«ROSATOM» STATE NUCLEAR ENERGY CORPORATION

CERTIFICATE OF APPROVAL

Registration number 129 dtd. September 17, 2024

for Special Form Radioactive Material

SEALED SOURCES OF GAMMA-RADIATION BASED ON SELENIUM-75

RUS/6508/S-96 (Rev.1)

Issued	**17.09.2024**
Validity	**17.09.2029**

Director on special transportation and emergency - Director of Nuclear and Radiation Safety Department, Organization for Licensing and Authorization Activities **S.V. Raikov**

№ 001992

List of approval

APPROVED

Vice-chief of Federal service
on ecological, technological
and atomic supervision

A.V. Ferapontov
13.09.2024

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Validity up to 17.09.2029

Chief of Department on safety
management of nuclear fuel, nuclear
energy ship installations and
radioactively dangerous objects of
Federal Agency on ecological,
technological and atomic
supervision
_____ D.J. Belkin

«__»_____ 2024

Director on special transportation
and emergency - Director of Nuclear
and Radiation Safety Department,
Organization for Licensing and
Authorization Activities of Rosatom
State Nuclear Energy Corporation
_____ S.V. Raikov

«_16___»_____08_____ 2024

Applicant – JSC "Energomontage International" (JSC "EMI").

EMI JSC is the customer for the manufacture of sealed gamma radiation sources with radionuclide selenium-75.

Post address of the Applicant: 107078, Moscow, Krasnovorotskiy proezd 3, bld. 1, office III-5. Tel/Fax +7(499) 262-36-73/+7(499) 262-27-54.

Developer of the design (holder of the original design documentation) and manufacturer of sealed radionuclide sources is Institute of Reactor Materials Joint-Stock Company (JSC IRM).

Certificate of Approval is given to JSC "EMI".

This Certificate of Approval confirms correspondence of design of sealed sources of gamma-radiation Se-75 of types SR and GIS75 according to Div. 2 with radioactive materials in correspondence with Div. 3 of "Safety Regulations for Transport of Radioactive Materials" (NP-053-16), as well as "Rules of Safety During Transportation of Radioactive Materials" (issue 2012 (SSR-6), IAEA, 2013) to RMSF.

1. Main Purpose

The sources manufactured by JSC IRM according to technical requirements 90.03.00.000TU designed for NDT control (in gamma-defectoscopes made by JSC EMI) of welding seams, integrity of materials, measurement and control of thickness as well as in the other brunches of since and industry.

2. Design of source

Common view of SR and GIS75 sources is presented in pictures 1 and 2.

The sources have hermetic design with double capsuling of the radioactive material. Internal capsule made of titanium (rod BT1-0 on GOST 1987) or vanadium (alloy VnM-1 TR 48-4-373-76) contains radionuclide Se-75.

External capsule made of corrosion proof steel 12X18H10T GOST 5632 has several types different in design, dimensions of active part and activity of source. Both capsules, internal and external are sealed by argon arc welding.

All the sources excluding GIS75M31 correspond C63545 class of hardness on GOST P52241 (classification ISO 2919:1999/E), but GIS75M31 – C63445.

3. Radioactive content

The sources of types SR and GIS75 use as an active part the radionuclide Se-75 obtained by irradiation in reactor IVV-2M of capsule with elemental or vanadium selenide Se-74.

Types of sources depending on their design, dimension of external capsule, active part and activity of a source are enumerated in table 1.

Physical content of active part is solid.

According to Table 1, activity of some sources is higher than stated A^1 for radionuclide Se-75 equal to 3 TBq (81,1 Ci). To transport such sources, B(U) type package is required.

Table 1 – Main parameters of sources

Type of source	Dimensions				Exposed power doze (MED) on distance 1 m, not less A/kg	Activity, Bq (Ci)
	Source		Active part			
	Diameter, D, mm	Length L, mm	Diameter d, mm	Length l, mm		
SR16.10	7,15	$19{,}5_{-0{,}3}^{+0{,}2}$	1	1	$1{,}43 \cdot 10^{-7}$	$3{,}70 \cdot 10^{11}$ (10)
SR17.10	6,7	$27{,}0_{-0{,}3}^{+0{,}2}$				
SR18.10	7,15	$23{,}5_{-0{,}3}^{+0{,}2}$				
GIS75M11.10	$6{,}0^{+0{,}5}$	$12_{-0{,}3}^{+0{,}5}$				
GIS75M12.10		$20_{-1{,}0}$				
GIS75M13.10		$20_{-1{,}0}$				
GIS75M14.10		$27_{-0{,}7}$				
GIS75M15.10		$19_{-1{,}0}$				
GIS75M21.10	$5{,}7^{+0{,}3}$	$12_{-0{,}3}^{+0{,}5}$				
SR16.20	7,15	$19{,}5_{-0{,}3}^{+0{,}2}$	1,5	1,5	$2{,}86 \cdot 10^{-7}$	$7{,}40 \cdot 10^{11}$ (20)
SR17.20	6,7	$27{,}0_{-0{,}3}^{+0{,}2}$				
SR18.20	7,15	$23{,}5_{-0{,}3}^{+0{,}2}$				
GIS75M11.20	$6{,}0^{+0{,}5}$	$12_{-0{,}3}^{+0{,}5}$				
GIS75M12.20		$20_{-1{,}0}$				
GIS75M13.20		$20_{-1{,}0}$				
GIS75M14.20		$27_{-0{,}7}$				
GIS75M15.20		$19_{-1{,}0}$				
GIS75M21.20	$5{,}7^{+0{,}3}$	$12_{-0{,}3}^{+0{,}5}$				
SR16.40	7,15	$19{,}5_{-0{,}3}^{+0{,}2}$	2	2	$5{,}71 \cdot 10^{-7}$	$1{,}48 \cdot 10^{12}$ (40)
SR17.40	6,7	$27{,}0_{-0{,}3}^{+0{,}2}$				
SR18.40	7,15	$23{,}5_{-0{,}3}^{+0{,}2}$				
GIS75M11.40	$6{,}0^{+0{,}5}$	$12_{-0{,}3}^{+0{,}5}$				
GIS75M12.40		$20_{-1{,}0}$				
GIS75M13.40		$20_{-1{,}0}$				
GIS75M14.40		$27_{-0{,}7}$				
GIS75M15.40		$19_{-1{,}0}$				
GIS75M21.40	$5{,}7^{+0{,}3}$	$12_{-0{,}3}^{+0{,}5}$				

SR16.90	7,15	$19,5_{-0,3}^{+0,2}$	2,5	2,5	$1,29 \cdot 10^{-6}$	$13,33 \cdot 10^{12}$ (90)
SR17.90	6,7	$27,0_{-0,3}^{+0,2}$				
SR18.90	7,15	$23,5_{-0,3}^{+0,2}$				
GIS75M11.90	$6,0^{+0,5}$	$12_{-0,3}^{+0,5}$				
GIS75M12.90		$20_{-1,0}$				
GIS75M13.90		$20_{-1,0}$				
GIS75M14.90		$27_{-0,7}$				
GIS75M15.90		$19_{-1,0}$				
GIS75M21.90	$5,7^{+0,3}$	$12_{-0,3}^{+0,5}$				
GIS75M31.90	$5,0^{+0,1}$	$6,8^{+0,5}$				
SR16.140	7,15	$19,5_{-0,3}^{+0,2}$	3	3	$2,00 \cdot 10^{-6}$	$5,18 \cdot 10^{12}$ (140)
SR17.140	6,7	$27,0_{-0,3}^{+0,2}$				
SR18.140	7,15	$23,5_{-0,3}^{+0,2}$				
GIS75M11.140	$6,0^{+0,5}$	$12_{-0,3}^{+0,5}$				
GIS75M12.140		$20_{-1,0}$				
GIS75M13.140		$20_{-1,0}$				
GIS75M14.140		$27_{-0,7}$				
GIS75M15.140		$19_{-1,0}$				
GIS75M21.140	$5,7^{+0,3}$	$12_{-0,3}^{+0,5}$				
GIS75M31.140	$5,0^{+0,1}$	$6,8^{+0,5}$	3,2	3,2		
SR16.200	7,15	$19,5_{-0,3}^{+0,2}$	3,5	3,5	$2,86 \cdot 10^{-6}$	$7,40 \cdot 10^{12}$ (200)
SR17.200	6,7	$27,0_{-0,3}^{+0,2}$				
SR18.200	7,15	$23,5_{-0,3}^{+0,2}$				
GIS75M11.200	$6,0^{+0,5}$	$12_{-0,3}^{+0,5}$				
GIS75M12.200		$20_{-1,0}$				
GIS75M13.200		$20_{-1,0}$				
GIS75M14.200		$27_{-0,7}$				
GIS75M15.200		$19_{-1,0}$				
GIS75M41.200	$6,35^{+0,1}$	$19,1^{+0,5}$	4	4		
GIS75M42.200		$24,2^{+0,5}$				

Source Type	Dimension				Exposure dose rate (EDR) at a distance of 1 m, not more than, A/kg	Kerma power in the air, not more than, Gr/s	Activity Bq (Ci)
	Source		active part				
	diameter D, мм	length L, мм	diameter d, мм	length l, мм			
GIS75M31.90	$5,0^{+0,1}$	$6,8^{+0,5}$	2,5	2,5	$1,29 \cdot 10^{-6}$	$4,38 \cdot 10^{-5}$	$3,33 \cdot 10^{12}$ (90)
GIS75M31.140			3,2	3,2	$2,00 \cdot 10^{-6}$	$6,79 \cdot 10^{-5}$	$5,18 \cdot 10^{12}$ (140)
GIS75M41.200	$6,35^{+0,1}$	$19,1^{+0,5}$	4	4	$2,86 \cdot 10^{-6}$	$9,71 \cdot 10^{-5}$	$7,40 \cdot 10^{12}$ (200)
GIS75M42.200		$24,2^{+0,5}$					

4. Special measures before transportation

The level of radioactive contamination of the surface of the source, determined by the wet smear method, should be no more than 185 Bq.

5. Quality assurance

5.1. Elaboration and manufacturing of sealed sources Se-75 is provided according to quality assurance program POK-09.7/04 red. 4.0, JSC IRM, 2019.

5.2. Quality assurance program POK-09.7/04 corresponds requirements of NP-090-11.

6. Laws, norms and rules

6.1. “Safety Rules in Transport of Radioactive Materials” (NP-053-16), Rostechnadzor 2016.

6.2. Regulations for the Safe Transport of Radioactive Material (2012 Edition (SSR-6), IAEA, 2013), 2012.

6.3. "Requirements for Quality Assurance Programs for Nuclear Facilities", NP-090-11, Rostekhnadzor, 2012.

6.4. GOST P 50629-93 “Sealed radionuclide sources. Classes of hardness and methods of tests. IPK Standards Publishing, 1994”.

7. Basic documents to issue of this Certificate

7.1. Application of AO “ATZ Rosatom” 218-01/21-1114 dtd 23.07.2024 for issuing of approval certificate (on power of attorney JSC EMI No. EI-505 dtd. 08.07.2024.

7.2. Expert report AE 2229, AO “ATZ Rosatom” 2024.

8. Common terms

8.1. Information about revisions

RUS/6142/S-96	Primary permit certificate. Issued on 20.05.2019, valid until 20.05.2024.

8.2. All inquiries related to this Certificate of Approval shall be directed to:

- Department for Nuclear and Radiation Safety, Organization of Licensing and Approval Activities of “Rosatom” State Nuclear Energy Corporation (119017, Moscow, ul. B. Ordynka, 24, phone: 8 (499) 949-29-27; fax 8 (499) 949-23-05);

- Federal cervices on ecological, technological and atomic supervision: 105066, Moscow, Lukjanova Str. 4, bld.1, tel. 8 (495) 645-94-79 (add. 60-04), 8-495-532-13-17, fax 8 (495) 532-13-46.
- AO “ATZ Rosatom” (194292, St.-Petersburg, 3-d Verkhny per., 2; phone/fax: 8-(812)-702-19-01(main), 8-(812)-591-52-30 (reserve)).

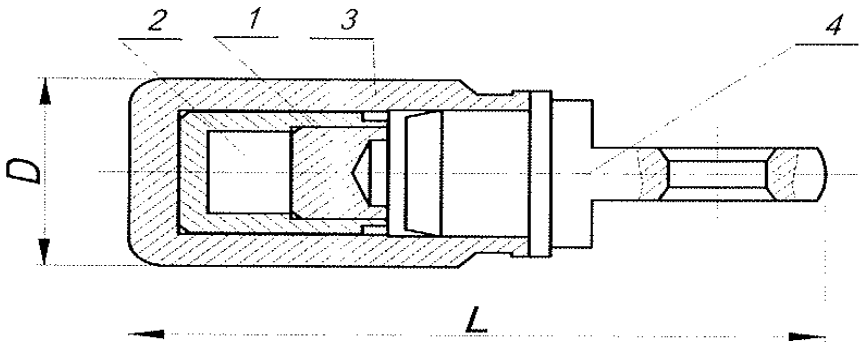
8.2. Only original and registered copies of the certificate of approval are in force authenticated by the seal of “Rosatom” State Nuclear Energy Corporation.

Translation is correct and fully correspond the original

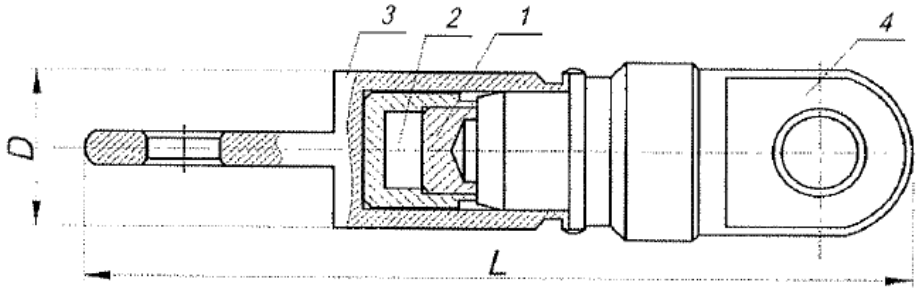
A. Alekseev

December 16, 2024

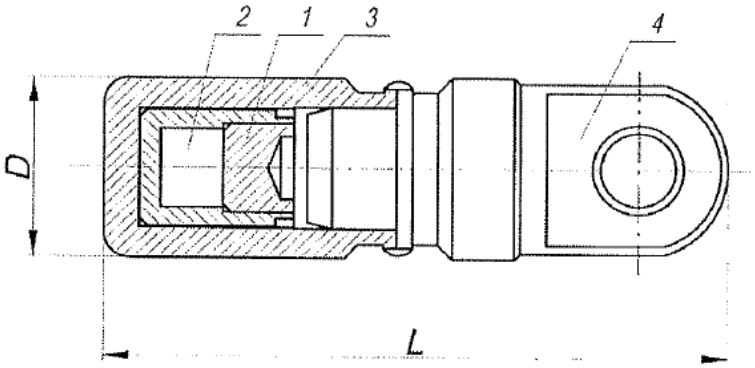
+7 (499) 262-12-87



a) Source of type SR16



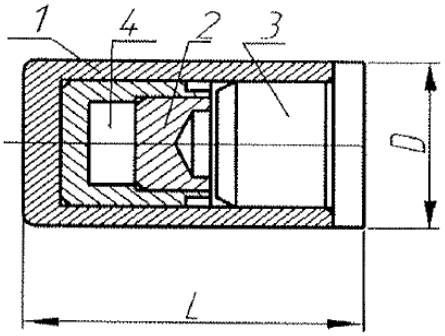
b) Source of type SR17



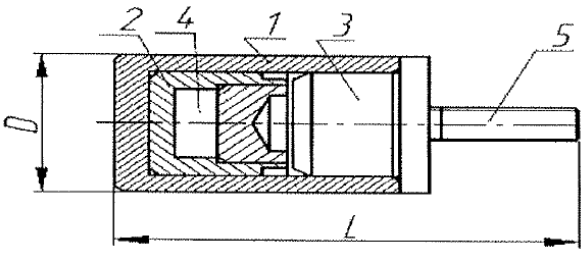
c) Source of type SR18

1 – internal capsule
2 – active part
3 – external capsule
4 – cap

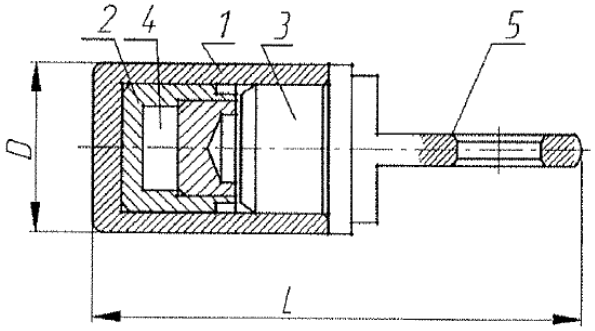
Pic. 1. Common view of sources SR



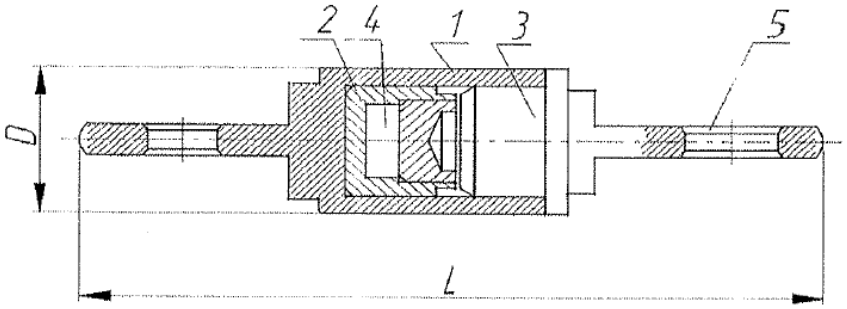
a) Source of type GIS75M11 (capsule without tail)
Source of type GIS75M21 (capsule without tail)



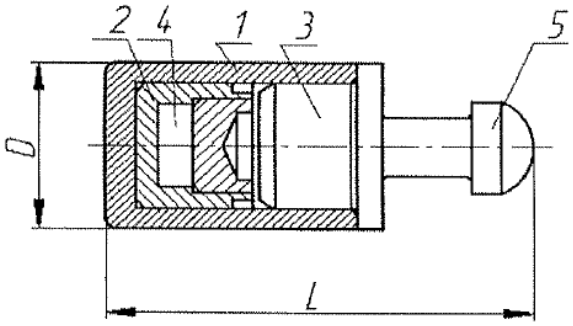
b) Source of type GIS75M12 (screwed tail of capsule)



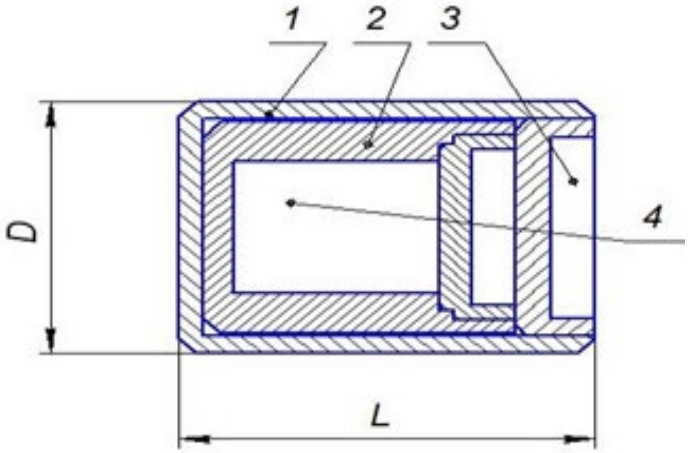
c) Source of type GIS75M13 (tail of capsule in vane shape)



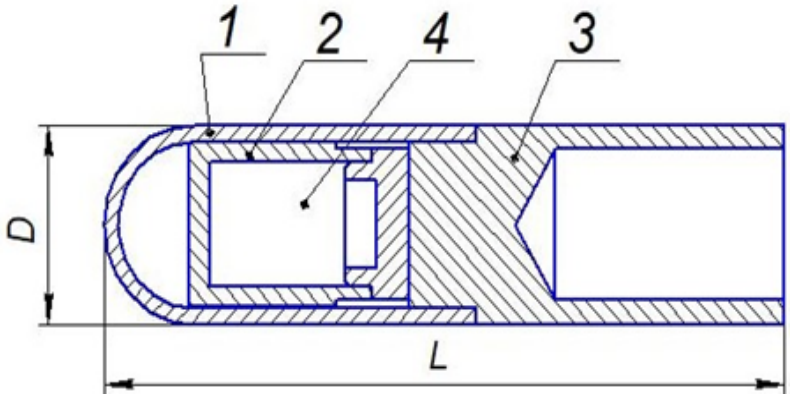
d) Source of type GIS75M14 (tail of capsule in double vane shape)



e) Source of type GIS75M15 (with spherical tail)



e) Source of type GIS75M31



ж) Source of type GIS75M41 and GIS75M42

1 – external capsule
2 – internal capsule
3 – cork
4 – active part
5 – tail

Picture 2 – Common view of sources GIS75