Certificate of Participation

for the EURADOS Intercomparison 2022 for whole body dosemeters (IC2022ph)

Certificate Number:	EURADOS-IC2022ph-S106 for system S106/2022
Number of pages:	4
Date of Issue:	July 07th, 2023
Participating Institute:	Research and Production Enterprise DOSIMETRICA LLC, Ukraine
Dosimetry System:	Harshaw 8800, s/n 112053
Reporting number:	18 (this anonymous number will be used in further publications)
Intercomparison procedure:	The EURADOS Intercomparison 2022 for whole body dosemeters was managed and coordinated on behalf of EURADOS by the WG2 Intercomparison Organization Group (OG). The OG established the irradiation plan and announced the intercomparison, including the range limits of the doses and radiation qualities, in May 2022. Participants were asked to indicate details of the dosemeter reference point on the online application form. After completing application procedures the participants sent their dosemeters, according to the instructions, to the OG coordinator (July 2022). The coordinator checked the correct labelling of the dosemeters and transferred all dosemeters, along with the instructions, to the irradiation laboratory. The laboratory irradiated the dosemeters according to the irradiation plan and sent all the dosemeters back to the coordinator (November 2022). The coordinator then returned the dosemeters to the participants for assessment and indicated which dosemeters were not irradiated. The participants were instructed to follow normal routine procedures as far as possible. The participants then sent the results of the dosemeter readings to the coordinator (January 2023). After receipt of the participants' results, the coordinator sent the irradiation data to the participants.
Number of participants:	96 institutes participated in IC2022ph with a total of 116 systems.
Coordinator:	Christian Gärtner (Seibersdorf Labor GmbH, A-2444 Seibersdorf)
Intercomparison results:	See the tables on pages 2 to 4 of this certificate.
Irradiation data:	See the attached certificate of the irradiation laboratory: Number Dos/2896-106/2022
Participant results:	See the attached signed dose report provided by the participant.

On behalf of the intercomparison Organization Group:

Christian Gärtner
Coordinator

On behalf of EURADOS:

Filip Vanhavere
Chairperson

Result of the Intercomparison (Dosimetry System S106/2022)

EURADOS Dosemeter ID	Participant's Dosemeter ID	Radiation Quality	Quantity	Participant's Value	Reference Value	Ratio
S106/2022–03	400003	S-Cs, 0°	$H_p(10)$	2.77 mSv	2.60 mSv	1.07
			$H_p(0.07)$	2.79 mSv	2.60 mSv	1.07
S106/2022–10	400010	S-Cs, 0°	$H_p(10)$	2.77 mSv	2.60 mSv	1.07
			$H_p(0.07)$	2.89 mSv	2.60 mSv	1.11
S106/2022–12	400013	S-Cs, 0°	$H_p(10)$	2.74 mSv	2.60 mSv	1.05
			$H_p(0.07)$	2.74 mSv	2.60 mSv	1.05
S106/2022–15	400016	S-Cs, 0°	$H_p(10)$	2.69 mSv	2.60 mSv	1.03
			$H_p(0.07)$	2.70 mSv	2.60 mSv	1.04
S106/2022–04	400004	S-Cs, 0°	$H_p(10)$	8.03 mSv	7.50 mSv	1.07
			$H_p(0.07)$	8.47 mSv	7.50 mSv	1.13
S106/2022–07	400007	S-Cs, 0°	$H_p(10)$	7.98 mSv	7.50 mSv	1.06
			$H_p(0.07)$	7.94 mSv	7.50 mSv	1.06
S106/2022–14	400015	S-Co, 0°	$H_p(10)$	10.15 mSv	9.64 mSv	1.05
			$H_p(0.07)$	10.33 mSv	9.81 mSv	1.05
S106/2022–26	400029	S-Co, 0°	$H_p(10)$	10.08 mSv	9.64 mSv	1.05
			$H_p(0.07)$	11.00 mSv	9.81 mSv	1.12
S106/2022–05	400005	S-Co, 0°	$H_p(10)$	140.00 mSv	131.00 mSv	1.07
			$H_p(0.07)$	155.90 mSv	133.30 mSv	1.17
S106/2022–25	400027	S-Co, 0°	$H_p(10)$	139.06 mSv	131.00 mSv	1.06
			$H_p(0.07)$	156.24 mSv	133.30 mSv	1.17

Result of the Intercomparison (Dosimetry System S106/2022), continued

EURADOS Dosemeter ID	Participant's Dosemeter ID	Radiation Quality	Quantity	Participant's Value	Reference Value	Ratio
S106/2022–06	400006	S-Co, 0°	$H_p(10)$	361.37 mSv	319.00 mSv	1.13
			$H_p(0.07)$	401.19 mSv	324.50 mSv	1.24
S106/2022–29	400032	S-Co, 0°	$H_p(10)$	366.33 mSv	319.00 mSv	1.15
			$H_p(0.07)$	380.35 mSv	324.50 mSv	1.17
S106/2022–22	400024	N-40, 0°	$H_p(10)$	6.06 mSv	5.80 mSv	1.04
			$H_p(0.07)$	6.20 mSv	6.14 mSv	1.01
S106/2022–23	400025	N-40, 0°	$H_p(10)$	6.08 mSv	5.80 mSv	1.05
			$H_p(0.07)$	6.18 mSv	6.14 mSv	1.01
S106/2022–18	400019	N-40 + S-Cs mixed, 0°	$H_p(10)$	3.42 mSv	3.00 mSv	1.14
			$H_p(0.07)$	3.52 mSv	3.10 mSv	1.14
S106/2022–21	400023	N-40 + S-Cs mixed, 0°	$H_p(10)$	3.50 mSv	3.00 mSv	1.17
			$H_p(0.07)$	3.50 mSv	3.10 mSv	1.13
S106/2022–01	400001	W-80, 0°	$H_p(10)$	5.88 mSv	6.00 mSv	0.98
			$H_p(0.07)$	6.01 mSv	5.56 mSv	1.08
S106/2022–13	400014	W-80, 0°	$H_p(10)$	5.72 mSv	6.00 mSv	0.95
			$H_p(0.07)$	6.23 mSv	5.56 mSv	1.12
S106/2022–02	400002	W-80, 60°	$H_p(10)$	5.93 mSv	5.80 mSv	1.02
			$H_p(0.07)$	5.80 mSv	6.26 mSv	0.93
S106/2022–17	400018	W-80, 60°	$H_p(10)$	6.61 mSv	5.80 mSv	1.14
			$H_p(0.07)$	6.87 mSv	6.26 mSv	1.10

Result of the Intercomparison (Dosimetry System S106/2022), continued

EURADOS Dosemeter ID	Participant's Dosemeter ID	Radiation Quality
S106/2022–08	400008	not irradiated
S106/2022–09	400009	not irradiated
S106/2022–11	400011	not irradiated
S106/2022–16	400017	not irradiated
S106/2022–19	400020	not irradiated
S106/2022–20	400022	not irradiated
S106/2022–24	400026	not irradiated
S106/2022–27	400030	not irradiated
S106/2022–28	400031	not irradiated
S106/2022–30	400034	not irradiated

Radiation Qualities and average photon energy (according to ISO 4037-1 and IEC 61267):

- Nuclide Radiation:
  - S-Cs: 662 keV
  - S-Co: 1250 keV
- X-Rays:
  - N-40: 33 keV
  - W-80: 56.5 keV

Calibrations
Cert. No 116(6)

HELLENIC REPUBLIC
MINISTRY OF DEVELOPMENT AND INVESTMENTS
GENERAL SECRETARIAT FOR RESEARCH & INNOVATION

EEAE ΕΛΛΗΝΙΚΗ ΕΠΙΤΡΟΠΗ ΑΤΟΜΙΚΗΣ ΕΝΕΡΓΕΙΑΣ
GREEK ATOMIC ENERGY COMMISSION

Ag. Paraskevi, 19/05/2023
Our Ref: B/428/11274

IONIZING RADIATION CALIBRATION LABORATORY
Affiliated to the Hellenic Metrology Institute

IRRADIATION CERTIFICATE No: Dos/2896- 106/2022

Number of Pages: 2
Date of Issue: 24/05/2023

The following personnel dosimeters from:	**EURADOS INTERCOMPARISON PROGRAM SYSTEM No:S106/2022**

have been irradiated at the ***Ionizing Radiation Calibration Laboratory of Greek Atomic Energy Commission:***

Personal Dosemeters (PD):	**Whole body**
Dosemeter Identification:	-
Detection Principle:	-
Irradiation Period:	**See below**

The Kair reference values have been obtained using the secondary standards ionization chambers PTW W-32002-LS01 (S/N: 69) or FC65-G (S/N: 634) and the electrometer PTW UNIDOS 10002 (S/N 20314). The LS01 chamber was calibrated in PTB during 06 & 07-03-2019 (PTB, Cal. Cert. No PTB-6.3-4094018). The FC65-G chamber was calibrated at BIPM on 24-04-2019 (BIPM, Cal. Cert. No 25).
The irradiation conditions are in accordance to ISO 4037/1-2-3-4 and IEC 62387.

Irradiation conditions

Phantom:	ISO water phantom, (30x30x15) cm^3
Source to PD Distance:	100-300 cm, depending on required Kair rate
Kair Rate:	S-Cs: 454.3 μGy/min (at 100 cm) W-80: 2.63 mGy/min (at 200 cm) N-40: 203.7 μGy/ min (at 200 cm) S-Co: 145.5 mGy/min (at 100 cm) S-Co: 18.6 mGy/min (at 300 cm) S-Co: 0.90 mGy/min (at 300 cm with lead block)
Field Size:	S-Cs: Circular with diameter of 55.6 cm (at 200 cm) x-rays: Circular with diameter 26.8 cm (at 200 cm) S-Co: Rectangular (30x30) cm^2 (at 300 cm)
Build up PMMA:	(0.3 x 30x30) cm^3
Reference point of PD:	Frontal surface of slab phantom

Environmental conditions during irradiations:

Temperature	Pressure	Relative Humidity
19.0-21.0 °C	981.0-985.0 hPa	10 %

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Irradiation Data

# Dosemeter	Date	Quality	$H_p(10)$ mSv	U % (1)	$H_p(0.07)$ mSv	U % (1)
S106-12	02/09/2022	S-Cs	2.60	4.9	2.60	4.9
S106-03	02/09/2022	S-Cs	2.60	4.9	2.60	4.9
S106-10	02/09/2022	S-Cs	2.60	4.9	2.60	4.9
S106-15	02/09/2022	S-Cs	2.60	4.9	2.60	4.9
S106-07	25/08/2022	S-Cs	7.50	4.9	7.50	4.9
S106-04	25/08/2022	S-Cs	7.50	4.9	7.50	4.9
S106-14	18/11/2022	S-Co	9.64	4.9	9.81	4.9
S106-26	18/11/2022	S-Co	9.64	4.9	9.81	4.9
S106-25	26/09/2022	S-Co	131	4.9	133	4.9
S106-05	26/09/2022	S-Co	131	4.9	133	4.9
S106-29	29/08/2022	S-Co	319	4.9	325	4.9
S106-06	29/08/2022	S-Co	319	4.9	325	4.9
S106-22	03/10/2022	N-40-(0°)	5.80	5.1	6.14	5.1
S106-23	03/10/2022	N-40-(0°)	5.80	5.1	6.14	5.1
S106-01	08/11/2022	W-80-(0°)	6.00	5.1	5.56	5.1
S106-13	08/11/2022	W-80-(0°)	6.00	5.1	5.56	5.1
S106-17	14/11/2022	W-80-(60°)	5.80	5.3	6.26	5.3
S106-02	14/11/2022	W-80-(60°)	5.80	5.3	6.26	5.3

# Dosemeter	Date	Quality	$H_p(10)$ mSv	U % (1)	$H_p(0.07)$ mSv	U % (1)
S106-18	12/09/2022	Cs-137	1.20	4.9 %	1.20	4.9 %
	31/10/2022	N-40	1.80	5.1 %	1.87	5.1 %
	Total		3.00	7.1 %	3.07	7.1 %
S106-21	12/09/2022	Cs-137	1.20	4.9 %	1.20	4.9 %
	31/10/2022	N-40	1.80	5.1 %	1.87	5.1 %
	Total		3.00	7.1 %	3.07	7.1 %

[1]*U= uncertainty 95% confidence level (k=2)*

Not Irradiated Dosemeters :

S106-08;S106-09; S106-11; S106-16; S106-19;S106-20; S106-24; S106-27;S106-28; S106-30;

Irradiations performed by:

Boziari A., Medical Physicist
Stamatopoulou E., Technician
Askounis P., Physicist

ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ ΥΠΟΥΡΓΕΙΟ ΑΝΑΠΤΥΞΗΣ ΚΑΙ ΕΠΕΝΔΥΣΕΩΝ ΕΘΝΙΚΗ ΕΠΙΤΡΟΠΗ ΑΤΟΜΙΚΗΣ ΕΝΕΡΓΕΙΑΣ

Argiro Boziari
Head of Dosimetry and Calibration Unit

ΕΣΥΔ
Calibrations
Cert. No 116(o)

This certificate is issued in according with the requirements of ISO 17025. It provides traceability of measurements to recognized national standards laboratories. The HIRCL/GAEC is a member of the IAEA/WHO Secondary Standard Dosimetry Laboratory Network.

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Whole body dosemeter intercomparison IC2022ph
Dose Values Form

General Data

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S106/2022, Harshaw 8800, s/n 112053

Dose Values

Dosemeter 'S106/2022 - 01':	**Hp(10) dose = 5.88 mSv**
400001	**Hp(0.07) dose = 6.01 mSv**
irradiated	**Remark =**
Dosemeter 'S106/2022 - 02':	**Hp(10) dose = 5.93 mSv**
400002	**Hp(0.07) dose = 5.8 mSv**
irradiated	**Remark =**
Dosemeter 'S106/2022 - 03':	**Hp(10) dose = 2.77 mSv**
400003	**Hp(0.07) dose = 2.79 mSv**
irradiated	**Remark =**
Dosemeter 'S106/2022 - 04':	**Hp(10) dose = 8.03 mSv**
400004	**Hp(0.07) dose = 8.47 mSv**
irradiated	**Remark =**
Dosemeter 'S106/2022 - 05':	**Hp(10) dose = 140 mSv**
400005	**Hp(0.07) dose = 155.9 mSv**
irradiated	**Remark =**
Dosemeter 'S106/2022 - 06':	**Hp(10) dose = 361.37 mSv**
400006	**Hp(0.07) dose = 401.19 mSv**
irradiated	**Remark =**
Dosemeter 'S106/2022 - 07':	**Hp(10) dose = 7.98 mSv**
400007	**Hp(0.07) dose = 7.94 mSv**
irradiated	**Remark =**
Dosemeter 'S106/2022 - 08':	**Hp(10) dose = 0.215 mSv**
400008	**Hp(0.07) dose = 0.225 mSv**
not irradiated	**Remark =**
Dosemeter 'S106/2022 - 09':	**Hp(10) dose = 0.224 mSv**
400009	**Hp(0.07) dose = 0.225 mSv**
not irradiated	**Remark =**
Dosemeter 'S106/2022 - 10':	**Hp(10) dose = 2.77 mSv**
400010	**Hp(0.07) dose = 2.89 mSv**
irradiated	**Remark =**

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Dose Values, continued

Dosemeter 'S106/2022 - 11':	**Hp(10) dose = 0.217 mSv**
400011	**Hp(0.07) dose = 0.216 mSv**
not irradiated	**Remark =**
Dosemeter 'S106/2022 - 12':	**Hp(10) dose = 2.74 mSv**
400013	**Hp(0.07) dose = 2.74 mSv**
irradiated	**Remark =**
Dosemeter 'S106/2022 - 13':	**Hp(10) dose = 5.72 mSv**
400014	**Hp(0.07) dose = 6.23 mSv**
irradiated	**Remark =**
Dosemeter 'S106/2022 - 14':	**Hp(10) dose = 10.15 mSv**
400015	**Hp(0.07) dose = 10.33 mSv**
irradiated	**Remark =**
Dosemeter 'S106/2022 - 15':	**Hp(10) dose = 2.69 mSv**
400016	**Hp(0.07) dose = 2.7 mSv**
irradiated	**Remark =**
Dosemeter 'S106/2022 - 16':	**Hp(10) dose = 0.221 mSv**
400017	**Hp(0.07) dose = 0.23 mSv**
not irradiated	**Remark =**
Dosemeter 'S106/2022 - 17':	**Hp(10) dose = 6.61 mSv**
400018	**Hp(0.07) dose = 6.87 mSv**
irradiated	**Remark =**
Dosemeter 'S106/2022 - 18':	**Hp(10) dose = 3.42 mSv**
400019	**Hp(0.07) dose = 3.52 mSv**
irradiated	**Remark =**
Dosemeter 'S106/2022 - 19':	**Hp(10) dose = 0.222 mSv**
400020	**Hp(0.07) dose = 0.22 mSv**
not irradiated	**Remark =**
Dosemeter 'S106/2022 - 20':	**Hp(10) dose = 0.219 mSv**
400022	**Hp(0.07) dose = 0.211 mSv**
not irradiated	**Remark =**

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Dose Values, continued

Dosemeter 'S106/2022 - 21':	**Hp(10) dose = 3.5 mSv**
400023	**Hp(0.07) dose = 3.5 mSv**
Irradiated	**Remark =**
Dosemeter 'S106/2022 - 22':	**Hp(10) dose = 6.06 mSv**
400024	**Hp(0.07) dose = 6.2 mSv**
irradiated	**Remark =**
Dosemeter 'S106/2022 - 23':	**Hp(10) dose = 6.08 mSv**
400025	**Hp(0.07) dose = 6.18 mSv**
irradiated	**Remark =**
Dosemeter 'S106/2022 - 24':	**Hp(10) dose = 0.218 mSv**
400026	**Hp(0.07) dose = 0.23 mSv**
not irradiated	**Remark =**
Dosemeter 'S106/2022 - 25':	**Hp(10) dose = 139.06 mSv**
400027	**Hp(0.07) dose = 156.24 mSv**
irradiated	**Remark =**
Dosemeter 'S106/2022 - 26':	**Hp(10) dose = 10.08 mSv**
400029	**Hp(0.07) dose = 11 mSv**
irradiated	**Remark =**
Dosemeter 'S106/2022 - 27':	**Hp(10) dose = 0.218 mSv**
400030	**Hp(0.07) dose = 0.218 mSv**
not irradiated	**Remark =**
Dosemeter 'S106/2022 - 28':	**Hp(10) dose = 0.213 mSv**
400031	**Hp(0.07) dose = 0.209 mSv**
not irradiated	**Remark =**
Dosemeter 'S106/2022 - 29':	**Hp(10) dose = 366.33 mSv**
400032	**Hp(0.07) dose = 380.35 mSv**
irradiated	**Remark =**
Dosemeter 'S106/2022 - 30':	**Hp(10) dose = 0.218 mSv**
400034	**Hp(0.07) dose = 0.232 mSv**
not irradiated	**Remark =**

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Dose Values Form

General Data

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S106/2022, Harshaw 8800, s/n 112053

Dose Values, continued

Transit dose: **Hp(10) dose = 0.22 mSv**

Remark =

Signature	Name	Date
	Vitalii Voloskyi	25.01.23