

Certificate of Participation

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

Certificate Number: EURADOS-IC2022ph-S022 for system S022/2022
Number of pages: 4
Date of Issue: July 07th, 2023
Participating Institute: Research and Production Enterprise DOSIMETRICA LLC, Ukraine
Dosimetry System: Harshaw 6600, s/n 9210060
Reporting number: 34 (this anonymous number will be used in further publications)
Intercomparison procedure: The EURADOS Intercomparison 2022 for whole body dosimeters 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 dosimeter reference point on the online application form. After completing application procedures the participants sent their dosimeters, according to the instructions, to the OG coordinator (July 2022). The coordinator checked the correct labelling of the dosimeters and transferred all dosimeters, along with the instructions, to the irradiation laboratory. The laboratory irradiated the dosimeters according to the irradiation plan and sent all the dosimeters back to the coordinator (November 2022).
The coordinator then returned the dosimeters to the participants for assessment and indicated which dosimeters were not irradiated. The participants were instructed to follow normal routine procedures as far as possible. The participants then sent the results of the dosimeter 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/2896-022/2022
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

Whole body dosimeter intercomparison IC2022ph

Result of the Intercomparison (Dosimetry System S022/2022)

EURADOS Dosemeter ID	Participant's Dosemeter ID	Radiation Quality	Quantity	Participant's Value	Reference Value	Ratio
S022/2022-08	30624	S-Cs, 0°	$H_p(10)$	3.10 mSv	3.60 mSv	0.86
			$H_p(0.07)$	3.40 mSv	3.60 mSv	0.94
S022/2022-10	30925	S-Cs, 0°	$H_p(10)$	3.17 mSv	3.60 mSv	0.88
			$H_p(0.07)$	3.30 mSv	3.60 mSv	0.92
S022/2022-13	30987	S-Cs, 0°	$H_p(10)$	3.23 mSv	3.60 mSv	0.90
			$H_p(0.07)$	3.49 mSv	3.60 mSv	0.97
S022/2022-17	30837	S-Cs, 0°	$H_p(10)$	3.10 mSv	3.60 mSv	0.86
			$H_p(0.07)$	3.11 mSv	3.60 mSv	0.86
S022/2022-16	30559	S-Cs, 0°	$H_p(10)$	7.47 mSv	8.40 mSv	0.89
			$H_p(0.07)$	8.52 mSv	8.40 mSv	1.01
S022/2022-23	30435	S-Cs, 0°	$H_p(10)$	7.71 mSv	8.40 mSv	0.92
			$H_p(0.07)$	7.79 mSv	8.40 mSv	0.93
S022/2022-01	30037	S-Co, 0°	$H_p(10)$	9.48 mSv	11.40 mSv	0.83
			$H_p(0.07)$	9.55 mSv	11.60 mSv	0.82
S022/2022-06	30493	S-Co, 0°	$H_p(10)$	9.35 mSv	11.40 mSv	0.82
			$H_p(0.07)$	10.35 mSv	11.60 mSv	0.89
S022/2022-20	31005	S-Co, 0°	$H_p(10)$	115.26 mSv	143.00 mSv	0.81
			$H_p(0.07)$	134.09 mSv	145.50 mSv	0.92
S022/2022-29	30479	S-Co, 0°	$H_p(10)$	121.91 mSv	143.00 mSv	0.85
			$H_p(0.07)$	130.04 mSv	145.50 mSv	0.89

Whole body dosemeter intercomparison IC2022ph

Result of the Intercomparison (Dosimetry System S022/2022), continued

EURADOS Dosemeter ID	Participant's Dosemeter ID	Radiation Quality	Quantity	Participant's Value	Reference Value	Ratio
S022/2022-02	30067	S-Co, 0°	$H_p(10)$	276.50 mSv	308.00 mSv	0.90
			$H_p(0.07)$	293.84 mSv	313.40 mSv	0.94
S022/2022-26	30202	S-Co, 0°	$H_p(10)$	281.30 mSv	308.00 mSv	0.91
			$H_p(0.07)$	303.68 mSv	313.40 mSv	0.97
S022/2022-03	30148	N-40, 0°	$H_p(10)$	2.92 mSv	3.80 mSv	0.77
			$H_p(0.07)$	3.77 mSv	4.02 mSv	0.94
S022/2022-09	30751	N-40, 0°	$H_p(10)$	2.95 mSv	3.80 mSv	0.78
			$H_p(0.07)$	3.93 mSv	4.02 mSv	0.98
S022/2022-14	30358	N-40 + S-Cs mixed, 0°	$H_p(10)$	2.52 mSv	3.40 mSv	0.74
			$H_p(0.07)$	2.63 mSv	3.49 mSv	0.75
S022/2022-15	31025	N-40 + S-Cs mixed, 0°	$H_p(10)$	2.73 mSv	3.40 mSv	0.80
			$H_p(0.07)$	3.25 mSv	3.49 mSv	0.93
S022/2022-05	30165	W-80, 0°	$H_p(10)$	4.74 mSv	5.10 mSv	0.93
			$H_p(0.07)$	4.77 mSv	4.73 mSv	1.01
S022/2022-28	30306	W-80, 0°	$H_p(10)$	4.37 mSv	5.10 mSv	0.86
			$H_p(0.07)$	4.21 mSv	4.73 mSv	0.89
S022/2022-21	30632	W-80, 60°	$H_p(10)$	6.14 mSv	7.10 mSv	0.86
			$H_p(0.07)$	6.70 mSv	7.66 mSv	0.87
S022/2022-22	30187	W-80, 60°	$H_p(10)$	5.83 mSv	7.10 mSv	0.82
			$H_p(0.07)$	6.40 mSv	7.66 mSv	0.84

Whole body dosemeter intercomparison IC2022ph

Result of the Intercomparison (Dosimetry System S022/2022), continued

EURADOS Dosemeter ID	Participant's Dosemeter ID	Radiation Quality
S022/2022-04	30146	not irradiated
S022/2022-07	30354	not irradiated
S022/2022-12	30241	not irradiated
S022/2022-18	30364	not irradiated
S022/2022-24	30800	not irradiated
S022/2022-25	30158	not irradiated
S022/2022-27	30618	not irradiated
S022/2022-30	30388	not irradiated
S022/2022-11	30877	wrongly irradiated
S022/2022-19	30989	wrongly 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(5)

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



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- 022/2022

Number of Pages: 2

Date of Issue: 24/05/2023

The following personnel dosimeters from:	EURADOS INTERCOMPARISON PROGRAM SYSTEM No:S022/2022
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have been irradiated at the *Ionizing Radiation Calibration Laboratory of Greek Atomic Energy Commission*:

Personal Dosimeters (PD):	Whole body
Dosimeter 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 %

T.Θ. 60092, Agia Paraskevi 153 10 Attiki, Tel. : +30 210 650 6765
e-mail : argiro.boziari@eeae.gr, info@eeae.gr

Irradiation Data

# Dosimeter	Date	Quality	H _p (10) mSv	U % ⁽¹⁾	H _p (0.07) mSv	U % ⁽¹⁾
S022-13	09/09/2022	S-Cs	3.60	4.9	3.60	4.9
S022-08	09/09/2022	S-Cs	3.60	4.9	3.60	4.9
S022-10	09/09/2022	S-Cs	3.60	4.9	3.60	4.9
S022-17	09/09/2022	S-Cs	3.60	4.9	3.60	4.9
S022-23	30/08/2022	S-Cs	8.40	4.9	8.40	4.9
S022-16	30/08/2022	S-Cs	8.40	4.9	8.40	4.9
S022-01	15/11/2022	S-Co	11.4	4.9	11.6	4.9
S022-06	15/11/2022	S-Co	11.4	4.9	11.6	4.9
S022-20	21/09/2022	S-Co	143	4.9	145	4.9
S022-29	21/09/2022	S-Co	143	4.9	145	4.9
S022-26	31/08/2022	S-Co	308	4.9	313	4.9
S022-02	31/08/2022	S-Co	308	4.9	313	4.9
S022-09	28/09/2022	N-40-(0°)	3.80	5.1	4.02	5.1
S022-03	28/09/2022	N-40-(0°)	3.80	5.1	4.02	5.1
S022-28	04/11/2022	W-80-(0°)	5.10	5.1	4.73	5.1
S022-05	04/11/2022	W-80-(0°)	5.10	5.1	4.73	5.1
S022-22	09/11/2022	W-80-(60°)	7.10	5.3	7.66	5.3
S022-21	09/11/2022	W-80-(60°)	7.10	5.3	7.66	5.3

# Dosimeter	Date	Quality	H _p (10) mSv	U % ⁽¹⁾	H _p (0.07) mSv	U % ⁽¹⁾
S022-14	12/09/2022	Cs-137	1.80	4.9 %	1.80	4.9 %
	26/10/2022	N-40	1.60	5.1 %	1.70	5.1 %
	Total		3.40	7.1 %	3.50	7.1 %
S022-15	12/09/2022	Cs-137	1.80	4.9 %	1.80	4.9 %
	26/10/2022	N-40	1.60	5.1 %	1.70	5.1 %
	Total		3.40	7.1 %	3.50	7.1 %

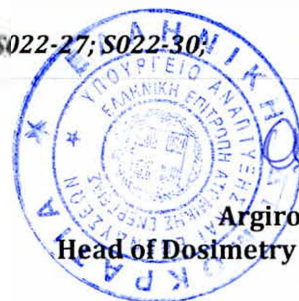
¹U= uncertainty 95% confidence level (k=2)

Not Irradiated Dosimeters :

S022-04; S022-07; S022-12; S022-18; S022-24; S022-25; S022-27; S022-30;

Irradiations performed by:

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



Argiro Boziari
 Head of Dosimetry and Calibration Unit



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Whole body dosimeter intercomparison IC2022ph Dose Values Form

General Data

P028/2022, Research and Production Enterprise DOSIMETRICA LLC, 04050 ...
S022/2022, Harshaw 6600, s/n 9210060

Dose Values, continued

<p>Dosemeter 'S022/2022 - 21': 30632 Irradiated</p>	<p>Hp(10) dose = 6.14 mSv Hp(0.07) dose = 6.698 mSv Remark =</p>
<p>Dosemeter 'S022/2022 - 22': 30187 Irradiated</p>	<p>Hp(10) dose = 5.83 mSv Hp(0.07) dose = 6.402 mSv Remark =</p>
<p>Dosemeter 'S022/2022 - 23': 30435 Irradiated</p>	<p>Hp(10) dose = 7.71 mSv Hp(0.07) dose = 7.79 mSv Remark =</p>
<p>Dosemeter 'S022/2022 - 24': 30800 not irradiated</p>	<p>Hp(10) dose = 0.310 mSv Hp(0.07) dose = 0.310 mSv Remark =</p>
<p>Dosemeter 'S022/2022 - 25': 30158 not irradiated</p>	<p>Hp(10) dose = 0.311 mSv Hp(0.07) dose = 0.309 mSv Remark =</p>
<p>Dosemeter 'S022/2022 - 26': 30202 Irradiated</p>	<p>Hp(10) dose = 281.3 mSv Hp(0.07) dose = 303.68 mSv Remark =</p>
<p>Dosemeter 'S022/2022 - 27': 30628 not irradiated</p>	<p>Hp(10) dose = 0.340 mSv Hp(0.07) dose = 0.352 mSv Remark =</p>
<p>Dosemeter 'S022/2022 - 28': 30306 Irradiated</p>	<p>Hp(10) dose = 4.37 mSv Hp(0.07) dose = 4.21 mSv Remark =</p>
<p>Dosemeter 'S022/2022 - 29': 30479 Irradiated</p>	<p>Hp(10) dose = 121.91 mSv Hp(0.07) dose = 130.04 mSv Remark =</p>
<p>Dosemeter 'S022/2022 - 30': 30386 not irradiated</p>	<p>Hp(10) dose = 0.327 mSv Hp(0.07) dose = 0.330 mSv Remark =</p>



Whole body dosimeter intercomparison IC2022ph Dose Values Form

General Data

P028/2022, Research and Production Enterprise DOSIMETRICA LLC, 04050 ...
S022/2022, Harshaw 6600, s/n 9210060

Dose Values, continued

<p>Dosemeter 'S022/2022 - 11': 30877 irradiated</p>	<p>Hp(10) dose = 1.59 mSv Hp(0.07) dose = 2.2 mSv Remark =</p>
<p>Dosemeter 'S022/2022 - 12': 30241 not irradiated</p>	<p>Hp(10) dose = 0.311 mSv Hp(0.07) dose = 0.288 mSv Remark =</p>
<p>Dosemeter 'S022/2022 - 13': 30987 irradiated</p>	<p>Hp(10) dose = 3.23 mSv Hp(0.07) dose = 3.49 mSv Remark =</p>
<p>Dosemeter 'S022/2022 - 14': 30358 irradiated</p>	<p>Hp(10) dose = 2.52 mSv Hp(0.07) dose = 2.63 mSv Remark =</p>
<p>Dosemeter 'S022/2022 - 15': 31025 irradiated</p>	<p>Hp(10) dose = 2.73 mSv Hp(0.07) dose = 3.25 mSv Remark =</p>
<p>Dosemeter 'S022/2022 - 16': 30559 irradiated</p>	<p>Hp(10) dose = 7.47 mSv Hp(0.07) dose = 8.52 mSv Remark =</p>
<p>Dosemeter 'S022/2022 - 17': 30837 irradiated</p>	<p>Hp(10) dose = 3.1 mSv Hp(0.07) dose = 3.11 mSv Remark =</p>
<p>Dosemeter 'S022/2022 - 18': 30364 not irradiated</p>	<p>Hp(10) dose = 0.298 mSv Hp(0.07) dose = 0.288 mSv Remark =</p>
<p>Dosemeter 'S022/2022 - 19': 30989 irradiated</p>	<p>Hp(10) dose = 1.61 mSv Hp(0.07) dose = 1.71 mSv Remark =</p>
<p>Dosemeter 'S022/2022 - 20': 31005 irradiated</p>	<p>Hp(10) dose = 115.26 mSv Hp(0.07) dose = 134.09 mSv Remark =</p>



Whole body dosimeter intercomparison IC2022ph Dose Values Form

General Data

P028/2022, Research and Production Enterprise DOSIMETRICA LLC, 04050 ...
S022/2022, Harshaw 6600, s/n 9210060

Dose Values

Dosemeter 'S022/2022 - 01':	Hp(10) dose = 9.48 mSv
30037	Hp(0.07) dose = 9.55 mSv
irradiated	Remark =
Dosemeter 'S022/2022 - 02':	Hp(10) dose = 276.5 mSv
30067	Hp(0.07) dose = 293.84 mSv
irradiated	Remark =
Dosemeter 'S022/2022 - 03':	Hp(10) dose = 2.92 mSv
30148	Hp(0.07) dose = 3.771 mSv
irradiated	Remark =
Dosemeter 'S022/2022 - 04':	Hp(10) dose = 0.304 mSv
30146	Hp(0.07) dose = 0.330 mSv
not irradiated	Remark =
Dosemeter 'S022/2022 - 05':	Hp(10) dose = 4.74 mSv
30165	Hp(0.07) dose = 4.77 mSv
irradiated	Remark =
Dosemeter 'S022/2022 - 06':	Hp(10) dose = 9.35 mSv
30493	Hp(0.07) dose = 10.35 mSv
irradiated	Remark =
Dosemeter 'S022/2022 - 07':	Hp(10) dose = 0.307 mSv
30354	Hp(0.07) dose = 0.304 mSv
not irradiated	Remark =
Dosemeter 'S022/2022 - 08':	Hp(10) dose = 3.1 mSv
30624	Hp(0.07) dose = 3.4 mSv
irradiated	Remark =
Dosemeter 'S022/2022 - 09':	Hp(10) dose = 2.95 mSv
30751	Hp(0.07) dose = 3.925 mSv
irradiated	Remark =
Dosemeter 'S022/2022 - 10':	Hp(10) dose = 3.17 mSv
30925	Hp(0.07) dose = 3.3 mSv
irradiated	Remark =



Whole body dosemeter intercomparison IC2022ph Dose Values Form

General Data

P028/2022, Research and Production Enterprise DOSIMETRICA LLC, 04050 ...
S022/2022, Harshaw 6600, s/n 9210060

Dose Values, continued

Transit dose: Hp(10) dose = 0.31 mSv

Remark =



Signature

Vitalii Voloskyi

Name

20.01.23

Date