

Certificate number: o60240450i202861-A-1



Calibration Certificate



Customer

SET Y GAD SAS
CRA 48 NO 101A-69
110111 BOGOTA
CO

Laboratory

Unfors RaySafe Inc.
2 Science Road
Glenwood, IL 60425-1586
USA
+1-833-296-9240
customerservice.us@raysafe.com

CUSTOMER INSTRUMENT

Product X2 MAM
Serial number 202861
Manufacturer RaySafe

CALIBRATION INFORMATION

As found 6/3/2024
As left 6/11/2024
Adjustment done Yes
Tested by Amber Ramos
Armad Bryant
Nate Barnes
Rosio Ramos

Approved by

Josefina Diaz
Finalization technician

Certificate date

6/13/2024

CALIBRATION RESULT

AS FOUND: One or more measured and tested values of this certificate are within the specifications by a margin less than the expanded measurement uncertainty. Therefore, it is not possible to state conformance with specifications for those measurements.

AS LEFT: All measured and tested values of this certificate were found to be in conformance with the specification.

Relevant instrument specifications

Air Kerma: 5 %
Voltage: 2 % or 0.5 kV (without paddle), 2 % or 0.7 kV (with paddle)

This laboratory is accredited according to ISO/IEC 17025:2017 by the American Association for Laboratory Accreditation (A2LA) and the results shown in this certificate have been determined within the scope of accreditation unless stated otherwise in this certificate.



GENERAL INFORMATION

LABORATORY CALIBRATION

All reference standards used for this calibration are valid for one year. Voltage, Time, Electrical current, Electrical charge, Illuminance and Luminance standards are traceable to RISE Research Institute of Sweden. All Air kerma and Air kerma rate standards are traceable to Physikalisch-Technische Bundesanstalt (PTB). HVL standards are traceable to RISE and PTB.

CALIBRATION ENVIRONMENTAL CONDITIONS

Ambient temperature: 15 – 30 °C
Relative humidity: < 80 %

CALIBRATION METHODS

RaySafe calibration method(s) used for this certificate: "Calibration method for Air Kerma.ACCR-0453 version 5" and "Calibration method for Voltage.ACCR-0454 version 6".

CALIBRATION UNCERTAINTY

All measurements are associated with some level of uncertainty. The measurement uncertainties in this certificate are stated in accordance with EA-4/02 (Expression of the Uncertainty of Measurement in Calibration) and JCGM 100:2008, Guide to the Expression of Uncertainty in Measurement (GUM).

The term *Expanded uncertainty* in this certificate, is defined as the standard uncertainty multiplied by a coverage factor $k = 2$. For a normal distribution, this gives approximately 95 % probability that the measurement result is within the stated uncertainty.

SCOPE OF CERTIFICATE

The results in this calibration certificate only relate to the customer instrument specified on the first page of the certificate. Whether the device under test conforms to the requirements for its intended use or not, has to be decided by its user.

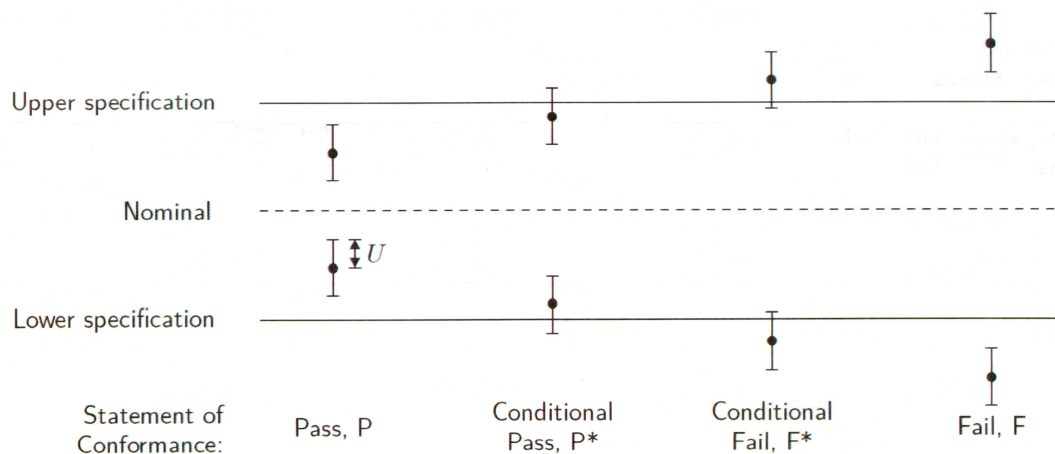
CONFORMANCE WITH SPECIFICATION

The conformance with specification (Result) has been determined in accordance with ILAC publication ILAC-G8:09/2019. The statement of conformance is based on a 95 % coverage probability for the expanded uncertainty and is only valid for the tested measurements.

All statements of conformance with specification in this certificate are reported as:

- P PASS** – The measured value is within the specification by a margin greater than the expanded uncertainty.
- P* CONDITIONAL PASS** – The measured value is within the specification by a margin less than the expanded measurement uncertainty. Therefore, it is not possible to state conformance with specification using a 95 % coverage probability for the expanded uncertainty.
- F* CONDITIONAL FAIL** – The measured value is outside of the specification by a margin less than the expanded measurement uncertainty. Therefore, it is not possible to state non-conformance with specification using a 95 % coverage probability for the expanded uncertainty.
- F FAIL** – The measured value is outside of the specification by a margin greater than the expanded measurement uncertainty.

A summary of all performed tests is reported on the first page of this certificate.



$U = 95 \% \text{ expanded measurement uncertainty}$

Other terms that may be used:

- NS NO SPECIFICATION** – The measured value has no specification.
- NM NOT MEASURED** – The measurement has not been performed and no value is tested against the specification.

Certificate number: o60240450i202861-A-1



CALIBRATION AS FOUND

REFERENCE EQUIPMENT

INSTRUMENT	VALID UNTIL DATE
RaySafe X2 MAM Serial number: 260378	9/6/2024
Siemens Mammomat 3000 Serial number: 5853	9/5/2024
Siemens P40 Mo W Serial number: 576875	
RaySafe X2 MAM Serial number: 260280	2/26/2025
RaySafe X2 MAM Serial number: 260339	5/22/2025
RaySafe X2 MAM Serial number: 260523	5/17/2025
GE Medical systems Seno DMR+ Serial number: 447233BU8	5/9/2025
Varian M-152 Serial number: 97122-U4	

MEASUREMENTS

AIR KERMA

Set voltage	Anode target	Nominal tube filtration	Added filtration	Air kerma rate $\mu\text{Gy/s}$	Instrument setting	Standard	Measured	Deviation from standard	Expanded uncertainty	Result
23 kV	Mo	30 μm Mo	0.1 mm Al	6778	Mo/Mo paddle	2275 μGy	2281 μGy	0.2 %	2.1 %	P
28 kV	Mo	30 μm Mo	0.1 mm Al	12530	Mo/Mo paddle	4703 μGy	4594 μGy	-2.3 %	2.1 %	P
35 kV	Mo	30 μm Mo	0.1 mm Al	19954	Mo/Mo paddle	9361 μGy	9192 μGy	-1.8 %	2.2 %	P
23 kV	Mo	25 μm Rh	0.1 mm Al	4547	kVp off	1539 μGy	1551 μGy	0.7 %	2.1 %	P
28 kV	Mo	25 μm Rh	0.1 mm Al	9087	kVp off	3440 μGy	3398 μGy	-1.2 %	2.4 %	P
35 kV	Mo	25 μm Rh	0.1 mm Al	14546	kVp off	6892 μGy	6800 μGy	-1.3 %	2.4 %	P
23 kV	W	50 μm Ag	0.1 mm Al	2474	W/Ag paddle	660.7 μGy	662.9 μGy	0.3 %	2.0 %	P
28 kV	W	50 μm Ag	0.1 mm Al	5158	W/Ag paddle	1537 μGy	1534 μGy	-0.2 %	1.9 %	P

Continued on next page

AIR KERMA – continued

Set voltage	Anode target	Nominal tube filtration	Added filtration	Air kerma rate $\mu\text{Gy/s}$	Instrument setting	Standard	Measured	Deviation from standard	Expanded uncertainty	Result
35 kV	W	50 μm Ag	0.1 mm Al	7322	W/Ag paddle	2725 μGy	2700 μGy	-0.9 %	1.9 %	P
23 kV	W	0.5 mm Al	0.1 mm Al	7981	W/Al	2139 μGy	2142 μGy	0.1 %	2.1 %	P
28 kV	W	0.5 mm Al	0.1 mm Al	13701	W/Al	4086 μGy	3982 μGy	-2.6 %	2.0 %	P
35 kV	W	0.5 mm Al	0.1 mm Al	19683	W/Al	7321 μGy	7203 μGy	-1.6 %	2.0 %	P
47 kV	W	0.3 mm Cu	0 mm Al	566.3	W/Al	389.0 μGy	394.3 μGy	1.4 %	2.1 %	P
23 kV	W	50 μm Rh	0.1 mm Al	2841	W/Rh Siemens paddle	758.8 μGy	757.1 μGy	-0.2 %	2.0 %	P
28 kV	W	50 μm Rh	0.1 mm Al	5131	W/Rh Siemens paddle	1530 μGy	1526 μGy	-0.3 %	2.0 %	P
35 kV	W	50 μm Rh	0.1 mm Al	6854	W/Rh Siemens paddle	2551 μGy	2524 μGy	-1.1 %	2.0 %	P
27 kV	Rh	30 μm Ag	0.1 mm Al	3467	Rh/Ag paddle	2793 μGy	2768 μGy	-0.9 %	2.0 %	P
34 kV	Rh	30 μm Ag	0.1 mm Al	6476	Rh/Ag paddle	5931 μGy	5798 μGy	-2.3 %	2.0 %	P
40 kV	Rh	30 μm Ag	0.1 mm Al	8506	Rh/Ag paddle	9140 μGy	8844 μGy	-3.2 %	2.0 %	P*

VOLTAGE

Set voltage	Anode target	Nominal tube filtration	Added filtration	Air kerma rate $\mu\text{Gy/s}$	Instrument setting	Standard	Measured	Deviation from standard	Expanded uncertainty	Result
23 kV	Mo	30 μm Mo	0.1 mm Al	6778	Mo/Mo paddle	22.94 kV	22.90 kV	-0.2 %	0.6 %	P
28 kV	Mo	30 μm Mo	0.1 mm Al	12530	Mo/Mo paddle	27.99 kV	27.70 kV	-1.0 %	0.6 %	P
35 kV	Mo	30 μm Mo	0.1 mm Al	19954	Mo/Mo paddle	35.11 kV	34.60 kV	-1.5 %	0.7 %	P*
32 kV	Mo	25 μm Rh	2 mm Al	15585	Mo/Rh 2 mm Al	32.09 kV	32.30 kV	0.7 %	0.9 %	P
35 kV	Mo	25 μm Rh	2 mm Al	18393	Mo/Rh 2 mm Al	35.11 kV	35.10 kV	0.0 %	0.8 %	P
39 kV	Mo	25 μm Rh	2 mm Al	19283	Mo/Rh 2 mm Al	39.15 kV	39.20 kV	0.1 %	0.8 %	P
23 kV	W	50 μm Ag	0.1 mm Al	2474	W/Ag paddle	22.89 kV	22.80 kV	-0.4 %	0.6 %	P
28 kV	W	50 μm Ag	0.1 mm Al	5158	W/Ag paddle	27.94 kV	28.20 kV	0.9 %	0.9 %	P
35 kV	W	50 μm Ag	0.1 mm Al	7322	W/Ag paddle	35.08 kV	35.30 kV	0.6 %	0.7 %	P
23 kV	W	0.5 mm Al	0.1 mm Al	7981	W/Al	22.89 kV	22.70 kV	-0.8 %	0.6 %	P
28 kV	W	0.5 mm Al	0.1 mm Al	13701	W/Al	27.94 kV	27.90 kV	-0.1 %	0.6 %	P
35 kV	W	0.5 mm Al	0.1 mm Al	19683	W/Al	35.08 kV	35.30 kV	0.6 %	0.7 %	P
23 kV	W	50 μm Rh	0.1 mm Al	2841	W/Rh Siemens paddle	22.89 kV	22.60 kV	-1.3 %	0.6 %	P
28 kV	W	50 μm Rh	0.1 mm Al	5131	W/Rh Siemens paddle	27.94 kV	27.80 kV	-0.5 %	0.8 %	P
35 kV	W	50 μm Rh	0.1 mm Al	6854	W/Rh Siemens paddle	35.08 kV	35.20 kV	0.3 %	0.7 %	P
27 kV	Rh	30 μm Ag	0.1 mm Al	3467	Rh/Ag paddle	26.97 kV	27.00 kV	0.1 %	0.7 %	P
34 kV	Rh	30 μm Ag	0.1 mm Al	6476	Rh/Ag paddle	34.04 kV	34.10 kV	0.2 %	0.7 %	P

Continued on next page

Certificate number: o60240450i202861-A-1

VOLTAGE – continued

Set voltage	Anode target	Nominal tube filtration	Added filtration	Air kerma rate $\mu\text{Gy/s}$	Instrument setting	Standard	Measured	Deviation from standard	Expanded uncertainty	Result
40 kV	Rh	30 μm Ag	0.1 mm Al	8506	Rh/Ag paddle	40.14 kV	40.10 kV	-0.1 %	0.7 %	P

CALIBRATION AS LEFT

REFERENCE EQUIPMENT

INSTRUMENT	VALID UNTIL DATE
RaySafe X2 MAM Serial number: 260280	2/26/2025
Siemens Mammomat 3000 Serial number: 5904	2/7/2025
Siemens P40 Mo W Serial number: 576363	
RaySafe X2 MAM Serial number: 260339	5/22/2025
RaySafe X2 MAM Serial number: 260523	5/17/2025
GE Medical systems Seno DMR+ Serial number: 447233BU8	5/9/2025
Varian M-152 Serial number: 97122-U4	

MEASUREMENTS

AIR KERMA

Set voltage	Anode target	Nominal tube filtration	Added filtration	Air kerma rate $\mu\text{Gy/s}$	Instrument setting	Standard	Measured	Deviation from standard	Expanded uncertainty	Result
23 kV	Mo	30 μm Mo	0.1 mm Al	6846	Mo/Mo paddle	2302 μGy	2321 μGy	0.8 %	2.1 %	P
28 kV	Mo	30 μm Mo	0.1 mm Al	12387	Mo/Mo paddle	4665 μGy	4598 μGy	-1.4 %	2.1 %	P
35 kV	Mo	30 μm Mo	0.1 mm Al	19180	Mo/Mo paddle	9045 μGy	8968 μGy	-0.9 %	2.2 %	P
23 kV	Mo	25 μm Rh	0.1 mm Al	4549	kVp off	1530 μGy	1557 μGy	1.7 %	2.1 %	P
28 kV	Mo	25 μm Rh	0.1 mm Al	9082	kVp off	3422 μGy	3402 μGy	-0.6 %	2.4 %	P
35 kV	Mo	25 μm Rh	0.1 mm Al	14559	kVp off	6860 μGy	6861 μGy	0.0 %	2.4 %	P
23 kV	W	50 μm Ag	0.1 mm Al	2928	W/Ag paddle	786.6 μGy	790.1 μGy	0.4 %	2.0 %	P
28 kV	W	50 μm Ag	0.1 mm Al	6039	W/Ag paddle	1808 μGy	1799 μGy	-0.5 %	1.9 %	P
35 kV	W	50 μm Ag	0.1 mm Al	8519	W/Ag paddle	3193 μGy	3174 μGy	-0.6 %	1.9 %	P
23 kV	W	0.5 mm Al	0.1 mm Al	8597	W/Al	2310 μGy	2343 μGy	1.4 %	2.1 %	P

Continued on next page

Certificate number: o60240450i202861-A-1



AIR KERMA – continued

Set voltage	Anode target	Nominal tube filtration	Added filtration	Air kerma rate $\mu\text{Gy/s}$	Instrument setting	Standard	Measured	Deviation from standard	Expanded uncertainty	Result
28 kV	W	0.5 mm Al	0.1 mm Al	14846	W/Al	4447 μGy	4410 μGy	-0.8 %	2.0 %	P
35 kV	W	0.5 mm Al	0.1 mm Al	21408	W/Al	8015 μGy	7993 μGy	-0.3 %	2.0 %	P
47 kV	W	0.3 mm Cu	0 mm Al	566.6	W/Al	389.2 μGy	389.4 μGy	0.0 %	2.1 %	P
23 kV	W	50 μm Rh	0.1 mm Al	2684	W/Rh Siemens paddle	720.8 μGy	719.4 μGy	-0.2 %	2.0 %	P
28 kV	W	50 μm Rh	0.1 mm Al	4947	W/Rh Siemens paddle	1482 μGy	1482 μGy	0.0 %	2.0 %	P
35 kV	W	50 μm Rh	0.1 mm Al	6677	W/Rh Siemens paddle	2502 μGy	2496 μGy	-0.2 %	2.0 %	P
27 kV	Rh	30 μm Ag	0.1 mm Al	3451	Rh/Ag paddle	2778 μGy	2774 μGy	-0.2 %	2.0 %	P
34 kV	Rh	30 μm Ag	0.1 mm Al	6419	Rh/Ag paddle	5882 μGy	5814 μGy	-1.2 %	2.0 %	P
40 kV	Rh	30 μm Ag	0.1 mm Al	8441	Rh/Ag paddle	9070 μGy	8869 μGy	-2.2 %	2.0 %	P

VOLTAGE

Set voltage	Anode target	Nominal tube filtration	Added filtration	Air kerma rate $\mu\text{Gy/s}$	Instrument setting	Standard	Measured	Deviation from standard	Expanded uncertainty	Result
23 kV	Mo	30 μm Mo	0.1 mm Al	6846	Mo/Mo paddle	22.94 kV	22.90 kV	-0.2 %	0.6 %	P
28 kV	Mo	30 μm Mo	0.1 mm Al	12387	Mo/Mo paddle	28.01 kV	27.80 kV	-0.7 %	0.6 %	P
35 kV	Mo	30 μm Mo	0.1 mm Al	19180	Mo/Mo paddle	35.12 kV	34.90 kV	-0.6 %	0.7 %	P
32 kV	Mo	25 μm Rh	2 mm Al	14844	Mo/Rh 2 mm Al	32.12 kV	32.20 kV	0.2 %	0.9 %	P
35 kV	Mo	25 μm Rh	2 mm Al	17319	Mo/Rh 2 mm Al	35.12 kV	35.10 kV	-0.1 %	0.8 %	P
39 kV	Mo	25 μm Rh	2 mm Al	18188	Mo/Rh 2 mm Al	38.99 kV	39.00 kV	0.0 %	0.8 %	P
23 kV	W	50 μm Ag	0.1 mm Al	2928	W/Ag paddle	22.88 kV	22.90 kV	0.1 %	0.6 %	P
28 kV	W	50 μm Ag	0.1 mm Al	6039	W/Ag paddle	27.96 kV	28.00 kV	0.1 %	0.9 %	P
35 kV	W	50 μm Ag	0.1 mm Al	8519	W/Ag paddle	35.07 kV	35.00 kV	-0.2 %	0.7 %	P
23 kV	W	0.5 mm Al	0.1 mm Al	8597	W/Al	22.88 kV	22.80 kV	-0.3 %	0.6 %	P
28 kV	W	0.5 mm Al	0.1 mm Al	14846	W/Al	27.96 kV	27.90 kV	-0.2 %	0.6 %	P
35 kV	W	0.5 mm Al	0.1 mm Al	21408	W/Al	35.07 kV	35.00 kV	-0.2 %	0.7 %	P
23 kV	W	50 μm Rh	0.1 mm Al	2684	W/Rh Siemens paddle	22.88 kV	22.90 kV	0.1 %	0.6 %	P
28 kV	W	50 μm Rh	0.1 mm Al	4947	W/Rh Siemens paddle	27.96 kV	27.90 kV	-0.2 %	0.8 %	P
35 kV	W	50 μm Rh	0.1 mm Al	6677	W/Rh Siemens paddle	35.07 kV	35.10 kV	0.1 %	0.7 %	P
27 kV	Rh	30 μm Ag	0.1 mm Al	3451	Rh/Ag paddle	26.97 kV	26.90 kV	-0.3 %	0.7 %	P
34 kV	Rh	30 μm Ag	0.1 mm Al	6419	Rh/Ag paddle	34.04 kV	34.10 kV	0.2 %	0.7 %	P
40 kV	Rh	30 μm Ag	0.1 mm Al	8441	Rh/Ag paddle	40.14 kV	40.10 kV	-0.1 %	0.7 %	P