Performance and Approvals Testing - ISO/IEC 17025 Application Document

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This document provides interpretative criteria and recommendations for the application of ISO/IEC 17025 in the field of Performance and Approvals Testing for both applicant and accredited facilities.

Applicant and accredited facilities must also comply with the ISO/IEC 17025 standard application document and any field annexes, policies and/or technical circulars (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.

4 Management requirements

4.1 Organisation

4.1.3 On-site testing

Facilities can be accredited for carrying out on-site and/or mobile testing. Specific capability, ranges and least uncertainties applicable to on-site work and mobile facilities will be included in the facility's scope of accreditation.

The facility bears the responsibility for ensuring that conditions at the customer's premises are suitable for the work to be carried out.

Special precautions shall be adopted and documented with regard to:

- the handling and transport of reference equipment to prevent vibration, shock and temperature excursions;
- reduced calibration intervals on reference equipment and regular cross-checking to prove that it is not being adversely affected;
- separation of the activity from other activities that could adversely affect the integrity of the work;
- ensuring that the environment is suitable, and that it meets the requirement of the test specification. Temperature shall be monitored and recorded during work;
- ensuring that reference equipment has reached thermal equilibrium.

As well as factors such as temperature and humidity, additional care needs to be exercised that other factors outside of the control of the facility staff (e.g. the electromagnetic environment, stability of the available power supply) are considered when setting up and conducting tests.

4.4 Review of requests, tenders and contracts

Facilities issuing compliance results to a published conformity assessment standard such as product testing standards, must ensure the name or identification of the published standard is evident in the scope of accreditation. The use of 'and similar standards' in scopes of accreditation is not permitted.

When testing to a standard, the review phase should address the following.

- If the customer has indicated that testing is to be performed for multiple markets and regulatory frameworks, that their requirements are clearly understood, including whether the tests are to be conducted and reported to multiple standards;

- The version and amendment status of the standards to which the tests are to be conducted is explicit.

4.13 Control of records

4.13.2 Technical records

a) Information on the sources of uncertainty:

Calibration certificates on reference equipment need to be kept for longer periods than just their validity in order to be able to determine the equipment stability. This will be a component to be considered in the uncertainty estimation.

b) Testing facilities should retain sufficient information to allow the equipment under test to be uniquely identified and show the configuration of the sample tested. In a dispute situation, this additional information is essential to the facility.

5 Technical requirements

5.2 Personnel

Facilities must document a policy or procedure for the approval of appropriate staff authorised to perform critical tasks including the issuing of test reports. Approval is to be based on academic qualifications, practical experience and demonstration of technical competence.

Records of staff authorisation and the information on which it has been made must be maintained.

5.2.5 Persons issuing test reports

Individuals who issue test results assume responsibility for the technical validity and accuracy of all information contained in test reports. They must have and demonstrate a sound knowledge of:

- the principles of the calibrations, measurements and/or tests they perform or supervise;

- the standards or specifications for which accreditation is sought or held;
- the facility's management system;
- sound understanding of quality control data;
- awareness of the status of equipment checks and calibrations;
- understanding of the requirements for test item acceptance handling;
- ISO/IEC 17025, NATA Rules, this document and pertinent NATA Policy and Technical Circulars;
- measurement ranges and the estimation of the uncertainties of measurement associated with the test or calibration results for which the facility is accredited or seeking accreditation.

Facility staff who release test results shall hold a position within the organisation which provides authority over the calibration and/or testing activities and, where necessary, results to be rejected when they consider them to be inadequate.

Consultants to the facility may issue test reports provided they have the knowledge necessary to allow them to have authority over the testing and/or calibration activities. Consultants must also hold a written contract or agreement with the facility in which their role and authority is clearly defined and that they agree to hold confidential information relating to customers of the facility. The agreement should further indicate that the facility is responsible for work performed by the consultant including acceptance of the indemnity responsibilities detailed in NATA Rules.

Where a facility's approval process for assigning staff to critical tasks including the release test results is found to not satisfy the requirements for accreditation, the facility will be required to review all reports issued since the time it was determined not to comply and, if necessary, withdraw and/or issue replacement reports. The accreditation status of the facility may also be reviewed.

5.3 Accommodation and environmental conditions

The facility shall specify limits on the environmental conditions to be achieved in the laboratory, on-site and in mobile facilities. The conditions shall be appropriate to the level of accuracy required for the testing, or as specified in a relevant test specification.

The environmental conditions shall be monitored at appropriate intervals and testing activities suspended when the environmental conditions fall outside the specified limits.

5.4 Test and calibration methods and method validation

5.4.1 General

Where a facility is requesting a minor variation to the scope of accreditation and this variation relates to changes or additions of published standards, the application for variation must be supported by a gap analysis between relevant standards that are already in the scope and the new standard.

5.4.2 Selection of methods

Facilities accredited for tests to published test methods must have a system in place to ensure that such documents are the current version.

Recommended reference literature and test methods that are acceptable may be found in the technical discipline appendices.

5.4.6 Estimation of uncertainty of measurement

Appropriate methods of uncertainty of measurement analysis are contained in:

- the NATA booklet *Uncertainty of Measurement for Testing and Calibration Laboratories* by R R Cook;
- the *ISO Guide to the Expression of Uncertainty in Measurement*;
- certain test or calibration specifications which specify the method for the estimation of uncertainty.

Testing facilities are required to identify all significant components contributing to the overall uncertainty of measurement and assign reasonable estimates to them based on numerical/historical evidence and experience. Where the application allows for a relatively large measurement uncertainty, the uncertainty components may be combined in a more simplified way (e.g. arithmetic addition or square root of the sum of the squares), rather than using a full ISO GUM analysis. Pre-calculated uncertainties may be used, provided the facility can demonstrate that each uncertainty component for a particular test fell within the value assigned for that component in the pre-calculated uncertainty. In that case, it would be reasonable to assign an overestimate to some of the uncertainty components to cover the range of values for that component that would typically be encountered in practice.

In applications requiring small uncertainties, e.g. where small tolerances are specified or results generally fall very close to specification limits, a more rigorous uncertainty analysis, more consistent with the ISO GUM, is required.

For some measurement and testing disciplines, the scope of accreditation will include the facility's estimate of their 'least uncertainty of measurement' for each parameter and measurement range. Facilities are required to maintain detailed records for these estimates and to review them periodically for currency.

The least uncertainties of measurement can be specified in the form of an equation which may include a fixed component and a component proportional to the range (e.g. a percentage) or fixed components for discrete steps where the uncertainty allocated for the range is the largest uncertainty calculated for any part of that range.

Where the 'least uncertainties of measurement' is stated in the scope of accreditation, it represents the lowest uncertainties that a facility is permitted to report under the scope of accreditation. It is a realistic means for customers to select and compare accredited facilities' capabilities. It is estimated from a combination of:

- the uncertainty associated with the facility's measurement or testing system (including any environmental influences), and;
- the uncertainty associated with a specified quality of instrument or item under test.

The facility's ability to achieve their nominated 'least uncertainties of measurement' is evaluated during on-site assessments and by review of proficiency testing results.

Facilities shall have a system for reviewing and, where necessary, updating their uncertainty calculations following recalibration of reference equipment or other changes that would significantly affect the magnitude of relevant uncertainty components. This review would cover both the uncertainty of the latest calibration results reported for the reference equipment and a review of the stability of the equipment by comparing the latest results with previous results.

Facilities claiming the AS ISO/IEC 17025 Clause 5.4.6.2 Note 2 exemption from calculating measurement uncertainty must have documentation showing that the test standards have been reviewed and found to meet the criteria specified in Note 2, and that the laboratory's measurement methods or equipment (as appropriate) comply with all the specifications in the test standards.

5.4.7 Control of data

Facilities shall ensure that appropriate checks of calculations and data transfers have been carried out before results are issued.

Whenever possible, a second officer should check all calculations and data transfers. Worksheets must have a place dedicated for the signature of the checking officer. Special care should be taken to ensure that correct formulas are used in computer spreadsheets.

Problems may arise when computer files such as spreadsheets, word processor worksheets and/or report files are reused by overwriting previous results. Only blank templates should be used.

Where measurements are highly automated and/or routine, or where information is processed electronically, the emphasis may be moved to checking for errors created by the system (e.g. by audit checks) and to automatic highlighting of results falling outside the expected range.

Validation of spreadsheets must be carried out initially and after changes to software. It must include careful examination of cell formulae as well as comparison against data sets that have been manually checked. Signed and dated validation records must be kept.

5.6 Measurement traceability

5.6.2 Specific requirements

In-house calibrations

A facility performing its own calibrations will also be subject to technical assessment of these calibrations. The assessment team will determine if the in-house calibrations are fit for the purpose for which they are being used and that a reasonable estimate of the associated measurement uncertainty has been made. Where possible, the review of in-house calibrations will be covered as part of the traceability and calibration aspects during reassessments. Where significant additional assessment time or additional assessors are required, there will be an additional and on going cost associated with this activity. Specialist calibration assessors will only be used when either the calibration is outside the area of expertise of the technical assessors who would normally conduct the assessment or it will be more time or cost effective.

Note: Refer to NATA Policy Circular 12 for additional information.

5.6.2.1 Calibration

Reference standards and equipment shall be calibrated over the range for which testing and/or measurements are taken and to an appropriate level of accuracy. Accreditation cannot be given for extremes of the measurement range based on extrapolation beyond the maximum and minimum calibration points.

5.8 Handling of test and calibration items

5.8.1 Where the equipment to be tested may need to be dismantled, the facility must provide appropriate means of identifying and storing the various components. Similarly when equipment is provided with accessories, these must be appropriately identified and stored.

Where type testing or product development testing is performed, facilities must take steps to ensure the issues covered by this clause, including ‘visual’ security of the equipment under test, are adequately addressed.

5.8.2 As many instruments are identified by a manufacturer’s model type or number as well as a unique serial number, additional labelling of equipment under test may not be necessary provided the identification and customer are recorded immediately upon receipt.

5.9 Assuring the quality of test and calibration results

Facilities must be able to demonstrate how it complies with the requirements of this clause and regularly seek participation in proficiency testing round robins when they become available. The Performance and Approvals Testing Accreditation Advisory Committee may on occasions mandate participation in a round robin when initiated. When a facility initiates and conducts its own inter-

or intra-laboratory comparison, it must be able to demonstrate that the testing officer is not aware of the reference values. The appropriateness of the proficiency testing activity will be assessed during assessment.

Proficiency testing may take the form of a program involving a number of participants where the results are compared or testing on an artefact where an individual facility's results are compared with those of another accredited facility.

5.10 Reporting the results

5.10.2 Test reports and calibration certificates

Units and unit symbols shall be in the form specified in AS 1000 unless the test standard reads in other units or where contractual arrangements demand otherwise.

5.10.3 and 5.10.4 Sampling

When a batch or consignment is sampled in accordance with a method included in the scope of accreditation, test results for samples may be extended to the batches or consignments from which they are drawn.

Statements of Compliance

Where testing is performed in the context of electrical compliance testing, the following protocol is to be adopted:

- If a result of a test falls within the range of the specified limit, then a 'Pass' is to be reported. However, if the result when combined with its associated measurement uncertainty would fall outside the specified limit, the result and its uncertainty of measurement must also be reported.

- If the result falls outside the range of the specified limit, then a 'Fail' is to be reported. However, if the result when combined with its associated measurement uncertainty would fall inside the specified limit, the result and its uncertainty of measurement must also be reported.

Any associated statement of compliance must include the basis on which it is made (for example, in accordance with regulatory rulings).

Reporting the uncertainty of measurement

A facility shall not report uncertainties less than those that appear in their current scope of accreditation.

The uncertainty of measurement reported shall relate directly to the reported results, not just to the facility's least uncertainty of measurement. That is, it shall include all significant uncertainty contributions from the individual instrument calibrated that are not already taken into account fully by the facility's least uncertainty of measurement.

Pre-calculated (typical) uncertainties may only be reported where there is adequate and documented justification. If uncertainties are derived using a pre-characterised standard deviation, for the facility's measurement system, then an appropriate acceptance limit shall be set for the spread of results.

Unless otherwise required by a test specification, uncertainties shall be reported at a 95% confidence level. The confidence level and coverage factor 'k' shall be reported.

The estimated uncertainty should be rounded up and be reported using a maximum of two significant figures.

The uncertainty should be in the same units as the results. However, there may be cases where it is more practical for the uncertainty to be reported as a percentage that applies to all results.

Performance and Approvals Testing Appendix A: Acoustic measurements

5.2 Personnel

For a facility accredited for the field measurement of sound relating to a community noise assessment, as described by AS1055.1, the supervising staff shall be eligible for corporate membership of a society in a related field (e.g. Australian Acoustical Society, Institution of Engineers, Australia). Alternatively, supervising staff shall hold an appropriate degree or diploma in a related field and have acceptable practical field experience with a good practical knowledge of instrumentation and understanding of community noise measurement and assessment. In exceptional circumstances, persons without formal qualifications or eligibility of corporate membership of a society may be acceptable. The acceptability of supervision arrangements will be reviewed at assessments.

Supporting staff must demonstrate, in a field situation, practical ability in community noise measurement and assessment. The staff should be prepared to demonstrate their competence in a field exercise as an integral part of the assessment of the facility.

Staff who are not normally located in the same state as the accredited facility and who are conducting field measurement of sound or vibration surveys shall be suitably qualified and experienced in this area. Such staff are considered field testing officers and their duties and responsibilities must be stated in the quality documentation. The approved signatory must ensure that the field testing staff have received relevant training and provide adequate technical control over testing before allocating work to them.

5.3 Accommodation and environment conditions

Anechoic and reverberant rooms

Such rooms must be evaluated in terms of the requirements of relevant test procedures. Reports of evaluations must be available and must include a description of room size, volume and construction, ambient noise and vibration levels, environmental conditions, microphone placements and measurement techniques and must also provide a statement of uncertainty of measurement and the frequency range over which measurements can be performed satisfactorily.

Note: Refer to ISO 3741 and ISO 3745 for additional information.

Field sites

Sites used for acoustic performance tests will be inspected and must comply with the requirements of the test procedures. Sites used for measurement of sound and vibration levels must be adequately described, preferably with an attached map of the site location. Measurement sites must be identified, the period of measurement reported and temperature, humidity and weather conditions recorded.

5.6 Measurement traceability

Acoustic calibrators

To be accredited for field acoustics measurements, a suitably calibrated sound calibrator or pistonphone must be available to perform checks on a sound level meter before and after a set of field measurements.

Microphones

Microphones should be stored in a dry ambient environment (eg in boxes with sachets of drying agents or in a desiccator).

Pistonphones

When using a pistonphone to check a sound level meter's acoustic sensitivity, ambient air pressure must be measured with a calibrated barometer.

Vibration calibrators

To be accredited for field vibration measurements, a suitably calibrated vibration calibrator must be available to perform checks on a vibration transducer set before and after a field measurement.

Accelerometers

Accelerometers are to be calibrated at a minimum of 2 frequencies and 2 levels that cover the range of use (as far as practical). Triaxial accelerometers must be calibrated for each axis.

Performance and Approvals Testing Appendix B: Electromagnetic compatibility testing (EMC)

The following requirements are additional to the testing standards and have been devised to ensure consistency between facilities in areas where a lack of clarity in the standards is evident.

Scope of accreditation

The scope of accreditation will include identification of the test sites, such as Open Area Test Sites (OATS) and Anechoic Chambers. Addition of test sites will be processed as a variation to the scope of accreditation following receipt of a written request from a facility.

5.4 Test and calibration methods and method validation

OATS acceptability guidelines – pre-screening

OATS with ambient signals above the limits which would place them in categories b) or c) as defined by clause 16.4 of AS/NZS CISPR 16.1, techniques for pre-screening of equipment under test (EUT) must be employed to ensure that emissions which are being masked by ambient signals are identified and quantified. Compliance with the relevant clause of the standard cannot be stated unless the EUT has been tested over the entire frequency range defined.

US FCC rules

Facilities seeking accreditation for US FCC Rules, Part 15 requirements for digital equipment must meet the requirements for accreditation to CISPR 22 or ANSI C63.4 as well as the additional requirements specified in Part 15 itself. Facilities must demonstrate that they have adequate systems in place to ensure that their copies of FCC Rules are up-to-date and that they have a reliable system for monitoring new FCC rulings relating to this area.

IEC 61000-4-3 tests

An automated record of the output level as a function of frequency is considered to be the only practical means of conducting tests. If a facility is performing these measurements entirely manually, an automated record cannot be mandated and such an approach is unlikely on economic grounds.

The use of a feedback system to keep the source at the correct level during test is essential.

For tests requiring 80% amplitude modulation, there needs to be some check that the amplifier can handle the additional power output requirements and there must be checks for distortion (e.g.: that THD <10%).

Monitoring the performance of the field over time must involve monitoring the forward and reverse power.

Monitoring the field using a field probe is desirable in providing evidence that the field is being applied even if it did not provide a measure of the absolute field strength.

Antenna calibration methods

A suitable 'calibration' site complying to the specifications stated in (CISPR 16-1-5 Antenna Calibration Test Sites) must be used, and it is considered as poor practice to use the same site for testing activities. This method can be used to calibrate antennas used for CISPR measurements, as long as an appropriate allowance is made in the calibration uncertainty to account for the assumptions made by the method (typically an uncertainty component of 2 to 3 dB).

Facilities who have a reference antenna calibrated externally by an accredited facility and use a substitution method to calibrate working antennas would not normally require an additional calibration assessor to be present at assessment.

Testing Above 1 GHz

At assessment, facilities must be able to demonstrate the ability for testing above 1 GHz particularly at their OATS, or limit the current scope of accreditation to less than 1 GHz. Refer to CISPR 16-1-4 .2008.

5.5 Equipment

For emissions testing to relevant Australian/New Zealand Standards, equipment, instrumentation and test facilities are all expected to comply with the requirements of the relevant sections of AS/NZS CISPR 16.1 where this is physically possible.

Antenna compliance with CISPR 16

It is recognised that not all complex antenna types are capable of meeting the CISPR specifications. The focus should be on antennas being a reasonable approximation of a dipole and the understanding by staff of:

- the limitations of various types of antennas; and
- the need to increase the measurement uncertainty due to the limitations.

Bilog antennas for compliance measurements

If facilities wish to use 'bilog' antennas for compliance measurements the onus of proof is on the facility to demonstrate that they are a good representation of a dipole. Use for 3 metre measurements is unacceptable. The antenna must comply with the 250 mm ground clearance specification.

EMI receiver compliance with CISPR

Receivers must be compliant with CISPR 16 specifications. This includes the expectation that the receiver incorporates a tracking preselector.

It is recognised that the CISPR requirements for pulse response calibration present great difficulties in sourcing complete and traceable calibrations. Other parameters can be calibrated/verified by a number of accredited facilities.

There are pulse generators specifically designed for performing these calibrations but even these are not capable of dealing with all of the CISPR parameters. Having these traceably calibrated also presents difficulties.

In the absence of either a calibration service by the NMI or an accredited facility, facilities are required to source what calibrations are available. This approach will be revisited by NATA periodically and may change should resources be identified.

Partial accreditation for radiated measurements over a limited frequency range is not acceptable.

OATS acceptability guidelines – Ambient signals

OATS must also comply with the requirements of AS/NZS CISPR 16.1 (clauses 16.1 to 16.6). Sites with broad frequency bands masked by ambient signals such that they would be classified as being in category d) of clause 16.4 in AS/NZS CISPR 16.1 will not be considered acceptable for accreditation. Facilities seeking accreditation for radiated measurements will be asked to submit details of ambient signals prior to lodging an application.

It should also be noted that the ambient levels on the OATS must be monitored and records made available at assessment. Facilities will be expected to demonstrate their management of sites with high ambient levels through their methodology, procedures and records.

OATS acceptability guidelines – Site validation

When performing the site validation procedure, it must be remembered that the data obtained will have uncertainties of a magnitude which make it very difficult to determine unequivocally compliance with the CISPR requirement for all points to be within ±4 dB of the theoretical curve. As such, consideration should be given to how these uncertainties may be kept to a minimum.

OATS acceptability guidelines – Structural

For NATA to consider any OATS for the purposes of accreditation:

- there can be no obstructions within the ellipse;
- there can be no gaps in the ground plane greater than one-tenth of a wavelength; and
- the site-attenuation results should take into account the measurement uncertainty. (In any case, the results should fit comfortably within the limits and the results of a swept attenuation measurement demonstrate that there are no significant discontinuities).

The site attenuation should be critically examined if there are nearby reflecting surfaces (outside but adjacent to the ellipse). A swept measurement must be performed periodically.

Daily checks with a suitable source are required in all cases. Daily system checks are also required for the conducted systems.

5.6 Measurement traceability

Following from the requirements for instrumentation to comply with AS 1052.1, it is expected that this be demonstrated by an appropriate level of calibration or verification. All equipment used for EMC testing including absorbing clamps, chambers and test sites, measurement instruments and antennas are recommended to have a recalibration interval of 12 months, unless the facility has demonstrated suitable stability to extend the recalibration interval as prescribed under clause 5.6 of the general FAD. Exceptions are reference dipoles, horn and loop antennas which are recommended to have a 3 year recalibration interval. Field strength meters are required to have a full calibration every 3 years, a 12 monthly verification, and functions check on use using a TEM cell or other equivalent devices.

Equipment which is typically calibrated or verified in-house by most of the accredited EMC facilities will have the calibration method assessed at the time of the assessment. Equipment that is typically calibrated externally may require additional resources at an assessment in order to have the method and traceability of this in-house calibration adequately assessed.

5.10 Reporting the results

In addition to the normal requirements specified for test reports, the following information is to be included in reports on EMC tests covered by the scope of accreditation:

- Where other than a category a) OATS has been used, a statement that additional screening procedures have been used to identify emissions masked by ambient signals;
- Photographs which will both adequately identify the EUT and any counter-measures taken to limit emissions in the course of the testing; and
- Photographs which show test configurations critical to the measurement results.

Facilities accredited for Part 15 of the FCC Rules must provide customers who intend to use a Declaration of Conformity for their product reports with the additional information required by the FCC. These reports must also bear the NATA endorsement to ensure that they are acceptable in an audit situation.

Performance and Approvals Testing Appendix C: Energy efficiency and performance testing

5.1 General

This Appendix applies to facilities wishing to be accredited for registration and/or check testing of electrical products for energy efficiency rating.

5.2 Personnel

Energy efficiency and 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
- Liquid flow
- 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, it is still necessary for staff to 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.

The facility’s management must ensure that staff involved in tests such as those for dish washing machines which require a visual examination of the washed load must have adequate visual acuity and colour vision. They must participate in internal proficiency tests with other testing staff to ensure consistency (see 5.9).

5.3 Accommodation and environmental conditions

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.

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.

5.4 Test and calibration methods and method validation

Documented 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 positioning and application method of thermocouples for temperature measurement, loading of clothes washing machines or application of soil to plates for dish washer tests), test procedures must fully describe these to a level where 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.

5.5 Equipment

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.

5.6 Measurement traceability

Care must be taken where manufacturer’s supply ‘reference’ artefacts for the calibration of instruments. Unless provided with an endorsed 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.

Standard materials such as wash swatches for washing machine testing and spinach for dish washing 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.

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 constitute an adequate calibration by itself. It is still necessary to perform the full calibration (verification) of the instrument as specified by the manufacturer.

Power Measurements

Facilities wishing to perform power measurements in accordance with AS/NZS 4665.1 need to 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 can in some circumstances be as high as 10.

To meet the above requirements the power analyser would typically have a power resolution of 1mW 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 a.c. cycle (for example 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 such as 5 minutes.

The facility must be able to demonstrate control of these factors when making measurements and as part of that the power analyser is to be calibrated to demonstrate the above uncertainties at a current crest factor of 3 or more. Manufacturer's specifications alone are not sufficient evidence of traceability.

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

Gas Appliances

The facility must analyse the gases used for testing in order to determine the composition, Wobbe Index and other relevant characteristics and not rely solely on supplier's data.

Sampling

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.

5.9 Assuring the quality of test and calibration results

Facilities must undertake intra-laboratory 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.

Inter-laboratory testing will be coordinated with the relevant regulatory authorities.

Thermal Conductivity

Laboratories engaged in determining the thermal conductivity of materials must observe the following requirements, when applicable;

- Documenting the traceability of the sample is paramount. For a full compliance report to AS/NZS 4859.1, labelling must be as required by AS/NZS 4859.1.

- AS/NZS 4859.1 compliance reports must clearly state the manufacturer's name and address and the Batch number in order to ensure there is clear traceability between the compliance report and the sample tested.

- If the manufacturer is not known, there must be a clear statement on the front page of the test report to say – 'Part testing only – this test has looked at the thermal resistance testing only as the manufacturer was not able to be identified.' Full compliance to AS/NZS 4859.1 cannot be stated. Reports must describe the sample "as received".

- The reporting requirements of all the relevant standards must be followed; for example if the report is to AS/NZS 4859.1, the reporting

requirements of that standard in addition to the reporting requirements of the relevant called-up standards eg ASTM C518, ISO 8302, or ASTM C653 and ASTM C167, as appropriate, must be adhered to.

- A compliance statement to AS/NZS 4859.1 under Clause 2.3.3.9 requires the average thermal resistance to be greater than or equal to the declared value (refer AS/NZS 4859.1 Clause 2.3.3.7). It is noted, the standard requires for the thermal resistance of 95% of the packs must be within 10% of the declared value.

- When making a compliance statement, the uncertainty of measurement is not to be included. However, if the facility's uncertainty means the result could have been below the compliance limit, the uncertainty of measurement must be stated on the test report.

- A laboratory cannot report to a standard that is not in their scope of accreditation. For example, a laboratory accredited for ASTM C518 cannot issue an AS/NZS 4859.1 report.

- When testing compliance to AS/NZS 4859.1, if a facility does not use ASTM C653 and ASTM C167 to test low density fibrous insulation, then it must document how it has determined the uniformity of performance of the samples tested to within the limits prescribed in AS/NZS 4859.1 Clause 2.3.2 c, together with a validation of the method used in determining whether a statistically valid population has been used to achieve a 95% confidence level.

- The laboratory's procedure must be technically assessed and an appropriate description of the method used to be included in the scope of accreditation.

- A statement as to how uniformity was demonstrated must also be included on the test report.

- When testing low density fibrous materials, extrapolation of results to different thicknesses outside the sample thickness(es) tested is not permitted.

  (Note that ASTM C653 states that extrapolation of the apparent thermal conductivity or the thermal resistance beyond the ranges of thickness or density of products tested is not valid.)

- Laboratories accredited or seeking accreditation for thermal conductivity testing must meet the requirements of NATA Policy Circular 2 - Proficiency Testing Policy and proficiency testing must be completed before assessment. Proficiency testing must include low density fibrous materials if the laboratory wishes to be accredited to test such materials. Results must be compared with the results of another accredited facility that is covered by the NATA Mutual Recognition Arrangement.

- Where the product thickness is beyond the capacity of the laboratory's equipment, the laboratory must have a process to demonstrate that splitting of the sample is valid. EN 12939 : Thermal Performance of building materials and products - Determination of thermal resistance by means of guarded hot plate and heat flow meter method-thick products of high and medium thermal resistance – deals with this issue.

  However, the practice of splitting samples should be avoided where possible.

Performance and Approvals Testing Appendix D: Flammability testing

5.3 Accommodation and environmental conditions

A facility involved with fire testing should adopt measures, including adequate barriers, to prevent fire hazards.

Potentially hazardous gas cylinders must be kept well away from the fire testing environment.

Appropriate fire extinguishers should be accessible.

5.5 Equipment

Apparatus for fire tests

The critical dimensions of the apparatus must be measured and recorded to establish compliance with the requirements of AS 1530.1, .3 and .4 on Methods for fire tests on building materials, components and structures.

Due to the limitations in access of thermopile calibrations across a number of measurement points, the linearity across the entire measurement range must be determined where extrapolation is made and records of this determination kept.

Apparatus for Electrical Safety Flammability Testing

An initial dimensional verification of the needle flame apparatus is required together with an inspection on use. The gas used must have an initial verification of mixture plus a 3 monthly check with the copper block (AS/NZS 60695-11-5)

The glow wire apparatus requires an initial verification plus 6 monthly check of force and temperature.

The tracking test apparatus requires a 12 monthly verification and on use check.

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.

NATA Publications

NATA Rules

NATA Policy Circular 2, Proficiency Testing Policy

NATA Policy Circular 12*, Requirements for the Performance of Calibrations In-house*

Standards and other references

AS 1000 *The International System of Units (SI) and its application*

Assessment of Uncertainties of Measurement for calibration and testing laboratories, R R Cook, NATA

Guidance documents covering the implementation of specific accreditation requirements are also available from the ILAC (www.ilac.org) and APLAC (www.aplac.org) websites.

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

ISO *Guide to the Expression of Uncertainty in Measurement*

National Measurement Regulations 1999

Appendix A: Acoustic measurements

AS 1055.1*Acoustics - Description and measurement of environmental noise*

ISO 3741 *Acoustics -- Determination of sound power levels of noise sources using sound pressure -- Precision methods for reverberation rooms*.

ISO 3745 *Acoustics -- Determination of sound power levels of noise sources using sound pressure -- Precision methods for anechoic and hemi-anechoic rooms*

Appendix B: Electromagnetic compatibility testing (EMC)

ANSCI 63.4 Methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 khz to 40 ghz

AS/NZS 1052	CISPR specification for radio interference measuring apparatus and measurement methods
AS/NZS 61000.4.3	Electromagnetic compatibility (EMC) Testing and measurement techniques – Radiated radiofrequency electro-magnetic field immunity test
AS/NZS CISPR 16-1	Specification for radio disturbance and immunity measuring apparatus
CISPR 22	Compliance Test of Power-Line Transmission Systems
US FCC Regulations	(Federal Commmunications Commission) Part 15 Radio Frequency Devices

Appendix C: Energy efficiency and performance testing

AS/NZS 4665.1	Performance of external power supplies Part 1: Test method and energy performance mark
AS/NZS 4859.1	Materials for the thermal insulation of buildings - General criteria and technical provisions
AS/NZS 62301	Household electrical appliances – Measurement of standby power (IEC 62301, Ed. 1.0 (2005) MOD)
ASTM C167	Standard Test Methods for Thickness and Density of Blanket or Batt Thermal Insulations
ASTM C518	Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
ASTM C653	Standard Guide for Determination of the Thermal Resistance of Low-Density Blanket-Type Mineral Fiber Insulation
EN 12939	Thermal Performance Of Building Materials And Products - Determination Of Thermal Resistance By Means Of Guarded Hot Plate And Heat Flow Meter Methods - Thick Products Of High And Medium Thermal Resistance
ISO 8302	Thermal insulation - Determination of steady-state thermal resistance and related properties - Guarded hot plate apparatus

Appendix D: Flammability testing

AS/NZS 1530	*Methods for fire tests on materials, components and structures*
AS/NZS 60695	*Fire Hazard Testing - Test flames - Needle-flame test method - Apparatus, confirmatory test arrangement and guidance*

Amendment Table

The following amendments were made to the NATA Accreditation Requirements ISO/IEC 17025 Field Application Document in Performance and Approvals Testing.

Please refer to this sheet in conjunction with the NATA Procedures for Accreditation and the associated ISO/IEC 17025 Standard and Field Application Document and Annexes to ensure that you are familiar with these amendments.

AMENDMENT TABLE			
	Title	**Clause or Class of test amended**	**Amendment**
Section 1	Introduction	All	Reissued as NATA Procedures for Accreditation
Section 2	Accreditation procedures	All	Reissued as NATA Procedures for Accreditation
Section 3	Supplementary requirements for accreditation		
	Management requirements	4.1.4 4.2.1 4.5.1 4.5.4 4.13.1 4.13.2 4.13.2.1 4.13.2.3 4.14 4.15	Removed from PAT Application Document and Reissued as ISO/IEC 17025 Standard Application Document
		4.4	The use of the wording ‘and similar standards’ in not acceptable in scopes of accreditation
	Technical Requirements	5.2.5 5.4.1 5.4.2 5.4.3 5.4.6 5.6.1 5.6.2 5.6.2.2 5.6.3.2 5.7 5.9 5.10.2 5.10.2 (j) 5.10.3.1 (b)	Removed from PAT Application Document and Reissued as ISO/IEC 17025 Standard Application Document

		5.10.6 5.10.7	
		5.2	Policy Circular 39 has been incorporated into the FAD
		5.10.5	The exclusion of opinions and interpretations has been removed
	Annex Energy Efficiency and Performance Testing		Added requirement for proficiency testing for Thermal Conductivity.
	Annex Flammability Testing		Guidance added for the calibration of Thermopiles
Section 4	Equipment calibration intervals		Reissued as stand alone documents • General Equipment Table • Reference Equipment Table
Section 5	Classes of test		Reissued as a stand alone document
Section 6	References		Revised and Updated