Irish National Accreditation Board

Accreditation Certificate

Calibration Specialists Ltd

The National Technological Park, Castletroy, Limerick

Calibration Laboratory

Registration number: 001C

is accredited by the Irish National Accreditation Board (INAB) to undertake calibration as detailed in the Schedule bearing the Registration Number detailed above, in compliance with the International Standard **ISO/IEC 17025:2005 2nd Edition**

"General Requirements for the Competence of Testing and Calibration Laboratories"

(This Certificate must be read in conjunction with the annexed Schedule of Accreditation)

Date of award of accreditation: **24:12:2002**

Date of last renewal of accreditation: **08:01:2018**

Expiry date of this certificate of accreditation: **08:01:2023**

This Accreditation shall remain in force until further notice subject to continuing compliance with INAB accreditation criteria, ISO/IEC 17025 and any further requirements specified by the Irish National Accreditation Board.

Manager: _____ **Chairperson:** _____

Dr Adrienne Duff Ms Ita Kinahan

Issued on 08 January 2018

Organisations are subject to annual surveillance and are re-assessed every five years. The renewal date on this Certificate confirms the latest date of renewal of accreditation. To confirm the validity of this Certificate, please contact the Irish National Accreditation Board.
INAB is a signatory of the European co-operation for Accreditation (EA) Testing Multilateral Agreement (MLA) and the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement.

The Metropolitan Building, James Joyce Street, Dublin 1, Ireland Tel 1890 289 389 E-mail inab@inab.ie Web inab@inab.ie

Schedule of Accreditation

(Annex to Accreditation Certificate)

Permanent Laboratory:

Category ***A, B***

CALIBRATION SPECIALISTS LTD

Electrical and Metrology Calibration Laboratory

Initial Accreditation Date :	**10-March-1987 - Electrical Permanent Lab at Limerick**
	17-December-1997 - Metrology Permanent Lab at Limerick
Postal Address:	
	The National Technology Park
	Castleroy
	Limerick
Telephone:	+353 (61) 330333
Fax:	+353 (61) 330452
E-mail:	calibrations@feasa.ie
Contact Name:	Mr T Davern
Facilities:	**Public calibration service**

Schedule of Accreditation

Permanent Laboratory:
Category A, B

THE IRISH NATIONAL ACCREDITATION BOARD (INAB) is the Irish body for the accreditation of organisations including laboratories.

Laboratory accreditation is available to testing and calibration facilities operated by manufacturing organisations, government departments, educational institutions and commercial testing/calibration services. Indeed, any organisation involved in testing, measurement or calibration in any area of technology can seek accreditation for the work it is undertaking.

Each accredited laboratory has been assessed by skilled specialist assessors and found to meet criteria which are in compliance with ISO/IEC 17025 or ISO 15189 (medical laboratories). Frequent audits, together with periodic inter-laboratory test programmes, ensure that these standards of operation are maintained.

Calibration Categories:

Category A: Permanent calibration laboratory where the laboratory is erected on a fixed location for a period expected to be greater than three years.

Category B: Site calibration that is performed by staff sent out on site by a permanent laboratory that is accredited by the Irish National Accreditation Board.

Category C: Site calibration that is performed in a site/mobile laboratory or by staff sent out by such a laboratory, the operation of which is the responsibility of a permanent laboratory accredited by the Irish National Accreditation Board.

Category D: Site calibration that is performed on site by individuals and organisations that do not have a permanent calibration laboratory. Calibration may be performed using

(a) portable test equipment
(b) a site laboratory
(c) a mobile laboratory or
(d) equipment from a mobile or site laboratory

Standard Specification or Calibration Procedure Used:

The standard specification or calibration procedure that is accredited is the issue that is current on the date of the most recent visit, unless otherwise stated.

Glossary of Terms

Facilities:

Public calibration service:	Commercial operations which actively seek work from others.
Conditionally available for public calibration:	Established for another primary purpose but, more commonly than not, is available for outside work.
Normally not available for public calibration:	Unavailable for public calibration more often than not.

Laboratory users wishing to obtain assurance that calibration results are reliable and carried out to the Irish National Accreditation Board criteria should insist on receiving an accredited calibration certificate.
Users should contact the laboratory directly to ensure that this schedule of accreditation is current. INAB will on request verify the status and scope.

Scope of Accreditation

Calibration Specialists Ltd

Permanent Laboratory:

Category A, B

Electrical Calibration Laboratory

(Nominal temperature for calibration work: 23±5°C; Relative Humidity 50% ± 25%)

INAB Classification number (P9) Measured quantity	Range of measurement	Calibration & Measurement Capability expressed as an uncertainty	Method and remarks Notes 1 & 4
D.C. Resistance Measure *Other Values* 0.1 Ω nominal 0.1 Ω to 12 Ω 12 Ω to 120 Ω 120 Ω to 1.2 kΩ 1.2 kΩ to 12 kΩ 12 kΩ to 120 kΩ 120 kΩ to 1.2 MΩ 1.2 MΩ to 12 MΩ 12 MΩ to 120 MΩ 120 MΩ to 1.2 GΩ		 0.5 mΩ*** 32 µΩ to 0.25 mΩ 0.5 mΩ to 2 mΩ 1.8 mΩ to 15 mΩ 18 mΩ to 147 mΩ 0.2 mΩ to 1.5 Ω 3.4 Ω to 23 Ω 165 Ω to 748 Ω*** 8.2 kΩ to 73 kΩ*** 610 kΩ to 6 MΩ***	Based on documented in-house method QMP 028
Generate *Discrete Values* 0.1 Ω 1 Ω 10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ 1 MΩ 10 MΩ 100 MΩ 1 GΩ 5 GΩ		 0.65 mΩ*** 53 µΩ 0.29 mΩ 1.1 mΩ 0.11 Ω 1.1 Ω 1.5 Ω 30 Ω 590 Ω 56 kΩ 1.06 MΩ 13 MΩ	QMP 028

Scope of Accreditation

Calibration Specialists Ltd

Permanent Laboratory:

Category A,B

Electrical Calibration Laboratory

(Nominal temperature for calibration work: 23±5°C; Relative Humidity 50% ± 25%)

INAB Classification number (P9) Measured quantity	Range of measurement	Calibration & Measurement Capability expressed as an uncertainty	Method and remarks Notes 1, 4 & 5
D.C. Voltage *Generate* Up to 2V 2 V to 20 V 20 V to 200 V 200 V to 1.2 kV		 1.3 µV to 27 µV 16 µV to 160 µV 0.26 mV to 3 mV 3 mV to 17 mV	QMP 028
Measure 1.2 mV to 120 mV 120 mV to 1.2 V 1.2 V to 12 V 12 V to 120 V 120 V to 1000 V 1kV to 6kV 6kV to 10kV		 1.61 µV to 3 µV 3 µV to 13.6 µV 15 µV to 123 µV 0.2 mV to 1.5 mV 2.9 mV to 23 mV 10 V to 60 V 60 V to 100 V	QMP 028

Scope of Accreditation

Calibration Specialists Ltd

Permanent Laboratory:

Category A,B

Electrical Calibration Laboratory

(Nominal temperature for calibration work: 23±5˚C; Relative Humidity 50% ± 25%)

INAB Classification number (P9) Measured quantity	Range of measurement	Calibration & Measurement Capability expressed as an uncertainty	Method and remarks Notes 1 & 4
DC Current *Measure* 12 nA to 120 nA 120 nA to 1.2 µA 1.2 µA to 12 µA 12 µA to 120 µA 120 µA to 1.2 mA 1.2 mA to 12 mA 12 mA to 120 mA 120 mA to 1 A 1 A to 30 A 30 A to 100 A		0.05 nA 0.05 nA to 0.08 nA 0.2 nA to 0.4 nA 1.3 nA to 4 nA 9 nA to 35 nA 89 nA to 248 nA 0.06 µA to 5.0 µA 27.2 µA to 139 µA 0.4 mA to 9.1 mA 12 mA to 21 mA	QMP 028
DC Current *Generate* 10 µA to 200 µA 200 µA to 2 mA 2 mA to 20 mA 20 mA to 200 mA 200 mA to 2 A		750 pA to 15 nA 13.6 nA to 136 nA 0.13 µA to 1.3 µA 1.3 µA to 13.4 µA 26 µA to 0.26 mA	QMP 028

Scope of Accreditation

Calibration Specialists Ltd

Permanent Laboratory:

Category A,B

Electrical Calibration Laboratory

(Nominal temperature for calibration work: 23±5°C; Relative Humidity 50% ± 25%)

INAB Classification number (P9) Measured quantity	Range of measurement	Calibration & Measurement Capability expressed as an uncertainty	Method and remarks Notes 1 & 4
A.C. Voltage			QMP 028
Generate			
0.09 mV to 2 mV	10 Hz to 40 Hz	5.9 µV to 12 µV	
2 mV to 20 mV		6.6 µV to 13 µV	
20 mV to 200 mV		10.8 µV to 56 µV	
200 mV to 2 V		44 µV to 0.44 mV	
2 V to 20 V		0.44 mV to 4.4 mV	
20 V to 200 V		4.4 mV to 44 mV	
0.09 mV to 2 mV	40 Hz to 10 kHz	6 µV to 98 µV	
2 mV to 20 mV		6.3 µV to 11.0 µV	
20 mV to 200 mV		9.6 µV to 44 µV	
200 mV to 2 V		26µV to 260 µV	
2 V to 20 V		0.26mV to 2.6 mV	
20 V to 200 V		2.8 mV to 28 mV	
200 V to 1 kV		56 mV to 0.28 V	
0.09 mV to 2 mV	10 kHz to 100 kHz	6.3 µV to 16 µV	
2 mV to 20 mV		7 µV to 17 µV	
20 mV to 200 mV		16 µV to 0.12 mV	
200 mV to 2 V		0.04 mV to 0.42 mV	
2 V to 20 V		0.44 mV to 4.4 mV	
20 V to 200 V		4.8 mV to 48 mV	

Scope of Accreditation

Calibration Specialists Ltd

Permanent Laboratory:

Category A,B

Electrical Calibration Laboratory

(Nominal temperature for calibration work: 23±5˚C; Relative Humidity 50% ± 25%)

INAB Classification number (P9) Measured quantity	Frequency range	Calibration & Measurement Capability expressed as an uncertainty	Method and remarks Notes 1 & 4
A.C Voltage			QMP 028
1.0 mV to 12.0 mV	1 Hz to 40 Hz	3.3 µV to 6.6 µV	
	40 Hz to 1 kHz	1.3 µV to 3.5 µV	
	1 kHz to 20 kHz	1.4 µV to 4.7 µV	
	20 kHz to 50 kHz	2.1 µV to 13 µV	
	50 kHz to 100 kHz	6.1 µV to 61 µV	
	100 kHz to 300 kHz	42 µV to 0.5 mV	
Measure	1 Hz to 40 Hz	4.8 µV to 13 µV	
12.0 mV to 120.0 mV	40 Hz to 1 kHz	4.8 µV to 13 µV	
	1kHz to 20 kHz	3.7 µV to 19 µV	
	20 kHz to 50 kHz	5.6 µV to 38 µV	
	50 kHz to 100 kHz	12 µV to 98 µV	
	100 kHz to 300 kHz	46 µV to 0.37 mV	
	300 kHz to 1 MHz	0.2 mV to 1.2 mV	
	1 MHz to 2 MHz	0.2 mV to 1.8 mV	
Measure	1 Hz to 40 Hz	47 µV to 114 µV	
120.0 mV to 1.2 V	40 Hz to 1 kHz	29 µV to 109 µV	
	1 kHz to 20 kHz	37 µV to 193 µV	
	20 kHz to 50 kHz	56 µV to 0.4 mV	
	50 kHz to 100 kHz	0.12 mV to 1 mV	
	100 kHz to 300 kHz	0.5 mV to 4 mV	
	300 kHz to 1 MHz	1.2 mV to 12 mV	
	1 MHz to 2 MHz	1.9 mV to 18 mV	

Scope of Accreditation

Calibration Specialists Ltd

Permanent Laboratory:

Category A,B

Electrical Calibration Laboratory

(Nominal temperature for calibration work: 23±5°C; Relative Humidity 50% ± 25%)

INAB Classification number (P9) Measured quantity	Frequency range	Calibration & Measurement Capability expressed as an uncertainty	Method and remarks Notes 1 & 4
A.C. Voltage *Measure* 1.2 V to 12.0 V	1 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 1 MHz 1 MHz to 2 MHz	0.5 mV to 1.3 mV 0.3 mV to 1.1mv 0.4 mV to 2 mV 0.6 mV to 3.8 mV 1.2 mV to 10 mV 5 mV to 37 mV 13 mV to 121 mV 19 mV to 181 mV	QMP 028
Measure 12.0 V to 120.0 V	1 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz	6.4 mV to 28 mV 4.4 mV to 26 mV 4.4 mV to 26 mV 6.2 mV to 146 mV 6.4 mV to 146 mV	
Measure 120.0 V to 1000 V	1 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 20 kHz	44 mV to 88 mV 42 mV to 68 mV 620 mV to 92 mV	
Measure 1 kV to 2 kV 2 kV to 7 kV	20 Hz to 100 Hz 20 Hz to 60 Hz	4.2 V to 8.4 V 54 V to 189 V	

Scope of Accreditation

Calibration Specialists Ltd

Permanent Laboratory:

Category A,B

Electrical Calibration Laboratory

(Nominal temperature for calibration work: 23±5˚C; Relative Humidity 50% ± 25%)

INAB Classification number (P9) Measured quantity	Frequency range	Calibration & Measurement Capability expressed as an uncertainty	Method and remarks Notes 1 & 4
AC Current *Generate* 10µA to 200 µA 200 µA to 2 mA 2 mA to 20 mA 20 mA to 200 mA 200 mA to 2 A	40 Hz to 5 kHz	7.5 nA to 150 nA 130 nA to 1.3 µA 1.2 µA to 12 µA 12 µA to 126 µA 0.18 mA to 1.8 mA	QMP 028

Scope of Accreditation

Calibration Specialists Ltd

Permanent Laboratory:

Category A,B

Electrical Calibration Laboratory

(Nominal temperature for calibration work: 23±5˚C; Relative Humidity 50% ± 25%)

INAB Classification number (P9) Measured quantity	Frequency range	Calibration & Measurement Capability expressed as an uncertainty	Method and remarks Notes 1 & 4
Measure			QMP 028
6.0 µA to 120.0 µA	45 Hz to 1 kHz	24 nA to 92 nA ***	
120.0 µA to 1.20 mA	45 Hz to 100 Hz	0.3 µA to 0.9 µA ***	
	100 Hz to 5 kHz	0.2 µA to 0.6 µA ***	
1.2 mA to 12.0 mA	45 Hz to 100 Hz	2.7 µA to 9.2 µA ***	
	100 Hz to 5 kHz	2.4 µA to 5.6 µA ***	
12.0 mA to 120.0 mA	45 Hz to 100 Hz	27 µA to 92 µA ***	
	100 Hz to 5 kHz	24 µA to 56 µA ***	
120.0 mA to 1.0 A	45 Hz to 100 Hz	0.3 mA to 1 mA ***	
	100 Hz to 5 kHz	0.3mA to 1.2 mA ***	
1.0 A to 10.0 A	50 Hz to 2 kHz	20 mA to 120 mA	
10.0 A to 30.0A	50 Hz to 60 Hz	6.6 mA to 18 mA ***	

Scope of Accreditation

Calibration Specialists Ltd

Permanent Laboratory:
Category A,B

Electrical Calibration Laboratory

(Nominal temperature for calibration work: 23±5°C; Relative Humidity 50% ± 25%)

INAB Classification number (P9) Measured quantity	Frequency range	Calibration & Measurement Capability expressed as an uncertainty	Method and remarks Notes 1 & 4
Frequency *Generate Discrete values*	1 MHz 5 MHz 10 MHz 0.2 Hz 0.5 Hz	2mHz 0.01 Hz 0.02 Hz 1.2 µHz 3.0 µHz ***	QMP 028 (With external reference
1.0 Hz to 100 kHz (in discreet steps: 1,2,5 10 etc)		4 µHz to 4 Hz ***	(With External reference)
100 kHz to 10 MHz		0.07 Hz to 0.25 Hz ***	(With External reference)
10 MHz to 20 GHz		0.2 Hz to 2.4 kHz ***	(within 12 months of last calibration of internal reference standard)

Scope of Accreditation

Calibration Specialists Ltd

Permanent Laboratory:

Category A,B

Electrical Calibration Laboratory

(Nominal temperature for calibration work: 23±5˚C; Relative Humidity 50% ± 25%)

INAB Classification number (P9) Measured quantity	Frequency range	Calibration & Measurement Capability expressed as an uncertainty	Method and remarks Notes 1 & 4
Measure			QMP 028
0.1 Hz to 1 Hz		50 µHz to 500 µHz	
1 Hz to 10 Hz		50 µHz to 500 µHz	
10 Hz to 100 Hz		52 µHz to 0.52 mHz	See Note 2
100 Hz to 1 kHz		6.2 µHz to 0.62 mHz	
1 kHz to 1.2 GHz		0.21 mHz to 252 Hz	
Period			
Generate			
10.0 Ns to 1.0 S		0.004 pS to 4 µS	
2.0 S		8.0 µS	
5.0 S		30 µS	

Scope of Accreditation

Calibration Specialists Ltd

Permanent Laboratory:

Category A,B

Electrical Calibration Laboratory

(Nominal temperature for calibration work: 23±5˚C; Relative Humidity 50% ± 25%)

INAB Classification number (P9) Measured quantity	Range of measurement	Calibration & Measurement Capability expressed as an uncertainty *	Method and remarks Notes 1, 3 & 4
Risetime/Falltime *Generate*			QMP 028
Nominal risetime <200 ps into 50 Ω		77 pS	
Time	24 Hrs	± *40mS*	QMP063

Scope of Accreditation

Calibration Technology

Permanent Laboratory:

Category A,B

Electrical Calibration Laboratory

The following types of instrument can be calibrated in accordance with the scheduled measured quantities and ranges. An uncertainty reported on an INAB certificate will be that for the instrument itself during calibration plus the appropriate measurement capability of the laboratory for the quantities and ranges concerned.

INAB Classification number (P9)		Instrument
302	**Resistors, resistance boxes and potential dividers**	
.01		Precision resistors, resistance boxes and conductance boxes
.02		Volt ratio boxes and potential dividers
.03		DC Shunts
.04		AC Shunts
307	**Voltage Standards**	
.01		Standard cells
.11		Electronic e.m.f. reference devices
309	**Instrument Calibrators**	
.01		DC voltage
.02		AC voltage
.03		DC voltage
.04		AC current
.51		Resistance
310	**Indicating and recording instruments**	
.01		DC voltmeters
.02		AC voltmeters
.03		DC ammeters
.04		AC ammeters
.09		Ohmmeters
.81		Graphic recording instruments
.82		Digital storage recorders

Scope of Accreditation

Calibration Specialists Ltd

Permanent Laboratory:

Category A,B

Electrical Calibration Laboratory

The following types of instrument can be calibrated in accordance with the scheduled measured quantities and ranges. An uncertainty reported on an INAB certificate will be that for the instrument itself during calibration plus the appropriate measurement capability of the laboratory for the quantities and ranges concerned.

INAB Classification number (P9)		Instrument
311	**Bridges, potentiometers, test sets**	
.01		DC bridges
.02		DC potentiometers
.11		AC bridges
.12		AC potentiometers
312	**Frequency and time measuring instruments and standards**	
.01		Frequency meters
.02		
.11		Counters
.12		Time interval meters
.13		clocks and Watches
.14		Stroboscopes (Electrical)
.15		Tachometers
.21		Frequency standards
313	**Waveform measuring instruments**	
.01		Frequency characteristics
.02		Input characteristics
.03		Timing characteristics
.99		Other characteristics: Transition time
321	**Power supplies and stabilizers**	
.01		Power supplies
.02		Stabilizers

Scope of Accreditation

Calibration Specialists Ltd

Permanent Laboratory:

Category A,B

Electrical Calibration Laboratory

The following types of instrument can be calibrated in accordance with the scheduled measured quantities and ranges. An uncertainty reported on an INAB certificate will be that for the instrument itself during calibration plus the appropriate measurement capability of the laboratory for the quantities and ranges concerned.

INAB Classification number (P9)		Instrument
322	**Signal sources**	
.01		Frequency characteristics
.04		Sweep characteristics
326	**Electronic**	
.10	**equipment**	Transducer indicators and calibrators
340	**High voltage testing**	
.11		Direct voltage tests
.12		Alternating voltage tests
		Heat & Temperature measurement
503	**Calibration of ancillary temperature measuring**	Electrical Simulation
.01	**instruments**	Portable potentiometers
.02		Digital voltmeters
.03		Resistance bridges
.04		Indicators, recorders and controllers
.05		Transmitters

Scope of Accreditation

Calibration Specialists Ltd

Permanent Laboratory:

Category A

Metrology Laboratory

(Nominal temperature for calibration work: 23±5˚C; Relative Humidity 50% ± 25%)

INAB Classification number (P9) Measured quantity		Range of measurement	Calibration & Measurement Capability expressed as an uncertainty	Method and remarks
103	**Engineering Metrology Equipment**			
.22	External micrometers and Setting Rods	0 to 300 mm	Heads: 2.0microns between any two points. Setting and Extension Rods: [1+(5 X Length in m)]	ISO 3611: 2010
.23	Internal micrometers (including stick mics) and Extension Rods	0 to 1 m		To BS 959: 2008
.24	Micrometer height and depth guages and Extension Rods	0 to 150 mm		To BS 6468: 2008
.27	Electric, dial and vernier callipers	0 to 300 mm	Overall performance 10 +(30 x length in m)	To BS 887: 2008 ISO 13385-1: 2011
152	**Torque measuring devices** Torque tools	3 N·m to 1000 N·m (Excludes torque screwdrivers)	0.8%	ISO 6789-2:2017

Notes:

* See Note 1.

** The Uncertainty is given with a 95% confidence level with a t-distribution and a modified coverage factor,

Scope of Accreditation

Calibration Specialists Ltd

Permanent Laboratory:

Category A

Metrology Laboratory

(Nominal temperature for calibration work: 23±5°C; Relative Humidity 50% ± 25%)

INAB Classification number (P9) Measured quantity	Range of measurement	Calibration & Measurement Capability expressed as an uncertainty	Method and remarks

kp = 2.15

*** These Uncertainties are dominated by the accuracy of the reference standard for which a rectangular distribution has been assumed with a coverage factor, k = √3.

1 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% except where there is an asterisk.

2 For a characteristic signal of 20 mV (p-p) with a 10mV(p-p) signal noise level. Input impedence 1M Ω/35 pf.

3 For scopes set to 50 Ω coupling and does not include cursor, visual, timebase and bandwidth errors due to the oscilloscope.

4 Calibration and measurement capability expressed as an uncertainty (±) to be reported in compliance to clause 6.3 of EA 4/02 “Expression of the Uncertainty of Measurement in Calibration”.

5 For a zero offset measurement, a copper short is used with uncertainties not greater the ±1 μV.