



INDEPENDENT X-RAY
QUALITY ASSURANCE

Calibration Certificate

Calibration certificate issued by an accredited calibration laboratory.

Air Kerma

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Certificate Number 248F132354
Date of Calibration 2024-08-21
Date of Issue 2024-08-21
Location RTI Group Headquarters, Mölndal
Radiation Quality R1
Object kVp-, dose-, doserate- and time-meter
Manufacturer RTI Group

Man. part Number 4560.000076
Calibrated By Sama Hussein
Customer RTI Group

Serial Number CB3-24082127
Object Cobia Smart R/F

Environment All climatic conditions are within RTI's limits for a reliable calibration environment, i.e. 18-25 deg C, 90-110 kPa, and <70 % air humidity. For the solid-state detectors manufactured by RTI Group no temperature or pressure corrections of readings are required.
Room Temperature 22,0 °C
Air Pressure 100,0 kPa

Geometric Arrangement The detector was irradiated perpendicular to the entrance window. The reference point is 6.0 mm behind the cross on the surface of the detector area. The depth is marked with a groove on the detector side.

Method The method is described in the document MTB-020 (rev. L) Calibration method-Dose, by RTI.

Traceability The calibration is performed by comparison against a reference radiation detector. The reference detector is traceable through PTB (Germany) to national or international measurement standards.

Uncertainty The expanded uncertainty for the calibration factor, NK, at reference conditions when calibrating is $\pm 1,7\%$. The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95 %. The standard uncertainty of measurement has been determined in accordance with EAL Publication EA-4/02.

Evaluation A new calibration factor is derived every time the detector is recalibrated.

Authorized signature:

Sama Hussein



Ackred. nr. 2021
Calibration
ISO/IEC 17025

The calibration results refer exclusively to the object.
This calibration certificate may not be circulated other than in full.
Template version: 2024.3A

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Certificate Number 248F132354
Serial Number CB3-24082127
Date of Calibration 2024-08-21
Radiation Quality
Designation R1
Reference (kVp) 70 kV
Anod/Filter W/3,0 mm Al
HVL 2,65 mm Al at 70 kV

Calibration Factor
 N_k 0,221533 · 10⁶ Gy/C
 N_k 25,280 · 10⁶ R/C
Calibration factor N_k in terms of air kerma

Reading With A Meter When the object is used with an RTI electrometer and a valid calibration certificate, the expanded uncertainty of the dose readings at reference conditions is ±1,7%. See measured results below.

Reference	Object	Deviation	Tolerance	Status
1,3001 mGy	1,3001 mGy	0,0%	±5,0%	Pass
148,34 mR	148,34 mR	0,0%	±5,0%	Pass

Pass/Fail Criteria

The statement of conformity is based on Case 2 as described in ILAC G8:09/2019. I.e. The calibration result is compared against manufacturer specification, see MTB-020_bil.1_C_Object Uncertainty - Air Kerma. A deviation (excluding expanded uncertainty) less than manufacturer specification is reported as pass, and a larger deviation is reported as fail. The probability for a false pass, or a false fail, depend on the relation of the magnitude of the expanded uncertainty and the manufacturer specification. If the device under test is compliant and fit for purpose for its intended use has to be made by the customer.

Reference Equipment	Ref Number	Type	Model
	012-R1-231107	Dose Detector	RTI R100 Dose Detector
	11-RF005-240405	Voltage divider	Sedecal Internal Divider
	19-5-111031	RTI X-ray lab 5:1, R/F	Sedecal, Mod. SHF 535
	315-240209	Electrometer	Solldose 400
	67-240502	Thermometer	Testo 0900.0530
	66-230911	Barometer	GTD 1100



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Tube Voltage

Page of pages	1(2)	Serial Number	CB3-24082127
Certificate Number	248A90721	Object	Cobia Smart R/F
Date of Calibration	2024-08-21		
Date of Issue	2024-08-21		
Location	RTI Group Headquarters, Mölndal		
Radiation Quality	Radiography (R1)		
Object	kVp-, dose-, dose-rate- and time-meter		
Manufacturer	RTI Group		
Man. part Number	4560.000076		
Calibrated By	Sama Hussein		
Customer	RTI Group		

Environment	All climatic conditions are within RTI's limits for a reliable calibration environment, i.e. 18-25 deg C, 90-110 kPa, and <70 % air humidity.
Geometric Arrangement	The detector was irradiated perpendicular to the entrance window. The point of reference is 10.0 mm below the top surface.
Method	The method is described in the document MTB-010 (rev. I) Calibration method- Tube Potential, by RTI Group AB.
Traceability	The calibration is performed by comparison against a reference high voltage divider system. The reference high voltage divider system is traceable through RISE Technical Research Institute of Sweden to national or international measurement standards.
Uncertainty	The expanded uncertainty at reference conditions when calibrating is ± 0.56 %. The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95 %. The standard uncertainty of measurement has been determined in accordance with EAL Publication EA-4/02.
Evaluations	The measured values are within the error limits specified by the manufacturer of the equipment under test.

Authorized signature:

Sama Hussein



Akkred. nr. 2021
Calibration
ISO/IEC 17025

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Tube Voltage

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Date of Calibration 2024-08-21

Radlography (R1) SDD 80 cm
Anode/Filter W / 3.0 mm Al
HVL 3,0 mm Al at 80 kV

Settings			Measured Data		Tolerance		Result	
Current (mA)	Time (ms)	Detector Filter	Reference kVp (kV)	Detector kVp (kV)	High (kV)	Low (kV)	Deviation (%)	Status Pass/Fail
100	100	Auto	40,43	40,20	41,43	39,43	-0,6	Pass
100	100	Auto	59,58	59,55	60,77	58,39	-0,1	Pass
100	100	Auto	59,58	59,70	60,77	58,39	0,2	Pass
100	100	Auto	99,46	99,50	101,45	97,47	0,0	Pass
100	100	Auto	119,77	119,50	122,17	117,37	-0,2	Pass
100	100	Auto	139,65	139,40	142,44	136,86	-0,2	Pass

Pass/Fail Criteria

The pass and fail criteria are based on Case 2 as defined in *ILAC-G8:03/2009*. I.e. The calibration result is compared against manufacturer specification, see MTB-010_bil.1_B_Object Uncertainty - Tube Potential. A deviation (excluding expanded uncertainty) less than manufacturer specification is reported as pass, and a larger deviation is reported as fail. Pass/Fail criteria for kV calibrations of the Cobia is $\pm 2.0\%$.

Reference Equipment	Ref Number	Type	Model
	11-RF005	Voltage divider	Sedecal Internal Divider
	19-5-111031	RTI X-ray lab 5:1, R/F	Sedecal, Mod. SHF 535