



General Equipment - Calibration and Checks

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General Equipment- Calibration and Checks

For NATA's policies on metrological traceability and equipment please refer to NATA Policy 11 Policy on Metrological Traceability and Policy Circular 12 NATA Policy on equipment assurance, in-house calibration and equipment verification.

The recommended calibration and checking intervals as presented in this table is to be used in conjunction with the guidance on establishing an equipment assurance program as found in the informative annex of Policy Circular 12.

General Equipment Table

Item of equipment	Calibration interval (years)	Checking interval (months)	Procedures and references
Accelerometers			
Piezoelectric types	3		
		12	Intercomparison.
		On use	Check against vibration calibrator.
Servo, strain gauge and piezoresistive types (CD or 0Hz response)	2	On use	Check by inversion
Air flow nozzles	Initial		
		12	Check throat diameter.
Anemometers	1		
Angle gauges	2 then 4		
Balances	3		<i>The Calibration of Weights and Balances</i> EC Morris and KMK Fen
		12	Service.
		6	Repeatability check. NATA Technical Note 13.
		1	One point check. NATA Technical Note 13.
Barometers	Initial		NATA Technical Note 8.
Biological safety cabinets (BSC) Class I and Class II for personnel and environment protection	1		AS 2252.4
Callipers	2		AS 1984
Dial gauges	2		AS 2103
Digestion blocks e.g. blocks or mantles used for Kjeldahl Nitrogen, Chemical Oxygen Demand or metal digestions		Initial, then 12 and after repair or maintenance	Temperature variation check across working spaces or recovery check with a difficult to digest standard/sample e.g. nicotinic acid for TKN digestion.
Dimensional Measuring machines			
Precision scales	10		
Geometric tests	5		
Micrometer heads	3		
Coordinate Measuring Machines (CMMs)	2		

Item of equipment	Calibration interval (years)	Checking interval (months)	Procedures and references
		6	Intermediate volumetric check (eg ball bar).
Displacement transducers (LVDT)	2		
		On use	Against length standard.
Electrical instruments			
Digital multimeters (DMM) , and other types of meters which measure electrical parameters such as volts, resistance, current, capacitance etc. Including: Analog meters, Data loggers, Chart recorders, Watt-hour and Var-hour meters.	1		Calibrate over all ranges and parameters of use including calibration across frequency (Hz) of use.
		6	Compare with meters of similar resolution.
Environmentally controlled enclosures including Incubators, Ovens, Furnaces, Conditioning enclosures (ageing), Refrigerators and Freezers, Water baths			
Temperature	3		Spatial uniformity, IEC 60068-1; 60068-2-38; 60068-2-39; AS 2853
		On use	Monitor temperature at at least one point
Humidity	3		
		12	Spatial uniformity of temperature.
CO ₂		On use	Monitor level.
Infra Red, Ultraviolet and Visible	3		
		On use	Check operation of the lamps.
Pressure / Vacuum		On use	Monitor level.

Item of equipment	Calibration interval (years)	Checking interval (months)	Procedures and references
Extensometers			
Contact and Optical	2		AS 1545. Grading requirements apply.
Feeler gauges	2		AS 1665
Flowmeters			
Differential Pressure meters, orifice meters, venturi meters and Anubar	2		
		6	Flow or dimensional calibration plus inspection for wear and damage. Pressure to be calibrated as appropriate.
Electronic Thermal, Mass Flow	1		Where high temperature or corrosive gases are monitored a shorter interval is recommended.
Laminar flow meters	2		
		6	Inspect for damage or contamination
Sonic Nozzle			
Reference 0.1%	3	6	Inspect and clean.
Working 0.5%	6	6	Inspect and clean.
Soap Film	2		
Positive Displacement Meters	2		
Provers	2		
		6	Thermometer ice points and pressure readout checks for stability
Rotary meter	2		
		6	Inspect for contamination or damage
Rotameters Variable area meters	2		
		3	Visual inspection for damage to float edges or ball float for pitting
Turbine meters	2		
		6	Inspect for contamination or damage of turbine blades
Turbine meters (Pelton Wheel/Miniature)	1		
Vortex shedding	2		
		6	Inspect for contamination of the bluff body
Wet test meters	2		

Item of equipment	Calibration interval (years)	Checking interval (months)	Procedures and references
		Before use	Set water level before use
Force testing machines			
Dead Weight	5		AS 2193
Elastic Dynamometer	2		AS 2193
Hydraulic, pneumatic	2		AS 2193
		6	Cross head speed (for constant rate of extension machines) and pressure
Fume cupboards (cabinets)	1	6	Depending on cabinet type either AS/NZS 2243.8 or AS/NZS 2243.9
Gauge blocks	2 then 4 subsequent		AS 1457
Hygrometers			
(Assmann and sling psychrometers)	10		
		6	Compare thermometers at room temperature with wick dry. AS 2001.1 Appendix C
Thermohygrographs (hair)	1		
		Weekly	Check against a calibrated psychrometer.
Electronic types (eg. digital psychrometer)	1		
Digital psychrometers (not electrical impedance sensors)	3		
		6	Check against a calibrated thermometer at ambient temperature.
Electrical impedance humidity probes	1		2 yearly if used only under ambient conditions.
Dew or frost point hygrometers	2		
Levels (precision)	4		
		12	12- monthly single point check for electronic levels
Load cells and Large scale weighing devices	2		AS 2193
		On use	If amplification is variable, perform shunt calibration check.
Luminance meters & Illuminance meters			

Item of equipment	Calibration interval (years)	Checking interval (months)	Procedures and references
Digital	1		
Analogue	2		
Manometers			
Liquid	10		
Electronic	1		
Masses			
Stainless steel, nickel chromium alloy	3		
Other alloy and iron Class III	2		
For proof loading purposes	5		Against calibrated load cell (in house) or weighing device, which achieves the specified accuracy.
Micrometers	5		AS 2102
		1	Zero, one point (against gauge block) and condition of anvils.
Optical electronic distance measurement equipment	2		
Optical projectors	5		
pH meters		Daily or on use	Check against two buffer solutions as per manufacturer's instructions.
Pipettes (POVAs)	*	*	*Equipment calibration and/or checking requirement will be dependent on the criticality of volume dispensed and/or the repeatability of dispensed volume required by the test method.
Pressure equipment			
Test gauges used for calibration of industrial gauges	1		AS 1349 for Bourdon tube types
Industrial gauges not subject to shock loading	1		AS 1349 for Bourdon tube types
Industrial gauges subject to shock loading.	6 months		AS 1349 for Bourdon tube types
Digital pressure gauges	1		
Pressure transducers	1		
Pressure transmitters	1		

Item of equipment	Calibration interval (years)	Checking interval (months)	Procedures and references
Calibrators	1		
Radiation thermometers including Visible and Infrared Pyrometers	2		Initial test of target size dependence should be performed Initial calibration should include sufficient points to confirm linearity
		12	Check at one point in range or at ice point
Disappearing filament pyrometers	3		
Pyrometers	3		
Sieves	Initial		Compliance certificate to AS 1152, BS 410.
		12	More or less frequent checks may be required against a reference set or a suitable reference material.
Sound measuring devices Including Sound level meters & Noise dosimeters	2		
		On use	Check against acoustic calibrator or pistonphone
Acoustic calibrators including Pistonphones and sound sources	1		AS/IEC 60942
		6	Intercompare
Spectrophotometers and Spectroradiometers		6	Wavelength accuracy, bandpass, absorbance, stray light error, linearity of response, repeatability and matching of cells.
		On use	A blank and at least 2 points on the calibration curve must be checked.
Tape measures, rules			
Tape measures and retractable pocket rules	Initial		AS 1290.4
		24 to 60	Check at maximum length, depending on use and accuracy required.
Steel rules	Initial		BS 4372
		6	1 point check within operating range.
Thermocouples			
'Base metal' type, sheathed	2		For use up to 400°C. For use from 400°C to 1300 °C the same immersion depth must always be used (or a greater depth of immersion). Homogeneity must be assessed as

Item of equipment	Calibration interval (years)	Checking interval (months)	Procedures and references
			part of their recalibration.
'Base metal' type, wire	2		For use up to 300° C. Replace if used above 300° C.
Stored reels	10		Reel of wire – 4 samples of wire from end points and middle of reel.
'Rare metal' type	3		3 years or after 100 hours above 500° C whichever is sooner.
Thermocyclers	*	12	*Equipment calibration and/or checking requirement will be dependent on test method/kit. When performing a verification, measure temperature uniformity across the block for a number of cycles, logging time spent at temperature using a measurement frequency of at least 2 Hz; Check for excessive overshoot and undershoot (recovery rate) of temperature between temperature point. Perform verification of digital display accuracy as required.
Thermometers			
Liquid-in-glass	5		
		6	Check at ice point. NATA Technical Note 19 or against reference thermometer at 1 point in range
Resistance			
-40°C to 250°C	5		
		6	Check at ice point.
<-40°C and >250°C	2		
		6	Check resistance at ice point.
Measuring instrument AC Bridge type, Reference and Working	5		
Measuring instrument DC Bridge type	2		
		6	Check at ice point.

Item of equipment	Calibration interval (years)	Checking interval (months)	Procedures and references
Digital indicating systems, with or without a temperature sensor, hand held or bench type, single and multichannel. (Includes temperature loggers)	2		
		6	Check against a reference device at the temperature of use. If used at more than one temperature, choose the most critical temperature. Check at ice point if the facility does not have a reference device. (For data loggers the reference device can not be another data logger of the same type).
Timing devices			
Stop watches, clocks (mechanical and electrical devices)		6	Check using Telephone Speaking Clock or GPS signal
Torque wrench and transducers, Screwdrivers	1		
		6	In house cross check of overlapping ranges if possible.
Velocity transducers	3		
		24	Check frequency response and sensitivity.
Volumetric glassware	Initial (on commissioning and subject to nature of intended use)		AS 2162.1; BS 1797

REFERENCES

This section lists publications referenced in this document. The year of publication is not included as it is expected that only current versions of the references shall be used.

Australian Standards

AS 1152	Specification for test sieves
AS 1290.1	Linear measuring instruments used in construction - General requirements
AS 1290.4	Linear measuring instruments used in construction - Retractable steel pocket rules
AS 1349	Bourdon tube pressure and vacuum gauges
AS 1457	Geometrical Product Specifications (GPS) - Length standards - Gauge blocks
AS 1545	Methods for the calibration and grading of extensometers
AS/NZS 1665	Welding of aluminium structures
AS 1984	Vernier callipers (metric series)
AS 2001.1	Methods of test for textiles - Conditioning procedures
AS 2102-	Micrometer callipers for external measurement
AS 2103	Dial gauges and dial test indicators (metric series)
AS 2162.	Verification and use of volumetric apparatus - General - Volumetric glassware
AS 2190	Clinical maximum thermometers - Mercury-in-glass
AS 2193	Calibration and classification of force-measuring systems
AS/NZS 2243.8	Safety in laboratories - Fume cupboards
AS/NZS 2243.9	Safety in laboratories - Recirculating fume cabinets
AS 2252.1	Biological safety cabinets - Biological safety cabinets (Class I) for personnel and environment protection
AS 2853	Enclosures - Temperature-controlled - Performance testing and grading
AS IEC 60942	Electroacoustics - Sound calibrators

Other Standards

BS 410.	Stainless steel test sieves
BS 1797	Schedule for tables for use in the calibration of volumetric glassware
BS 4372	Specification for engineers' steel measuring rules
IEC 60068-1	Environmental testing. Part 1: General and guidance;
IEC 60068-2-38	Environmental testing - Part 2-38: Tests - Test Z/AD: Composite temperature/humidity cyclic test;

IEC 60068-2-39 Environmental testing - Part 2: Tests. Test Z/AMD: Combined sequential cold, low air pressure, and damp heat test

ISO/IEC Guide 99 International vocabulary of metrology -- Basic and general concepts and associated terms (VIM)

ISO/IEC 17025 General Requirements for the competence of calibration and testing laboratories

NATA Publications

NATA Policy Circular 11 Policy on Metrological Traceability

NATA Policy Circular 12 NATA Policy on equipment assurance, in-house calibration and equipment verification

NATA Technical Note 8 The in-situ calibration of Barometers

NATA Technical Note 13 User Checks of Balance Calibration

NATA Technical Note 19 Liquid-in-Glass Thermometers – Selection, Use and Calibration Checks

Other Publications

The Calibration of Weights and Balances EC Morris and KMK Fen

Amendment Table

The table below provides a summary of changes made to the document with this issue.

Section	Amendment			
Forward	Guidance on equipment assurance programs			Updated in accordance with Policy Circular 12