

Radiation Sources

Product Catalog



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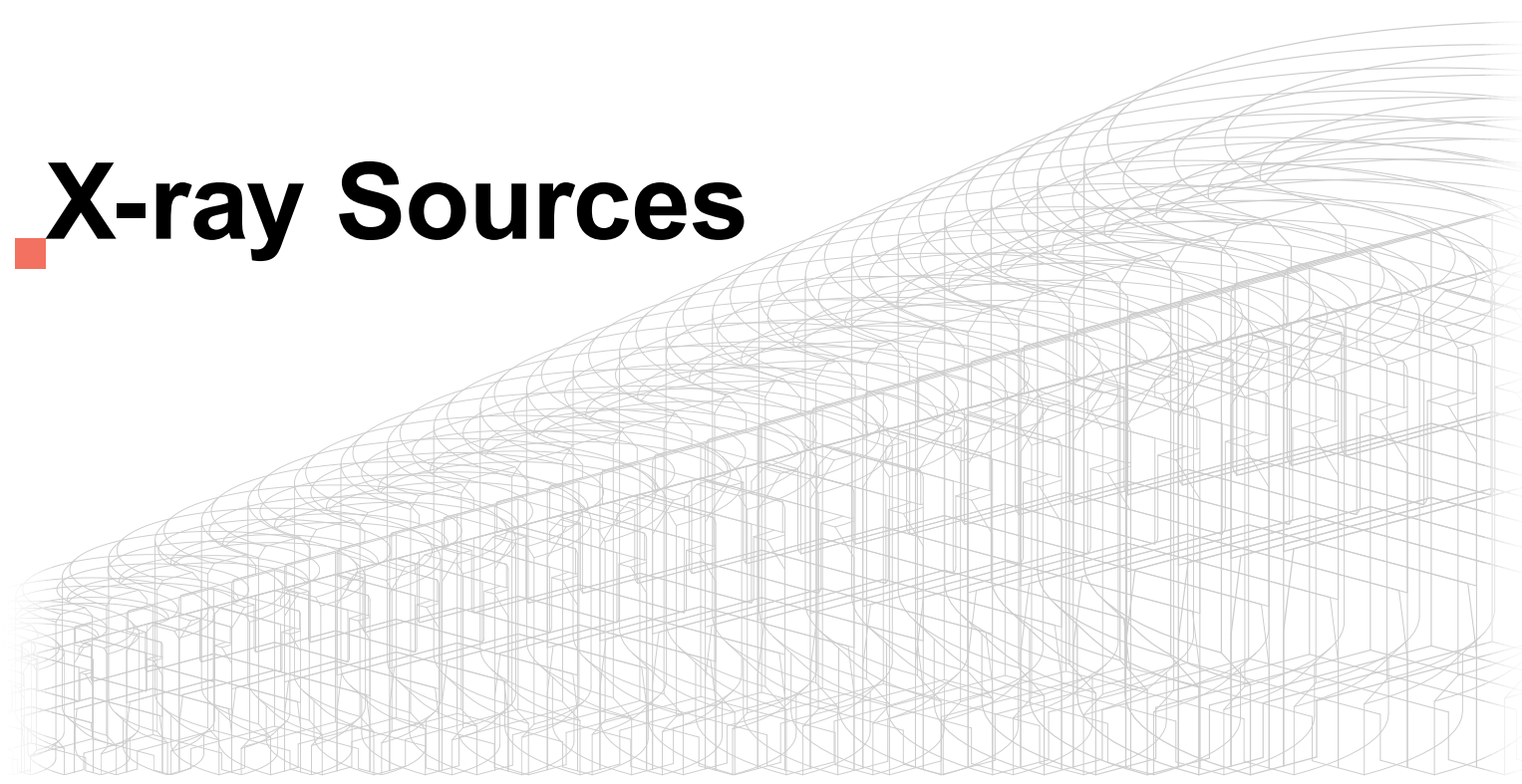
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X-ray Sources

An abstract wireframe graphic of a dome-like structure, composed of numerous overlapping lines and curves, creating a complex, geometric pattern that resembles a modern architectural design or a scientific instrument component.

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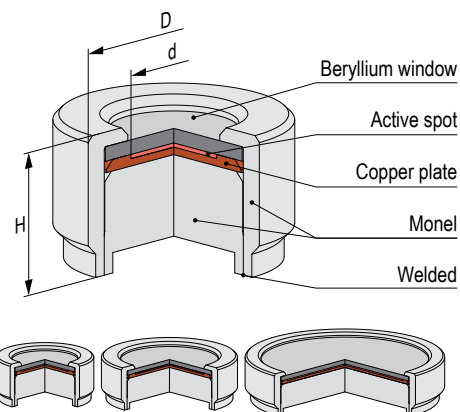
Email: info@ritverc.com
Url: www.ritverc.com

^{55}Fe X-ray Sources

^{55}Fe is electrochemically deposited on copper plate and sealed in a welded monel metal capsule with brazed beryllium window. Recommended working life: 15 years.

Certificates

IAEA Special Form Certificate No D/0097/S-96 (Rev.1) (for XFe5.21, XFe5.22, XFe5.23)



21 22 23 24

D × H, mm	d, mm	Nominal activity *		Typical photon output for Mn KX **, (ph/s)·10 ⁻⁴ sr	ISO classification	Code
		mCi	MBq			
8 × 5	4	5	185	0.3 × 10 ³	C64343	XFe5.21
		10	370	0.6 × 10 ³		
		20	740	1.2 × 10 ³		
		30	1110	1.8 × 10 ³		
		40	1480	2.4 × 10 ³		
		60	2220	3.6 × 10 ³		
10.8 × 5	7.2	5	185	0.3 × 10 ³	C64343	XFe5.22
		20	740	1.2 × 10 ³		
		40	1480	2.4 × 10 ³		
		80	2960	4.8 × 10 ³		
		100	3700	6.0 × 10 ³		
		150	5550	9.0 × 10 ³		
15 × 5	10.6	5	185	0.3 × 10 ³	C64343	XFe5.23
		40	1480	2.4 × 10 ³		
		100	3700	6.0 × 10 ³		
		150	5550	9.0 × 10 ³		
		200	7400	12.0 × 10 ³		
		250	9250	15.0 × 10 ³		
22 × 5	18	10	370	0.6 × 10 ³	C64343	XFe5.24
		80	2960	4.8 × 10 ³		
		100	3700	6.0 × 10 ³		
		200	7400	12.0 × 10 ³		
		300	11100	18.0 × 10 ³		
		500	18500	30.0 × 10 ³		

* — tolerance -10 ÷ +20 %

** — extended measurement uncertainty ±10 % for k = 2

Other activities and dimensions are available on request

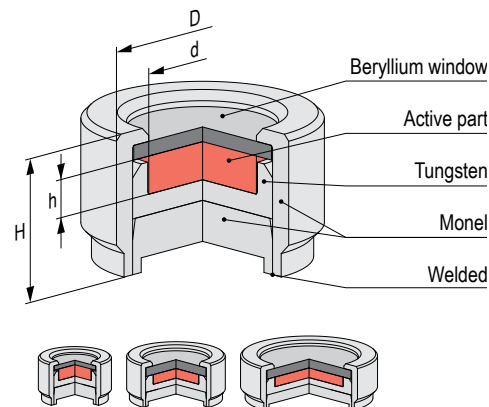
^{109}Cd X-ray Sources

^{109}Cd is incorporated in a light ceramic matrix and sealed in a welded monel metal capsule with brazed beryllium window.

Recommended working life: 15 years.

Certificates

IAEA Special Form Certificate No D/0097/S-96 (Rev.1) (for XCd.06)



06 07 08

D × H, mm	d × h, mm	Nominal activity *		Typical photon output for Ag KX **, (ph/s)·10 ⁻⁴ sr	ISO clas- sification	Code
		mCi	MBq			
8 × 5	5 × 1.2	5	185	1.5 × 10 ³	C65344	XCd9.06
		10	370	3.0 × 10 ³		
		15	555	4.5 × 10 ³		
		20	740	6.0 × 10 ³		
		40	1480	10.0 × 10 ³		
10.8 × 5	7 × 1	5	185	1.5 × 10 ³	C65343	XCd9.07
		10	370	3.0 × 10 ³		
		15	555	4.5 × 10 ³		
		20	740	6.0 × 10 ³		
		40	1480	10.0 × 10 ³		
		60	2220	12.5 × 10 ³		
15 × 5	10.5 × 1	5	185	1.5 × 10 ³	C65343	XCd9.08
		10	370	3.0 × 10 ³		
		15	555	4.5 × 10 ³		
		20	740	6.0 × 10 ³		
		40	1480	10.0 × 10 ³		
		60	2220	12.5 × 10 ³		
		80	2960	14.0 × 10 ³		
		100	3700	15.0 × 10 ³		

* — tolerance -10 ÷ +20 %

** — extended measurement uncertainty ±10 % for k = 2

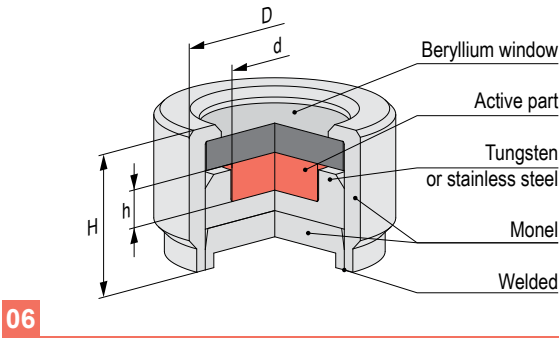
Other activities and dimensions are available on request

¹³³Ba X-ray Sources

¹³³Ba is incorporated in a light ceramic matrix and sealed in a welded monel metal capsule with brazed beryllium window. Spacer material is tungsten (for XBa3 sources) or stainless steel (for GBa3 sources). Recommended working life: 15 years.

Certificates

IAEA Special Form Certificate No D/0097/S-96 (Rev.1)



D × H, mm	d × h, mm	Nominal activity *		Typical photon output for Cs KX **, (ph/s)·10 ⁻⁴ sr	ISO clas-sification	Code
		mCi	MBq			
8 × 5	4 × 1.2	1	37	0.3 × 10 ³	C65344	XBa3.06 GBa3.06 (061.4)
		3	111	0.9 × 10 ³		
		5	185	1.5 × 10 ³		
		10	370	3.0 × 10 ³		
		20	740	5.5 × 10 ³		
		30	1110	8.0 × 10 ³		

* — tolerance -10 ÷ +20 %
 ** — extended measurement uncertainty ±10 % for k = 2
 Other activities and dimensions are available on request

⁵⁵Fe, ¹⁰⁹Cd Ring X-ray Sources

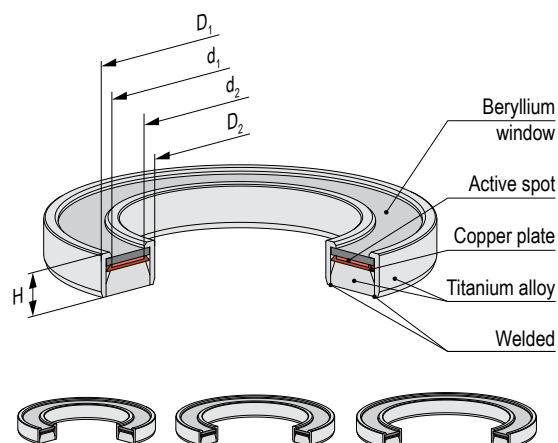
⁵⁵Fe Sources

⁵⁵Fe is electrochemically deposited on ring copper plate and sealed in a welded titanium capsule with brazed beryllium window. Recommended working life: 5 years.

$D_1 \times D_2 \times H$, mm	$d_1 \times d_2$, mm	Nominal activity *		Code
		mCi	MBq	
26 × 16 × 3	24 × 18	20–200	740–7400	XFe5.231
30 × 20 × 3	28 × 22	20–200	740–7400	XFe5.232
34 × 24 × 3	32 × 26	20–200	740–7400	XFe5.233

* — tolerance -10 ÷ +20 %

Other activities are available on request



231 232 233

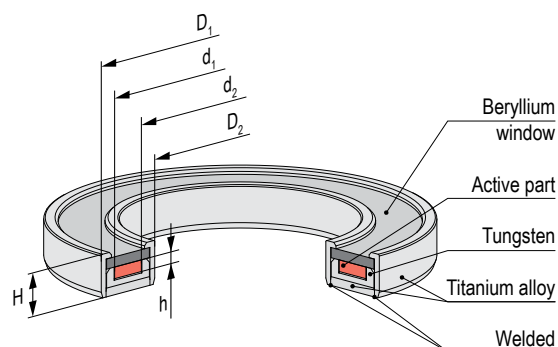
¹⁰⁹Cd Sources

¹⁰⁹Cd is incorporated in a ring light ceramic matrix and sealed in a welded titanium capsule with brazed beryllium window. Recommended working life: 5 years.

$D_1 \times D_2 \times H$, mm	$d_1 \times d_2 \times h$, mm	Nominal activity *		Code
		mCi	MBq	
26 × 16 × 3	23.5 × 18.5 × 1	10–30	370–1110	XCd9.231
30 × 20 × 3	27.5 × 22.5 × 1	10–50	370–1850	XCd9.232
34 × 24 × 3	31.5 × 26.5 × 1	10–70	370–2590	XCd9.233

* — tolerance -10 ÷ +20 %

Other activities are available on request



231 232 233

Gamma Sources

An abstract wireframe graphic of a dome-like structure, composed of numerous overlapping lines and curves, creating a complex, geometric pattern that resembles a modern architectural design or a scientific instrument component.

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^{22}Na Gamma Sources

^{22}Na is incorporated in a light ceramic matrix and sealed in a welded stainless steel capsule. GNa2.27 source is also available in titanium capsule.

Recommended working life: 15 years. Recommended working life of the control source in case of using in control devices is 5 years.

Certificates

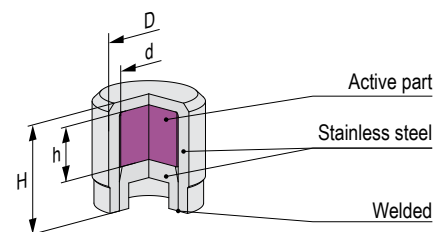
IAEA Special Form Certificate No D/0098/S-96 (Rev.0) (for GNa2.12, GNa2.13, GNa2.14, GNa2.15, GNa2.27)

D × H, mm	d × h, mm	Nominal activity *		ISO classification	Code
		mCi	MBq		
3 × 3	2.1 × 1.5	0.0027–0.27	0.1–10	C64344	GNa2.11
3 × 10	2.1 × 1.5	0.0027–0.27	0.1–10	C64444	GNa2.12
4 × 10	3.1 × 1.5	0.0027–0.27	0.1–10	C64444	GNa2.13
7 × 10	5.2 × 2.5	0.0027–0.27	0.1–10	C64444	GNa2.14
8 × 5	4 × 1.2	0.0027–0.27	0.1–10	C64444	GNa2.15
10 × 5	8.5 × 1	0.0027–0.27	0.1–10	C64444	GNa2.16
12 × 3	8.5 × 1	0.0027–0.27	0.1–10	C64444	GNa2.17
30 × 4.5	8.5 × 1	0.0027–0.27	0.1–10	C64444	GNa2.18
10 × 4	4 × 1.2	0.0027–0.27	0.1–10	C64444	GNa2.19
3 × 5	2.1 × 1.5	0.0027–0.27	0.1–10	C66444	GNa2.27

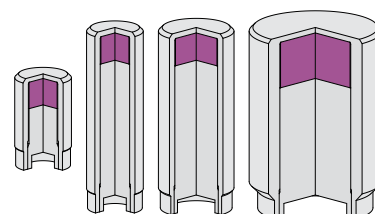
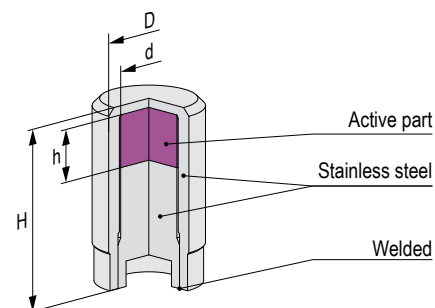
* — tolerance -10 ÷ +20 %

Other activities are available on request

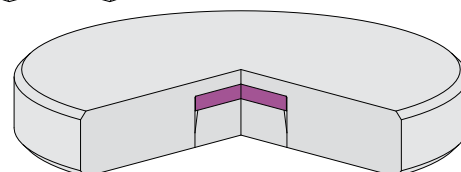
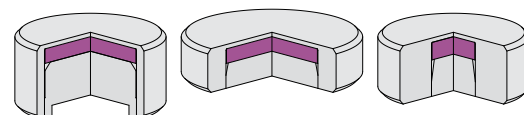
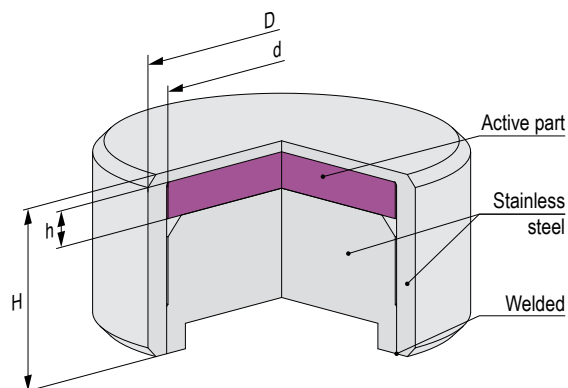
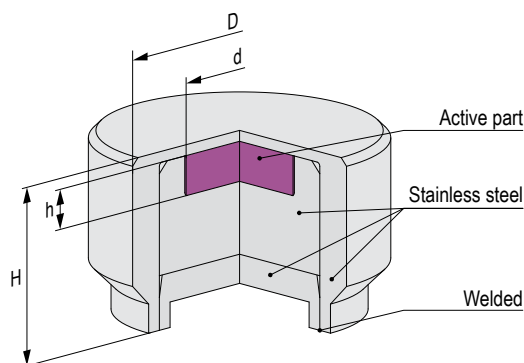
Sources can be supplied complete with holders. For details see [page 20](#)



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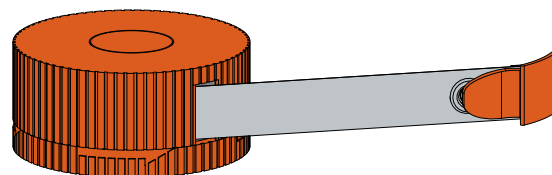
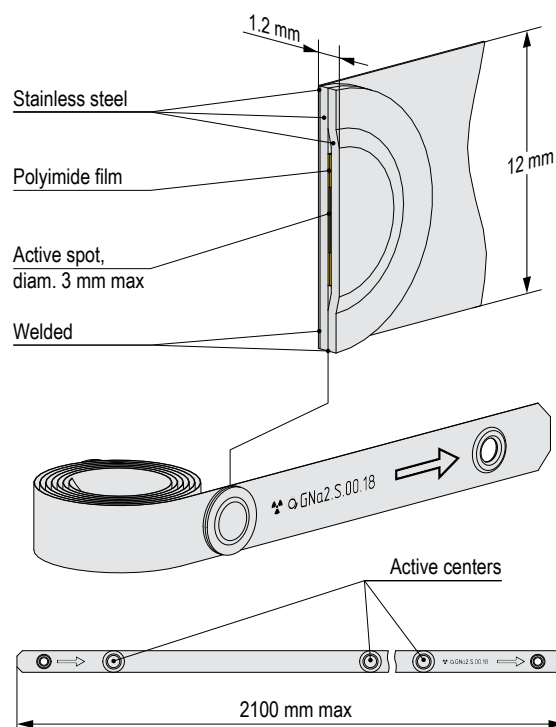
^{22}Na Linear Sources

The active parts of the source GNa2.S are located on a stainless steel strap. Sealing is performed by laser welding.

- The length is not more than 2100 mm (the tape can consist of several pieces).
- The width is 12 mm.
- Activity is not more than 10 MBq in total.
- The number of active points is not more than 10 pcs.

Recommended working life: 8 years.

ISO classification: C64343.



^{57}Co Gamma Sources

^{57}Co is incorporated in a light ceramic matrix and sealed in a welded stainless steel capsule. GCo7.27 source is also available in titanium capsule.

Recommended working life: 15 years.

Certificates

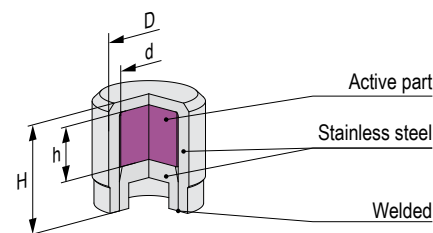
IAEA Special Form Certificate No D/0098/S-96 (Rev.0) (for GCo7.12, GCo7.13, GCo7.14, GCo7.15, GCo7.27)

D × H, mm	d × h, mm	Nominal activity *		ISO classification	Code
		mCi	MBq		
3 × 3	2.1 × 1.5	1–300	37–11100	C64344	GCo7.11
3 × 10	2.1 × 1.5	1–300	37–11100	C64444	GCo7.12
4 × 10	3.1 × 1.5	1–300	37–11100	C64444	GCo7.13
7 × 10	5.2 × 2.5	1–300	37–11100	C64444	GCo7.14
8 × 5	4 × 1.2	1–300	37–11100	C64444	GCo7.15
10 × 5	8.5 × 1	1–300	37–11100	C64444	GCo7.16
12 × 3	8.5 × 1	1–300	37–11100	C64444	GCo7.17
30 × 4.5	8.5 × 1	1–300	37–11100	C64444	GCo7.18
10 × 4	4 × 1.2	1–300	37–11100	C64444	GCo7.19
3 × 5	2.1 × 1.5	1–300	37–11100	C66444	GCo7.27

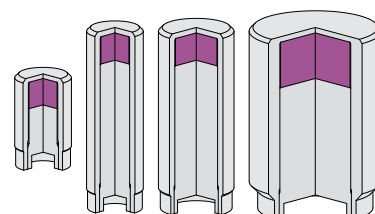
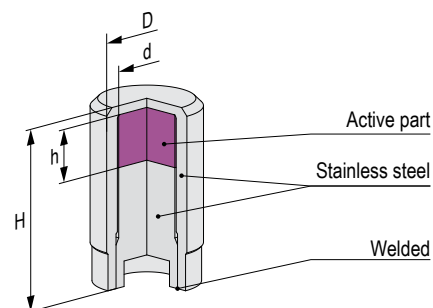
* — tolerance -10 ÷ +20 %

Other activities are available on request

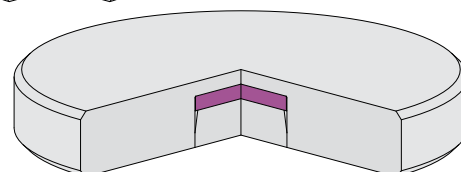
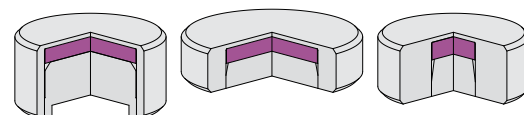
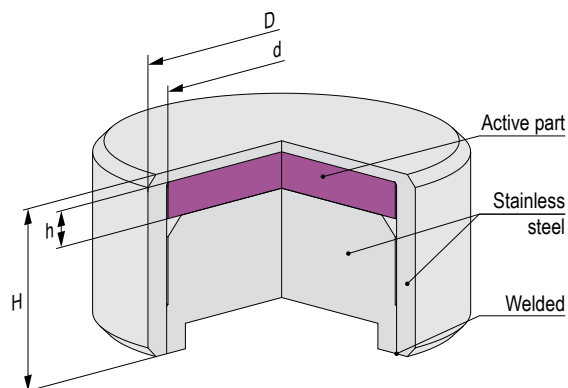
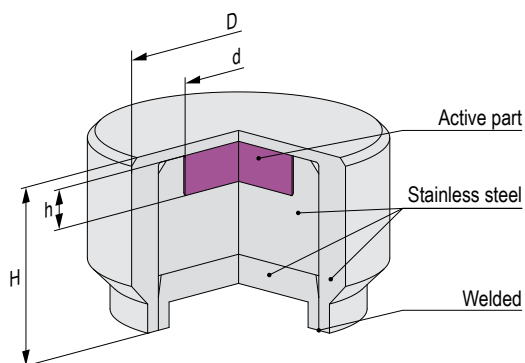
Sources can be supplied complete with holders. For details see [page 20](#)



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^{60}Co Gamma Sources

^{60}Co is incorporated in a light ceramic matrix and sealed in a welded stainless steel capsule. GCo0.27 source is also available in titanium capsule.

Recommended working life: 15 years.

Certificates

IAEA Special Form Certificate No D/0098/S-96 (Rev.0) (for GCo0.12, GCo0.13, GCo0.14, GCo0.15, GCo0.27)

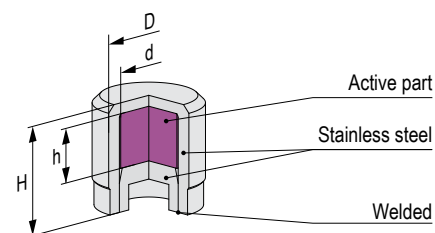
D × H, mm	d × h, mm	Nominal activity *		ISO classification	Code
		mCi	MBq		
3 × 3	2.1 × 1.5	0.0027–0.135	0.1–5	C64344	GCo0.11
3 × 10	2.1 × 1.5	0.0027–0.135	0.1–5	C64444	GCo0.12
4 × 10	3.1 × 1.5	0.0027–0.135	0.1–5	C64444	GCo0.13
7 × 10	5.2 × 2.5	0.0027–0.135	0.1–5	C64444	GCo0.14
8 × 5	4 × 1.2	0.0027–0.135	0.1–5	C64444	GCo0.15
10 × 5	8.5 × 1	0.0027–0.135	0.1–5	C64444	GCo0.16
12 × 3	8.5 × 1	0.0027–0.135	0.1–5	C64444	GCo0.17
30 × 4.5	8.5 × 1	0.0005–0.135	0.0185–5	C64444	GCo0.18
10 × 4	4 × 1.2	0.0027–0.135	0.1–5	C64444	GCo0.19
6 × 7	3 × 3.3	0.0027–0.135	0.1–5	C65546	GCo0.25**
3 × 5	2.1 × 1.5	0.0027–0.135	0.1–5	C66444	GCo0.27

* — tolerance -10 ÷ +20 %

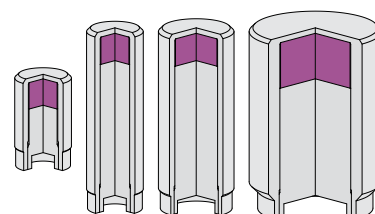
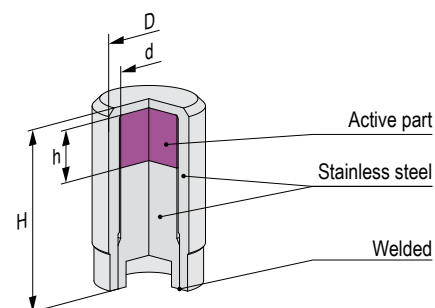
** — for details see [page 19](#)

Other activities are available on request

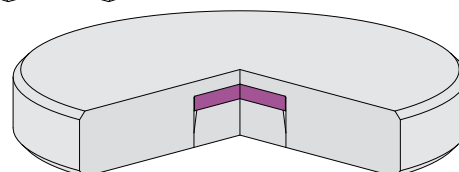
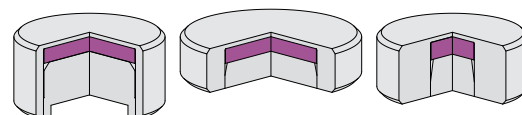
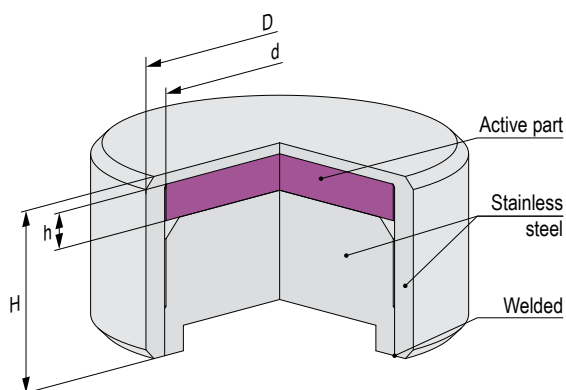
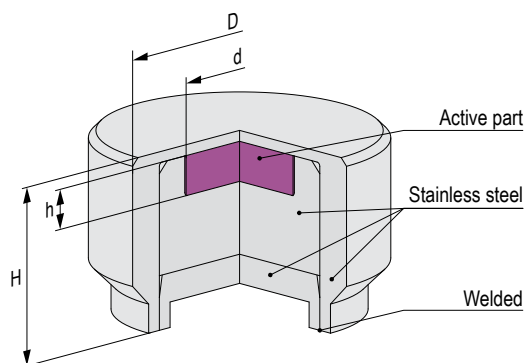
Sources can be supplied complete with holders. For details see [page 20](#)



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⁶⁵Zn Gamma Sources

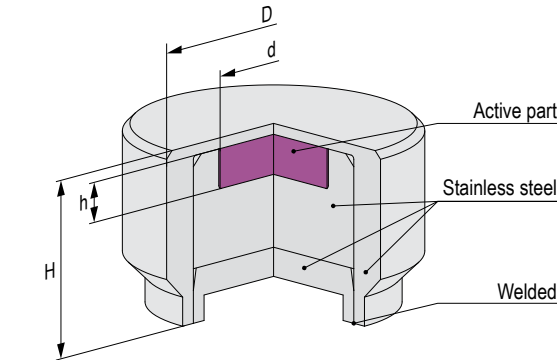
⁶⁵Zn is incorporated in a light ceramic matrix and sealed in a welded stainless steel capsule. GZn5.27 source is also available in titanium capsule.
Recommended working life: 15 years.

Certificates

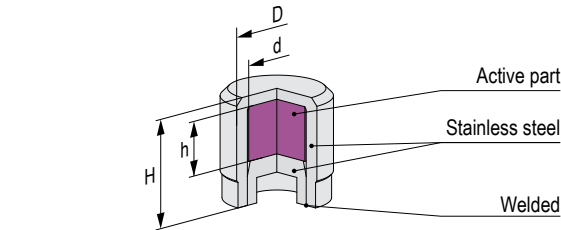
IAEA Special Form Certificate No D/0098/S-96 (Rev.0) (for GZn5.12, GZn5.13, GZn5.14, GZn5.15, GZn5.27)

D × H, mm	d × h, mm	Nominal activity *		ISO clas-sification	Code
		mCi	MBq		
3 × 3	2.1 × 1.5	0.0027–0.135	0.1–5	C64344	GZn5.11
3 × 10	2.1 × 1.5	0.0027–0.135	0.1–5	C64444	GZn5.12
4 × 10	3.1 × 1.5	0.0027–0.135	0.1–5	C64444	GZn5.13
7 × 10	5.2 × 2.5	0.0027–0.135	0.1–5	C64444	GZn5.14
8 × 5	4 × 1.2	0.0027–0.135	0.1–5	C64444	GZn5.15
10 × 5	8.5 × 1	0.0027–0.135	0.1–5	C64444	GZn5.16
12 × 3	8.5 × 1	0.0027–0.135	0.1–5	C64444	GZn5.17
30 × 4.5	8.5 × 1	0.0027–0.135	0.1–5	C64444	GZn5.18
10 × 4	4 × 1.2	0.0027–0.135	0.1–5	C64444	GZn5.19
3 × 5	2.1 × 1.5	0.0027–0.135	0.1–5	C66444	GZn5.27

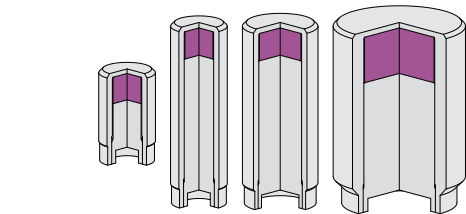
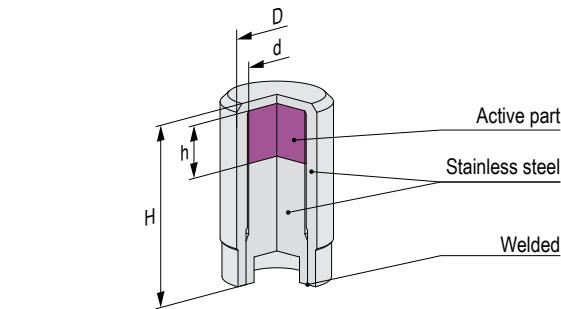
* — tolerance -10 ÷ +20 %
Other activities are available on request
Sources can be supplied complete with holders. For details see [page 20](#)



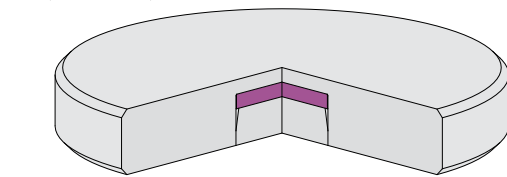
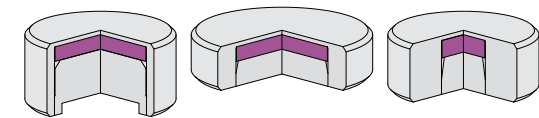
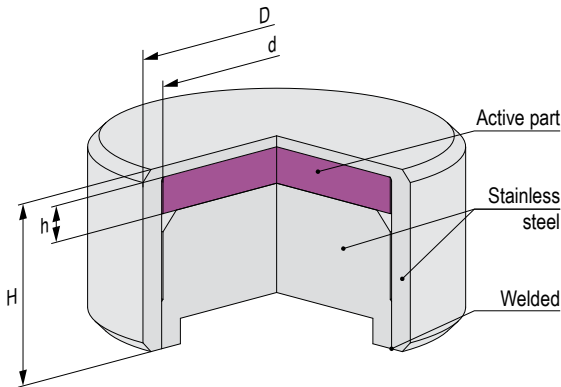
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^{88}Y Gamma Sources

^{88}Y is incorporated in a light ceramic matrix and sealed in a welded stainless steel capsule. GY8.27 source is also available in titanium capsule.

Recommended working life: 15 years.

Certificates

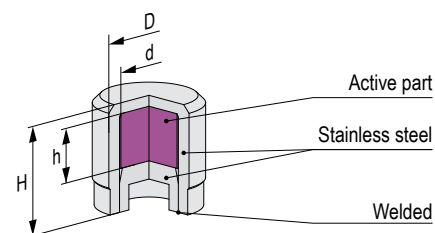
IAEA Special Form Certificate No D/0098/S-96 (Rev.0) (for GY8.12, GY8.13, GY8.14, GY8.15, GY8.27)

D × H, mm	d × h, mm	Nominal activity *		ISO classification	Code
		mCi	MBq		
3 × 3	2.1 × 1.5	0.0027–0.027	0.1–1	C64344	GY8.11
3 × 10	2.1 × 1.5	0.0027–0.027	0.1–1	C64444	GY8.12
4 × 10	3.1 × 1.5	0.0027–0.027	0.1–1	C64444	GY8.13
7 × 10	5.2 × 2.5	0.0027–0.027	0.1–1	C64444	GY8.14
8 × 5	4 × 1.2	0.0027–0.027	0.1–1	C64444	GY8.15
10 × 5	8.5 × 1	0.0027–0.027	0.1–1	C64444	GY8.16
12 × 3	8.5 × 1	0.0027–0.027	0.1–1	C64444	GY8.17
30 × 4.5	8.5 × 1	0.0027–0.027	0.1–1	C64444	GY8.18
10 × 4	4 × 1.2	0.0027–0.027	0.1–1	C64444	GY8.19
3 × 5	2.1 × 1.5	0.0027–0.027	0.1–1	C66444	GY8.27

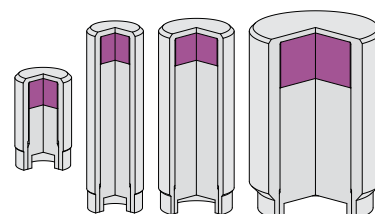
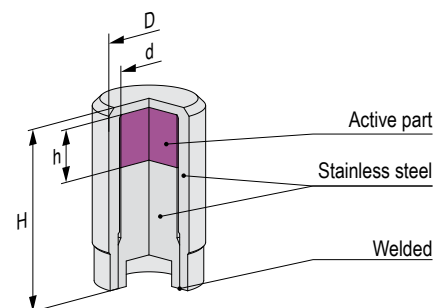
* — tolerance -10 ÷ +20 %

Other activities are available on request

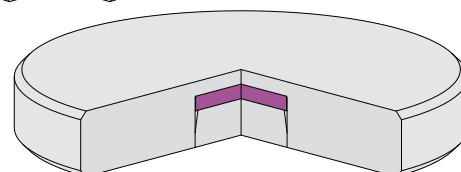
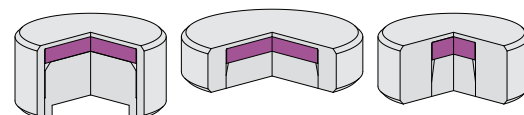
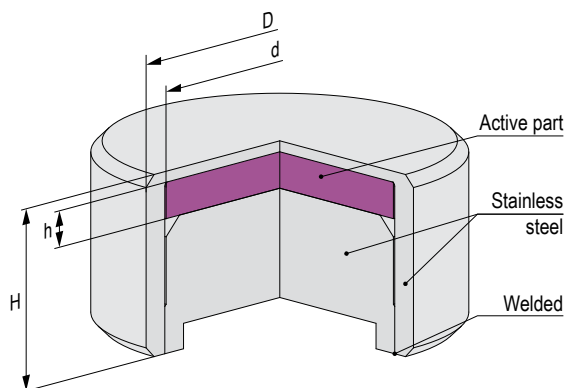
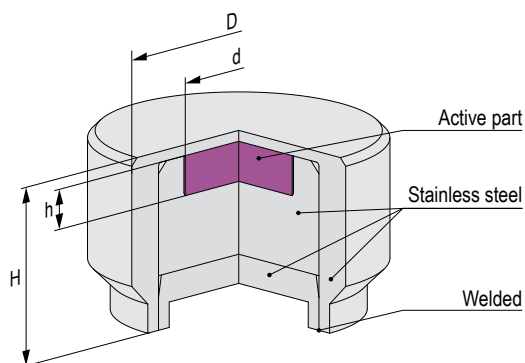
Sources can be supplied complete with holders. For details see [page 20](#)



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^{133}Ba Gamma Sources

^{133}Ba is incorporated in a light ceramic matrix and sealed in a welded stainless steel capsule. GBa3.27 source is also available in titanium capsule.

Recommended working life: 15 years.

Certificates

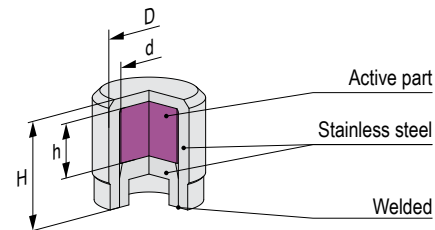
IAEA Special Form Certificate No D/0098/S-96 (Rev.0) (for GBa3.12, GBa3.13, GBa3.14, GBa3.15, GBa3.27)

D × H, mm	d × h, mm	Nominal activity *		ISO classification	Code
		mCi	MBq		
3 × 3	2.1 × 1.5	0.027–3	1–111	C64344	GBa3.11
3 × 10	2.1 × 1.5	0.027–3	1–111	C64444	GBa3.12
4 × 10	3.1 × 1.5	1–10	37–370	C64444	GBa3.13
7 × 10	5.2 × 2.5	1–10	37–370	C64444	GBa3.14
8 × 5	4 × 1.2	1–10	37–370	C64444	GBa3.15
10 × 5	8.5 × 1	1–10	37–370	C64444	GBa3.16
12 × 3	8.5 × 1	1–10	37–370	C64444	GBa3.17
30 × 4.5	8.5 × 1	1–10	37–370	C64444	GBa3.18
10 × 4	4 × 1.2	1–10	37–370	C64444	GBa3.19
3 × 5	2.1 × 1.5	0.027–3	1–111	C66444	GBa3.27

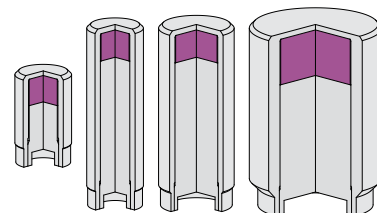
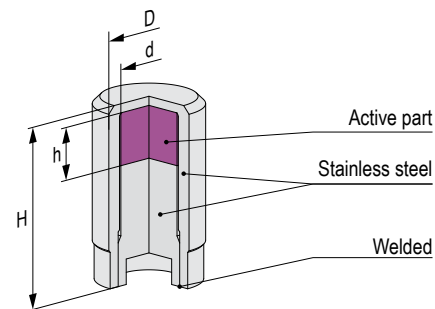
* — tolerance -10 ÷ +20 %

Other activities are available on request

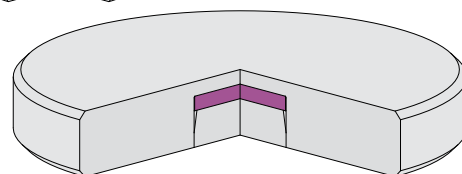
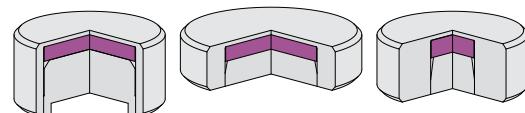
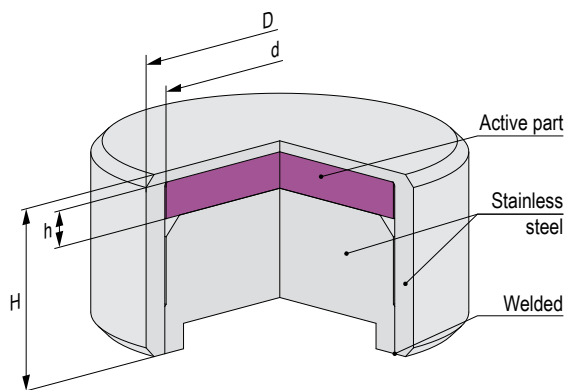
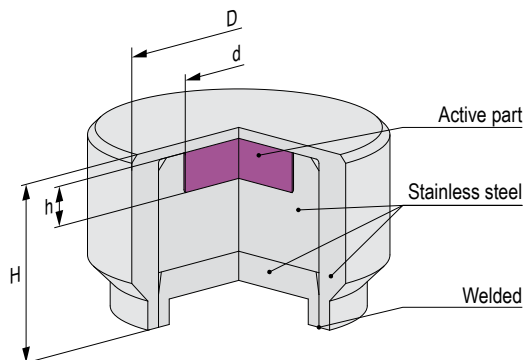
Sources can be supplied complete with holders. For details see [page 20](#)



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^{137}Cs Gamma Sources

^{137}Cs is incorporated in a light ceramic matrix and sealed in a welded stainless steel capsule. GCs7.27 source is also available in titanium capsule.

Recommended working life: 15 years.

Certificates

IAEA Special Form Certificate No D/0098/S-96 (Rev.0) (for GCs7.12, GCs7.13, GCs7.14, GCs7.15, GCs7.27)

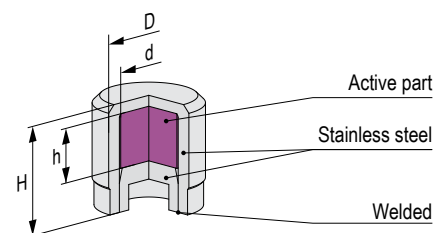
D × H, mm	d × h, mm	Nominal activity *		ISO classification	Code
		mCi	MBq		
3 × 3	2.1 × 1.5	0.0027–0.135	0.1–5	C64344	GCs7.11
3 × 10	2.1 × 1.5	0.0027–0.135	0.1–5	C64444	GCs7.12
4 × 10	3.1 × 1.5	0.0027–0.135	0.1–5	C64444	GCs7.13
7 × 10	5.2 × 2.5	0.0027–0.135	0.1–5	C64444	GCs7.14
8 × 5	4 × 1.2	0.0027–0.135	0.1–5	C64444	GCs7.15
10 × 5	8.5 × 1	0.0027–0.135	0.1–5	C64444	GCs7.16
12 × 3	8.5 × 1	0.0027–0.135	0.1–5	C64444	GCs7.17
30 × 4.5	8.5 × 1	0.0027–0.135	0.1–5	C64444	GCs7.18
10 × 4	4 × 1.2	0.0027–0.135	0.1–5	C64444	GCs7.19
6 × 10	4 × 6.1	0.0027–0.135	0.1–5	C65546	GCs7.26**
3 × 5	2.1 × 1.5	0.0027–0.135	0.1–5	C66444	GCs7.27
6 × 9.5	3 × 4	0.0058–0.23	0.215–8.5	C66546	GCs7.46**

* — tolerance -10 ÷ +20 %

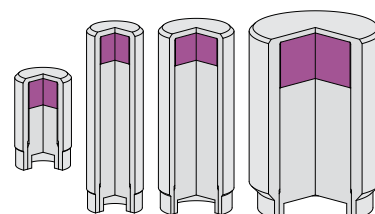
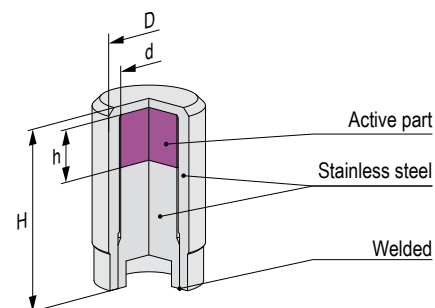
** — for details see [page 19](#)

Other activities are available on request

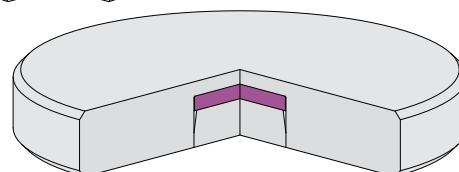
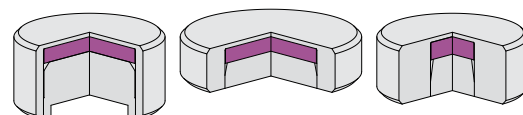
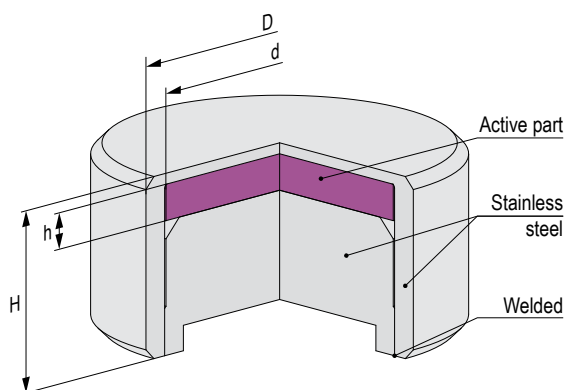
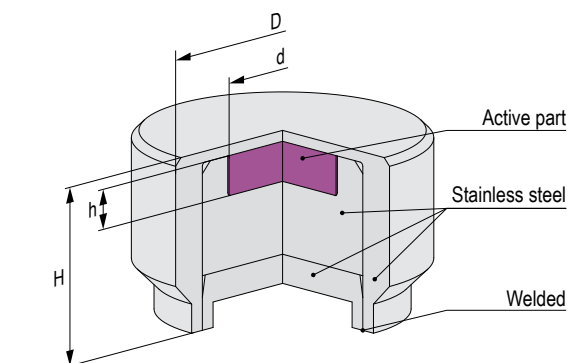
Sources can be supplied complete with holders. For details see [page 20](#)



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¹⁵²Eu Gamma Sources

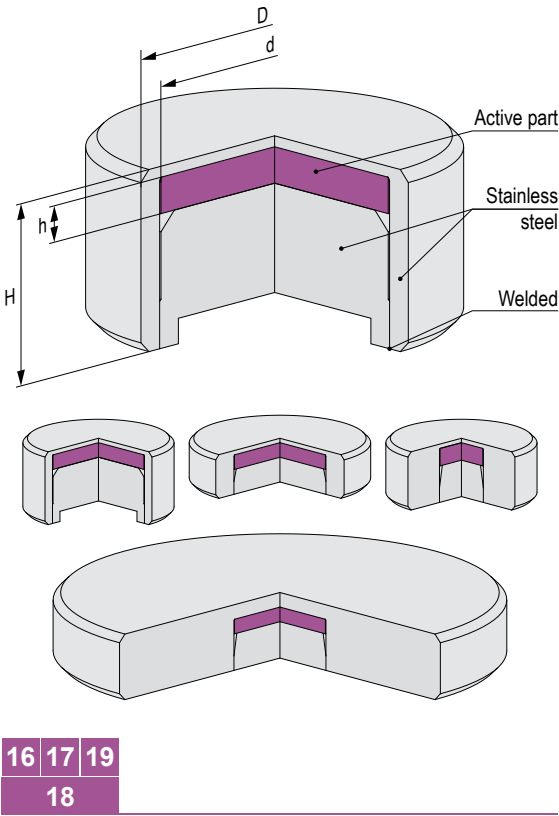
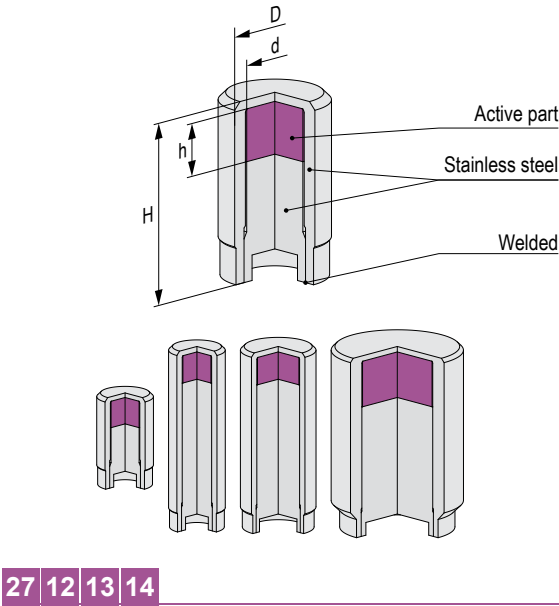
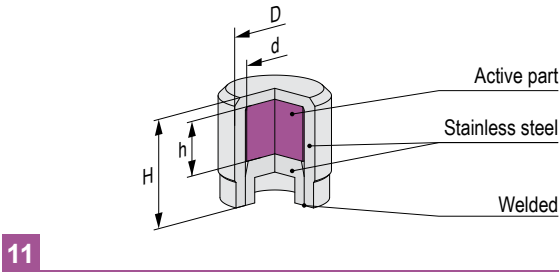
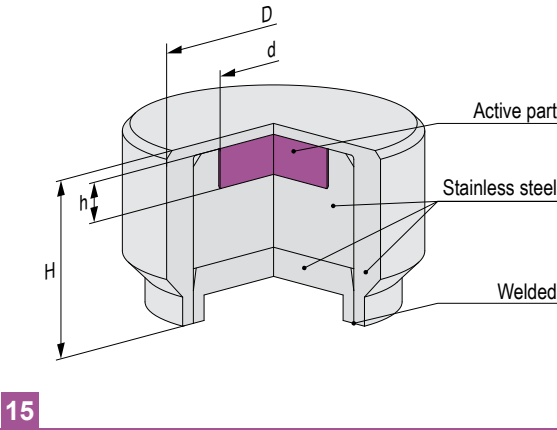
¹⁵²Eu is incorporated in a light ceramic matrix and sealed in a welded stainless steel capsule. GEu2.27 source is also available in titanium capsule.
Recommended working life: 15 years.

Certificates

IAEA Special Form Certificate No D/0098/S-96 (Rev.0) (for GEu2.12, GEu2.13, GEu2.14, GEu2.15, GEu2.27)

D × H, mm	d × h, mm	Nominal activity *		ISO clas-sification	Code
		mCi	MBq		
3 × 3	2.1 × 1.5	0.0027–0.135	0.1–5	C64344	GEu2.11
3 × 10	2.1 × 1.5	0.0027–0.135	0.1–5	C64444	GEu2.12
4 × 10	3.1 × 1.5	0.0027–0.135	0.1–5	C64444	GEu2.13
7 × 10	5.2 × 2.5	0.0027–0.135	0.1–5	C64444	GEu2.14
8 × 5	4 × 1.2	0.0027–0.135	0.1–5	C64444	GEu2.15
10 × 5	8.5 × 1	0.0027–0.135	0.1–5	C64444	GEu2.16
12 × 3	8.5 × 1	0.0027–0.135	0.1–5	C64444	GEu2.17
30 × 4.5	8.5 × 1	0.0027–0.135	0.1–5	C64444	GEu2.18
10 × 4	4 × 1.2	0.0027–0.135	0.1–5	C64444	GEu2.19
3 × 5	2.1 × 1.5	0.0027–0.135	0.1–5	C66444	GEu2.27

* — tolerance -10 ÷ +20 %
Other activities are available on request
Sources can be supplied complete with holders. For details see [page 20](#)



Heavy-duty Sources

Radionuclide is incorporated in a light ceramic matrix and sealed in a welded stainless steel capsule. GCs7.46 source is double-encapsulated.

Recommended working life:

15 years for GCs7.25, GCs7.46,

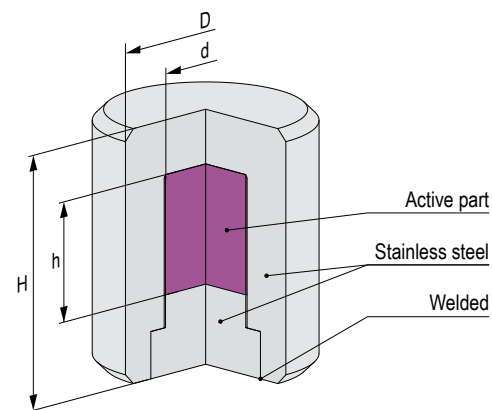
7 years for GCs7.26.

D × H, mm	d × h, mm	Radio- nuclid	Nominal activity *		ISO clas- sification	Code
			mCi	MBq		
6 × 7	3 × 3.3	⁶⁰ Co	0.0027–0.135	0.1–5	C65546	GCo0.25
6 × 10	4 × 6.1	¹³⁷ Cs	0.0027–0.135	0.1–5	C65546	GCs7.26
6 × 9.5	3 × 4	¹³⁷ Cs	0.0058–0.23	0.215–8.5	C66546	GCs7.46

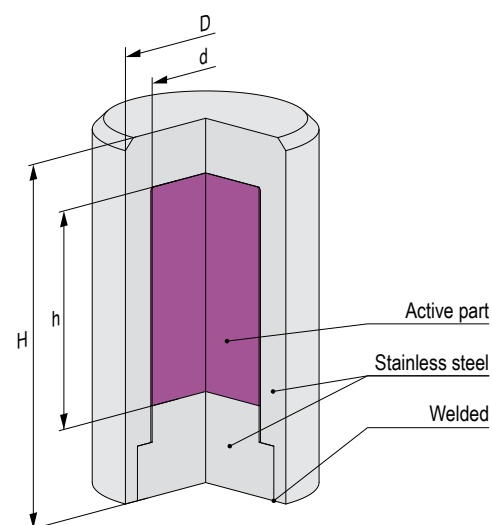
* — tolerance -10 ÷ +20 %

Other activities are available on request

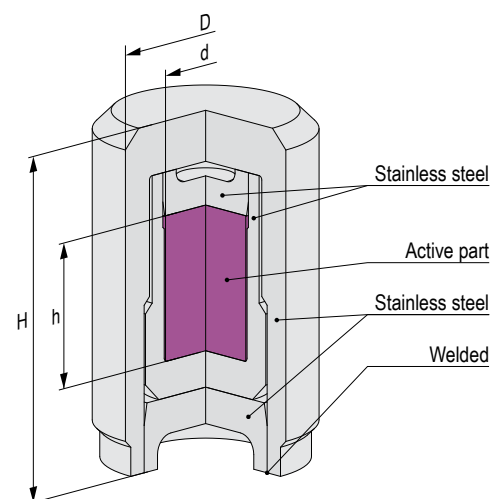
Sources can be supplied complete with holders. For details see [page 20](#)



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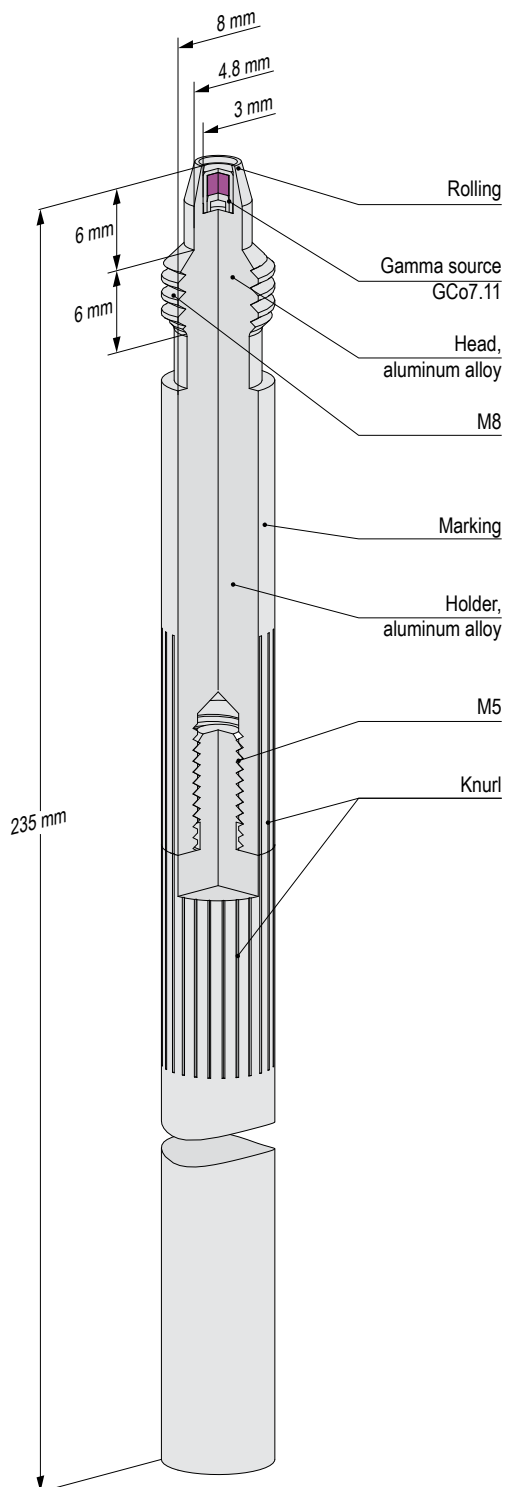


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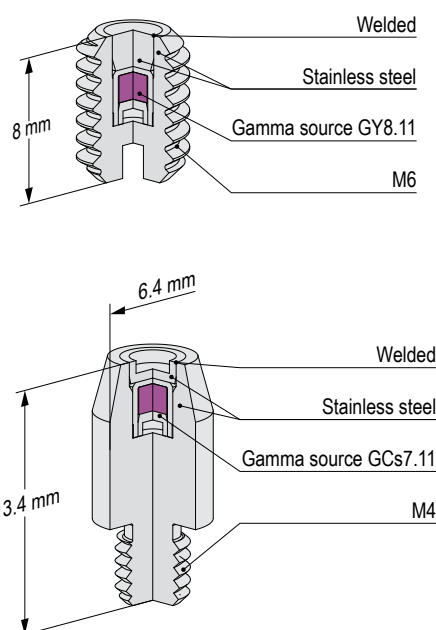
Source Holders

Sources can be supplied complete with holders, developed under the requirements of the Customer.

GCo7.11 source is fixed in a holder made of aluminum alloy by rolling. The holder is made collapsible for easy transport.



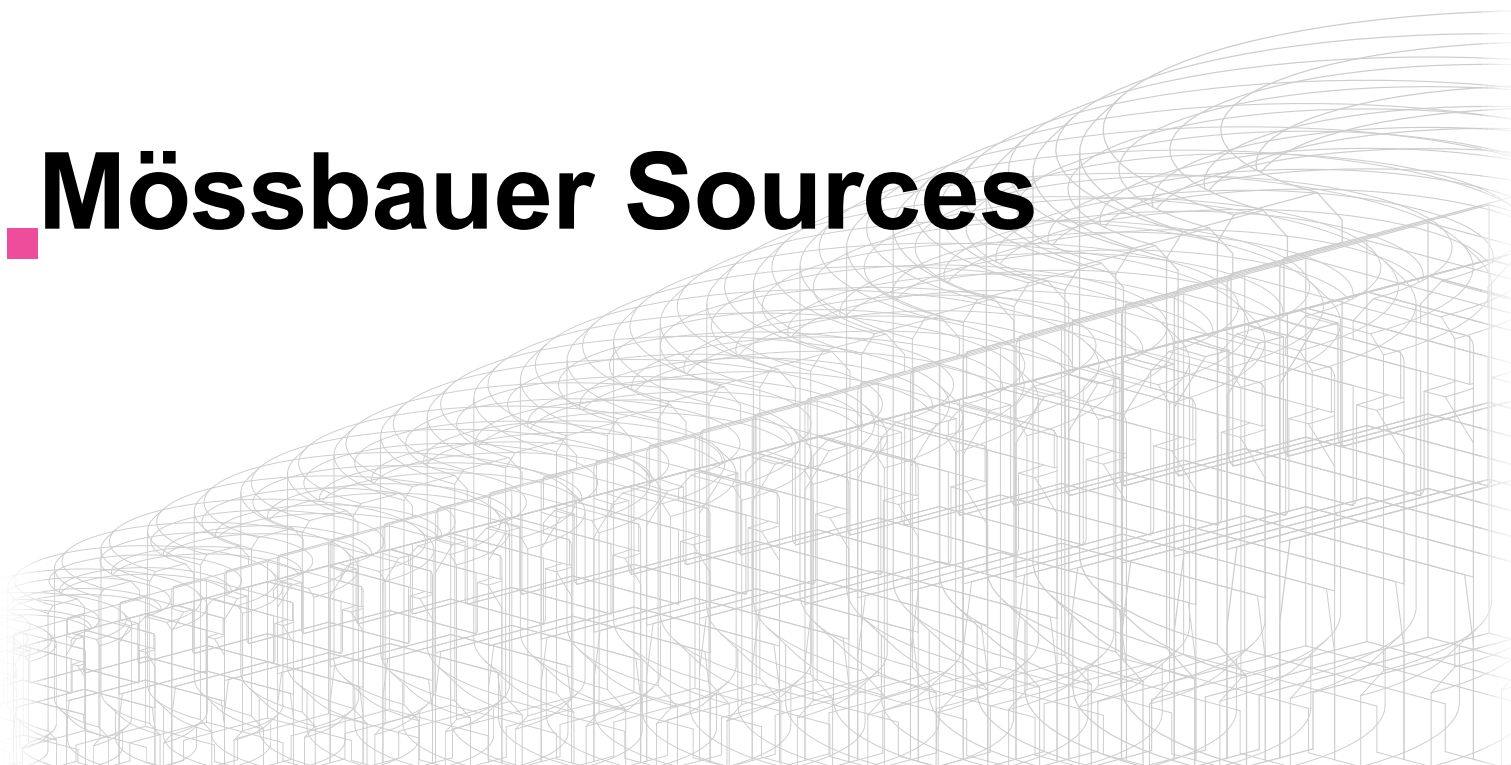
GCs7.11 and GY8.11 sources are fixed in welded holders made of stainless steel. Holders have a thread for mounting on equipment.



RITVERC JSC
Radiation Sources
Product Catalog
Rev. 3.1/12/2019
21/37

· X-ray Sources
· Gamma Sources
· Mössbauer Sources
· Beta Sources
· Reference Sources

Mössbauer Sources



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Url: www.ritverc.com

⁵⁷Co Mössbauer Sources

Mössbauer resonance on ⁵⁷Fe

Mössbauer source active part is prepared by electrodepositing high purity carrier-free ⁵⁷Co onto a thin metal backing (matrix) followed by controlled annealing process. Standard matrix is rhodium or chromium. Other matrices are available on request.

All sources are carefully tested on certified equipment. Each source is supported by a Test Report with measured values of Mössbauer spectra parameters.

Recommended working life: 10 years.

Cap- sule type	D × H, mm	d, mm	Nominal activity *		Line- width, mm/s	ISO classifi- cation	Tempe- rature range, K	Code
Rhodium matrix								
1	11.2 × 13	8	5	185	0.11–0.13	C54243	4.2–700	MCo7.111
			10	370				MCo7.112
			25	925				MCo7.113
			50	1850				MCo7.114
			100	3700				MCo7.115
2	14 × 14	8	5	185	0.11–0.13	C54243	4.2–700	MCo7.121
			10	370				MCo7.122
			25	925				MCo7.123
			50	1850				MCo7.124
			100	3700				MCo7.125
6	6 × 13	4	5	185	0.11–0.15	C54243	4.2–700	MCo7.161
			10	370				MCo7.162
			25	925				MCo7.163
			50	1850				MCo7.164
			100	3700				MCo7.165
9	4 × 14	1	5	185	0.13–0.15	C34243	220–450	MCo7.191
			10	370				MCo7.192
10	6 × 17	1	5	185	0.13–0.15	C34243	220–450	MCo7.1101
			10	370				MCo7.1102

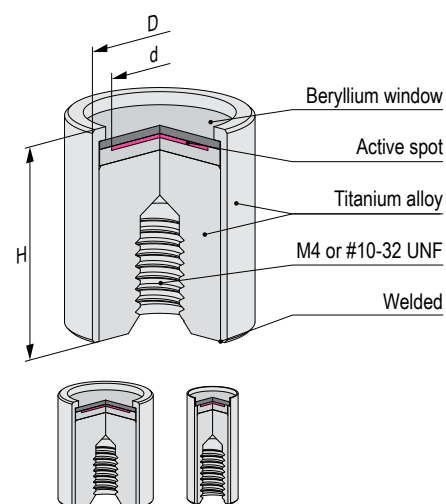
Chromium matrix

1	11.2 × 13	8	5	185	0.13–0.16	C54243	4.2–700	MCo7.511
			10	370				MCo7.512
			25	925				MCo7.513
			50	1850				MCo7.514
2	14 × 14	8	5	185	0.13–0.16	C54243	4.2–700	MCo7.521
			10	370				MCo7.522
			25	925				MCo7.523
			50	1850				MCo7.524

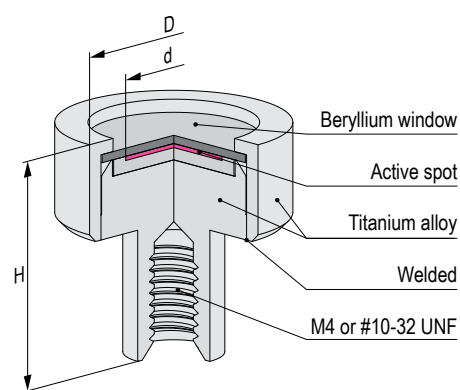
* — tolerance -5 ÷ +10 %

Recoilless fraction: 0.75

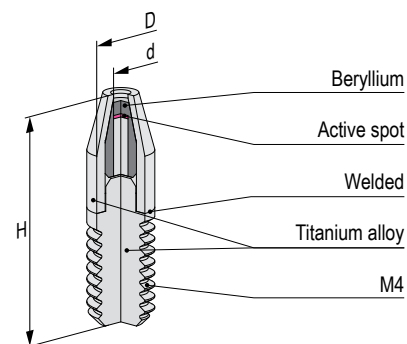
14.41 keV photon emission efficiency: ≥ 75 %



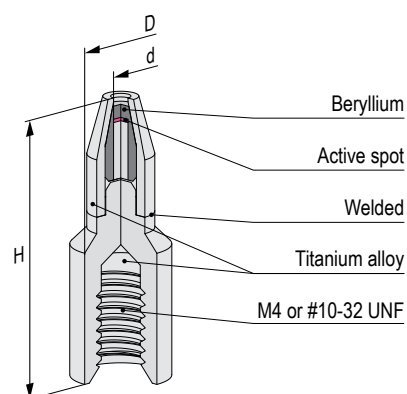
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10

^{119}mSn Mössbauer Sources

Mössbauer resonance on ^{119}Sn

Mössbauer source active part is based on calcium stannate $[\text{CaSnO}_3]$ matrix synthesized from high specific activity ($> 300 \text{ mCi/g}$) $^{119\text{m}}\text{Sn}$ radionuclide.

All sources are carefully tested on certified equipment. Each source is supported by a Test Report with measured values of Mössbauer spectra parameters.

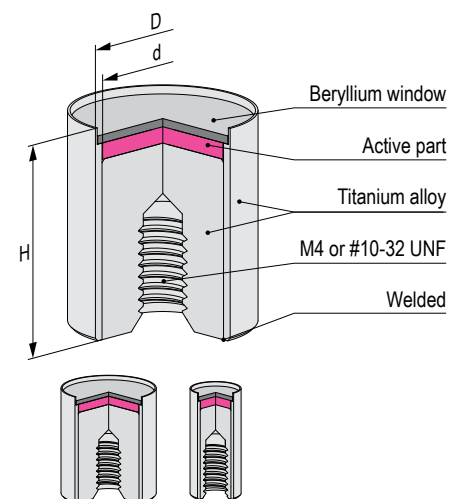
Recommended working life: 10 years.

Cap- sule type	D × H, mm	d, mm	Nominal activity *		Line- width, mm/s	ISO classifi- cation	Tempe- rature range, K	Code
			mCi	MBq				
1	11.2 × 13	10	2	74	0.38–0.54	C54243	4.2–700	MSn9.211
			5	185				MSn9.212
			10	370				MSn9.213
2	14 × 14	10	2	74	0.38–0.54	C54243	4.2–700	MSn9.221
			5	185				MSn9.222
			10	370				MSn9.223
			15	555				MSn9.224
3	18 × 14	15	10	370	0.38–0.45	C54243	4.2–700	MSn9.233
			15	555				MSn9.234
			20	740				MSn9.235
6	6 × 13	5	2	74	0.45–0.54	C54243	4.2–700	MSn9.261
			5	185				MSn9.262

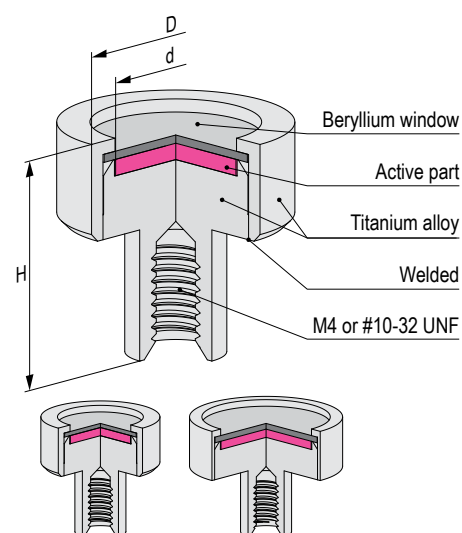
* — tolerance $-5 \div +10 \%$

Recoilless fraction: 0.50

23.87 keV photon emission efficiency: $\geq 75 \%$



1 6

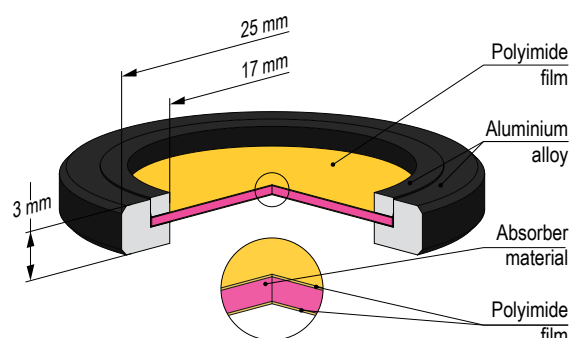


2 3

Reference Absorbers

Mössbauer effect reference absorbers contain chemical substances synthesized with either enriched ^{57}Fe (> 95 %) or natural iron. The substances are uniformly dispersed in polyethylene and shaped into discs: 1 mm thickness and 20 mm in diameter, placed between two polyimide films with total thickness of $100 \pm 10 \mu\text{m}$ in aluminium holders. Potassium and potassium-magnesium ferrocyanide [$\text{K}_4\text{Fe}(\text{CN})_6 \times 3\text{H}_2\text{O}$; $\text{K}_2\text{MgFe}(\text{CN})_6$] exhibit unsplit narrow line in Mössbauer absorption spectra. Ferrous oxalate dihydrate [$\text{FeC}_2\text{O}_4 \times 2\text{H}_2\text{O}$] exhibits quadrupole splitting, leading to two narrow lines in Mössbauer absorption spectrum. Metallic iron and iron oxide [αFe ; Fe_2O_3] exhibit magnetic hyperfine splitting, leading to six narrow lines in Mössbauer absorption spectra.

All reference absorbers are carefully tested on certified equipment. Each absorber is supported by a Test Report with measured values of Mössbauer spectra parameters.



Description	Thickness, $\text{mg } ^{57}\text{Fe}/\text{cm}^2$	Code *
Enriched iron reference absorbers		
$\text{K}_2\text{MgFe}(\text{CN})_6$	0.25–1.00	MRA.1.1.X
$\text{FeC}_2\text{O}_4 \times 2\text{H}_2\text{O}$	0.50–1.00	MRA.1.2.X
Fe_2O_3	1.00–2.00	MRA.1.3.X
$\alpha\text{-Fe}$ foil	$3 \mu\text{m}$	MRA.1.6
Natural iron reference absorbers		
$\text{FeC}_2\text{O}_4 \times 2\text{H}_2\text{O}$	0.13–0.25	MRA.2.2.X
Fe_2O_3	0.13–0.25	MRA.2.3.X
$\text{K}_4\text{Fe}(\text{CN})_6 \times 3\text{H}_2\text{O}$	0.13–1.00	MRA.2.4.X
$\alpha\text{-Fe}$ foil	$30 \mu\text{m}$	MRA.2.6

* — "X" is the thickness of the reference absorber in $\text{mg } (^{57}\text{Fe}/\text{cm}^2)$:

X = 1, 2, 3, 4 and 5 for 0.13, 0.25, 0.50, 1.00 and 2.00 respectively.

Beta Sources

An abstract wireframe graphic of a dome-like structure, composed of numerous overlapping lines and curves, creating a complex, geometric pattern that resembles a modern architectural design or a scientific instrument component.

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⁶³Ni Beta Sources

⁶³Ni is electrically deposited on a rectangular or round nickel backing and covered with a protective nickel layer (nickel coated) or corrosion-resistant layer (corrosion-resistant coated).

Sources are characterized by ionization current measured in a flat free-air ionization chamber. Ionization current for cylindrical sources is measured before rolling.

Recommended working life: 5 years in air, 10 years in inert gas atmosphere. Storage in inert gas atmosphere is recommended when not in use.

Corrosion-resistant sources are suitable for applications with temperatures up to +250 °C in aerial environment.

Other dimensions and activities are available on request. Maximum practical surface activity load is ~ 9 mCi/cm².

Sources can be shipped in customer supplied holders.

Planar Sources

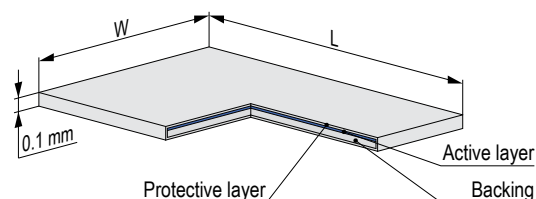
Source code		L × W, mm	Ionization current, not less than, nA	Nominal activity *, MBq (mCi)
Nickel coated	Corrosion-resistant coated			
BNi3.S1.1.R	BNi3.K.S1.1.R	15 × 10	3	296 (8)
BNi3.S1.3.R	BNi3.K.S1.3.R		5	700 (18.9)
BNi3.S3.1.R	BNi3.K.S3.1.R	30 × 10	2	100 (2.7)
BNi3.S3.3.R	BNi3.K.S3.3.R		9	740 (20)
BNi3.S3.4.R	BNi3.K.S3.4.R		12	999 (27)
BNi3.S4.2.R	BNi3.K.S4.2.R	48 × 3	5	370 (10)
BNi3.S7.1.R	BNi3.K.S7.1.R	15 × 3	0.5	33 (0.89)
BNi3.S7.2.R	BNi3.K.S7.2.R		0.7	40 (1.08)
BNi3.S8.1.R	—	22 × 10	8	555 (15)
BNi3.S12.1.R	—	40 × 38	40	5060 (137)
BNi3.S15.1.R	BNi3.K.S15.1.R	10 × 10	1.5	100 (2.7)
BNi3.S16.1.R	BNi3.K.S16.1.R	31 × 10	7	370 (10)
BNi3.S17.1.R	—	3 × 3	0.3	30 (0.81)
BNi3.S18.1.R	BNi3.K.S18.1.R	22 × 7	6.5	555 (15)

* — tolerance -15 ÷ +15 %

ISO classification:

C33221 (nickel coated)

C43221 (corrosion-resistant coated)



Disk Sources

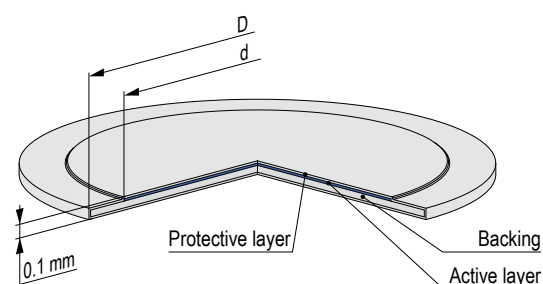
Source code		D × d, mm	Ionization current, not less than, nA	Nominal activity *, MBq (mCi)
Nickel coated	Corrosion-resistant coated			
BNi3.S9.1.R	BNi3.K.D1.1.R	20 × 16	2	88.8 (2.4)
BNi3.S9.2.R	BNi3.K.D1.2.R		8	666 (18)

* — tolerance -15 ÷ +15 %

ISO classification:

C33221 (nickel coated)

C43221 (corrosion-resistant coated)



Cylindrical Sources

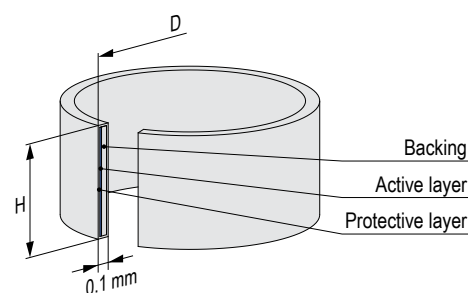
Source code		D × H, mm	Ionization current, not less than, nA	Nominal activity *, MBq (mCi)
Nickel coated	Corrosion-resistant coated			
BNi3.C1.1.R	BNi3.K.C1.1.R	4.8 × 10.0	3	296 (8)
BNi3.C3.1.R	BNi3.K.C3.1.R	9.6 × 10.0	2	100 (2.7)
BNi3.C3.3.R	BNi3.K.C3.3.R		9	740 (20)
BNi3.C3.4.R	BNi3.K.C3.4.R		12	999 (27)
BNi3.C4.1.R	BNi3.K.C4.1.R	15.3 × 3.0	2	100 (2.7)
BNi3.C4.2.R	BNi3.K.C4.2.R		5	370 (10)
BNi3.C7.1.R	BNi3.K.C7.1.R	4.8 × 3.0	0.5	33 (0.89)
BNi3.C7.2.R	BNi3.K.C7.2.R		0.7	40 (1.08)
BNi3.C13.1.R	—	8.0 × 8.0	6	370 (10)
BNi3.C13.2.R	—		7.5	555 (15)
—	BNi3.K.C14.1.R	15.3 × 6.0	10	740 (20)
BNi3.C16.1.R	—	9.9 × 10.0	7	370 (10)
BNi3.C17.1.R	BNi3.K.S17.1.R	7.0 × 7.0	6.5	555 (15)

* — tolerance -15 ÷ +15 %

ISO classification:

C33221 (nickel coated)

C43221 (corrosion-resistant coated)



RITVERC JSC
Radiation Sources
Product Catalog
Rev. 3.1/12/2019
28/37

· X-ray Sources
· Gamma Sources
· Mössbauer Sources
· Beta Sources
· Reference Sources

Reference Sources



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Reference and Calibration

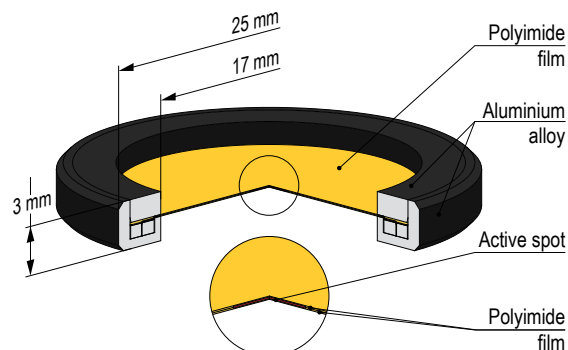
Gamma Sources — OSGI-RT

^{22}Na , ^{44}Ti , ^{54}Mn , ^{55}Fe , ^{57}Co , ^{60}Co , ^{65}Zn , ^{88}Y , ^{109}Cd , ^{113}Sn , ^{133}Ba ,
 ^{134}Cs , ^{137}Cs , ^{139}Ce , ^{152}Eu , ^{153}Gd , ^{207}Bi , ^{228}Th , ^{241}Am , ^{243}Am

Reference and calibration gamma sources are used for efficiency and energy calibration of gamma-spectrometric equipment, testing of ionizing chambers and scintillation counters.

Radionuclide is deposited on polyimide film with tolerance on activity $\pm 20\%$. Active spot is smaller than 3 mm. Active spot is sealed by thermal gluing of 2 or 4 polyimide foils with total thickness 100 or 200 μm . Foil is mounted into aluminum ring with diameter 25 mm (29 mm on request) and height 3 mm. Producer logo, element symbol with atomic weight, serial number and production date are engraved on surface of the ring. Sources meet ISO 2919 requirements to sealed radiation sources. Source type is recommended for indoor laboratory applications.

ISO classification: C35242.



Multinuclide OSGI-RT sources

Multinuclide OSGI-RT sources are recommended as reference standards for efficiency and energy calibration of gamma-spectrometers with semiconductor detectors.

Active spot of the source contains 4 nuclides:

^{88}Y — 370 kBq

^{133}Ba — 37 kBq

^{152}Eu — 37 kBq

^{241}Am — 37 kBq

At least 20 energy lines are required for efficiency calibration of semiconductor detector of HPGe and Ge(Li) types.

Source is designed for 2 years useful work.

Advantages:

- all calibration data are acquired in one run. This reduces systematic mistakes, while all components are measured at the same time and exposition.
- time saving compare to calibration with single nuclide sources.

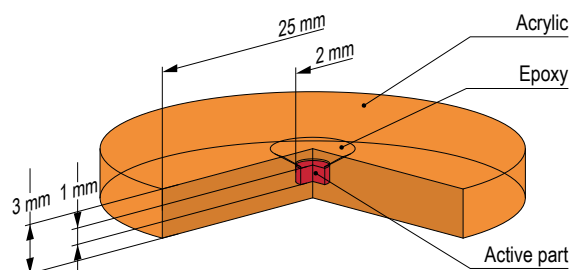
Reference and Calibration Sources — OSGI-P

^{22}Na , ^{44}Ti , ^{54}Mn , ^{57}Co , ^{60}Co , ^{65}Zn , ^{88}Y , ^{109}Cd , ^{113}Sn , ^{133}Ba , ^{134}Cs , ^{137}Cs , ^{139}Ce , ^{152}Eu , ^{153}Gd , ^{207}Bi , ^{210}Pb , ^{228}Th , ^{241}Am , ^{243}Am

Reference and calibration sources are used for efficiency and energy calibration of gamma-spectrometric equipment, testing of ionizing chambers and scintillation counters. Robust design is suitable for “in field” calibrations and tests.

Radionuclide is deposited on active part made of light ceramic pellet. Dimensions of active part are 2 mm in diameter and 1 mm in height with tolerance on activity $-10 \div +30\%$. Active part is mounted in center of acrylic capsule and sealed with epoxy resin. Source is a transparent disc with diameter 25 mm and height 3 mm. Radiation sign, producer logo, element symbol with atomic weight, serial number and production date are engraved on surface of the source. Sources meet ISO 2919 requirements to sealed radiation sources. Source type is recommended for “in field” and laboratory applications.

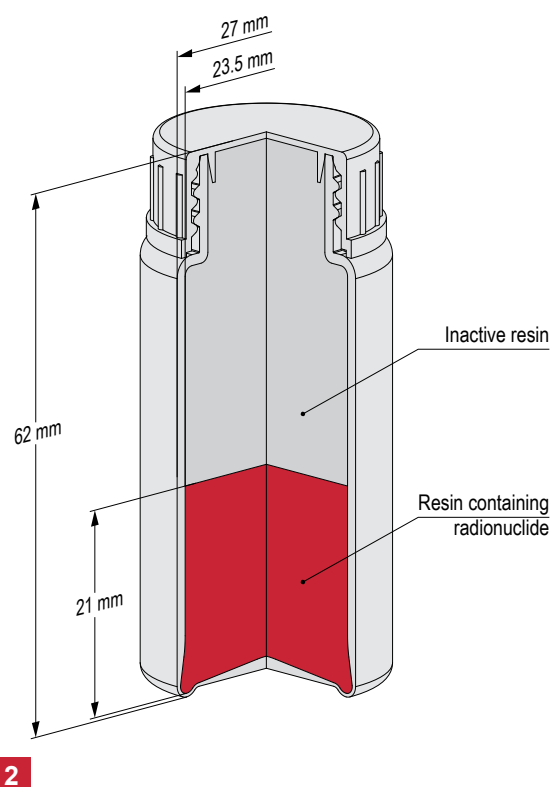
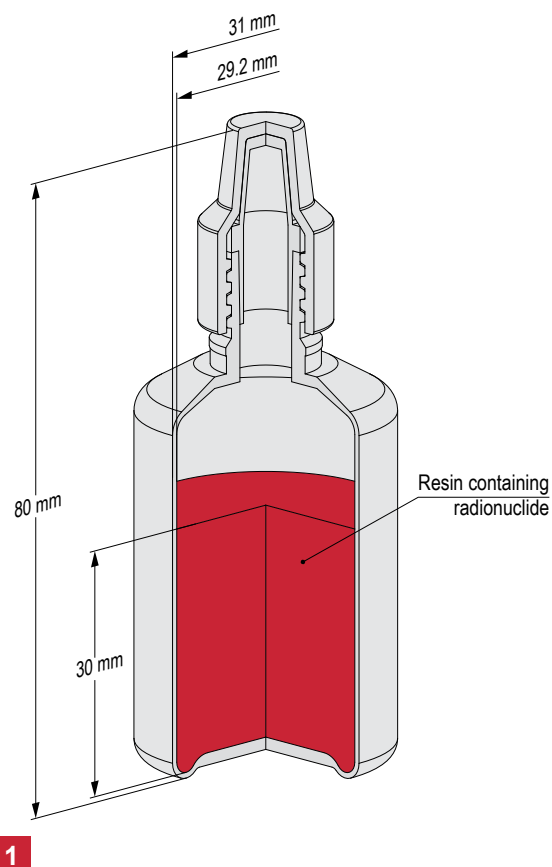
ISO classification: C34343.



Dose Calibrator Gamma Standard Sources — DCGS

^{22}Na , ^{57}Co , ^{60}Co , ^{133}Ba , ^{137}Cs

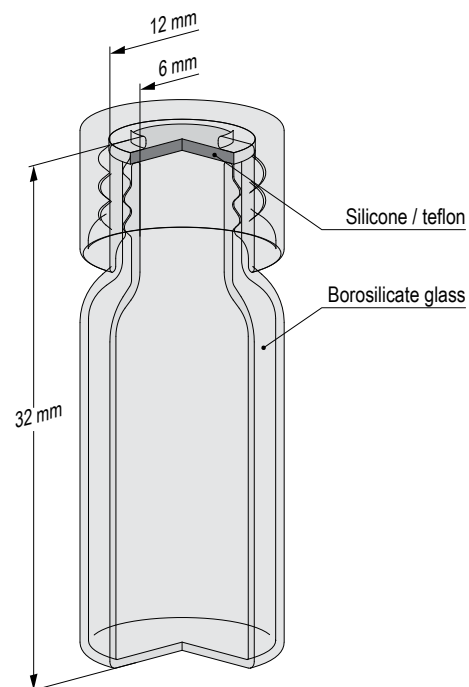
Sealed gamma radiation sources type DCGS are purposed for suitability checks of well detector ionizing chambers, also known as dose-calibrators. Sources are made in PE vials with active part of epoxy resin with homogenized with radionuclide solution. Volume of the active part is 20 ml for type 1 and 10 ml for type 2. Each nuclide is color coded. Sources meet requirements of ISO 2919 to sealed radiation sources. ISO classification: C23222.



Radionuclide Solutions

^{22}Na , ^{54}Mn , ^{55}Fe , ^{57}Co , ^{60}Co , ^{65}Zn , ^{88}Y , ^{109}Cd , ^{113}Sn , ^{133}Ba , ^{134}Cs , ^{137}Cs ,
 ^{139}Ce , ^{152}Eu , ^{207}Bi , ^{241}Am

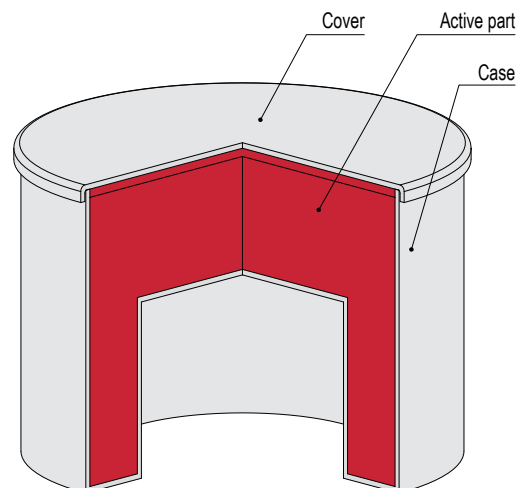
Radionuclide solutions can be provided as reference solutions with calibration certificate of all-Russia D. I. Mendeleev Research and scientific institute of Metrology. Standard primary packages are 1.8, 5, 15 ml vials with screw cap and silicon septa. On special order can be produced and / or retailed bigger quantities of materials.



Special Volumetric Activity Measures — Marinelli Beakers

^{22}Na , ^{40}K , ^{54}Mn , ^{57}Co , ^{60}Co , ^{65}Zn , ^{88}Y , ^{90}Sr , ^{109}Cd , ^{113}Sn , ^{133}Ba , ^{137}Cs ,
 ^{139}Ce , ^{152}Eu , ^{210}Pb , ^{226}Ra , ^{228}Th , ^{232}Th , ^{238}U , ^{241}Am

Volumetric Sources — Marinelli beakers are designed for low specific activity measurement. Sources are produced by deposition of precise quantity of the radioactive solution on the cationite granules with density $0.7\text{--}1.18\text{ g/cm}^3$ or other materials by customer request. Sources are attested by ISO 17025 certified laboratory and purposed for calibration, validation and test of gamma spectrometers. Volumetric sources are produced in Marinelli beakers from general suppliers (www.ga-maassociates.com) or in containers provided by end users.



²²Na Sources for Calibration of Medical Equipment

Multimodal Gamma Source

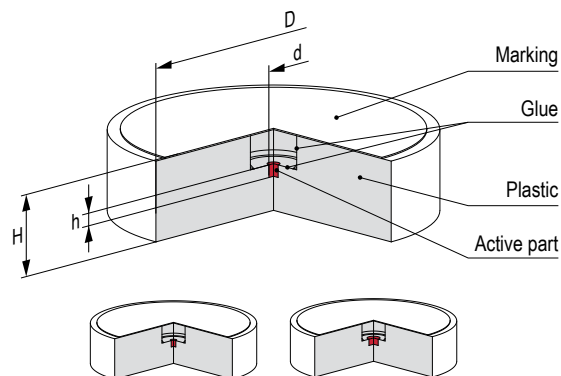
²²Na is incorporated in a light ceramic matrix and sealed in a glued plastic capsule with mineral filler.

Recommended working life: 5 years.

D × H, mm	d × h, mm	Nominal activity *		ISO classification	Code
		mCi	kBq		
25.4 × 6.4	1 × 1	0.01	370	C22212	GNa2.M.28.1
	2 × 1				GNa2.M.28.2

* — tolerance -10 ÷ +10 %

Other activities are available on request



28.1 28.2

Linear Gamma Source

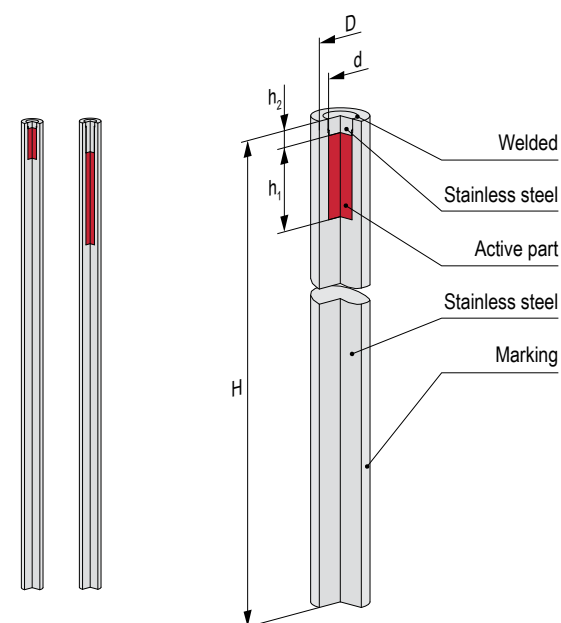
²²Na is incorporated in a light ceramic matrix and sealed in a welded stainless steel capsule

Recommended working life: 5 years.

D × H, mm	d × h ₁ × h ₂ , mm	Nominal activity *		ISO classification	Code
		mCi	MBq		
3.4 × 76	1.9 × 5 × 1	0.1	3.7	C65424	GNa2.M.29.1
	1.9 × 15 × 5				GNa2.M.29.2

* — tolerance -10 ÷ +10 %

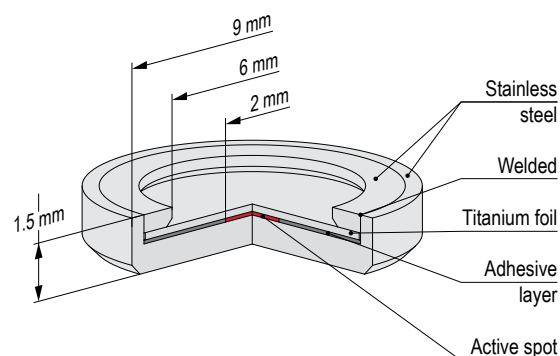
Other activities are available on request



29.1 29.2

Disk Calibration Sources

Radionuclide is deposited on the adhesive layer in the center of the stainless steel case. Active spot is smaller than 2 mm. The active spot is sealed with a 10 μm vacuum-tight titanium foil. Output window is protected by titanium ring, welded by laser welding to the case. Sources can be supplied in special holders. Recommended working life: 10 years.



Radionuclide	Nominal activity *		Code
	mCi	kBq	
^{22}Na	0.027–27	1–1000	GNa2.30
^{44}Ti	0.027–2.7	1–100	GTi4.30
^{54}Mn	0.027–27	1–1000	GMn4.30
^{57}Co	0.027–27	1–1000	GCo7.30
^{60}Co	0.027–2.7	1–100	GCo0.30
^{65}Zn	0.027–27	1–1000	GZn5.30
^{88}Y	0.027–27	1–1000	GY8.30
^{109}Cd	0.027–27	1–1000	GCd9.30
^{113}Sn	0.027–6.8	1–250	GSn3.30
^{133}Ba	0.027–2.7	1–100	GBa3.30
^{134}Cs	0.027–0.27	1–10	GCs4.30
^{137}Cs	0.027–0.27	1–10	GCs7.30
^{139}Ce	0.027–27	1–1000	GCe9.30
^{152}Eu	0.027–27	1–1000	GEu2.30
^{207}Bi	0.027–2.7	1–100	GBi7.30

* — tolerance $-15 \div +15 \%$

Other activities are available on request

Educational Sources

Sources are comply with the requirements of the methodical center Cleapps, England, for use in school experiments in studying the phenomenon of radioactivity, its properties and methods of protection against it, alpha, beta and gamma radiation.

Active part of the source is placed in a stainless steel capsule.

The capsule lid is fixed in the case of a capsule by laser welding.

Optionally the disk capsule is could be joint by laser welding with the holder (rectangular stainless steel plate). The holder provides additional area for engraving of customer's requested information.

Recommended working life: 10 years.

ISO classification: C23312.

Alpha Sources

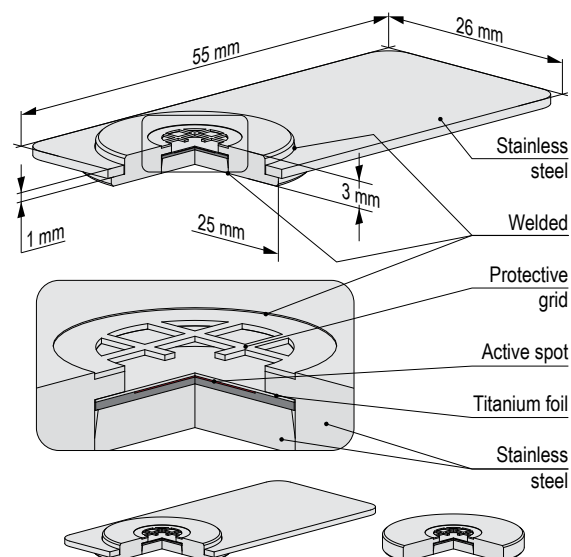
The capsule case has the output window 7 mm in diameter, covered by a stainless steel protective grid. The active part contains the radionuclide fixed in a surface layer, protected by 2 μm titanium foil.

Beta Sources

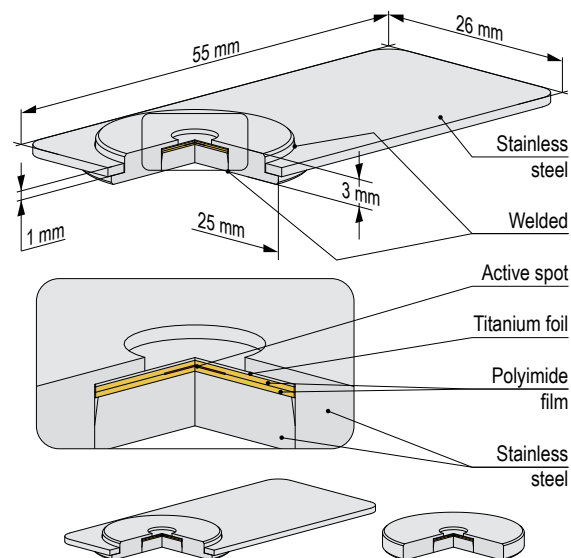
The capsule case has the output window 5 mm in diameter. The active part contains the radionuclide fixed between two 50 μm polyimide films and protected by 10 μm titanium foil.

Gamma Sources

The capsule case has a stainless steel output window 10 mm in diameter and 0.5 mm in thickness. The active part contains the radionuclide fixed between two 50 μm polyimide films.



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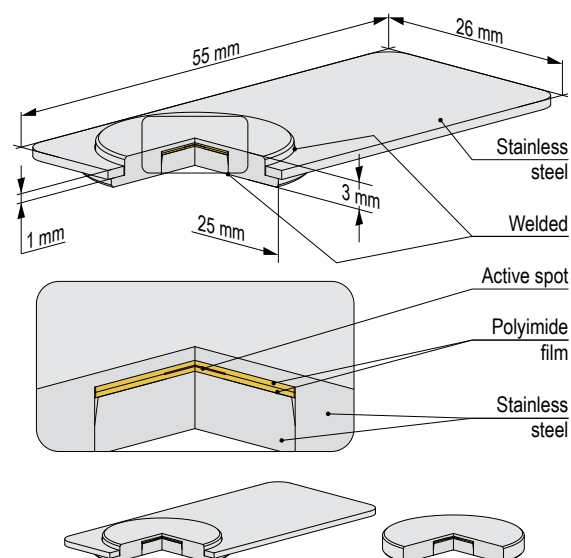


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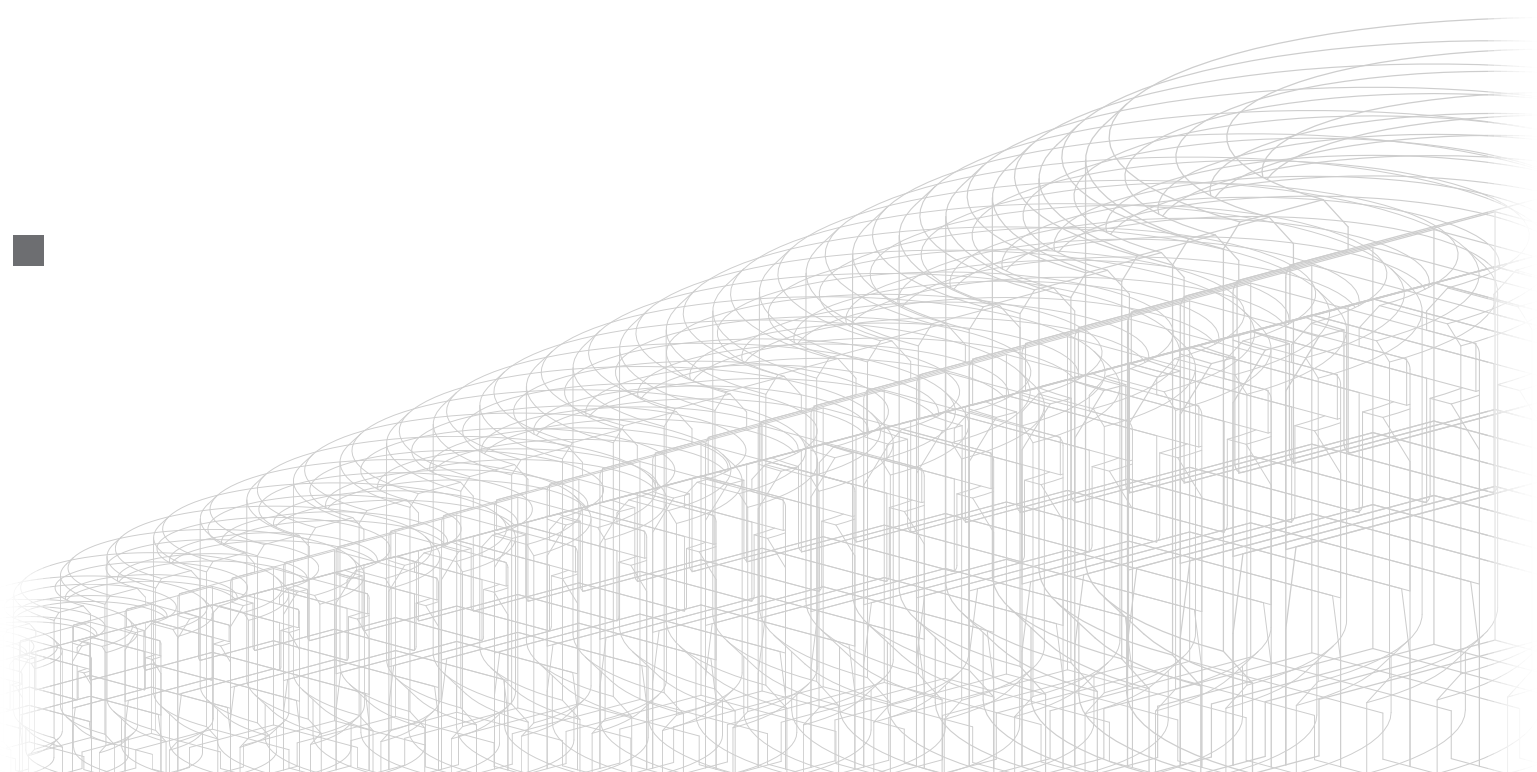
Radionuclide	Type of radiation	Nominal activity *		Code
		μCi	kBq	
^{241}Am	$\alpha + X + \gamma$	0.1, 0.27	3.7, 10	AAm1.E.34
^{22}Na	$\beta^+ + \gamma$	0.1, 0.27	3.7, 10	BNa2.E.35
^{60}Co	$\beta^- + \gamma$	0.1, 0.27	3.7, 10	BCo0.E.35
^{90}Sr	β^-	0.1, 0.27	3.7, 10	BSr0.E.35
^{137}Cs	$e + \beta^- + X + \gamma$	0.1, 0.27	3.7, 10	BCs7.E.35
^{22}Na	γ	0.1, 0.27	3.7, 10	GNa2.E.36
^{60}Co	γ	0.1, 0.27	3.7, 10	GCo0.E.36
^{133}Ba	$X + \gamma$	0.1, 0.27	3.7, 10	GBa3.E.36
^{137}Cs	$X + \gamma$	0.1, 0.27	3.7, 10	GCs7.E.36

* — tolerance $-20 \div +20 \%$. Extended measurement uncertainty $\pm 10 \%$ for $k = 2$

Other activities are available on request



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