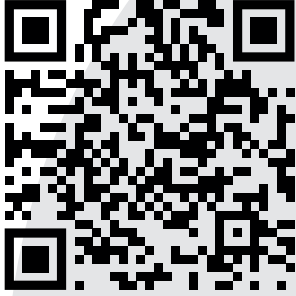


## How to make a Mössbauer source



# Mössbauer Sources & Reference Absorbers



# Mössbauer Sources: <sup>57</sup>Co

## Mössbauer resonance on <sup>57</sup>Fe

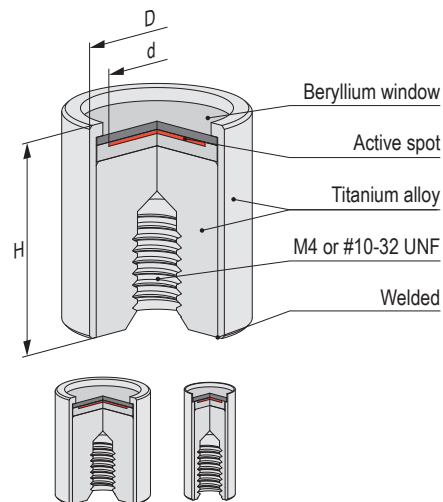
Mössbauer source active part is prepared by electrodepositing high purity carrier-free <sup>57</sup>Co onto a thin metal backing (matrix) followed by controlled annealing process. Standard matrix is rhodium. Other matrices and activities are available on request.

Capsule type	D×H, mm	d, mm	Nominal activity *		Linewidth, mm/s	Code
			mCi	MBq		
1	11.2×13	8, 6, 4	5	185	0.11-0.14	MCo7.111
			10	370		MCo7.112
			25	925		MCo7.113
			50	1850		MCo7.114
			100	3700		MCo7.115
2	14×14	8, 6, 4	5	185	0.11-0.14	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	MCo7.161
			10	370		MCo7.162
			25	925		MCo7.163
			50	1850		MCo7.164
9	4×14	1	5	185	0.13-0.17	MCo7.191
			10	370		MCo7.192
			10	370		MCo7.1101
10	6×17	1	5	185	0.13-0.17	MCo7.1102
			10	370		MCo7.1102

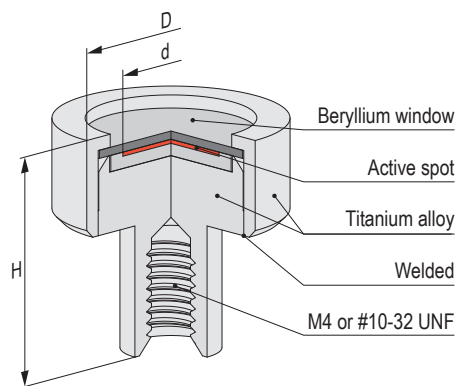
\* — tolerance -5...+10 %  
 Recoilless fraction: 0.75  
 14.41 keV photon emission efficiency: ≥ 75 %  
 ISO classification:  
 Capsule 1, 2, 6: C54243  
 Capsule 9, 10: C33243  
 Temperature range:  
 Capsule 1, 2, 6: 4.2 - 700 K \*\*  
 Capsule 9, 10: 220 - 450 K  
 Recommended working life: 10 years

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

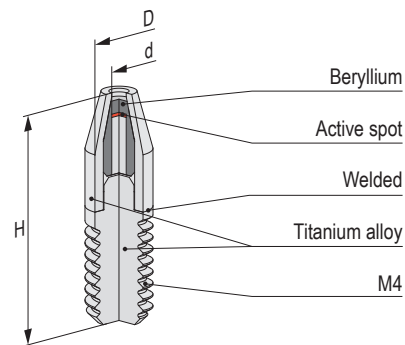
\*\* — additional notification is required for liquid helium temperature application



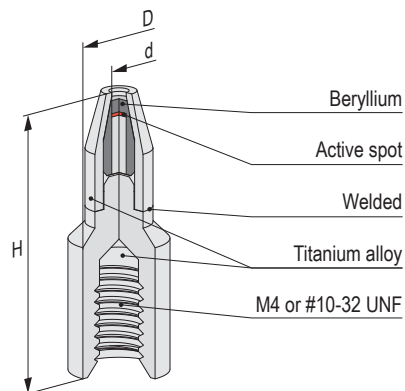
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# Mössbauer Sources: $^{119m}\text{Sn}$

## Mössbauer resonance on $^{119}\text{Sn}$

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

Capsule type	D×H, mm	d, mm	Nominal activity *		Linewidth, mm/s	Code
			mCi	MBq		
1	11.2×13	10	2	74	0.38-0.54	MSn9.211
			5	185		MSn9.212
			10	370		MSn9.213
2	14×14	10	2	74	0.38-0.54	MSn9.221
			5	185		MSn9.222
			10	370		MSn9.223
3	18×14	15	15	555	0.38-0.45	MSn9.233
			20	740		MSn9.234
			20	740		MSn9.235
6	6×13	5	2	74	0.45-0.54	MSn9.261
			5	185		MSn9.262

\* — tolerance -5...+10 %

Recoilless fraction: 0.50

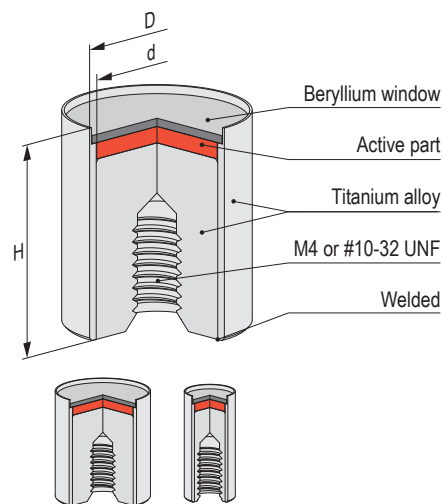
23.87 keV photon emission efficiency:  $\geq 75 \%$

ISO classification: C54243

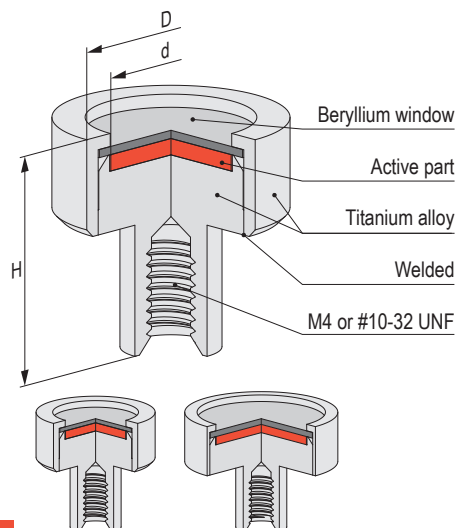
Temperature range: 77 - 700 K

Recommended working life: 10 years

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



1 6

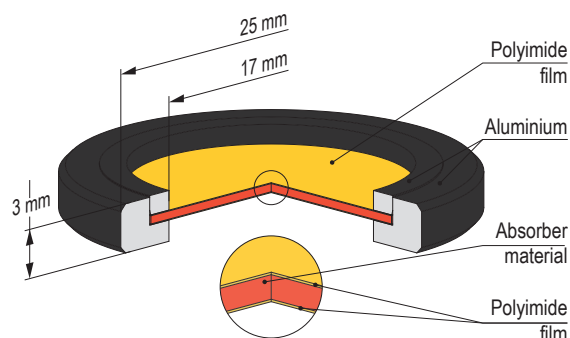


2 3

## Reference Absorbers

Reference absorbers contain chemical substances synthesized with either enriched  $^{57}\text{Fe}$  (> 95 %) or natural iron. The substances are uniformly dispersed in polyethylene and shaped in 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 [ $\alpha\text{-Fe}$ ;  $\text{Fe}_2\text{O}_3$ ] 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 *
<b>Enriched iron reference absorbers</b>		
$\text{K}_2\text{MgFe}(\text{CN})_6$	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
$\text{Fe}_2\text{O}_3$	1.00-2.00	MRA.1.3.X
$\alpha\text{-Fe}$ foil	$3 \mu\text{m}$	MRA.1.6
<b>Natural iron reference absorbers</b>		
$\text{FeC}_2\text{O}_4 \times 2\text{H}_2\text{O}$	0.13-0.25	MRA.2.2.X
$\text{Fe}_2\text{O}_3$	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.

# Mössbauer Sources Grippers

Grippers are designed for mounting and dismounting of Mössbauer sources (MCo7 and MSn9) manufactured by RITVERC on an NGR-spectrometer. Significant decrease of gamma radiation dose provided by using of tungsten shield.

Code	Capsule type	d, mm
GrMS.1	1	11.2
GrMS.2	2	14
GrMS.6	6	6

