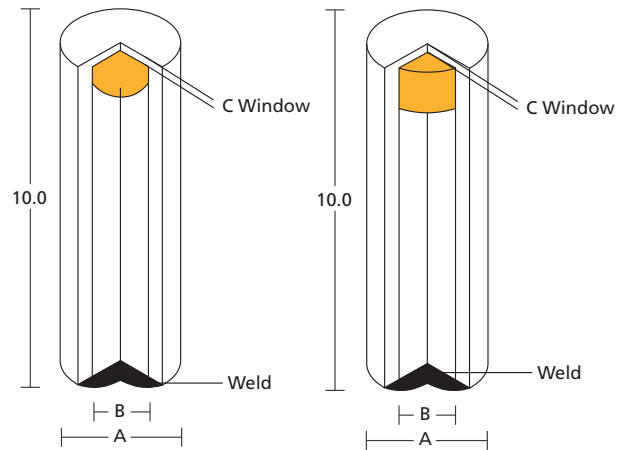
Spectral purity is checked using Si (Li), Ge and NaI detectors.

Neutron emission

All Americium-241 sources emit 0.3n/s per MBq ($\sim 10^4$ n/s per Ci) due to (α ,n) reactions with the low atomic number elements (for example, Si, Al, O) in the active material.

X.100-102

X.108



Capsule dimensions and safety performance testing

Capsule	Overall diam.	Active diam.	Window thickness	Safety performance testing		US-Model ref.
	'A'/mm	'B'/mm	'C'/mm	ANSI/ISO class	IAEA special form	
X.100	2.0	1.0	0.2-0.25	C64444	YES	AMC.Pn
X.101/2	3.0	2.0	0.2-0.25	C64444	YES	AMC.Pn
X.102	4.0	3.0	0.2-0.25	C64444	YES	AMC.Pn
X.108	7.0	5.0	0.2-0.3	C64444	YES	AMC.Pn

Americium-241

γ and Primary X-ray Sources

Line Sources

Americium-241 incorporated in ceramic beads, sealed in a welded stainless steel capsule.

Nominal activity*		Capsule	Typical photon output in photons/s per steradian 59.5keV	Product code
GBq	mCi			
3.7	100	X.1213	37-44 x 10 ⁶	AMCK5490
4.8	130	X1213	42-58 x 10 ⁶	AMCK6693
3.7	100	X103	45-55 X 10 ⁶	AMC36
18.5	500	XN49/1	22.5-30 X 10 ⁷	AMCK445

* Tolerance \pm 10%

Recommended working life: 10 years

Quality control

Wipe Test I

Immersion Test II

Bubble Test III

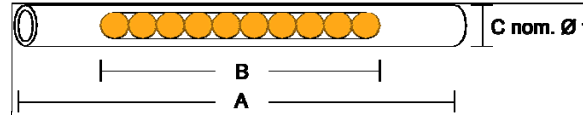
59.5keV γ -ray emission is measured in narrow beam geometry using a thin NaI detector.

Spectral purity is checked using Si (Li), Ge and NaI detectors.

Neutron emission

All Americium-241 sources emit 0.3n/s per MBQ ($\sim 10^4$ n/s per Ci) due to (α ,n) reactions with the low atomic number elements (for example, Si, Al, O) in the active material.

X.1213/XN49/1/X103



Safety performance testing

Capsule	Overall Length "A" mm	Active Length "B" mm	Source Diameter "C" mm	Safety Perf. Testing		US Model Ref.
				ANSI/ISO Class	IAEA spec. form	
X.1213	30	20	3.4 Nom.	C64344	YES	AMC.L1
X103	30	20	2.85 Nom.	C64444	YES	AMC.36
XN49/1	90	80	2.80 Nom.	C64334	NO	No

Americium-241/Beryllium

Neutron Sources Source Emission Data

Neutron emission:	$\sim 6 \times 10^7$ n/s per TBq ($\sim 2.2 \times 10^6$ n/s per Ci)
Air kerma rate:	\sim Air kerma rate at 1m of 0.6 μ Gy/h per GBq (~ 2.5 mR/h at 1m per Ci)
Neutron dose rate:	0.6 μ Sv/h at 1m per GBq (2.2 mrem/h at 1m per Ci)

Note

Neutron emission depends on the ratio of Beryllium to Americium Oxide. The optimum ratio can be determined upon customer request.

(α -n) beryllium neutrons sources also emit a significant number of low energy neutrons.
($\sim 23\%$ below 1MeV with mean energy 400keV)

Cylinder sources

Compacted mixture of Americium oxide with beryllium metal, doubly encapsulated in welded stainless steel.

Nominal activity		Emission *	Capsule	Product code
MBq	mCi			
37	1	2.2×10^3	X.2	AMN11
111	3	6.6×10^3	X.2	AMN13
370	10	2.2×10^4	X.2	AMN15
1110	30	6.6×10^4	X.2	AMN16
1110	30	6.6×10^4	X.21	AMN168
3700	100	2.2×10^5	X.2	AMN17
11100	300	6.6×10^5	X.2	AMN18

* Tolerance $\pm 10\%$

Recommended working life: 15 years

Quality control

Wipe Test I, Immersion Test II, Bubble Test III

Neutron emission measured against standards using BF₃/wax moderator system.

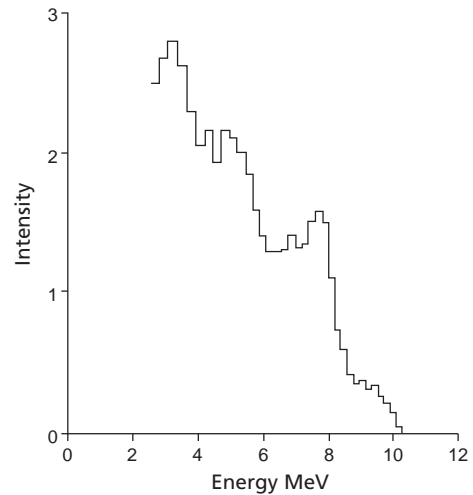
The test report includes a statement of the neutron emission.

Calibration for Am-241/Be neutron sources

Special calibrations of neutron emissions can be made on these sources and certificates issued by the National Physics Laboratory in Teddington, England.

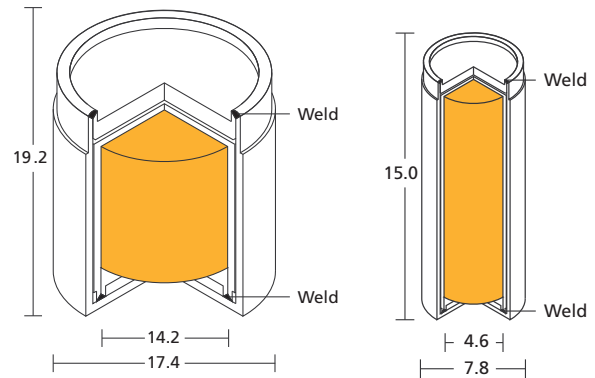
Neutron spectrum

Spectrum reproduced by courtesy of LORCH, E.A.
Int J. Appl. Radiat. Isotopes, 24, 590, 1973



X.2

X.21



Safety performance testing

Capsule	ANSI/ISO classification	IAEA special form	US-Model number
X.2	E66646	YES	AMN.PE1
X.21	C65545	YES	AMN.PE5

Americium-241/Beryllium

Neutron Sources Source Emission Data

Neutron emission:	$\sim 6 \times 10^7 \text{ n/s per TBq}$ ($\sim 2.2 \times 10^6 \text{ n/s per Ci}$)
Air kerma rate:	\sim Air kerma rate at 1m of $0.6 \mu\text{Gy/h per GBq}$ ($\sim 2.5 \text{ mR/h at 1m per Ci}$)
Neutron dose rate:	$0.6 \mu\text{Sv/h at 1m per GBq}$ ($2.2 \text{ mrem/h at 1m per Ci}$)

Note

Neutron emission depends on the ratio Beryllium to Americium Oxide. The optimum ratio can be determined upon customer request.

(α -n) beryllium neutrons sources also emit a significant number of low energy neutrons.
($\sim 23\%$ below 1MeV with mean energy 400keV)

Cylinder sources

Compacted mixture of Americium oxide with beryllium metal, doubly encapsulated in welded stainless steel.

Nominal activity		Emission *	Capsule	Product code
GBq	Ci			
18.5	0.5	1.1×10^6	X.3	AMN19
37	1	2.2×10^6	X.3	AMN22
111	3	6.6×10^6	X.4	AMN23
185	5	11×10^6	X.14	AMN24
370	10	20×10^6	X.14	AMN25

* Tolerance $\pm 10\%$

Recommended working life: 15 years

Quality control

Wipe Test I
Immersion Test II
Bubble Test III

Neutron emission measured against standards using BF_3 /wax moderator system.

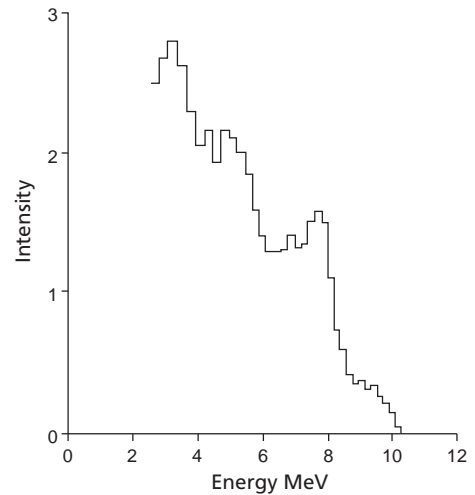
The test report includes a statement of the neutron emission.

Calibration for Am-241/Be neutron sources

Special calibrations of neutron emissions can be made on these sources and certificates issued by the National Physics Laboratory in Teddington, England.

Neutron spectrum

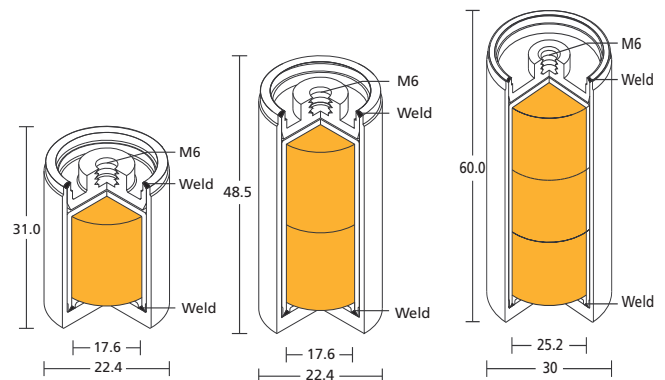
Spectrum reproduced by courtesy of LORCH, E.A.
Int. J. Appl. Radiat. Isotopes, 24, 590, 1973



X.3

X.4

X.14



Safety performance testing

Capsule	ANSI/ISO classification	IAEA special form	US-Model number
X.3	E66545	YES	AMN.PE2
X.4	E66545	YES	AMN.PE3
X.14	E66545	YES	AMN.PE4