

Certificate number: o60240521i292072-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 R/F
Serial number 292072
Manufacturer RaySafe

CALIBRATION INFORMATION

As found 6/5/2024
As left 6/6/2024
Adjustment done Yes
Tested by Christina Arroyo

Approved by

Josefina Diaz
Finalization technician
6/13/2024

CALIBRATION RESULT

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

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 %, Air kerma rate: 5 %
Time: 0.5 %, Voltage: 2 %

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.



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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 Rate.ACCR-1112 version 4", "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.

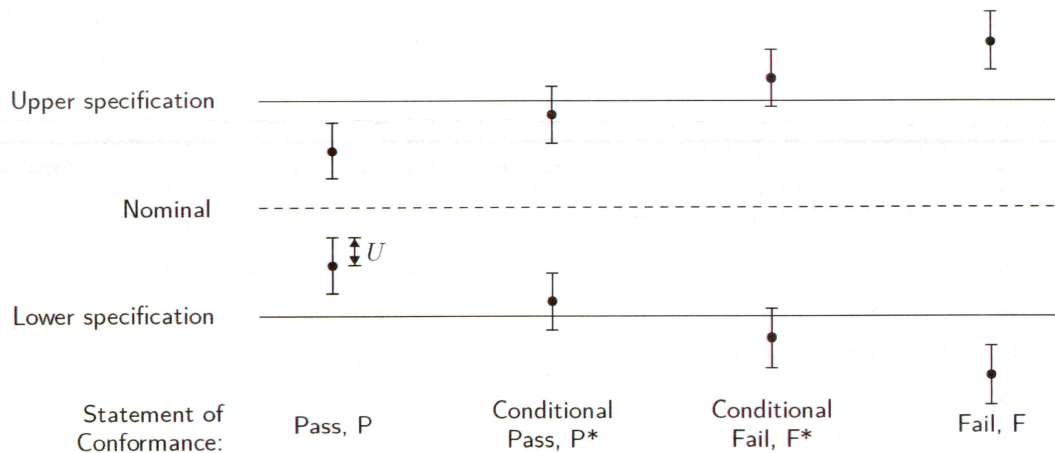
CONFORMANCE WITH SPECIFICATION

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.

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CALIBRATION AS FOUND

REFERENCE EQUIPMENT

INSTRUMENT	VALID UNTIL DATE
RaySafe X2 Survey Serial Number: 282142	1/17/2025
RaySafe X2 R/F Serial Number: 261668	1/16/2025
EMD Epsilon EPS 80RF Serial Number: 19-A0024	1/16/2025
Varian A196 Serial Number: 86795-2W	

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
80 kV	W	2.5 mm Al	26 mm Al	623.0	—	199.1 μGy	198.2 μGy	-0.5 %	1.4 %	P
150 kV	W	2.5 mm Al	0 mm Al	2661	—	858.8 μGy	857.0 μGy	-0.2 %	1.4 %	P
50 kV	W	2.5 mm Al	0 mm Al	4696	—	1501 μGy	1472 μGy	-2.0 %	1.3 %	P
70 kV	W	2.5 mm Al	0 mm Al	4033	—	1290 μGy	1278 μGy	-1.0 %	1.3 %	P
100 kV	W	2.5 mm Al	0 mm Al	2033	—	652.2 μGy	652.4 μGy	0.0 %	1.3 %	P

AIR KERMA RATE

Set voltage	Anode target	Nominal tube filtration	Added filtration	Standard	Measured	Deviation from standard	Expanded uncertainty	Result
80 kV	W	2.5 mm Al	26 mm Al	0.958 $\mu\text{Gy/s}$	0.956 $\mu\text{Gy/s}$	-0.3 %	2.6 %	P

EXPOSURE TIME (NON - ACCREDITED)

Set voltage	Anode target	Nominal tube filtration	Added filtration	Standard	Measured	Deviation from standard	Expanded uncertainty	Result
70 kV	W	2.5 mm Al	0 mm Al	320.0 ms	319.9 ms	-0.1 %	0.2 %	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
80 kV	W	2.5 mm Al	26 mm Al	623.0	—	80.22 kV	80.20 kV	0.0 %	0.9 %	P
150 kV	W	2.5 mm Al	0 mm Al	2661	—	150.4 kV	150.1 kV	-0.2 %	0.7 %	P
50 kV	W	2.5 mm Al	0 mm Al	4696	—	50.10 kV	50.10 kV	0.0 %	0.5 %	P
70 kV	W	2.5 mm Al	0 mm Al	4033	—	70.17 kV	70.50 kV	0.5 %	0.5 %	P
100 kV	W	2.5 mm Al	0 mm Al	2033	—	100.2 kV	100.7 kV	0.4 %	0.6 %	P

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CALIBRATION AS LEFT

REFERENCE EQUIPMENT

INSTRUMENT	VALID UNTIL DATE
RaySafe X2 Survey Serial Number: 282142	1/17/2025
RaySafe X2 R/F Serial Number: 261668	1/16/2025
EMD Epsilon EPS 80RF Serial Number: 19-A0024	1/16/2025
Varian A196 Serial Number: 86795-2W	

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
80 kV	W	2.5 mm Al	26 mm Al	625.8	—	200.0 μGy	198.0 μGy	-1.0 %	1.4 %	P
150 kV	W	2.5 mm Al	0 mm Al	2662	—	858.8 μGy	863.1 μGy	0.5 %	1.4 %	P
50 kV	W	2.5 mm Al	0 mm Al	4702	—	1503 μGy	1485 μGy	-1.2 %	1.3 %	P
70 kV	W	2.5 mm Al	0 mm Al	4041	—	1293 μGy	1294 μGy	0.0 %	1.3 %	P
100 kV	W	2.5 mm Al	0 mm Al	2037	—	654.1 μGy	660.8 μGy	1.0 %	1.3 %	P

AIR KERMA RATE

Set voltage	Anode target	Nominal tube filtration	Added filtration	Standard	Measured	Deviation from standard	Expanded uncertainty	Result
80 kV	W	2.5 mm Al	26 mm Al	0.961 $\mu\text{Gy/s}$	0.951 $\mu\text{Gy/s}$	-1.1 %	2.6 %	P

EXPOSURE TIME (NON - ACCREDITED)

Set voltage	Anode target	Nominal tube filtration	Added filtration	Standard	Measured	Deviation from standard	Expanded uncertainty	Result
70 kV	W	2.5 mm Al	0 mm Al	320.0 ms	319.9 ms	0.0 %	0.2 %	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
80 kV	W	2.5 mm Al	26 mm Al	625.8	—	80.22 kV	80.40 kV	0.2 %	0.9 %	P
150 kV	W	2.5 mm Al	0 mm Al	2662	—	150.4 kV	150.3 kV	-0.1 %	0.7 %	P
50 kV	W	2.5 mm Al	0 mm Al	4702	—	50.10 kV	50.10 kV	0.0 %	0.5 %	P
70 kV	W	2.5 mm Al	0 mm Al	4041	—	70.17 kV	70.20 kV	0.0 %	0.5 %	P
100 kV	W	2.5 mm Al	0 mm Al	2037	—	100.2 kV	100.7 kV	0.4 %	0.6 %	P

