


Schedule of Accreditation

issued by

United Kingdom Accreditation Service

2 Pine Trees, Chertsey Lane, Staines-upon-Thames, TW18 3HR, UK

| | | |
|--|---|---|
|  <p>UKAS CALIBRATION</p> <p>0381</p> <p>Accredited to ISO/IEC 17025:2017</p> | <h3>Sercal Non Destructive Test Equipment Limited</h3> <p>Issue No: 028 Issue date: 05 April 2024</p> | |
| | <p>Unit 1 Littleton Business Park Littleton Drive Off Cocksparrow Lane Huntington Cannock Staffordshire WS12 4TR</p> | <p>Contact: Dennis Ball Tel: +44 (0)1543 570074 Fax: +44 (0)1543 570074 E-Mail: dball@sercal.co.uk Website: www.sercal.co.uk</p> |
| <p>Calibration performed at the above address only</p> | | |

Calibration and Measurement Capability (CMC)

| Measured Quantity Instrument or Gauge | Range | Expanded Measurement Uncertainty ($k = 2$) | Remarks |
|---|---|--|---|
| ELECTRICAL VERIFICATION of ULTRASONIC FLAW DETECTION EQUIPMENT | As BS EN ISO 22232-1:2020 Group 2 tests and including the following calibrations and quantities: Pulser Voltage V_{50} Pulser Risetime Pulse duration Frequency response <i>0.2 MHz to 30 MHz</i> Equivalent input noise Calibrated attenuator Gain linearity Vertical Linearity | 4.0 % 2.3 ns 2.3 ns 3.0 % at -3 dB point 5.0 % 0.033 dB to 0.48 dB 0.50 % 0.50 % of screen height | For instruments designed to comply with BS EN 12668- 1:2010, the centre frequency f_0 is calculated using $f_0 = \sqrt{(f_u \times f_l)}$, otherwise the expression $f_0 = (f_u + f_l)/2$ is used. Using Method B as described in Section 9.4.3.3 of BS EN ISO 22232-1:2020. |
| ELECTRICAL VERIFICATION of ULTRASONIC FLAW DETECTION EQUIPMENT | As Electrical Supply Industry Standard ESI 98-9:Issue 1:1985 | See Page 2 | |
| ELECTRICAL VERIFICATION of ULTRASONIC THICKNESS MEASURING EQUIPMENT | DIHM based on BS EN 15317:2013 | See Page 2 | Determination of resolution is conducted using a different method to that described in the standard however the outcome is identical. |



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| Measured Quantity Instrument or Gauge | Range | Expanded Measurement Uncertainty ($k = 2$) | Remarks |
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| ELECTRICAL VERIFICATION of ULTRASONIC PROBES: | | | |
| Nominal 0° compression wave probes for contact testing | As Electrical Supply Industry Standard ESI 98-7:Issue 1:1982 | See below | |
| Low frequency single crystal shear wave, angle probes | As Electrical Supply Industry Standard ESI 98-8:Issue 1:1982 | See below | |
| Single and twin crystal probes | As Electrical Supply Industry Standard ESI 98-2:Issue 1:1979 | See below | |
| EVALUATION OF PERFORMANCE CHARACTERISTICS OF ULTRASONIC PULSE-ECHO TESTING INSTRUMENTS WITHOUT THE USE OF ELECTRONIC MEASUREMENT STANDARDS | | | |
| | As ASTM E317-11, paragraphs 6.2 to 6.6 | See below | |
| QUANTITIES | | | |
| The capabilities above are limited to the following quantities, ranges and uncertainties: | | | |
| DC Resistance | 10 Ω to 1 k Ω | 0.44 % | |
| DC Current | 10 mA to 1 A | 1.6 % | |
| DC Voltage | 100 mV to 100 V 100 V to 1000 V | 0.46 % 2.5 % | |
| AC Voltage | 100 V to 150 V <i>at 50 Hz</i> 150 V to 240 V <i>at 50 Hz</i> 240 V to 1000 V <i>at 50 Hz</i> | 2.6 % 0.51 % 2.6 % | |
| Frequency | 10 Hz to 10 kHz 10 kHz to 20 MHz | 2.6 % 1.2 % | |
| Attenuation | 0 dB to 100 dB <i>at 15 MHz and 20 MHz</i> | 0.68 dB | Using calibrated attenuator |
| Pulse Parameter | Risetime Pulse Duration Pulsar Voltage V_{50} | 2.3 ns 2.3 ns 4 % | Using oscilloscope |
| Dimensional | 70° nominal 1 mm, 25 mm, 50 mm, 90 mm, 100 mm, 150 mm and 200 mm nominal | 0.14° 0.032 mm | |



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| Measured Quantity Instrument or Gauge | Range | Expanded Measurement Uncertainty ($k = 2$) | Remarks |
|--|--|--|--|
| PHASED ARRAY SETS | As BS EN ISO 18563-1:2022 including the following calibrations and quantities. | | Ranges and methods are as defined in BS EN ISO 18563- 1:2022 |
| | Pulse Amplitude | 4.0 % of screen height | |
| | Pulse Width | 2.3 ns | |
| | Pulse risetime | 2.3 ns | |
| | Time delay linearity | 1.0 % of screen width | |
| | Frequency response 200 kHz to 30 MHz | 3.0 % at -3 dB point | |
| | Channel gain variation | 1.0 % | |
| | Equivalent input noise | 4.0 % | |
| | Gain linearity | 0.51 % | |
| | Linearity of vertical display | 0.50 % of screen height | |
| | Linearity of time delay | 1.0 % of screen width | |
| CALIBRATION OF ULTRASONIC TEST BLOCKS | | | |
| Linear dimensions | 0 mm to 25 mm | 6.0 μ m | using micrometers |
| | 25 mm to 200 mm | 14 μ m | using optical projector |
| | 200 mm to 300 mm | 30 μ m | using height gauge |
| | 300 mm to 305 mm | 40 μ m | using height gauge |
| Hole diameter | 1.5 mm to 50 mm | 19 μ m | using optical projector |
| External radius | 10 mm to 100 mm | 20 μ m | using optical projector |
| Slot width | 1 mm to 8 mm | 14 μ m | using optical projector |

END



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Appendix - Calibration and Measurement Capabilities

Introduction

The definitive statement of the accreditation status of a calibration laboratory is the Accreditation Certificate and the associated Schedule of Accreditation. This Schedule of Accreditation is a critical document, as it defines the measurement capabilities, ranges and boundaries of the calibration activities for which the organisation holds accreditation.

Calibration and Measurement Capabilities (CMCs)

The capabilities provided by accredited calibration laboratories are described by the Calibration and Measurement Capability (CMC), which expresses the lowest measurement uncertainty that can be achieved during a calibration. If a particular device under calibration itself contributes significantly to the uncertainty (for example, if it has limited resolution or exhibits significant non-repeatability) then the uncertainty quoted on a calibration certificate will be increased to account for such factors.

The CMC is normally used to describe the uncertainty that appears in an accredited calibration laboratory's schedule of accreditation and is the uncertainty for which the laboratory has been accredited using the procedure that was the subject of assessment. The measurement uncertainty is calculated according to the procedures given in the GUM and is normally stated as an expanded uncertainty at a coverage probability of 95 %, which usually requires the use of a coverage factor of $k = 2$. An accredited laboratory is not permitted to quote an uncertainty that is smaller than the published measurement uncertainty in certificates issued under its accreditation.

Expression of CMCs - symbols and units

It should be noted that the percentage symbol (%) represents the number 0.01. In cases where the measurement uncertainty is stated as a percentage, this is to be interpreted as meaning percentage of the measurand. Thus, for example, a measurement uncertainty of 1.5 % means $1.5 \times 0.01 \times q$, where q is the quantity value.

The notation $Q[a, b]$ stands for the root-sum-square of the terms between brackets: $Q[a, b] = [a^2 + b^2]^{1/2}$