



Specific Accreditation Criteria

ISO/IEC 17025 Application Document Manufactured Goods - Annex

Electrical appliance performance testing

XXXXXXXXXX 2025

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Electrical appliance performance testing

This document provides interpretative criteria and recommendations for the application of ISO/IEC 17025 for both applicant and accredited facilities conducting electrical appliance performance testing.

Applicant and accredited facilities must comply with all relevant documents in the NATA Accreditation Criteria (NAC) package for Manufactured Goods (refer to *NATA Procedures for Accreditation*).

The clause numbers in this document follow those of ISO/IEC 17025 but since not all clauses require interpretation the numbering may not be consecutive.

6 Resource requirements

6.2 Personnel

6.2.3 Energy efficiency and appliance performance testing requires expertise in a broad range of measurement disciplines. While extensive knowledge in all of these is not expected, staff performing such tests must have been trained to a level which permits them to evaluate all aspects of the testing processes.

For a facility performing tests on a broad range of products, this expertise would normally cover the following measurement disciplines:

- energy, voltage, current and power factor
- liquid flow
- noise level
- photometry
- spectrophotometry
- temperature (absolute and differential)
- temperature rise
- water analysis

In particular, it is necessary for testing staff to understand the limitations and uncertainties associated with the various measurement techniques used in their facility.

While it may be difficult or impossible to determine combined uncertainties for such parameters as percentage soil removal (for clothes washing machines) or the actual energy consumption of the appliance or device, facility personnel must have an adequate understanding of the relative importance of the various uncertainties associated with the measurements.

For high precision measurements of such parameters as temperature differentials used in air conditioner testing, a high level of expertise in temperature measurement and uncertainty analysis is essential.

6.2.5 The facility's management must ensure that staff involved in tests which require a visual examination (e.g. for dishwashing machine tests) must have adequate visual acuity and colour vision.

6.3 Facilities and environmental conditions

6.3.1 Power supplies must be suitably conditioned where noise or voltage fluctuations on the mains supply would impact on the measured performance of the equipment under test.

Facilities must provide for adequate isolation of the test instrumentation from the test environment where these may compromise the reliability of the test results.

6.4 Equipment

6.4.1 Standard materials, such as wash swatches for washing machine testing, and spinach for dishwashing machine testing, are to be sourced from suppliers identified by, or directly from, Standards Australia.

When testing to foreign or international standards, the relevant standards-writing body should be contacted regarding suitable sources of reference materials.

6.4.4 Where instruments having specifications which differ from those of the standard method are to be considered for use, the facility must be able to demonstrate their equivalence quantitatively.

Care must be taken where manufacturers supply 'reference' artefacts for the calibration of instruments. Unless provided with a calibration certificate from an accredited facility, such an artefact must be calibrated as part of the usual commissioning processes and included on the facility's equipment calibration schedule.

While reflectance standards, such as barium sulphate reference tiles used in the measurement of the reflectance of wash swatches during washing machine tests, may be regarded as having an absolute reflectance of almost 100%, commissioning checks must be performed to ensure that the reference is in fact as specified.

6.4.7

Artefact calibration

Some digital instruments are adjusted by a process usually referred to as 'artefact calibration'. This typically consists of connecting the instrument with one or more reference devices, such as a DC voltage reference and a standard resistor.

While this procedure is specified by the manufacturer and should be performed at the specified intervals, it does not establish metrological traceability. It is still necessary to calibrate these instruments as per the requirements of ISO/IEC 17025 clause 6.5 and the NATA Accreditation Criteria. (Refer to the NATA publications *General Accreditation Criteria: Metrological traceability policy*, and *General Accreditation Criteria: Equipment assurance, in-house calibration and equipment verification*.)

Ingress Protection (IP) access probes

IP access probes must have an initial traceable calibration and periodic dimensional verification. Prior to each use, a visual inspection of the probe is required. Where force is a measurement component, calibration must be performed initially and periodically, the interval depending on the frequency and type of usage.

7 Process requirements

7.2 Selection, verification and validation of methods

7.2.1.1

Power Measurements

Facilities intending to perform power measurements in accordance with AS/NZS 4665.1 must be aware of the specification requirements for the power analyser used for these measurements.

Measurements of power of 0.5 W or greater should be made with an uncertainty of 2% or less at the 95% confidence level. Measurements of power less than 0.5 W should be made with an uncertainty 0.01 W or less at the 95% confidence level.

Annex B of AS/NZS 62301, *Notes on measurement of low power modes*, discusses the need for the crest factor capability of the meter to be greater than the actual crest factor of the load, otherwise the peak value of the current will be lopped off and the integration for power will be incorrect. The crest factors for standby loads are typically 3, and in some circumstances can be as high as 10.

To meet these requirements, the power analyser would typically have a power resolution of 1 mW or better and a minimum current range of 10 mA or less. In order to capture harmonic components in instances where the current is distorted and the current appears as a series of short spikes or a series of pulses over a typical AC cycle (e.g. switch mode power supplies), the power analyser would typically have the ability to measure the signal up to at least 2.5 kHz, and thus have a sampling rate of greater than 5 kHz in order to avoid aliasing.

The instrument should be able to average power over any user selected time interval or be capable of integrating energy over any user selected time interval with an energy resolution of less than or equal to 0.1 mW/hr, and integrating time displayed with a resolution of 1 s or less. For cyclic or pulsing loads, the analyser must be capable to provide a power average over a reasonable period, i.e., several minutes.

The facility must be able to demonstrate control of these factors when making measurements, including calibration of the power analyser to a suitable level of accuracy at a current crest factor of at least 3.

If the analyser does not meet the above capabilities, the facility must be able to demonstrate (in the test method) how it will ensure the measurements taken are correct.

7.2.1.2 Test procedures or work instructions must, where possible, meet the exact requirements of the standards. In some instances, facilities testing products to a range of national, regional, or international standards may choose to develop generic test procedures. These must, however, clearly identify where reference to a particular national or regional difference must be taken into consideration.

Where particular operator techniques may have an effect on the test results (such as the positioning and application of thermocouples for temperature measurement, loading of clothes washing machines, or application of soil to plates for dishwasher tests), test procedures must fully describe these techniques at a level of detail such that another operator could reasonably be expected to replicate the technique.

Where visual examination forms a part of the testing, test procedures must incorporate detailed protocols and criteria for evaluation of the test outputs, such that different testing officers can achieve consistency. (Also refer to clause 6.2.5 of this document.)

7.3 Sampling

7.3.1 For registration tests, products tested will usually be as submitted by the supplier or manufacturer.

Where 'check testing' is to be performed as per the requirements of a regulatory authority for market surveillance, the regulator is responsible for the test samples.

7.7 Ensuring the validity of results

7.7.1 Facilities must undertake intralaboratory proficiency tests using reference test items to ensure the ongoing stability of their testing processes and the suitability of consumables.

This must, where possible, include the performance of tests by different staff members as a means of ensuring consistency of testing techniques.

7.7.2 Interlaboratory comparison activities are to be coordinated with the relevant regulatory authorities, where available.

References

This section lists publications that may be 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.

Standards

AS/NZS 3100	<i>Approval and test specification – General requirements for electrical equipment</i>
AS/NZS 3112	<i>Approval and test specification – Plugs and socket-outlets</i>
AS/NZS 3120	<i>Approval and test specification – Cord extension sockets</i>
AS/NZS 4665.1	<i>Performance of external power supplies – Part 1: Test method and energy performance mark</i>
AS/NZS 61558.1	<i>Safety of Power Transformers, Power Supplies, Reactors and Similar Products, Part 1: General requirements and tests (IEC 61558-1 Ed 2, MOD)</i>
AS/NZS 60335.1	<i>Household and similar electrical appliances – Safety, Part 1: General requirements (IEC 60335-1 Ed 5.2, MOD)</i>
AS/NZS 60598.1	<i>Luminaires, Part 1: General requirements and tests (IEC 60598.1:1996, MOD)</i>
AS/NZS 60745.1	<i>Hand-held motor-operated electric tools – Safety, Part 1: General requirements (IEC 60745-1 Ed 4, MOD)</i>
AS/NZS 62301	<i>Household electrical appliances – Measurement of standby power (IEC 62301, Ed. 1.0 (2005) MOD)</i>
AS/NZS IEC 60998.1	<i>Connecting devices for low-voltage circuits for household and similar purposes, Part 1: General requirements</i>
ISO/IEC 17025	<i>General requirements for the competence of testing and calibration laboratories</i>

NATA publications

NATA Accreditation Criteria (NAC) package for Manufactured Goods

Amendment Table

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

Section or Clause	Amendment
Whole document	Minor editorial amendments.
6.4.7	Added calibration requirements for IP access probes.