Laboratory Accreditation Programmes

Schedule to

CERTIFICATE OF ACCREDITATION

CPS (NZ) Limited **Client Number 927**

38J Angle Street, Onehunga, Auckland, 1061

Telephone 09 636-4999 **www.cps.co.nz**

Authorised Representative
Ms Kirsty Russell
Laboratory Manager

Programme
Metrology & Calibration Laboratory

Accreditation Number 271 **Initial Accreditation Date** 18 December 1985

Conformance Standard
ISO/IEC 17025:2017
General requirements for the competence of testing and calibration laboratories

Laboratory Services Summary

4.55	Pipes, Hoses, Valves and Fittings
5.22	Precision Laboratory Balances
5.23	Industrial Balances
5.41	Barometers
5.42	Differential Pressure Measuring Devices (including Manometers)
5.43	Pressure Gauge Testers and Pressure Balances
5.44	Pressure and Vacuum Measurement
5.61	Temperature Measuring Equipment
5.88	Calibrators for Instrumentation
5.89	Indicating Instruments and Recording Instruments
5.91	Frequency Measurement and Time Measurement

Key Technical Personnel

Mr Paul Black	5.22, 5.23, 5.42, 5.44 (ii)(iii), 5.61
Mr Richard Ettema	5.88, 5.89, 5.91
Mr Douglas Fraser	5.88, 5.89, 5.91
Mr Jerome Fryer	5.88, 5.89, 5.91
Mr Mohammed Khan	4.55, 5.22, 5.23, 5.44 (iii), 5.61
Ms Kirsty Russell	4.55, 5.22, 5.23, 5.41, 5.42, 5.43, 5.44, 5.61
Mr Christopher Woudenberg	4.55, 5.41, 5.42, 5.43, 5.44, 5.61

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Calibration and Measurement Capability (CMC) Uncertainties are expressed as an expanded uncertainty with a level of confidence of approximately 95 % (k = 2) Note1.

Measurement results are traceable to the International System of Units (SI) via an unbroken chain of comparisons to the New Zealand National Standards or to the National Standards of other Signatories to the CIPM MRA.

Most calibrations of working pressure and temperature measuring equipment can be carried out on-site including a limited range of measurements that can be carried out using equipment and personnel in Fiji. Refer to the specific class of test information below for further information.

Branch laboratories are maintained at the following addresses:

107 De Havilland Drive, Bell Block, New Plymouth Phone (06) 755 4949
31 Paerata Road, Pukekohe Phone (09) 636 4999
Calibration Connect: Unit 3/50 Acheron Drive, Riccarton, Christchurch 8041 Phone (03) 963 9244

4.55 Pipes, Hoses, Valves and Fittings

(e) Other tests

The testing of Pressure Relief Valves and Pressure Switches up to 120000 kPa, in accordance with in-house methods. Measurements can be carried out on-site or in the laboratory.

5.22 Precision Laboratory Balances

Calibration of balances in accordance with in-house methods based on MSL TG 25 and OIML R 111-1

	CMC Uncertainty
1 mg to 100 mg	6.3×10^{-3} mg
100 mg to 1000 mg	1.6×10^{-2} mg
1 g to 100 g	3.0×10^{-5} g
100 g to 500 g	7.8×10^{-7} g

5.23 Industrial Balances

Ranges and CMC uncertainties as under class 5.22

5.41 Barometers

(a) Aneroid barometers (including digital barometers) by comparison with DHI 7601 pressure balance and piston/cylinder assemblies

	CMC Uncertainty
80 kPa to 120 kPa	0.23 Pa + 0.0014 % of reading

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SCOPE OF ACCREDITATION

Accreditation Number 271

5.42 Differential Pressure Measuring Devices

(a) Diaphragm types
(b) Liquid column types, inclined and vertical
(c) Pressure transducers
(d) Pressure recorders

By comparison with automatic calibrators (in laboratory or on-site)

Ruska 7250 LP -7 kPa to 7 kPa	CMC Uncertainty 0.01 % of reading or 0.042 Pa, whichever is greater

5.43 Pressure Gauge Testers and Pressure Balances

Pressure calibrators or indicators by comparison with DHI 7601 pressure balance and piston/ cylinder assemblies

Gauge mode – gas medium	CMC Uncertainty
4 kPa to 350 kPa	0.23 Pa + 0.0014 % of reading
40 kPa to 7000 kPa	2.0 Pa + 0.005 % of reading*
	*Reference uncertainty of 0.002 % of reading
Gauge mode – liquid medium	
100 kPa to 20,000 kPa	0.018 kPa + $4.1 \times 10^{-5} p$, where p is indicated pressure in kPa*
20,000 kPa to 200,000 kPa	0.19 kPa + $4.9 \times 10^{-5} p$, where p is indicated pressure in kPa*
	*Reference uncertainty of 0.004 % of reading
Absolute mode	
7 kPa to 350 kPa	0.23 Pa + 0.0014 % of reading
50 kPa to 7000 kPa	2.0 Pa + 0.005 % of reading*
	*Reference uncertainty of 0.002 % of reading

5.44 Pressure and Vacuum Measurement

(a) Pressure gauges
(b) Vacuum gauges (Maximum vacuum achievable is subject to ambient barometric pressure conditions)

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(c) Pressure transducers
(d) Pressure recorders

Accuracy classes: 0.1, 0.25, 0.6, 1.0, 1.6, 2.5, 4.0 in accordance with AS 1349:1986 and BS EN 837-1:1998; gauges of accuracy 4A, 3A, 2A, 1A and below as defined in ASME B40.100-2013

	CMC Uncertainty
i) By comparison with DHI 7601 and DHI 7302 pressure balances and piston/cylinder assemblies	
Range and uncertainties as per 5.43 above, for gas medium, plus:	
Gauge pressure – liquid medium	
100 kPa to 20,000 kPa	0.018 kPa + $4.1 \times 10^{-5} p$, where p is indicated pressure in kPa*
20,000 kPa to 200,000 kPa	0.19 kPa + $4.9 \times 10^{-5} p$, where p is indicated pressure in kPa*
	*Reference uncertainty of 0.004 % of reading
ii) By comparison with automatic calibrators (in laboratory or on-site)	
Ruska 7250 LP	
-7 kPa to 7 kPa	0.01 % of reading or 0.042 Pa, whichever is greater
DHI PPC3 and PPC4 Gauge pressure	
-15 kPa to 15 kPa	0.03 % of reading or 0.005 % of span, whichever is greater
DHI PPC3 and PPC4 Gauge or absolute pressure	
-100 kPa to 7000 kPa	0.008 % of reading* or 0.0024 % of span, whichever is greater *Reference uncertainty of 0.005 % of reading
Ruska controller and RPM4 automatic calibrator Gauge pressure	
7000 kPa to 40000 kPa	0.013 % of reading or 0.0039 % of span, whichever is greater
40000 kPa to 70000 kPa	0.013 % of reading or 0.0039 % of span, whichever is greater
iii) By comparison with digital reference gauges (in laboratory or on-site) CMC uncertainty is % reading or floor value, whichever value is greater	

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-100 kPa to 0 kPa	0.25 kPa
0 kPa to 100 kPa	0.06 % of reading or 0.02 kPa
100 kPa to 200 kPa	0.06 % of reading or 0.04 kPa
200 kPa to 700 kPa	0.06 % of reading or 0.14 kPa
700 kPa to 2000 kPa	0.06 % of reading or 0.4 kPa
2000 kPa to 3000 kPa	0.06 % of reading or 0.6 kPa
3000 kPa to 7000 kPa	0.06 % of reading or 1.4 kPa
7000 kPa to 14000 kPa	0.06 % of reading or 2.8 kPa
14000 kPa to 70000 kPa	0.06 % of reading or 14 kPa
70000 kPa to 100000 kPa	0.06 % of reading or 20 kPa
100000 kPa to 200000 kPa	0.1 % of range of device calibrated

5.61 Temperature Measuring Equipment

(including temperature calibration of electronic thermometers)

(a) Rare metal thermocouples
(b) Base metal thermocouples
(c) Platinum (and other metallic) resistance thermometers
(e) Thermistors and other semi-conductor thermometers
(f) Liquid-in-glass thermometers
(g) Clinical thermometers
(j) Radiation pyrometers, including infrared thermometers and infrared imaging cameras
(k) Vapour pressure thermometers
(l) Filled metal systems
(m) Bimetallic systems
(o) Indicators, recorders and controllers
(p) Other direct reading temperature measuring systems including transducers and transmitters with electrical 4-20 mA, 1-10 Vdc and 1-5 Vdc outputs

Range applies to all of the above, except (j) (see further below)

Range	CMC Uncertainty
Ice-point *	0.01 °C
-100 °C to -60 °C	0.080 °C
-60 °C to -20 °C	0.028 °C
-20 °C to 200 °C	0.015 °C
200 °C to 660 °C	0.17 °C

*Includes ice-point measurements of liquid in glass thermometers

On-site temperature calibration is offered over the ranges below.

Ice-point*	0.01 °C
-30 °C to -20 °C	0.10 °C

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-20 °C to 80 °C	0.03 °C
80 °C to 150 °C	0.046 °C
150 °C to 350 °C	0.51 °C

On-site temperature calibration is offered in Fiji over the ranges below.

Ice-point	0.02 °C
-25 °C to 25 °C	0.031 °C
25 °C to 80 °C	0.019 °C
80 °C to 150 °C	0.020 °C

Using a customer's device as a heat source. Note additional spatial uncertainties may apply

150 °C to 400 °C	0.19 °C

Radiation pyrometers, including infrared thermometers and infrared imaging cameras

-15 °C to 0 °C	1.0 °C
0 °C to 130 °C	0.24 °C
130 °C to 500 °C	0.75 °C

Thermocouple simulation internal reference junction (all units in °C) can be carried out onsite

J Type

-210 to -100	0.27
-100 to -30	0.16
-30 to 150	0.14
150 to 760	0.17
760 to 1200	0.23

K Type

-200 to -100	0.33
-100 to -25	0.18
-25 to 120	0.16
120 to 1000	0.26
1000 to 1372	0.4

T Type

-250 to -150	0.63
-150 to 0	0.24
0 to 120	0.16
120 to 400	0.14

Thermocouple simulation reference junction at 0 °C.

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Using the tables outlined in appendix D of "Traceable Temperatures" second edition.

Resistance Based thermometry

Using the tables outlined in appendix C of "Traceable Temperatures" second edition.

5.88 Calibrators for Instrumentation

(a)	DC voltage	CMC
	200 mV range	
	0 mV	0.2 µV
	29.9 mV	12 µV/V + 0.2 µV
	100 mV	9.4 µV/V
	190 mV	9.6 µV/V
	2 V range	
	0.2 V	4.6 µV/V
	0.329 V	3.5 µV/V
	1 V	3.1 µV/V
	1.9 V	2.9 µV/V
	20 V range	
	2 V	3.7 µV/V
	3.29 V	3.7 µV/V
	5 V	3.9 µV/V
	10 V	3.9 µV/V
	15 V	3.9 µV/V
	19 V	3.9 µV/V
	200 V range	
	20 V	2.9 µV/V
	32.9 V	2.8 µV/V
	50 V	2.7 µV/V
	100 V	2.6 µV/V
	190 V	2.6 µV/V
	1000 V range	
	200 V	2.8 µV/V
	329 V	2.8 µV/V
	334 V	2.8 µV/V
	900 V	2.5 µV/V
	1020 V	2.5 µV/V
(b)	AC voltage	

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Metrology & Calibration Laboratory
SCOPE OF ACCREDITATION

Accreditation Number 271

All values in µV/V

		10 Hz	20 Hz	45 Hz	200 Hz	1 kHz	3 kHz	8 kHz	10 kHz	18 kHz	20 kHz	25 kHz	50 kHz	100 kHz	450 kHz	500 kHz	1 MHz
2	mV		2300		1100	4400						4500	10000				
3	mV		2300	270	460					4400							
10	mV				310	460				1100			2700				
20	mV		330		200					950		720	1700				
30	mV	160		190		180	200			200		160		160	1500		
300	mV	180		41		39	43			42		62		140	1700		
3	V	180		36		33	55			56		170		260	1900		7000
30	V	190		44		36	47			170		220		300			
200	V			53		40	52			170	160			330			
300	V																
1000	V			130		40	48	83									
1020	V					40	83										

(c) DC current

330 µA range
0 µA — 0.15 nA
190 µA — 11 µA/A + 0.15 nA
329 µA — 21 µA/A

3.3 mA range
1.9 mA — 9.9 µA/A
3.29 mA — 22 µA/A

33 mA range
19 mA — 23 µA/A
32.9 mA — 28 µA/A

330 mA range
190 mA — 16 µA/A
329 mA — 50 µA/A

3 A range
1.09 A — 23 µA/A
2.99 A — 170 µA/A

20 A range
10.9 A — 98 µA/A
19.9 A — 78 µA/A

(d) AC current

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All values in µA/A

		10 Hz	20 Hz	45 Hz	65 Hz	200 Hz	500 Hz	1 kHz	5 kHz	10 kHz	30 kHz
10	µA					3400			3100		
33	µA					3400		310	1000		1300
100	µA					72	290			860	820
190	µA			110				100	860		
199	µA		590	170	140				410	890	1200
330	µA	249									
1.9	mA	320		300				82	440		800
3.3	mA							120	360	1000	1200
19	mA	370						45	380		800
33	mA							100	140	360	1200
190	mA	1200		160				57	77		710
330	mA							130	480	680	3500
1.09	A	120		110				70	520	380	
3	A	1400		100	120				170	430	
3.3	A			120	120	140	480	120	170		
10.9	A					140		140	230		
20	A			110	90	100		120	500		

(e) Resistance

Calibrator range	
0 Ω	18 µΩ
1.9 Ω	21 µΩ/Ω + 18 µΩ
10.9 Ω	15 µΩ/Ω
11.9 Ω	10 µΩ/Ω
19 Ω	10 µΩ/Ω
30 Ω	6.4 µΩ/Ω
33 Ω	6.2 µΩ/Ω
109 Ω	7.8 µΩ/Ω
119 Ω	8.6 µΩ/Ω
190 Ω	8.4 µΩ/Ω
300 Ω	6.1 µΩ/Ω
330 Ω	6.3 µΩ/Ω
1.09 kΩ	6.9 µΩ/Ω
1.19 kΩ	7.4 µΩ/Ω
1.9 kΩ	6.7 µΩ/Ω
3 kΩ	6.2 µΩ/Ω
3.3 kΩ	5.7 µΩ/Ω
10.9 kΩ	7.8 µΩ/Ω
11.9 kΩ	5.6 µΩ/Ω
19 kΩ	5.6 µΩ/Ω
30 kΩ	6.8 µΩ/Ω

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SCOPE OF ACCREDITATION

Accreditation Number 271

33 kΩ	5.7 µΩ/Ω
109 kΩ	8.7 µΩ/Ω
119 kΩ	8.7 µΩ/Ω
190 kΩ	8.7 µΩ/Ω
300 kΩ	14 µΩ/Ω
330 kΩ	14 µΩ/Ω
1.09 MΩ	16 µΩ/Ω
1.19 mΩ	17 µΩ/Ω
1.9 MΩ	16 µΩ/Ω
3 MΩ	14 µΩ/Ω
3.3 MΩ	14 µΩ/Ω
10.9 MΩ	24 µΩ/Ω
11.9 MΩ	84 µΩ/Ω
19 MΩ	24 µΩ/Ω
30 MΩ	150 µΩ/Ω
33 MΩ	160 µΩ/Ω
109 MΩ	140 µΩ/Ω
119 MΩ	260 µΩ/Ω
400 MΩ	840 µΩ/Ω
640 MΩ	930 µΩ/Ω
1090 MΩ	940 µΩ/Ω

Miscellaneous

(i) Phase angle

0° to 360°

V & V

Amplitude	Frequency	
35 mV to 50 V	60 Hz to 10 kHz	0.075°

V & I

Amplitude (V)	Amplitude (I)	Frequency	
35 mV to 33 V	300 mA to 20 A	10 Hz to 1 kHz	0.075°

(ii) Electrical simulation of temperature signal for calibration of resistance temperature device calibrators

-200 °C to 0 °C	0.0041 °C
0 °C to 100 °C	0.0048 °C
100 °C to 300 °C	0.0054 °C
300 °C to 600 °C	0.0082 °C
600 °C to 850 °C	0.012 °C

(iii) Electrical simulation of temperature signal for calibration of thermocouple calibrators

-200 °C to 0 °C	0.021 °C

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0 °C to 100 °C	0.012 °C
100 °C to 300 °C	0.020 °C
300 °C to 600 °C	0.021 °C
600 °C to 1200 °C	0.022 °C

5.89 Indicating Instruments and Recording Instruments

(a) DC voltmeters

	CMC
220 mV range	
0 mV	0.39 µV
219˙ mV	6.3 µV/V + 0.39 µV
2.2 V range	
0.22 V	4.6 µV/V
2.19˙ V	5.0 µV/V
11 V range	
2.2 V	4.2 µV/V
10.9˙ V	3.3 µV/V
22 V range	
11 V	3.4 µV/V
21.9˙ V	3.3 µV/V
220 V range	
22 V	6.3. µV/V
219.9˙ V	4.8 µV/V
1000 V range	
220 V	7.9 µV/V
1000 V	6.5 µV/V

(b) AC voltmeters

All values in µV/V

		10 Hz	20 Hz	40 Hz	50 Hz	1 kHz	20 kHz	30 kHz	50 kHz	100 kHz	300 kHz	500 kHz	1 MHz
2	mV	2100	2100	1900				2000		2700	5500	10000	12000
2.2	mV	1900	1900	1800				1900		2500	2500	9900	11000
22	mV	400		260	240			360		660	1400	2200	4200
220	mV	290	280	110	81			140		380	920	2100	7500
2.2	V	260	240	91	58			87		130	920	2400	8800
22	V	250	240	91	66			190		320	800	1800	1500
220	V	240	240	91	52			83		150			

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Metrology & Calibration Laboratory
SCOPE OF ACCREDITATION

Accreditation Number 271

		10 Hz	20 Hz	40 Hz	50 Hz	1 kHz	20 kHz	30 kHz	50 kHz	100 kHz	300 kHz	500 kHz	1 MHz
250	V		330			460			470	1800			
750	V			467									
1050	V			68			130	460					

(c) DC ammeters

220 µA range	
0 µA	5.3 nA
220 µA	38 µA/A + 5.3 nA
2.2 mA range	
0.22 mA	59 µA/A
2.19˙ mA	34 µA/A
22 mA range	
2.2 mA	48 µA/A
21.9˙ mA	32 µA/A
220 mA range	
22 mA	66 µA/A
219˙ mA	48 µA/A
2.2 A range	
0.22 A	120 µA/A
2.2 A	110 µA/A
11 A range	
2.2 A	440 µA/A
11 A	300 µA/A
20 A range	
11 A	810 µA/A
19.9˙ A	790 µA/A

Clamp meters using current coil (nominal ranges)

4 mA	0.47 %
12 mA	0.31 %
20 mA	0.21 %
100 mA	0.19 %
3 A	2.20 %
10 A	0.69 %
100 A	0.67 %
550 A	0.58 %
600 A	0.58 %

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Metrology & Calibration Laboratory
SCOPE OF ACCREDITATION

Accreditation Number 271

900 A	0.55 %

(d) AC ammeters

All values in µA/A

		10 Hz	20 Hz	40 Hz	45 Hz	100 Hz	1 kHz	5 kHz	10 kHz	30 kHz
9	µA	1900	1900	1100			930	1500	7700	
220	µA	570	580	540			130	320	1200	
330	µA									13000
2.2	mA	280	240	160			100	220	1200	
3.3	mA	430	240							7700
22	mA						100	200	1100	
33	mA			160						3100
220	mA	280	240				100	190	1000	3500
330	mA		380	360	360		460	1000	8100	
2.2	A									
11	A						360	820	3200	
20	A				1100	1100	1300	23000		

Clamp meters using current coil (nominal ranges)

Frequency 50 Hz	
3 mA	0.22 %
30 mA	0.63 %
300 mA	0.36 %
3 A	0.28 %
10 A	0.61 %
100 A	0.80 %
550 A	0.20 %
600 A	0.71 %
900 A	0.66 %
Frequency 400 Hz	
20 A	1.8 %
50 A	1.3 %
100 A	1.2 %
120 A	1.1 %
250 A	1.2 %
400 A	1.1 %

(g) Phase angle indicators

Refer to 5.88 miscellaneous – Phase angle

(i) Ohmmeters

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Metrology & Calibration Laboratory
SCOPE OF ACCREDITATION

Accreditation Number 271

0 Ω	38 µΩ
1 Ω	46 µΩ/Ω + 38 µΩ
1.9 Ω	84 µΩ/Ω
10 Ω	21 µΩ/Ω
19 Ω	21 µΩ/Ω
100 Ω	9.2 µΩ/Ω
190 Ω	9.5 µΩ/Ω
1 kΩ	6.2 µΩ/Ω
1.9 kΩ	6.5 µΩ/Ω
10 kΩ	6.2 µΩ/Ω
19 kΩ	6.1 µΩ/Ω
100 kΩ	7.7 µΩ/Ω
190 kΩ	9.2 µΩ/Ω
1 MΩ	12 µΩ/Ω
1.9 MΩ	16 µΩ/Ω
10 MΩ	36 µΩ/Ω
19 MΩ	42 µΩ/Ω
100 MΩ	93 µΩ/Ω
1 GΩ	220 µΩ/Ω

(j) LCR meters

Capacitance	Frequency	CMC
0.22 nF	5 kHz	1800 µF/F
0.39 nF	1 kHz	2900 µF/F
0.48 nF	1 kHz	1300 µF/F
0.6 nF	1 kHz	830 µF/F
1 nF	1 kHz	540 µF/F
2 nF	1 kHz	460 µF/F
7 nF	1 kHz	390 µF/F
10.9 nF	1 kHz	190 µF/F
20 nF	1 kHz	190 µF/F
70 nF	1 kHz	240 µF/F
109 nF	1 kHz	270 µF/F
200 nF	1 kHz	480 µF/F
300 nF	1 kHz	690 µF/F
0.7 µF	100 Hz	780 µF/F
1.09 µF	100 Hz	780 µF/F
2 µF	100 Hz	790 µF/F
3 µF	100 Hz	780 µF/F
7 µF	100 Hz	790 µF/F
10 µF	100 Hz	830 µF/F
20 µF	100 Hz	910 µF/F
30 µF	100 Hz	1000 µF/F
70 µF	50 Hz	630 µF/F

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CPS (NZ) Limited
Metrology & Calibration Laboratory
SCOPE OF ACCREDITATION

Accreditation Number 271

109 µF	50 Hz	780 µF/F
200 µF	dc	290 µF/F
300 µF	dc	250 µF/F
0.33 mF	dc	240 µF/F
0.7 mF	dc	280 µF/F
1.09 mF	dc	240 µF/F
1.1 mF	dc	230 µF/F
2 mF	dc	250 µF/F
3 mF	dc	230 µF/F
3.3 mF	dc	250 µF/F
10.9 mF	dc	240 µF/F
20 mF	dc	230 µF/F
30 mF	dc	230 µF/F
33 mF	dc	230 µF/F
110 mF	dc	240 µF/F

5.91 Frequency Measurement and Time Measurement

(a) Frequency meters
(c) Counters

Nominal range	CMC Uncertainty
10 Hz	1.3 µHz/Hz
100 Hz	1.3 µHz/Hz
120 Hz	1.3 µHz/Hz
1000 Hz	1.3 µHz/Hz
10 kHz	1.3 µHz/Hz
50 kHz	1.3 µHz/Hz
100 kHz	1.3 µHz/Hz
1000 kHz	1.3 µHz/Hz
2000 kHz	1.4 µHz/Hz
10000 kHz	1.3 µHz/Hz

Note 1:
Unless stated otherwise the CMC is based on the performance of the best available device and measurement uncertainties achieved for specific calibrations may be greater than the CMC Uncertainty. A laboratory may not report measurement uncertainties lower than its CMC. However, if the device under calibration has a greater accuracy than the device used to calculate the CMC the laboratory may be able to use the calibration data to lower its CMC Uncertainty. Please contact the laboratory to discuss your specific requirements.

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