Australian Government
Department of Industry, Science and Resources
National Measurement Institute

Appointment as a Verifying Authority for Reference Standards of Measurement

In accordance with Regulation 73 of *National Measurement Regulations 1999* (Cth), in force under the *National Measurement Act 1960* (Cth), the Chief Metrologist hereby appoints,

Energy Queensland Limited
(ABN 96 612 535 583)

Operating at:
Energy Queensland Limited Standards Laboratory
524 Bilsen Road
Geebung QLD 4034

to be a Verifying Authority for the verification of reference standards of measurement under regulation 13 of the *National Measurement Regulations 1999* (Cth) for the following physical quantities:

time, frequency, temperature, electric current, potential difference and electromotive force, power, energy, electric resistance, phase angle

This appointment is for the period from 19 June 2023 to 18 June 2026 and is limited to the range specified in the attached schedule, and the use of procedures approved by the Chief Metrologist.

Dated this Ninth day of June 2023

Signed

James Cantrill
For Dr Richard Bruce Warrington
Chief Metrologist
National Measurement Institute

36 Bradfield Road, West Lindfield NSW 2070, GPO Box 2013 Canberra ACT 2601 Australia
Telephone (61 2) 8467 3600 Facsimile (61 2) 8467 3610 www.measurement.gov.au ABN 74 599 608 295

Schedule to Appointment as a Verifying Authority for Reference Standards of Measurement

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Physical Quantity	Range of Standard	Least Uncertainty
Time		
• Time interval meters	from 0.1 µs to 10^4 s	0.1 ns/s
Frequency		
• Frequency meters	from 10 mHz to 225 MHz	1 in 10^{10}
• Counters	from 10 mHz to 225 MHz	1 in 10^{10}
Temperature		
• Rare metal thermocouples	from 0°C to 100°C	0.1°C
	from 100°C to 200°C	0.2°C
	from 200°C to 300°C	0.3°C
	from 300°C to 400°C	0.5°C
	from 400°C to 500°C	1.5°C
	from 500°C to 1100°C	2.0°C
• Base metal thermocouples	from -50°C to 100°C	0.1°C
	from 100°C to 20°0C	0.2°C
	from 200°C to 30°0C	0.3°C
	from 300°C to 400°C	0.5°C
	from 400°C to 500°C	1.5°C
	from 500°C to 1100°C	2.0°C

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• Metallic resistance thermometers	from -50°C to 0°C	0.1°C
	at 0°C	0.007°C
	from 0°C to 200°C	0.02°C
	from 200°C to 300°C	0.08°C
	from 300°C to 400°C	0.17°C
	from 400°C to 500°C	1.5°C
• Semi-conductor thermometers	from 0°C to 80°C	0.1°C
	from 80°C to 200°C	0.5°C
• Surface probes	from 21°C to 25°C	0.6°C
	from 30°C to 50°C	1.1°C
	from 50°C to 100°C	1.3°C
	from 100°C to 200°C	1.6°C
	from 200°C to 300°C	2.0°C
	from 300°C to 350°C	2.2°C
• Radiation pyrometers (infra-red thermometers)	from 23°C to 260°C	5.0°C
Digital temperature indicator systems		
• Rare metal thermocouples	from °0C to 100°C	0.1°C
	from 100°C to 200°C	0.2°C
	from 200°C to 300°C	0.3°C
	from 300°C to 400°C	0.5°C
	from 400°C to 500°C	1.5°C
	from 500°C to 1100°C	2.0°C
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• Surface probes	from 21°C to 25°C	0.6°C
	from 30°C to 50°C	1.1°C
	from 50°C to 100°C	1.3°C
	from 100°C to 200°C	1.6°C
	from 200°C to 300°C	2.0°C
	from 300°C to 350°C	2.2°C

Electric Current

• Current transformers	from 0.5 A to 3 000 A at 50 Hz	0.02% for current error
		0.02 crad for phase displacement
• Instrument calibrators (D.C. current)	at 0 A	0.01 nA
	from 20 µA to 10 A	0.005%
	from 10 A to 100 A	0.01%
• Instrument calibrators (A.C. current)	from 30 µA to 20 A at 40 Hz to 1 kHz	0.05%
	from 20 A to 120 A at 50 Hz	0.1%

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• D.C. ammeters	at 0 A	0.01 nA
	from 20 µA to 10 A	0.005%
	from 10 A to 100 A	0.01%
• D.C. Clamp meters	up to 1000 A	0.7%
• A.C. ammeters	from 30 µA to 20 A at 40 Hz to 1 kHz	0.05%
	from 20 A to 120 A at 50 Hz	0.1%
• A.C. Clamp meters	up to 1000 A at 50 Hz	0.7%

Potential Difference and Electromotive Force

Voltage standards

• Electronic E.M.F. reference devices	at 1.018 V	0.7 µV/V
	at 10 V	0.5 µV/V
• Instrument calibrators (D.C. voltage)	at 0 V	0.02 µV
	up to 1 100 V	5 µV/V + 0.1µV
• Instrument calibrators (A.C. voltage)	from 1 mV to 100 mV and 40 Hz to 1 kHz	0.2%
	from 100 mV to 500 mV and 40 Hz to 1 kHz	0.02%
	from 0.5 V to 300 V and 40 Hz to 20 kHz	0.01%
	from 300 V to 1000 V and 40 Hz to 1 kHz	0.01%
	from 300 V to 1000 V and 1 kHz to 20 kHz	0.02%
• D.C. voltmeters	at 0 V	0.02 µV
	up to 1 100 V	5 µV/V + 0.1µV

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• A.C. voltmeters	from 1 mV to 100 mV and 40 Hz to 1 kHz	0.2%
	from 100 mV to 500 mV and 40 Hz to 1 kHz	0.02%
	from 0.5 V to 300 V and 40 Hz to 20 kHz	0.01%
	from 300 V to 1000 V at 40 Hz to 1 kHz	0.01%
	from 300 V to 1000 V and 1 kHz to 20 kHz	0.02%

Power

D.C. Power

• Wattmeters	up to 1000 V and 100 A on d.c.	0.01%

A.C. Active and Reactive Power

Wattmeters

• Single phase wattmeters	from 63.5 V to 300 V and 5 mA to 20 A	0.04%/cos Φ
	from 240 V to 320 V at 5 mA to 120 A	0.04%/cos Φ
	at 40 Hz to 60 Hz	0.04%/cos Φ
• Three phase wattmeters	from 63.5 V P-N to 415 P-P V and 5 mA to 60 A	0.1%/cos Φ
Varmeters	from 63.5 V to 240 V and 10 mA to 60 A	0.2%
	at 240 V from 5 mA to 10 mA	0.2%
	at 50 Hz	0.2%

Energy

A.C. Active and Reactive Energy

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Electricity meters	(From 40 Hz to 60 Hz)	
Watthour meters		
• single phase	from 60 V to 300 V and 5 mA to 120 A	0.01%/CosΦ
• three phase	from 60 V to 300 V and 5 mA to 60 A	0.01%/CosΦ
Varhour meters	from 63.5 V to 300 V and 5 mA to 100 A at sinΦ	0.05%
	from 1 to 0.25 at 50 Hz	0.05%

Electric Resistance

• Precision resistors, resistance boxes and conductance boxes Ohmmeters, D.C. bridges	from 10 μΩ to 10 mΩ	0.05% + 1 μΩ
	from 10 mΩ to 1 Ω	20 μΩ/Ω + 1μΩ
	at 0 Ω	0.8 μΩ
	from 1 Ω to 10 kΩ	5 μΩ/Ω
	from 10 kΩ to 1 MΩ	10 μΩ/Ω
	from 1 MΩ to 10 MΩ	20 μΩ/Ω
	from 10 MΩ to 1000 MΩ up to 200 V	0.5%
• Volt ratio boxes and potential dividers	up to 1000 V	10 μΩ/Ω
• Instrument calibrators (D.C. Resistance)	from 10 μΩ to 10 mΩ	0.05% + 1 μΩ
	from 10 mΩ to 1 Ω	20 μΩ/Ω + 1 μΩ
	at 0 Ω	0.8 μΩ
	from 1 Ω to 10 kΩ	5 μΩ/Ω
	from to 10 kΩ to 1 MΩ	10 μΩ/Ω
	from 1 MΩ to 10 MΩ	20 μΩ/Ω
	from 10 MΩ to 1 000 MΩ	0.5%
• DC shunts	with currents to 100 A	
	from 10 μΩ to 10 mΩ	0.05% + 1 μΩ
	from 10 mΩ to 1 Ω	20 μΩ/Ω + 1 μΩ

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• Resistance temperature bridges	excluding a.c. bridges		
		at 0 Ω	0.8 μΩ
		from 1 Ω to 10 kΩ	5 μΩ/Ω

Phase Angle

• Phase angle indicators	From 10 mV to 300 V and 0.1 A to 100 A		
		at 10 Hz to 65 Hz	0.04°
		at 65 Hz to 1 kHz	0.05°
• Power factor meters	From 10 mV to 300 V and 0.1 A to 100 A		
		and 40 Hz to 60 Hz	0.005°

Signatories

The following persons are the permitted signatories under this appointment:

Name	Physical Quantity	Range
Rai Pippia	Time, frequency, temperature, electric current, potential difference and electromotive force, power, energy, electric resistance, phase angle	as per the scope of this schedule
Robert Gold	Frequency, temperature, electric current, potential difference and electromotive force, electric resistance, phase angle.	as per the scope of this schedule

Statutory Conditions

This appointment as a verifying authority for reference standards of measurement under regulation 73 of the *National Measurement Regulations 1999* (Cth) is subject to the conditions stated in regulation 77 of the *National Measurement Regulations 1999* (Cth) as amended. At the time of appointment regulation 77 contains the following conditions

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(a) That the authority participate in training, related to the performance of the duties of an authority, required by the Chief Metrologist;

(b) That the authority report, as required by the Chief Metrologist, about its performance of its duties;

(c) That the authority, and any responsible agent or employee of the authority, comply with the *National Measurement Act 1960* (Cth) and the *National Measurement Regulations 1999* (Cth) and any condition stated in the instrument of appointment.

(d) That the authority comply with any determinations applying to the authority under regulation 20 of the *National Measurement Regulations 1999* (Cth).

Additional Conditions

In addition to the statutory conditions of appointment of authorities contained in regulation 77 of the *National Measurement Regulations 1999* (Cth) this appointment is also subject to the following conditions:

(i) Continuing accreditation against AS ISO/IEC 17025 *General requirements for the competence of testing and calibration laboratories* in the form of NATA accreditation No. 74

(ii) The authority shall not engage a responsible agent or arrange for any standard of measurement to be verified by an agent or anyone under its supervision without obtaining the prior consent of the Chief Metrologist in writing;

(iii) Discharge of all financial obligations to the Chief Metrologist and/or the National Measurement Institute in respect of this appointment;

(iv) Compliance with the formatting and/or any other requirements of the Chief Metrologist and/or the National Measurement Institute with respect to certificates of verification of reference standards of measurement;

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(v) During the term of this appointment each signatory under this appointment must attend a legal metrology seminar conducted by the Policy and Regulatory Services Section of the Legal Metrology Branch of the National Measurement Institute;

(vi) This appointment revokes and replaces any previous appointments and/or any extensions granted to any previous appointments.

Notes: Nil

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