

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

**Energy Queensland Limited
(ABN 96 612 535 583)**

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

Physical Quantity	Range of Standard	Least Uncertainty
Time		
<ul style="list-style-type: none">Time interval meters	from 0.1 μ s to 10^4 s	0.1 ns/s
Frequency		
<ul style="list-style-type: none">Frequency meters	from 10 MHz to 225 MHz	1 in 10^{10}
<ul style="list-style-type: none">Counters	from 10 MHz to 225 MHz	1 in 10^{10}
Temperature		
<ul style="list-style-type: none">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

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

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• Base metal thermocouples	from -50°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
• 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

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Digital temperature indicator systems

• 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 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
• 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

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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 from 20 μ A to 10 A from 10 A to 100 A	0.01 nA 0.005% 0.01%
• Instrument calibrators (A.C. current)	from 30 μ A to 20 A at 40 Hz to 1 kHz from 20 A to 120 A at 50 Hz	0.05% 0.1%
• D.C. ammeters	at 0 A from 20 μ A to 10 A from 10 A to 100 A	0.01 nA 0.005% 0.01%
• D.C. Clamp meters	up to 1000 A	0.7%
• A.C. ammeters	from 30 μ A to 20 A at 40 Hz to 1 kHz from 20 A to 120 A at 50 Hz	0.05% 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 at 10 V	0.7 μ V/V 0.5 μ V/V
• Instrument calibrators (D.C. voltage)	at 0 V up to 1 100 V	0.02 μ V 5 μ V/V + 0.1 μ V

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- 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 μ V
up to 1 100 V	5 μ V/V + 0.1 μ V

- 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%

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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

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%/Cos Φ
- three phase from 60 V to 300 V and 5 mA to 60 A 0.01%/Cos Φ

Varhour meters	from 63.5 V to 300 V and 5 mA to 100 A	0.05%
	at sin Φ	
	from 1 to 0.25 at 50 Hz	0.05%

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Electric Resistance

- | | | |
|---|--|---|
| • Precision resistors, resistance boxes and conductance boxes Ohmmeters, D.C. bridges | from 10 $\mu\Omega$ to 10 m Ω
from 10 m Ω to 1 Ω
at 0 Ω
from 1 Ω to 10 k Ω
from 10 k Ω to 1 M Ω
from 1 M Ω to 10 M Ω
from 10 M Ω to 1000 M Ω up to 200 V | 0.05% + 1 $\mu\Omega$
20 $\mu\Omega/\Omega$ + 1 $\mu\Omega$
0.8 $\mu\Omega$
5 $\mu\Omega/\Omega$
10 $\mu\Omega/\Omega$
20 $\mu\Omega/\Omega$
0.5% |
|---|--|---|

- | | | |
|---|--------------|-----------------------|
| • Volt ratio boxes and potential dividers | up to 1000 V | 10 $\mu\Omega/\Omega$ |
|---|--------------|-----------------------|

- | | | |
|--|--|---|
| • Instrument calibrators (D.C. Resistance) | from 10 $\mu\Omega$ to 10 m Ω
from 10 m Ω to 1 Ω
at 0 Ω
from 1 Ω to 10 k Ω
from to 10 k Ω to 1 M Ω
from 1 M Ω to 10 M Ω
from 10 M Ω to 1 000 M Ω | 0.05% + 1 $\mu\Omega$
20 $\mu\Omega/\Omega$ + 1 $\mu\Omega$
0.8 $\mu\Omega$
5 $\mu\Omega/\Omega$
10 $\mu\Omega/\Omega$
20 $\mu\Omega/\Omega$
0.5% |
|--|--|---|

- | | | |
|-------------|--|--|
| • DC shunts | with currents to 100 A
from 10 $\mu\Omega$ to 10 m Ω
from 10 m Ω to 1 Ω | 0.05% + 1 $\mu\Omega$
20 $\mu\Omega/\Omega$ + 1 $\mu\Omega$ |
|-------------|--|--|

- | | | |
|----------------------------------|---|---|
| • Resistance temperature bridges | excluding a.c. bridges
at 0 Ω
from 1 Ω to 10 k Ω | 0.8 $\mu\Omega$
5 $\mu\Omega/\Omega$ |
|----------------------------------|---|---|

Phase Angle

- | | | |
|--------------------------|--|----------------|
| • Phase angle indicators | From 10 mV to 300 V and 0.1 A to 100 A
at 10 Hz to 65 Hz
at 65 Hz to 1 kHz | 0.04°
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° |
|-----------------------|--|--------|

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Signatories

The following persons are the permitted signatories under this appointment:

Name	Physical Quantity	Range
Mr 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
Mr Robert Gold	Frequency, temperature, electric current, potential difference and electromotive force, and 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

- (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).

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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;
- (v) During the term of this appointment each signatory under this appointment must attend a legal metrology seminar conducted by Policy and Regulatory Services Section of the Legal Metrology Branch of the National Measurement Institute; and
- (vi) This appointment revokes and replaces any previous appointments and/or any extensions granted to any previous appointments.

Notes:

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