



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

ZETEC FRANCE
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CALIBRATION

Valid To: February 28, 2022

Certificate Number: 2734.04

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations^{1, 6}:

I. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2, 4} (±)	Comments
DC Voltage – Measure ³	(0 to 100) mV (0.1 to 1) V (1 to 10) V (10 to 100) V (100 to 1000) V	0.0069 % + 4.9 μV 0.0049 % + 15 μV 0.0041 % + 140 μV 0.0053 % + 1.9 mV 0.0052 % + 21 mV	Agilent 34401A & 34410A
Resistance – Measure ³	(0 to 100) Ω (0.1 to 1) kΩ (1 to 10) kΩ (10 to 100) kΩ (0.1 to 1) MΩ (1 to 10) MΩ	0.14 % + 6.0 mΩ 0.058 % + 29 mΩ 0.019 % + 290 mΩ 0.015 % + 2.9 Ω 0.041 % + 33 Ω 0.12 % + 1.2 kΩ	Agilent 34401A & 34410A

II. Magnetic (Eddy Current Instrumentation)

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Receiver Quadrature – Eddy Current Instrumentation ³	(0 to 360)°	0.023°	Agilent 33250A, ZETEC ACM/frequency, Tektronix TDS-3032 (A, B, or C)
Receiver Gain – Eddy Current Instrumentation ³	(0 to 80) dB	0.26 %	Agilent 33250A, ZETEC ACM/frequency, Tektronix TDS-3032 (A, B, or C)

Parameter/Equipment	Frequency	CMC ^{2,4} (±)	Comments
Coil Driver Frequency – Eddy Current Instrumentation ³	10 Hz to 6 MHz		Agilent 53131A, ZETEC ACM/frequency, Tektronix TDS-3032 (A, B, or C), & Agilent 34401A or 34410A
	JEAG-4208	0.0018 %	
	ASME BPVC Sections V & XI	0.12 %	
Receiver Frequency Bandwidth – Eddy Current Instrumentation ³	(8 to 5000) Hz	0.23 %	Agilent 33250A, ZETEC ACM/frequency, Tektronix TDS-3032 (A, B, or C)

III. Time & Frequency

Parameter/Range	Frequency	CMC ^{2,4} (\pm)	Comments
Frequency – Measure ³ (10 to 100) mV _{rms}	(3 to 5) Hz (5 to 10) Hz (10 to 40) Hz 40 Hz to 300 kHz	1.2 % + 0.29 μ Hz 0.59 % + 0.29 μ Hz 0.36 % + 0.29 μ Hz 0.12 % + 250 μ Hz	Agilent 34401A & 34410A
> 100 mV _{rms}	(3 to 5) Hz (5 to 10) Hz (10 to 40) Hz 40 Hz to 300 kHz	0.22 % + 0.29 μ Hz 0.15 % + 0.29 μ Hz 0.057 % + 0.29 μ Hz 0.012 % + 240 μ Hz	Agilent 34401A, 34410A, & 53131A

IV. Time & Frequency (Ultrasound Instrumentation - Dynaray)

Parameter/Range	Frequency	CMC ^{2,4} (\pm)	Comments
Receiver – Ultrasound Instrumentation ³			
Frequency Response:	(0.225 to 20) MHz		
Low Cutoff		None, HP1M, HP2M \leq 4.0 %, all others \leq 1.9 %	Agilent 33250A, Tektronix TDS- 3032 (A, B, or C), ZETEC attenuator 10040260, ZETEC ABUXE127A
High Cutoff		None, LP2M, LP5M, LP10M, LP15M, HP1M, HP2M, BP1- 5M \leq 5.4 %, all others \leq 1.9 %	
Bandwidth		None, HP1M, HP2M \leq 4.0 %, all others \leq 2.2 %	
Center		None, LP15M, HP1M, BP1-5M \leq 3.7 %, all others \leq 2.1 %	

Parameter/Equipment	Range ⁵	CMC ^{2, 4, 5} (±)	Comments
Transmitter – Ultrasound Instrumentation³			
Voltage	(25 to 250) V	2.5 %	Agilent 33250A, Tektronix TDS-3032 (A, B, or C), ZETEC ABUXE127A, 50 ohms/10W load
Reverberation (Overshoot)	(0 to 10) %	0.56 %	
Rise Time	(0 to 50) ns	1.3 ns	
Duration	(25 to 1000) ns	0.99 ns	
Linearity of Time Delays	(0 to 50) μs	0.070 %	
Receiver – Ultrasound Instrumentation³			
Linearity of Time Delays	(0 to 50) μs	0.0063 %	Agilent 33250A, Tektronix TDS-3032 (A, B, or C), ZETEC attenuator 10040260 ZETEC ABUXE127A
Gain Linearity	(0 to 80) dB	0.47 dB	
Channel Gain Variation	< 1.5 dB (Zetec) < 3.0 dB (Norm)	0.66 dB 0.66 dB	
Linearity of Vertical Display	(0 to 28) dB rel.	0.48 %	
Equivalent Input Noise	< 80 nVpp/Hz ^{0.5}	19 nVpp/Hz ^{0.5}	

V. Time & Frequency (Ultrasound Instrumentation – Zircon, Topaz16, Topaz32, Quartz)

Parameter/Equipment	Frequency	CMC ^{2,4} (±)	Comments
Receiver – Ultrasound Instrumentation ³			
Frequency Response – Zircon:	(0.225 to 20) MHz		Agilent 33250A, Tektronix TDS-3032 (A, B, or C), ZETEC attenuator 10040260, ZETEC 0040371
Low Cutoff		≤ 1.2 %	
High Cutoff		None, LP2M, LP5M, LP10M, HP1M, BP1-5M ≤ 2.9 %, all others ≤ 1.6 %	
Bandwidth		LP2M ≤ 1.8 %, all others ≤ 1.0 %	
Center – Phased Array		LP2M ≤ 2.2 %, all others ≤ 1.4 %	
Center – Conventional		LP2M ≤ 2.1 %, all others ≤ 1.3 %	
Frequency Response – Topaz32 & Quartz:	(0.225 to 20) MHz		
Low Cutoff		≤ 1.2 %	
High Cutoff		None, LP2M, LP5M, LP10M, HP1M, BP1-5M ≤ 2.9 %, all others ≤ 1.6 %	
Bandwidth		LP2M ≤ 1.8 %, all others ≤ 1.2 %	
Center – Phased Array		LP2M ≤ 2.2 %, all others ≤ 1.4 %	
Center – Conventional		LP2M ≤ 2.1 %, all others ≤ 1.3 %	

Parameter/Equipment	Frequency	CMC ^{2, 4} (±)	Comments
Receiver – Ultrasound Instrumentation ³ (cont)			
Frequency Response – Topaz16:	(0.50 to 18) MHz		Agilent 33250A, Tektronix TDS-3032 (A, B, or C), ZETEC attenuator 10040260, ZETEC 10040371
Low Cutoff		≤ 1.2 %	
High Cutoff		None, LP2M, LP5M, LP10M, HP1M, BP1-5M ≤ 2.9 %, all others ≤ 1.6 %	
Bandwidth		LP2M ≤ 1.8 %, all others ≤ 1.2 %	
Center – Phased Array		LP2M ≤ 2.2 %, all others ≤ 1.4 %	
Center – Conventional		LP2M ≤ 2.1 %, all others ≤ 1.3 %	

Parameter/Equipment	Range ⁵	CMC ^{2, 4, 5} (±)	Comments
Transmitter – Ultrasound Instrumentation ³			
Voltage –			Agilent 33250A, Tektronix TDS-3032 (A, B, or C), ZETEC 10040371, 50 ohms/10W load
Phased Array	(35 to 100) V	2.0 %	
Conventional	(25 to 250) V	2.4 %	
Reverberation (Overshoot), Manual –			
Phased Array	(0 to 10) %	0.18 %	
Conventional	(0 to 10) %	0.20 %	
Rise Time –			
Phased Array	(0 to 50) ns	1.6 ns	
Conventional	(0 to 50) ns	0.35 ns	

Parameter/Equipment	Range ⁵	CMC ^{2, 4, 5} (\pm)	Comments
Transmitter – Ultrasound Instrumentation ³ (cont)			
Duration			Agilent 33250A, Tektronix TDS-3032 (A, B, or C), ZETEC 10040371, 50 ohms/10W load
Phased Array	(25 to 500) ns	0.59 ns	
Conventional	(25 to 500) ns	0.46 ns	
Linearity of Time Delays	(0 to 20) μ s	0.052 %	
Receiver – Ultrasound Instrumentation ³			
Linearity of Time Delays	(0 to 20) μ s	0.013 %	Agilent 33250A, Tektronix TDS-3032 (A, B, or C), ZETEC attenuator 10040260, ZETEC 10040371
Gain Linearity –			
Phased Array	(0 to 70) dB	0.26 dB	
Conventional	(0 to 70) dB	0.26 dB	
Channel Gain Variation –			
Phased Array	< 1.5 dB (Zetec) < 3.0 dB (Norm)	0.36 dB 0.36 dB	
Conventional	< 1.5 dB (Zetec)	0.36 dB	
Linearity of Vertical Display	28 dB rel.	0.32 %	
Equivalent Input Noise	< 80 nVpp/Hz ^{0.5}	4.7 nVpp/Hz ^{0.5}	

¹ This laboratory offers commercial and field calibration service.

² Calibration and Measurement Capability Uncertainty (CMC) is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards or nearly ideal measuring equipment. CMCs represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of $k = 2$. The actual measurement uncertainty of a specific calibration performed by the laboratory may be greater than the CMC due to the behavior of the customer's device and to influences from the circumstances of the specific calibration.

³ Field calibration service is available for this calibration and this laboratory meets A2LA *R104 – General Requirements: Accreditation of Field Testing and Field Calibration Laboratories* for these calibrations. Please note the actual measurement uncertainties achievable on a customer's site can normally be expected to be larger than the CMC found on the A2LA Scope. Allowance must be made for aspects such as the environment at the place of calibration and for other possible adverse effects such as those caused by transportation of the calibration equipment. The usual allowance for the actual uncertainty introduced by the item being calibrated, (e.g. resolution) must also be considered and this, on its own, could result in the actual measurement uncertainty achievable on a customer's site being larger than the CMC.

⁴ The stated measured values are determined using the indicated instrument (see Comments). This capability is suitable for the calibration of the devices intended to measure or generate the measured value in the ranges indicated. CMC's are expressed as either a specific value that covers the full range or as a percent or fraction of the reading plus a fixed floor specification.

⁵ References to decibels (dB) refer to dB in voltage.

⁶ This scope meets A2LA's *P112 Flexible Scope Policy*.



Accredited Laboratory

A2LA has accredited

ZETEC FRANCE

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for technical competence in the field of

Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets R205 – Specific Requirements: Calibration Laboratory Accreditation Program. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).



Presented this 20th day of April 2020.

A blue ink signature of the Vice President of Accreditation Services.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 2734.04
Valid to February 28, 2022

For the calibrations to which this accreditation applies, please refer to the laboratory's Calibration Scope of Accreditation.