REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF SEALED SOURCE

NO.: LA-1491-S-106-S DATE: January 5, 2023

SOURCE TYPE: Calibration / Reference Sources

MANUFACTURER:
Ritverc JSC
10 Kurchatov Street
Saint Petersburg, 194223
Russia

DISTRIBUTOR:
ISOFLEX Radioactive LLC (ISO-RAD)
108 Teal Street
St. Rose, Louisiana 70087

SUBMANUFACTURER:
NDT TEXAS LLC (NDTT)
8701 Knight Road
Houston, Texas 77054

SEALED SOURCE MODEL DESIGNATION:

SOURCE MODEL:	ISOTOPE:	MAXIMUM ACTIVITY:
OSGI-RT	Na-22 (^{22}Na)	1000 kBq (27.027 microcuries)
OSGI-RT	Ti-44 (^{44}Ti)	300 kBq (8.1081 microcuries)
OSGI-RT	Mn-54 (^{54}Mn)	1000 kBq (27.027 microcuries)
OSGI-RT	Fe-55 (^{55}Fe)	1000 kBq (27.027 microcuries)
OSGI-RT	Co-57 (^{57}Co)	1000 kBq (27.027 microcuries)
OSGI-RT	Co-60 (^{60}Co)	500 kBq (13.514 microcuries)
OSGI-RT	Zn-65 (^{65}Zn)	1000 kBq (27.027 microcuries)
OSGI-RT	Y-88 (^{88}Y)	1000 kBq (27.027 microcuries)
OSGI-RT	Cd-109 (^{109}Cd)	1000 kBq (27.027 microcuries)
OSGI-RT	Sn-113 (^{113}Sn)	500 kBq (13.514 microcuries)
OSGI-RT	Ba-133 (^{133}Ba)	1000 kBq (27.027 microcuries)
OSGI-RT	Cs-134 (^{134}Cs)	300 kBq (8.1081 microcuries)
OSGI-RT	Cs-137 (^{137}Cs)	1000 kBq (27.027 microcuries)
OSGI-RT	Ce-139 (^{139}Cs)	1000 kBq (27.027 microcuries)
OSGI-RT	Eu-152 (^{152}Eu)	1000 kBq (27.027 microcuries)
OSGI-RT	Gd-153 (^{153}Gd)	500 kBq (13.514 microcuries)
OSGI-RT	Bi-207 (^{207}Bi)	100 kBq (2.7027 microcuries)
OSGI-RT	Th-228 (^{228}Th)	100 kBq (2.7027 microcuries)
OSGI-RT	Am-241 (^{241}Am)	300 kBq (8.1081 microcuries)
OSGI-RT	Am-243 (^{243}Am)	50 kBq (1.3514 microcuries)

LEAK TEST FREQUENCY: Six (6) Months

PRINCIPAL USE: (I) Calibration Sources

CUSTOM DEVICE: ___ Yes _X_ No

SOURCE TYPE: Calibration / Reference Sources

DESCRIPTION:

The sealed source OSGI-RT Series Calibration/Reference Sources are cylindrical in shape consisting of an outer body, ring, outer ring, inner ring, polyimide films, and active part (isotope). The outer body and rings are constructed of aluminum. The active part (isotope) is thermally sealed in between two pieces of polyimide film. The overall dimensions of the assembled source assemblies are 25 mm (0.984 inch) (standard) or 29 mm (1.14 inch) (Special Order) in outside diameter and 3.0 mm (0.118 inch) in height, with an active window less than 3.0 mm (0.118 inch).

The OSGI-RT Series are low-energy gamma (photon) radiation sources for use as calibration or reference sources consisting of Na-22, Ti-44, Mn-54, Fe-55, Co-57, Co-60, Zn-65, Y-88, Cd-109, Sn-113, Ba-133, Cs-134, Cs-137, Ce-139, Eu-152, Gd-153, Bi-207, Th-228, Am-241, or Am-243 with an activity range of 1 kBq (0.027027 microcuries) to 1000 kBq (27.027 microcuries) (See Table 1 for individual activities).

LABELING:

The OSGI-RT Series source assemblies are labeled using either laser or mechanical engraving. The minimum character height is 1.5 mm (0.059 inch). The label is located on the top face of the source assembly. The label contains the trefoil symbol, the Ritverc logo, the radioactive chemical symbol and the atomic mass, the serial number, and year of manufacture.

DIAGRAM:

Attachment 1: Drawing of OSGI-RT Series Source Assembly
Attachment 2: Diagram of Source Labeling

CONDITIONS OF NORMAL USE:

The source capsules are designed to be used as radioactive sources for calibration/reference to verify that survey meters, leak test analyzers, scientific analyzers, or similar equipment are functioning properly. The sources have been tested to perform satisfactorily under the following conditions:

Temperature	-50 °C (-58 °F) to +50 °C (122 °F)
Humidity	98% at +40 C (104 °F)
Pressure	25 to 500 kPa
Impact	50 m/s^2 (164.0 feet/ m/s^2) up to 100 ms (0.001 second)
Vibration	5 to 50 m/s^2(16.4 to 164.0 feet/ m/s^2), 5 to 500 Hz

USEFUL LIFE:

The estimated and recommended working life of the sources is 12 years except as noted in Table 1. At the end of the working life, the sources may be returned to the manufacturer for disposal.

SOURCE TYPE: Calibration / Reference Sources

PROTOTYPE TESTING:

The prototype sources were subjected to the required tests demonstrating the sources will maintain their integrity under stresses of use and accidental conditions that may occur. The required classification for calibration sources is C22212 and have achieved the classification shown in Table 1.

Table 1	**Ritverc OSGI Series Calibration/Reference Sources**				
Source Models	Source Classification (ANSI N43.6-2015) (ISO 2919:2012)	Isotopes	Capacity in microcuries (kBq)	Service Life Years (kBq)	Capsule Dimensions
OSGI-RT	C35242	Na-22	27.027 (1000)	12	3.0 mm H x 25.0 mm D 0.118 inch H x 0.984 inch D
OSGI-RT	C35242	Ti-44	8.1081 (300)	12	3.0 mm H x 25.0 mm D 0.118 inch H x 0.984 inch D
OSGI-RT	C35242	Mn-54	27.027 (1000)	5	3.0 mm H x 25.0 mm D 0.118 inch H x 0.984 inch D
OSGI-RT	C35242	Fe-55	27.027 (1000)	12	3.0 mm H x 25.0 mm D 0.118 inch H x 0.984 inch D
OSGI-RT	C35242	Co-57	27.027 (1000)	5	3.0 mm H x 25.0 mm D 0.118 inch H x 0.984 inch D
OSGI-RT	C35242	Co-60	13.514 (500)	12	3.0 mm H x 25.0 mm D 0.118 inch H x 0.984 inch D
OSGI-RT	C35242	Zn-65	27.027 (1000)	5	3.0 mm H x 25.0 mm D 0.118 inch H x 0.984 inch D
OSGI-RT	C35242	Y-88	27.027 (1000)	4	3.0 mm H x 25.0 mm D 0.118 inch H x 0.984 inch D
OSGI-RT	C35242	Cd-109	27.027 (1000)	5	3.0 mm H x 25.0 mm D 0.118 inch H x 0.984 inch D
OSGI-RT	C35242	Sn-113	13.514 (500)	4	3.0 mm H x 25.0 mm D 0.118 inch H x 0.984 inch D
OSGI-RT	C35242	Ba-133	27.027 (1000)	12	3.0 mm H x 25.0 mm D 0.118 inch H x 0.984 inch D
OSGI-RT	C35242	Cs-134	8.1081 (300)	12	3.0 mm H x 25.0 mm D 0.118 inch H x 0.984 inch D
OSGI-RT	C35242	Cs-137	27.027 (1000)	12	3.0 mm H x 25.0 mm D 0.118 inch H x 0.984 inch D
OSGI-RT	C35242	Ce-139	27.027 (1000)	4	3.0 mm H x 25.0 mm D 0.118 inch H x 0.984 inch D
OSGI-RT	C35242	Eu-152	27.027 (1000)	12	3.0 mm H x 25.0 mm D 0.118 inch H x 0.984 inch D
Note 1	The nominal value of the radionuclide activity in the source within the specified limits is set by the customer when ordering the source. Activity deviation from nominal value shall not exceed ± 20%.				
Note 2	When supplying sources with a higher radionuclide activity, by agreement with the customer, it is allowed to reduce the assigned service life.				

SOURCE TYPE: Calibration / Reference Sources

PROTOTYPE TESTING (Cont.):

Table 1	Ritverc OSGI Series Calibration/Reference Sources				
Source Models	Source Classification (ANSI N43.6-2015) (ISO 2919:2012)	Isotopes	Capacity in microcuries (kBq)	Service Life Years (kBq)	Capsule Dimensions
OSGI-RT	C35242	Gd-153	13.514 (500)	5	3.0 mm H x 25.0 mm D
OSGI-RT	C35242	Bi-207	2.7027 (100)	12	3.0 mm H x 25.0 mm D
OSGI-RT	C35242	Th-228	2.7027 (100)	3 (<10) 5(>10)	3.0 mm H x 25.0 mm D
OSGI-RT	C35242	Am-241	8.1081 (300)	3 (<10) 5(>10)	3.0 mm H x 25.0 mm D
OSGI-RT	C35242	Am-243	1.3514 (50)	3 (<10) 5(>10)	3.0 mm H x 25.0 mm D
Note 1	The nominal value of the radionuclide activity in the source within the specified limits is set by the customer when ordering the source. Activity deviation from nominal value shall not exceed ± 20%.				
Note 2	When supplying sources with a higher radionuclide activity, by agreement with the customer, it is allowed to reduce the assigned service life.				

The sources have been tested to the following ISO 2919 conditions:

Temperature: 3 (-40 °C (-40 °F) for 20 min ; +180 °C (356 °F) for 1 hour.);

Pressure: 5 (from 25 KPa absolute to 7 MPa absolute);

Impact: 2 (free fall of a 50 g steel hammer from a height of 1 m (3.2 feet) or equivalent imparted energy);

Vibration: 4 (3 time 30 min; 25 Hz to 80 Hz at 1.5 mm (0.059 inch) peak to peak and 80 Hz to 2000 Hz at 196 m/s^2 (643.0 feet/ m/s^2) (20g).

Puncture: 2 (Free fall of a 1 g hammer with striker from 1 m (3.2 feet) or equivalent imparted energy).

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EXTERNAL RADIATION LEVELS:

The radiation values were calculated (extrapolated) using the gamma constant values for the listed isotopes at 1 meter (3.2 feet) to provide the radiation profile and extrapolated at 5cm (1.96 inch) and 30cm (11.8 inch) using the inverse square law. The results are provided below in Table 2:

Table 2	**Unshielded Radiation Profile at 5cm, 30cm and 100cm**							
Source Model	Activity in µCi		Calculated 5 cm		Calculated 30 cm		Gamma Constant 100 cm	
	Isotope	Max Activity	µSv/h	mR/h	µSv/h	mR/h	µSv/h	mR/h
OSGI-RT	Na-22	27.027	144.0	14.4	4.0	0.4	0.36	0.036
OSGI-RT	Ti-44	8.1081	4.0	0.4	0.1	0.01	0.01	0.001
OSGI-RT	Mn-54	27.027	56.0	5.6	1.6	0.16	0.14	0.014
OSGI-RT	Fe-55*	27.027	0.00	0.000	0.00	0.000	0.00	0.000
OSGI-RT	Co-57	27.027	16.0	1.6	0.4	0.04	0.04	0.004
OSGI-RT	Co-60	13.514	76.0	7.6	2.1	0.21	0.19	0.019
OSGI-RT	Zn-65	27.027	36.0	3.6	1.0	0.1	0.09	0.009
OSGI-RT	Y-88	27.027	192.0	19.2	5.3	0.53	0.48	0.048
OSGI-RT	Cd-109	27.027	20.0	2.0	0.6	0.06	0.05	0.005
OSGI-RT	Sn-113	13.514	8.0	0.8	0.2	0.02	0.02	0.002
OSGI-RT	Ba-133	27.027	48.0	4.8	1.3	0.13	0.12	0.012
OSGI-RT	Cs-134	8.1081	32.0	3.2	0.9	0.09	0.08	0.008
OSGI-RT	Cs-137	27.027	40.0	4.0	1.1	0.11	0.10	0.010
OSGI-RT	Ce-139	27.027	24.0	2.4	0.7	0.07	0.06	0.006
OSGI-RT	Eu-152	27.027	80.0	8.0	2.2	0.22	0.20	0.020
OSGI-RT	Gd-153	13.514	8.0	0.8	0.2	0.02	0.02	0.002
OSGI-RT	Bi-207	2.7027	16.0	1.6	0.4	0.04	0.04	0.004
OSGI-RT	Th-228	2.7027	0.8	0.08	0.022	0.0022	0.002	0.0002
OSGI-RT	Am-241	8.1081	12.0	1.2	0.3	0.03	0.03	0.003
OSGI-RT	Am-243	1.3514	1.6	0.16	0.044	0.0044	0.004	0.0004
*** Only detectable with contact with scintillation probe**								

QUALITY ASSURANCE AND CONTROL:

Ritverc manufactures the OSGI-RT Series sources according to its approved Quality Assurance Program (QAP). Ritverc's QAP is approved under ISO 9001:2015, Certificate Number QEC21397. ISOFLEX Radioactive LLC's (ISO-RAD) QAP is approved under ISO 9001:2015, Certificate # 8342. Our USNRC QAP/QMS is on file with the USNRC. ISO-RAD's Quality System is described in the Quality Management System Manual. This quality system complies with requirements of the US Nuclear Regulatory Commission in 10 CFR 71.

SOURCE TYPE: Calibration / Reference Sources

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

- Only persons specifically licensed by the United States Nuclear Regulatory Commission (USNRC), by an agreement state, or other international regulatory body are authorized to use this radioactive source assembly.
- Handling, storage, use, transfer, and disposal: To be determined by the licensing authority.
- The source shall be tested for leakage at intervals not to exceed six (6) months using techniques capable of detecting 0.005 microcurie (185 Bq) of removable contamination.
- The sources shall not be subjected to conditions that exceed its ANSI 43.6-1997 or ISO 2919:2012 classification shown in Table 1.
- This registration sheet and the information contained within the references shall not be changed without the written consent of the State of Louisiana, Department of Environmental Quality, Office of Environmental Compliance, Emergency & Radiological Services Division.

SAFETY ANALYSIS SUMMARY:

Based on our review of the ISOFLEX Models sealed sources, its ANSI classification, and the information and test data submitted, we conclude that the source is acceptable for licensing purposes.

Furthermore, we conclude that this source would be expected to maintain its containment integrity for normal conditions of use and accidental conditions which might occur during uses specified in this certificate.

REFERENCES:

- ISO-RAD email dated October 10, 2022, with enclosures thereto.
- ISO-RAD email dated December 13, 2022, with enclosures thereto.

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NO.: LA-1491-S-106-S DATE: January 5, 2023

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ISSUING AGENCY:

State of Louisiana, Department of Environmental Quality, Office of Environmental Compliance, Emergency & Radiological Services Division:

Date: 1/5/2023 Reviewed By: _____
James M. Pate III, M.S.

Date: 1/5/2023 Reviewed By: _____
Gilberto Cuadra

Date: 1/5/2023 Concurrence: _____
Ziad Fahd, M.S.

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Drawing of OSGI-RT Series Sources

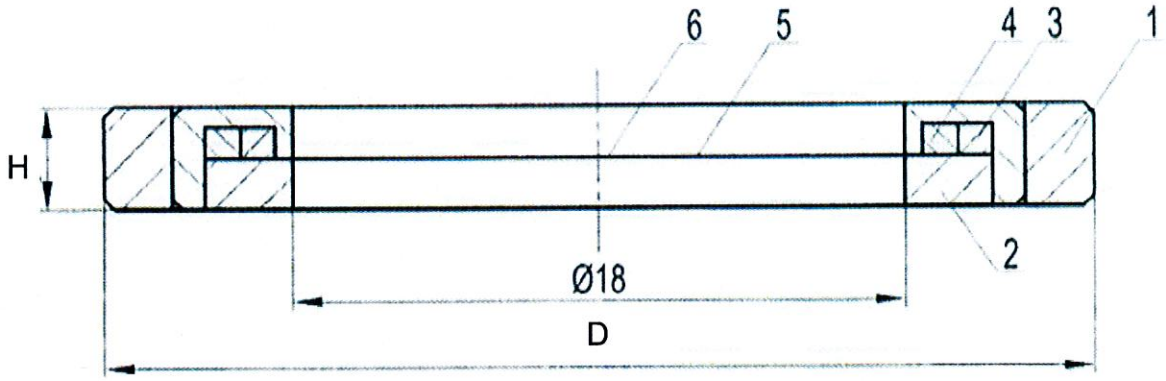

Figure 1 – General view of the OSGI-RT source

1 – case, 2 – ring, 3 – outer ring, 4 – inner ring,

5 – polyimide films, 6 – active part

Source Dimensions			
Source Model	**Height (H) mm / inch**	**Diameter (D) mm / inch**	**Options**
OSGI-RT	3.0 / 0.118	25.0 / 0.984	Option 1
OSGI-RT	3.0 / 0.118	29.0 / 1.14	Option 2

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Diagram of Source Labeling