

**specific criteria  
for accreditation**

Mechanical Testing

4

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## specific criteria for accreditation

### Mechanical Testing

#### AS LAB C 4

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**International Accreditation New Zealand**

626 Great South Road, Ellerslie, Auckland 1051

Private Bag 28908, Remuera, Auckland 1541, New Zealand

Telephone 64 9 525 6655

Facsimile 64 9 525 2266

Email: [info@ianz.govt.nz](mailto:info@ianz.govt.nz)

Internet: [www.ianz.govt.nz](http://www.ianz.govt.nz)

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## 1 Introduction

International Accreditation New Zealand (IANZ) Specific Criteria amplify or particularise IANZ's generic accreditation criteria for specific fields of technology. A list of all published Criteria is available from IANZ on request.

This document must be read in conjunction with current issues of NZS ISO/IEC 17025 and the IANZ publication *Procedures and Conditions of Accreditation*, the latter document describing the organisation and operation of the IANZ Laboratory Accreditation Programme.

This criteria document provides information on classes of test, staff, accommodation, equipment and other aspects of good laboratory management practice which are considered to be minimum standards for mechanical testing laboratories being accredited against NZS ISO/IEC 17025.

It is recognised that some areas of mechanical testing have very specific requirements in aspects such as staff, accommodation, environment, safety, equipment, etc. To provide clarification of our requirements in these areas, the following supplementary criteria have been written:

- AS LAB C 4.1 Non-Destructive Testing
- AS LAB C 4.2 Welder Qualification Testing to NZS 4711
- AS LAB C 4.3 Gas Cylinder Testing
- AS LAB C 4.5 Sub-contracted Sampling & Testing (by on-site personnel).

## 2 Scope

This document sets out the specific requirements a mechanical testing laboratory has to meet, in addition to the general requirements of NZS ISO/IEC 17025, if it is to be accredited by IANZ.

## 3 Classes of Test

IANZ accreditation does not constitute a blanket approval of all a laboratory's activities. Therefore, it is necessary to identify those activities for which accreditation is granted. The classes of test provide the framework within which the scope of accreditation is expressed.

These classes and subclasses do not constitute any restriction on the work which a laboratory can perform but provide a convenient means of expressing a laboratory's recognised capability.

Classes of test appropriate to mechanical testing laboratories are listed in Appendix 1. These classes are an arbitrary subdivision of the potential range of activities involved in mechanical testing laboratories on the basis of the types of samples being tested, the scientific disciplines involved, and the test methods employed.

## 4 Laboratory Accommodation and Safety Requirements

As discussed below, some mechanical tests have specific accommodation and safety requirements. For further explanation on some of these please also refer to the supplementary criteria as listed in Section 1.

### 4.1 Accommodation

Accommodation requirements for laboratories working in the mechanical field vary widely depending upon the nature of the items to be tested and the uncertainty with which measurements are to be made. A formal laboratory area will be required for precise measurements but many measurements and tests can be satisfactorily performed in production areas or in the field.

Irrespective of where tests and measurements are performed there must be adequate space and storage facilities for carrying out the tests, recording of test data, report preparation, etc.

Formal laboratory areas must have good lighting, adequate bench space, freedom from excessive dust and fumes, freedom from unwanted vibration and acoustic noise and for some tests, control of temperature and humidity. The extent to which these environmental factors apply will vary according to the type and precision of the measurements.

When highly precise measurements are to be made the following factors may assume greater importance:

- (a) Isolation from sources of mechanical vibration and shock likely to have a detrimental effect on sensitive instruments (e.g. high accuracy balances)
- (b) Adequate ventilation when fumes are created by the tests such as in bitumen testing
- (c) Temperature and humidity control of the laboratory as specified in the relevant test procedure (e.g. paper testing)
- (d) Protection from excessive levels of dirt and dust (e.g. civil materials, some types of NDT, etc)
- (e) Suitable equipment and areas for the preparation of test specimens such as in tensile testing and metallography
- (f) Isolation from stray electric and magnetic fields, particularly for thermocouples, strain gauges and other sensitive low output devices
- (g) Electromagnetic interference between items of test equipment and computers.

## 4.2 Safety

Safety has taken on an ever increasing emphasis of recent times and the safety of people within the testing environment must be of paramount concern to laboratory management.

Some types of tests have very specific safety requirements which must be met, e.g. radiography, and these may be subject to regulatory requirements.

Other tests will have less specific but otherwise significant safety concerns, e.g. compression tests on concrete. It is expected that accredited laboratories will have considered, and provided appropriate safety procedures to cover items such as:

- (a) Noise - from equipment such as mechanical sieve shakers and compaction hammers
- (b) Ventilation - adequate air flows in controlled environments - protection from corrosive or toxic fumes
- (c) Personal Protection - safety clothing, etc.
- (d) Physical Protection - safety screens on equipment such as compression testers.

The Health and Safety in Employment Act, 1992 (HSE Act) places specific legal obligations on all employers, including laboratories. Safety is outside the scope of accreditation and will not be audited during an on-site laboratory accreditation assessment. If, in the opinion of the assessment team, a safety issue is observed during an assessment it will be reported to the laboratory, as required by the Act. The reporting of a safety issue will **not** indicate that a comprehensive safety audit has been carried out. Safety auditing is a specialist activity and the responsibility for ensuring compliance with the HSE Act rests entirely with laboratory management.

## 5 Traceability of Measurement

Traceability requires that there is a chain of equipment whose calibrations, to known levels of uncertainty, are traceable from one item to the next and eventually to a national standard of measurement. The concept of traceability also includes the competence of all the people involved, the fitness of each measurement environment, the suitability of the methods used and all other aspects of the quality management systems involved at each step in the chain of measurements.

Traceability must be established for all critical\* measurement and calibration equipment either:

- (a) Directly to the national metrology institute (IRL - Measurement Standards Laboratory) or another such national body (e.g. NPL - UK, NMI - Australia, etc) that are signatories to the CIPM MRA, or
- (b) From a third party accredited calibration laboratory which is accredited by an organisation with which IANZ has a mutual recognition arrangement.

The calibration certificates issued by accredited calibration laboratories must be endorsed in accordance with the requirements of the accreditation bodies concerned. This constitutes proof of traceability to national standards.

*\*Critical measurements/calibrations are those which will significantly affect the accuracy or proper performance of tests.*

IRL	Industrial Research Ltd
NPL	National Physical Laboratory
NMIA	National Measurement Institute Australia
CIPM MRA	Comité International des poids et mesures Mutual Recognition Agreement

## 6 Laboratory Equipment Management and Calibration

Laboratory equipment, and its suitability, ranks on a level equal to the competence of the staff using it. An accredited laboratory will be expected to possess and maintain, under a documented management system, all equipment necessary to carry out the tests requested for inclusion in the scope of accreditation.

Guidelines on calibration requirements and recalibration intervals for specific items of equipment are detailed in Appendix 3. The guidelines set out **maximum** periods of use before equipment must be recalibrated. These periods have been established by accepted industry practice and, in most instances, are the maximum permitted recalibration intervals as laid down by international convention. Where a test method or operating environment requires a more stringent recalibration period than given here, more frequent calibration will apply.

IANZ may require **reduced** or accept **extended** calibration intervals based on factors such as history of stability, frequency of use, accuracy required and ability of staff to perform regular checks.

It is the responsibility of the laboratory to provide clear evidence that its calibration system, and any changes to an existing system, will ensure that confidence in the equipment can be maintained.

Force, impact and hardness testing machines generally require full recalibration if they are moved. Balances which are being used to their full readability (i.e. to the last place showing) will also require full recalibration by an appropriate calibration authority (i.e. external calibration). Balances being used for less than this accuracy limit may be revalidated using appropriate quality control methods (i.e. single point & repeatability checks with standard check masses).

Records of calibrations carried out in-house must confirm traceability of measurement (see section 5). This is normally achieved by the record specifically identifying the reference item used (this is the preferred method). Alternatively the documented calibration procedure may dictate the specific reference item to be used. The latter method does not allow any flexibility and the system will need to ensure that the procedure is updated when the reference item is changed.

A laboratory which uses a computerised testing system must satisfy the following criteria:

- (a) The system must be satisfactorily calibrated. The optimum calibration procedure for physical testing systems will depend upon the accessibility of individual components of the system, especially their input or output signals.

If a testing instrument cannot be isolated from the data processing system, the system as a whole must be calibrated either statically or dynamically. Calibrating the complete system is the preferred alternative.

If the testing instrument can be isolated from the data processing system, the opportunity is available to calibrate or verify each component of the system separately. The testing instrument can be calibrated (again, statically, or dynamically) in the conventional manner and a separate verification of the data processing system, including any interfacing systems, can be undertaken.

- (b) The computer program must be comprehensive in its coverage of the testing process and must have been checked at points covering the whole range of likely inputs and outputs.
- (c) The program must allow the operator to detect errors in data input and to monitor the progress of the test.
- (d) The system must be capable of being checked for error-free operation with respect to data capture, data processing, and freedom from sources of external interference. Where appropriate, manually checked data sets (or artefacts) must be available for regular system checks.

Other specific equipment requirements are given in the supplementary criteria listed in Section 1.

## 7 Laboratory Staff

Competent and committed staff should be considered as a valued asset to any organisation. Procedures which select, train, retain, and develop appropriate staff need to be in place. An accredited laboratory must have at least one staff member who is competent in the testing being undertaken. This competency is recognised by the person/s being awarded Approved Signatory status. Requirements for Approved Signatories are detailed in Appendix 2.

The laboratory must have sufficient staff for the work being carried out and this includes an appropriate mix of junior and senior staff.

Sound management is essential if a testing service is to operate to a satisfactory standard. Particular attention should be given to the following aspects of management:

- (a) There must be clearly defined and recognisable lines of authority and responsibility within the organisation, with each officer being aware of both the extent and the limitations of their own responsibility
- (b) Staff members must be allocated only duties commensurate with their knowledge and experience. They must be provided with the direction or supervision they need for effective performance of their duties. Adequately authorised and up to date competency records (training records) must be available for all staff carrying out testing work
- (c) Competency of staff is assessed by peer review during practical demonstrations. Generally personal qualifications are not a prerequisite for signatory status. However, some areas of expertise, where tests involve technical judgement (e.g. NDT), require personal qualifications as prerequisites to approved signatory status. Any such requirement will be specified in the supplementary criteria listed in section 1 above
- (d) It is important to emphasise that an Approved Signatory be not only competent in carrying out the required tests, but also be able to recognise when a test has gone wrong and take appropriate action. It is important for an Approved Signatory to know their own limitations and the scope of testing work for which they are approved
- (e) In some areas of testing, e.g. non destructive testing, a subjective analysis of the test sample is required. These types of test must be carried out by an Approved Signatory (refer AS LAB C 4.1)
- (f) It is important for management to recognise the need for keeping key staff up to date with technical developments within their area of expertise, and to provide access to appropriate ongoing training.

## **8 Test Methods**

Accreditation is normally granted only for internationally or nationally accepted standard test procedures or non-standard procedures (in-house methods) that have been appropriately validated, and which are performed regularly. The extent of a laboratory's scope of accreditation will therefore vary with the range of work performed, the scope and complexity of the tests involved, the competence and organisation of laboratory staff and the level of technology available in the laboratory.

In-house methods could include but need not be restricted to:

- (a) Methods developed in the laboratory
- (b) Methods developed by a client
- (c) Methods developed for an industry group
- (d) Functional tests
- (e) Modified standard test methods.

Validation of test methods shall involve, as appropriate, the use of certified reference materials, participation in interlaboratory comparison/proficiency test programmes, comparison with standard test procedures, determination of method precision, etc.

Standard test methods should be used whenever possible in order to ensure comparability of test results between laboratories. Laboratories are discouraged from seeking accreditation for test methods that depart from recognised published standards. If however, approval of an in-house test method is required the following information must be provided:

- (a) A copy of the fully documented test method.
- (b) Details of the origin of the in-house test method.
- (c) Details of the reason for its development.
- (d) The results of comparative tests with standard methods (if possible).
- (e) Full details of test method validation including estimation of the uncertainty of measurement.

Once a laboratory is accredited for a specific test method the detailed procedures of that method must be adhered to at all times. Occasionally it may be necessary to deviate from the documented test method. Any departures must be reported with the test results, and may invalidate accreditation status for that particular test.

## 9 Uncertainty of Measurement, Method Precision and Limits of Detection

It is important for testing laboratories to understand the concept of uncertainty of measurement. Laboratory management should be aware of the effect that their own uncertainty of measurement will have on test results produced in their laboratory.

For mechanical testing laboratories there are two specific areas where the estimation of uncertainty may be required to be reported:

- (a) When the client requests this information
- (b) When test results are used to determine if the sample conforms to a required numerical specification.

A great number of mechanical tests have quite large uncertainties of measurement and laboratories should be aware of the magnitude of these. Some test methods, notably ASTM's, have included the repeatability and reproducibility at the end of the method. Accredited laboratories should be able to demonstrate, through an inter-laboratory trial or similar, that the uncertainty of the test results produced by them will be of similar precision.

Typical civil materials tests with high uncertainty include tests such as the Vial test, viscosity tests, skid resistance, bitumen penetration, liquid limit, etc. Similarly, hardness testing generally has an associated high uncertainty. It is obvious also that tests involving operator judgement will be included, e.g. some NDT testing, ALD/AGD and Broken Faces in civil materials, and visual tests such as assessment of internal corrosion in gas cylinders.

It is strongly recommended that laboratories participate in as many inter-operator and inter-laboratory trials as possible. These are excellent means for establishing an awareness of uncertainty. Involvement in such programmes will not only raise technical knowledge with regard to testing, but will aid in the appropriate selection and application of tests. See also sections 11 and 12 below.

Estimation of the uncertainty of measurement is not required where test results are qualitative (i.e. non-numeric such as pass/fail or fracture/no fracture). However, an understanding of the causes of variability in such cases (that may cause a false positive or false negative) would be expected.

Some mechanical test methods can be classified as "well recognized test method(s) with specified limits to major sources of uncertainty of measurement and specified form of presentation of calculated results". Under note 2 of Clause 5.4.6.2 of the accreditation standard such tests can be considered to have satisfied the clause if the method is followed and results are reported as required by the test procedure. As above, an understanding of the sources of variability of results will still be beneficial in understanding any anomalies during testing and guide efforts to improve test procedures.

Where test methods do not fall into the above categories, including in-house and modified methods, laboratories will need to have a programme prepared for the estimation of uncertainty of measurement. In cases where laboratories request extensions to their scope or apply for accreditation, estimates of uncertainty of measurement will be required. This may include calibration of equipment, in-house methods or any other method. Guidance can be found in references 4 and 5.

## 10 Reports and Calibration Certificates

An adequate records system is essential. It must contain sufficient information on each test to permit another operator to repeat the test and, within the variation of the method, produce a comparable result.

Any variation from a standard test procedure must be noted and reported in test documents.

Sample identification, the client's instructions, the test procedure, all test data and the test results must be recorded. All records must be traceable to the article under test.

Most laboratories have developed forms (pro forma sheets) for all of their routine testing. These are generally the preferred option as laboratories are able to control the type of information being recorded, maintain consistency of records, and increase recording efficiency. Test records may also be contained in personal or test specific workbooks. This type of records system is generally less efficient, and requires a greater level of management to

ensure that records are not lost. For these reasons this system is now usually found only in research organisations where a high level of non-routine testing is carried out.

Test reports must give the client all relevant information. Every effort should be made to ensure that the test report is unambiguous. All information in a test report must be supported by the records pertaining to the test. All information required to be reported by the test specification must be included in the report.

It is important to note that in many instances the test standards, regulatory requirements and industry accepted practice will determine the report format and content.

## 11 Quality Control

It is important for laboratories to understand where tests can go wrong so that steps can be taken to either eliminate the potential error point, or put in a means for alerting the technicians when the test has gone wrong.

Quality control in some form is possible over any test being performed. There is a disciplined approach required for the development of a suitable quality control plan and this approach can be applied on a test by test basis.

It is expected that accredited mechanical testing laboratories will have developed, documented, and implemented an appropriate quality control programme.

## 12 Proficiency Testing

Proficiency testing is defined as the “*determination of laboratory testing performance by means of inter-laboratory comparisons*” (ISO/IEC Guide 43.1:1997) and is a very important tool in a laboratory’s quality control programme to demonstrate the validity and comparability of results.

In accordance with the policy of the Asia Pacific Laboratory Accreditation Cooperation (APLAC), to which IANZ is a full member of their Mutual Recognition Arrangement (MRA), (see Reference 6), it is IANZ policy that applicant/accredited testing laboratories shall:

- (a) Demonstrate their technical competence by the satisfactory participation in proficiency testing activity where such activity is available, and that:
- (b) The minimum amount of appropriate proficiency testing required per laboratory is one activity prior to gaining accreditation, followed by:
  - (i) Participation in as many inter-laboratory comparison programmes (where available) required to cover the scope of accreditation, and
  - (ii) For the programmes selected, to participate in all relevant rounds that are available. Where multiple programmes exist covering the same methodologies on similar sample types, participation in all rounds may be relaxed. This would need to be justified on performance-based criteria, and each case will be treated on its merits. The overall frequency must still be such as to demonstrate on-going proficiency.

Aside from the issues of coverage and frequency, laboratories are expected to select proficiency testing activities according to the following criteria (in a generally decreasing order of preference):

- (a) Mandated programmes. In some areas of testing, participation in a particular programme may be mandatory
- (b) International inter-laboratory comparison programmes
- (c) National inter-laboratory comparison programmes
- (d) Proficiency testing programmes operated in accordance with ISO Guide 43: Part 1
- (e) Formal inter-laboratory comparison programmes involving several independent laboratories
- (f) Less formal inter-laboratory comparison programmes between two or more laboratories
- (g) Where none of the above is neither available nor applicable, intra-laboratory comparisons between technicians within the same laboratory could be considered a valid proficiency testing activity.

The participation in a programme is of little value without the combined results being analysed to determine the nature of any discrepancies and the effect of this on any routine test results. Discrepancies may be in the order of expected uncertainty, or they may indicate a serious shortcoming in a laboratory’s procedure. It is important for laboratories to have undertaken this analysis and to have adequately determined and implemented appropriate corrective action.

Records of the above analysis, and any action taken, of all proficiency testing results are required, including those for which no further action is considered appropriate i.e. satisfactory results.  
The results from proficiency testing activities and their analysis will be viewed by IANZ at each assessment.

### **12.1 APLAC Proficiency Testing Programmes**

From time to time APLAC arranges for proficiency testing programmes to be run and expects accredited laboratories in all economies which are members of the MRA to participate.

On receipt of an invitation to participate, IANZ nominates (usually to a maximum of four) accredited laboratories to participate, provided the programme is relevant to their scope of accreditation. Nominated laboratories are expected to participate (usually no fee is charged) unless there are valid reasons for not doing so.

The results from these APLAC Proficiency Testing Programmes are required to be treated by IANZ in a formal manner. Both the participating laboratories and IANZ receive a copy of the report. Where a particular laboratory has outlier or non-conforming results they will be required to submit to IANZ detail on the investigations conducted and any corrective action taken.

*It should be noted that all accredited laboratories in any inter-laboratory comparison programme are expected to do this, but would not normally report it to IANZ. Such records would be reviewed at the next on-site visit.*

IANZ staff will review the response and comment where appropriate. The records will also be reviewed at subsequent on-site assessments – particularly by a technical assessor where appropriate.

*It should be noted that APLAC Proficiency Testing Programmes are as much a measure of the IANZ performance in accrediting laboratories as they are a measure of the participating laboratories' performance. The cooperation of the nominated laboratories is appreciated by IANZ.*

## **13 References**

1. *Procedures and Conditions of Accreditation AS 1*
2. *NZS ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories*
3. *HSE, 2007: Health and Safety in Employment Act 2007*
4. *The expression of Uncertainty and Confidence in Measurement for Calibration, NAMAS M3003, Edition 2, Jan 2007.*
5. *Guide to the Expression of Uncertainty in Measurement (GUM), 1995, issued by BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, and OIML.*
6. *APLAC MR-001: Procedure for Establishing and Maintaining Mutual Recognition Arrangements amongst Accreditation Bodies, (Issue No.4, December 2002)*

## APPENDIX 1 CLASSES OF TEST

### Mechanical Testing

- |  |   |
|--|---|
| <p>4.01 Aggregates</p> <ul style="list-style-type: none"> <li>(a) NZS 3111</li> <li>(b) NZS 4407, Part 2</li> <li>(c) NZS 4407, Part 3</li> <li>(d) AS Standards</li> <li>(e) ASTM Standards</li> <li>(f) BS/BSEN/EN Standards</li> <li>(g) Other Methods</li> <li>(h) In-House Methods</li> </ul> <p>4.02 Bituminous Materials</p> <ul style="list-style-type: none"> <li>(a) ASTM Methods</li> <li>(b) AS Methods</li> <li>(c) BS Methods</li> <li>(d) BCA Methods</li> <li>(e) Other Methods</li> <li>(f) In-House Methods</li> </ul> <p>4.03 Cements and Pozzolanic Materials</p> <ul style="list-style-type: none"> <li>(a) NZS 3122</li> <li>(b) AS 2350</li> <li>(c) ASTM Methods</li> <li>(d) Other Methods</li> <li>(e) In-House Methods</li> </ul> <p>4.04 Concrete</p> <ul style="list-style-type: none"> <li>(a) NZS 3112, Part 1</li> <li>(b) NZS 3112, Part 2</li> <li>(c) AS Standards</li> <li>(e) ASTM Standards</li> <li>(f) BS/BSEN/EN Standards</li> <li>(g) Other Methods</li> <li>(h) In-House Method</li> </ul> <p>4.08 Soils</p> <ul style="list-style-type: none"> <li>(a) NZS 4402                             <ul style="list-style-type: none"> <li>(i) Part 2: Soil Classification Tests</li> <li>(ii) Part 3: Soil Chemical Tests</li> <li>(iii) Part 4: Soil Compaction Tests</li> <li>(iv) Part 5: Soil Density Tests                                     <ul style="list-style-type: none"> <li>Test 5.1.4</li> <li>Test 5.1.5</li> </ul> </li> <li>(v) Part 6: Soil Strength Tests                                     <ul style="list-style-type: none"> <li>Test 6.1.1</li> <li>Test 6.1.2</li> <li>Test 6.2.1</li> <li>Test 6.3.1</li> <li>Test 6.3.2</li> </ul> </li> <li>(vi) Part 7: Soil Consolidation Tests</li> </ul> </li> </ul> | <p style="text-align: right;">Test 7.1</p> <ul style="list-style-type: none"> <li>(b) AS Standards</li> <li>(c) ASTM Standards</li> <li>(d) BS/BSEN/EN Standards</li> <li>(e) Other Methods</li> <li>(f) In-House Methods</li> </ul> <p>4.10 Geomechanical Field Tests</p> <ul style="list-style-type: none"> <li>(a) NZS 4402                             <ul style="list-style-type: none"> <li>(i) Part 5: Soil Density Tests                                     <ul style="list-style-type: none"> <li>Test 5.1.1</li> <li>Test 5.1.2</li> <li>Test 5.1.3</li> </ul> </li> <li>(ii) Part 6: Soil Strength Tests                                     <ul style="list-style-type: none"> <li>Test 6.1.3</li> <li>Test 6.5.1</li> <li>Test 6.5.2</li> <li>Test 6.5.3</li> </ul> </li> </ul> </li> <li>(b) NZS 4407: Part 4                             <ul style="list-style-type: none"> <li>Test 4.1.1</li> <li>Test 4.2.1</li> <li>Test 4.2.2</li> </ul> </li> <li>(c) AS Standards</li> <li>(d) ASTM Standards</li> <li>(e) BS/BSEN/EN Standards</li> <li>(f) Other Methods</li> <li>(g) In-House Methods</li> </ul> <p>4.15 Seconded Sampling</p> <ul style="list-style-type: none"> <li>(a) Aggregates                             <ul style="list-style-type: none"> <li>(i) NZS 3111 Test 5</li> <li>(ii) NZS 4407 Part 2</li> </ul> </li> <li>(b) Bituminous Materials                             <ul style="list-style-type: none"> <li>(i) ASTM Methods</li> </ul> </li> <li>(c) Concrete                             <ul style="list-style-type: none"> <li>(i) NZS 3112.1 Test 3</li> <li>(ii) NZS 3112.1 Test 5</li> <li>(iii) NZS 3112.1 Test 11</li> <li>(iv) NZS 3112.2 Test 3</li> </ul> </li> </ul> <p>4.20 Pavement Testing</p> <ul style="list-style-type: none"> <li>(a) TNZ Methods                             <ul style="list-style-type: none"> <li>(i) T/1 Pavement deflection by Benkelman Beam</li> <li>(ii) T/3 Pavement texture by sand circle</li> </ul> </li> <li>(b) NZS Methods</li> </ul> <p>4.21 Traffic Count and Classification</p> |
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- 4.25 Cement Products
  - (a) AS/NZS 4465
- 4.26 Fibre Rope and Cordage
  - (a) Tension tests
  - (b) Other tests
- 4.30 Safety Equipment
  - (a) Seat belts
  - (b) Safety helmets
  - (c) Eye protectors
  - (d) Hearing protectors
  - (e) Safety footwear
  - (f) Other safety products
- 4.31 Motor Vehicle Safety Tests
  - (a) Door latches and hangers
  - (b) Seat anchorages
  - (c) Seat belt anchorages
  - (d) Hydraulic brake hoses
  - (e) Steering columns
  - (f) Sun visors
  - (g) Rear view mirrors
  - (h) Windscreen wipers and washers
  - (i) Fuel systems for goods vehicles
  - (j) Safety rims
  - (k) Instrument panels
  - (l) Head restraints
  - (m) Tyres
  - (n) Door strength
  - (o) Hydraulic braking systems
  - (p) Motor cycle and moped braking systems
  - (q) Child restraint anchorages
  - (r) Commercial vehicle braking systems
  - (s) Other tests
  - (t) Highway Safety Products
- 4.33 Lifting Gear, Chain, Wire Rope and Fittings
  - (a) Proof tests
  - (b) Tension tests
  - (c) Other tests
- 4.36 Industrial Fasteners
  - (a) Tension tests
  - (b) Proof tests
  - (c) Tension-torque tests
  - (d) Stripping tests
  - (e) Torsion tests
  - (f) Drive tests
  - (g) Other tests
- 4.37 Hand Tools
  - (a) Open end and adjustable wrenches
  - (b) Torque wrenches
  - (c) Hand hammers
  - (d) Screwdrivers
  - (e) Pliers, pincers and nippers
  - (f) Woodworking saws
  - (g) Axes and hatchets
  - (h) Chisels
  - (i) Other hand tools
- 4.39 Weighing Devices
- 4.40 Window and Door Hardware
  - (a) ASTM Methods
    - (i) *list tests*
  - (b) Other Methods
- 4.41 Windows and Doors
  - (a) NZS 4211
    - (i) *list tests*
  - (b) AS/NZS 4284
    - (i) *list tests*
  - (c) AS 4420
    - (i) *list tests*
  - (d) ASTM Methods
    - (i) *list methods*
- 4.42 Assemblies and Structures
  - (a) Windows and doors
  - (b) Wall, floor, and ceiling panels
  - (c) Trusses
  - (d) Cranes
  - (e) Insulator and conductor fittings
  - (f) Transmission towers
  - (g) Aircraft structures
  - (h) Slide fasteners
  - (i) Ladders
  - (j) Other assemblies
- 4.43 Toys and Games
- 4.44 Sporting and Recreational Equipment
- 4.46 Packaging and Containers
- 4.47 Building Boards and Plywood
  - (a) Particle board
  - (b) Hardwood
  - (c) Plywood
  - (d) Fibreboard
  - (e) Other building boards

*Mechanical Testing*

- 4.48 Paper and Paperboard
  - (a) Sampling
  - (b) Tension tests
  - (c) Tear tests
  - (d) Burst tests
  - (e) Compression tests
  - (f) Other tests
- 4.49 Timber and Timber Products
  - (a) Bending tests
  - (b) Stress grading timber tests
  - (c) Other tests
- 4.54 Gas Cylinders
  - (a) Hydrostatic pressure tests
  - (b) Internal and external examination
  - (c) Pulsating pressure tests
- 4.55 Pipes, Hoses, Valves, and Fittings
  - (a) Hydraulic pressure tests
  - (b) Head loss tests
  - (c) Calibration of jets
  - (d) Fire hose
  - (e) Other tests
- 4.56 Pumps
- 4.57 Compressors
- 4.58 Fans and Blowers
- 4.59 Engines and Vehicles
- 4.61 Glass
  - (a) Glass
  - (b) Glass products
  - (c) Glass fibre
- 4.62 Textiles
  - (a) Tension tests
  - (b) Tear tests
  - (c) Burst tests
  - (d) Flammability tests
  - (e) Wear tests
  - (f) Other tests
- 4.64 Leather and Leather Products
- 4.65 Rubber and Rubber Products
  - (a) Tension tests
  - (b) Tear tests
  - (c) Tension set tests
  - (d) Compression set tests
  - (e) Hardness tests
  - (f) Flexure tests
  - (g) Low temperature brittleness
  - (h) Accelerated aging tests
  - (i) Flammability tests
- (j) Swelling in liquids
- (k) Density and specific gravity
- (l) Belting
- (m) Elastomeric bearings
- (n) Other products
- 4.68 Plumbing and Fittings
- 4.69 Plastics and Plastic Products
  - (a) Tensile tests
  - (b) Tear tests
  - (c) Burst tests
  - (d) Impact tests
  - (e) Hardness tests
  - (f) Low temperature tests
  - (g) Flammability tests
  - (h) Density and specific gravity
  - (i) Flow properties
  - (j) Heat distortion tests
  - (k) Other tests
- 4.71 Coatings
  - (a) ASTM Methods
- 4.72 Corrosion Tests
  - (a) ASTM Methods
- 4.73 Adhesives and Sealants
- 4.75 Welder Qualification Tests
- 4.76 Metals and Metal Products
  - (a) Tension tests
  - (b) Compression tests
  - (c) Bend tests
  - (d) Deflection tests
  - (e) Hardness tests
  - (f) Impact tests
  - (g) Weld tests
  - (h) Other tests
- 4.79 Metallographic Tests on Metals
  - (a) Grain size
  - (b) Case depth and depth of decarburisation
  - (c) Depth of surface defects
  - (d) Non-metallic inclusion content
  - (e) Macroscopic examination of steels
  - (f) Graphite type and distribution in cast iron
  - (g) Corrosion resistance of austenitic stainless steels
  - (h) Tests on welds
  - (i) Other tests

4.81	<p>Non Destructive Tests by Radiography</p> <p>(a) Radiographic examination of metals</p> <p>(i) Single wall or rolled product</p> <p style="padding-left: 20px;">- thickness measurements ‡</p> <p style="padding-left: 20px;">- corrosion pitting ‡</p> <p>(ii) Welded Joints ‡</p> <p>(iii) Castings ‡</p> <p>(iv) Forgings ‡</p> <p>(v) Other specified metallic products</p> <p style="padding-left: 20px;">- aircraft components and assemblies</p> <p>(b) Radiographic examination of bonded metals</p> <p>(i) Soldered and brazed joints</p> <p>(ii) Hard faced components</p> <p>(c) Radiographic examination of metal inserts in non-metals</p> <p>(i) Concrete</p> <p>(ii) Reinforcing in conveyor belts, hoses, etc</p> <p>(d) Radiographic examination of non-metals</p> <p>(i) Rubber and plastics</p> <p>(ii) Timber</p> <p>(iii) Bonded non-metallic components</p>	<p>(ii) Welded joints ‡</p> <p>(iii) Castings ‡</p> <p>(iv) Forgings ‡</p> <p>(v) Metallic coatings ‡</p>
4.84	<p>Non Destructive Test by Dye Penetrant Methods</p> <p>(i) Visible dye</p> <p style="padding-left: 20px;">- Water washable ‡</p> <p style="padding-left: 20px;">- Solvent removable method ‡</p> <p style="padding-left: 20px;">- Post emulsifiable method ‡</p> <p>(ii) Fluorescent dye</p> <p style="padding-left: 20px;">- Water washable ‡</p> <p style="padding-left: 20px;">- Solvent removable method ‡</p> <p style="padding-left: 20px;">- Post emulsifiable method ‡</p>	<p>4.85 Non Destructive Test by Magnetic Particle Methods</p> <p>(i) Magnetic flow method</p> <p style="padding-left: 20px;">- Welded joints ‡</p> <p style="padding-left: 20px;">- Forgings ‡</p> <p style="padding-left: 20px;">- Castings ‡</p> <p style="padding-left: 20px;">- Machined parts ‡</p> <p>(ii) Current flow method ‡</p> <p style="padding-left: 20px;">- Welded joints ‡</p> <p style="padding-left: 20px;">- Forgings ‡</p> <p style="padding-left: 20px;">- Castings ‡</p> <p style="padding-left: 20px;">- Machined parts ‡</p> <p>(iii) Coil method ‡</p> <p style="padding-left: 20px;">- Welded joints ‡</p> <p style="padding-left: 20px;">- Forgings ‡</p> <p style="padding-left: 20px;">- Castings ‡</p> <p style="padding-left: 20px;">-Machined parts ‡</p>
4.82	<p>Non Destructive Tests by Ultrasonics</p> <p>(a) Ultrasonic examination of metals</p> <p>(i) Single wall or rolled product</p> <p style="padding-left: 20px;">- thickness measurements ‡</p> <p style="padding-left: 20px;">- corrosion pitting ‡</p> <p>(ii) Welded Joints ‡</p> <p>(iii) Castings ‡</p> <p>(iv) Forgings ‡</p> <p>(v) Extruded products ‡</p> <p>(vi) Other specified metallic products</p> <p style="padding-left: 20px;">- aircraft components and assemblies</p> <p style="padding-left: 20px;">- Machined components</p> <p>(b) Ultrasonic examination of bonded metals</p> <p>(i) Soldered and brazed joints</p> <p>(ii) Hard faced components</p> <p>(iii) Machine bearings</p> <p>(iv) Friction welded components</p> <p>(v) Other specified components</p> <p>(c) Unallocated</p> <p>(d) Ultrasonic examination of non-metals</p> <p>(i) Rubber and plastics</p> <p>(ii) Timber and plywood</p> <p>(iii) Bonded non-metallic components</p> <p>(iv) Ceramics and refractories</p> <p>(v) Other specified non-metals</p>	<p>4.86 Non Destructive Tests by Eddy Current</p> <p>(a) Surface flaw detection ‡</p> <p>(b) Metallic coating thickness measurement ‡</p> <p>(c) Sorting of materials and components ‡</p> <p>(d) Sub-surface flaw detection ‡</p> <p>(e) Weld testing ‡</p>
4.83	<p>Non Destructive Test by Visual Inspection</p> <p>(a) Visual inspection of metals</p> <p>(i) Flat or rolled products ‡</p>	

*Mechanical Testing*

4.87 Non Destructive Tests by Specialised Techniques

- (a) Ultrasonic examination by Time of Flight diffraction ‡
- (b) Acoustic emission testing ‡
- (c) Flaw detection in coatings by electrical continuity
- (d) Phased Array
- (e) IRIS (Internal Rotation Inspection System) - UT method

† Add power capability Specify capability - Amps, AC, DC

‡Add Materials classification Specify -

Fe	Plain Carbon and Low Alloy Steels
Al	Aluminium alloys
Mg	Magnesium alloys
Cu	Copper alloys
Zn	Zinc alloys
Ni	Nickel, Chromium or Cobalt alloys
	Other specified products (including High Alloy and Stainless Steels)

## **APPENDIX 2**

### **APPROVED SIGNATORIES AND SUPERVISORY STAFF**

Supervisory staff in accredited organisations must be competent and experienced in the professional/technical areas covered by their accreditation. They must be able to oversee the operations and cope with any problems that might arise in their work or that of their colleagues or subordinates. Such staff members, nominated by their organisations, may be granted signatory approval by the Testing Laboratory Registration Council on the recommendation of International Accreditation New Zealand (IANZ). Approved Signatories authorise technical procedures and the release of IANZ endorsed work.

The qualifications and experience required of Approved Signatories and other professional/ technical staff members, cannot be rigidly specified but must be appropriate to the work in which they are engaged. Approved Signatories would normally hold tertiary qualifications or equivalent professional recognition in the relevant discipline. Organisations engaged in a restricted range of repetitive work may have that work controlled by a Signatory with appropriate practical experience and specific training in that work but without formal qualifications.

#### **Approved Signatories**

Approved Signatories are the knowledgeable staff members who, where relevant:

- (a) Develop and implement new operational procedures
- (b) Design quality control procedures, set action criteria and take corrective actions
- (c) Identify and resolve problems
- (d) Authorise the release of all reports
- (e) Take responsibility for the validity of outputs.

For NDT laboratories the Approved Signatory must also have performed or closely supervised the critical observations and measurements.

Every accredited organisation must have at least one Approved Signatory covering each item of its scope of accreditation. Accreditation is automatically suspended for any scope item where there is no Signatory for the item due to a Signatory leaving the organisation.

All IANZ endorsed work must be authorised for release by an Approved Signatory holding approval in that discipline, who will take full responsibility for the validity of the work.

Signatory approval is recognition of personal competence. However, it relates to the accreditation of the employing organisation and is therefore not automatically transferable to another organisation. It lapses when a Signatory leaves the accredited organisation or changes their role significantly within the accredited organisation.

The following are considered when IANZ assesses the suitability of staff members as Approved Signatories:

- (a) Relevant qualifications and/or experience. If the Signatories do not have relevant tertiary qualifications they must have sufficient relevant experience enabling them to comply with the requirements listed below.
- (b) Position in the staff structure. Approved Signatories must be professional/technical personnel closely involved in the day to day operations of the accredited organisation.
- (c) Familiarity with procedures and awareness of any limitations of these procedures. Approved Signatories must have appropriate personal experience in the work procedures for which they hold approval. They must be aware of any limitations of these procedures, and must understand the scientific basis of the procedures.
- (d) Ability to evaluate outputs critically and a position in the staff structure which makes them responsible for the adequacy of outputs.
- (e) Knowledge of the quality assurance procedures in operation and ability to take appropriate and effective corrective action, when required.
- (f) Knowledge of and a commitment to the IANZ requirements for Signatories and for accreditation. This will include being conversant with the principles of effective quality management embodied in ISO/IEC 17025, the Procedures and Conditions for Accreditation and IANZ Specific and Supplementary Criteria.

- (g) Sufficient experience with the accredited organisation to address the above points. It is difficult to specify an exact time a proposed Signatory should have spent in the organisation, as it is dependent on their previous knowledge and experience and their current role in the accredited organisation. It is unlikely that the time would be less than six months, but exceptional circumstances may apply.

Signatory approval is normally granted only to a staff member in charge, a section leader, a departmental manager or a senior staff member who authorises the release of outputs and who can also satisfy the above requirements.

Staff members may be granted signatory approval for all of the work included in their organisation's scope of accreditation or for only specific work or classes of work relating to their area of personal expertise.

Signatory approval is available to a person engaged by an accredited organisation as a consultant, with respect to work done within the scope of accreditation of that organisation, provided that there is a written agreement between the parties setting out the extent of the authority and responsibility of the consultant in relation to the services provided. The consultant's position in the organisation must be such that they can perform their role as a professional/technical decision maker, as effectively as if they were an employee.

Staff members of the accredited organisation who are not engaged full-time are also eligible for signatory approval, provided that the circumstances in which they are called upon to exercise their signatory function and their access to, and knowledge of, the professional/technical operations are such that they are able to take full responsibility for the outputs they authorise.

The position and function of an Approved Signatory are quite distinct from that of an Authorised Representative. An organisation will normally have only one Authorised Representative who is appointed by the organisation and is only the contact point for IANZ and need not have any particular professional or technical expertise. The organisation may, however, have several Signatories approved by IANZ and with their own individual areas of expertise.

An Authorised Representative who is not also an Approved Signatory shall not authorise the release of IANZ endorsed reports.

## APPENDIX 3

### EQUIPMENT CALIBRATION INTERVALS

The following table sets out the normal periods between successive calibrations for a number of reference standards and measuring instruments. It must be stressed that each period is generally considered to be the maximum appropriate in each case providing that the other criteria as specified below are met:

- (a) The equipment is of good quality and of proven adequate stability, and
- (b) The laboratory has both the equipment capability and staff expertise to perform adequate internal checks, and
- (c) If any suspicion or indication of overloading or mishandling arises, the equipment is checked immediately and thereafter at frequent intervals until it can be shown that stability has not been impaired.

Where the above criteria cannot be met, appropriately shorter intervals may be necessary.

It is possible to consider submissions for extension of calibration intervals based on factors such as history of stability, frequency of use, accuracy required and ability of staff to perform regular checks. It is the responsibility of the testing laboratory to provide evidence that its calibration system ensures that confidence in the equipment is maintained. Application of the requirements of ISO 10012, Parts 1 and 2 needs to be considered when seeking an extension of intervals.

Where calibrations have been performed as above, adequate records of these measurements must be maintained.

*NB: Checks or calibrations indicated \* can be done internally by a laboratory providing they possess the necessary reference equipment, documented procedure and technical competence.*

Type of Equipment	Period between successive calibrations	Calibration procedures and equipment requirements
<b>Accelerometers</b>	One year	By an accredited calibration authority. Twelve month service recommended. As balances used in civil materials laboratories are usually subject to excessive dust, the annual service becomes a requirement.  Zero check  One point check using a known mass close to balance capacity (see CSIRO paper).  Repeatability checks (see MSL Technical Guide 12 – Assuring the quality of weighing results). The standard deviation of the results can be compared against the results recorded in the last external calibration certificate.
<b>Anemometers</b>	One year	
<b>Balances and Scales</b>	Three years	
	accompanied by: (i) *Each weighing  (ii) *One month  (iii) *Six monthly	

Type of Equipment	Period between successive calibrations	Calibration procedures and equipment requirements
<p><b>NB:</b></p> <p><b>Barometers</b></p>	<p>Five years for weighing appliances where the required accuracy is <b>not better than 0.5%</b></p> <p>*Three months (single point)</p>	<p>By an accredited calibration authority. Check daily when in use at mid and extreme points of range using calibrated check masses. (Contact IANZ for further details).</p> <p>Telephone comparison with nearest Meteorological office.</p>
<p><b>Computerised Systems</b></p> <p>Instruments with electronic readouts e.g. accelerometers, must be calibrated as a system, including the electronic readout. The period between calibrations will depend entirely upon the nature of the instrument and the use it is being put to. Computer programs used to manipulate data into test results must be validated, against manually calculated data, upon commissioning. The results of this validation must be retained on file, in the same manner as a calibration record, and may be used for ongoing quality control checks. The programs will need revalidation if the program is reloaded, subjected to a voltage spike, or doubt of their integrity exists. In any event it is recommended that they be revalidated occasionally, e.g. annually.</p> <p>It is insufficient for the laboratory to assume that proprietary programs, or programs adopted from another laboratory, are inherently correct. The laboratory will need to run its own commissioning validations and subsequent quality control checks.</p>		
<p><b>Dial Gauges</b></p> <p><b>Dies and Cutters</b> For preparation of test specimens</p> <p><b>Extensometers</b></p> <p>(a) Lever and mirror types</p> <p>(b) Micrometer screw types</p> <p>(c) Dial indicator types</p> <p>(d) Recording types with electrical output.</p>	<p>*Two years or less depending on use</p> <p>Five years</p> <p>Five years</p> <p>Two years</p> <p>Two years</p>	<p>BS 907/AS 2103</p> <p>Frequent examination for damage. Full dimensional check whenever re-sharpened.</p> <p>BS EN 10002-4/AS 1545 Grade D (for proof stress tests and load-extension curves for prestressing wires).</p> <p>AS 1545 Grade B (for modulus of elasticity determination).</p>

Type of Equipment	Period between successive calibrations	Calibration procedures and equipment requirements
<b>Force Testing Machines</b>		
Tension, Compression, & Universal	One year	AS 2193. <i>Note: Some Standards specify the recalibration period (e.g. EN10002 specifies 13 months).</i>
TYPE 1 – Mechanical Force Measuring System		
(a) Dead weight	Five years	
(b) Knife edge, lever and steelyard	Five years	
(c) Pendulum dynamometer	Two years	
(d) Elastic dynamometer (e.g. spring, ring with dial gauge)	Two years	
<i>Note: Chain testing and similar machines in frequent use</i>		
TYPE 2 – Hydraulic or Pneumatic Force Measuring Systems		
(a) Mechanical system incorporating a pneumatic or hydraulic link, e.g. proportional cylinder	Two years	
(b) Bourdon Tube or diaphragm pressure gauge as force indicator	Six months	
(c) Type (b) fitted also with a master gauge which can be disconnected during normal testing	One year (plus frequent checks by user of working gauge against master gauge).	
(d) Bourdon tube or diaphragm gauge used only as a null detector for a mechanical system	Two years	
(e) Bourdon tube with Measuring System	Two years	
TYPE 3 – Electrical Force Measuring Systems		

Type of Equipment	Period between successive calibrations	Calibration procedures and equipment requirements
<b>Gauge Blocks</b> (a) Used as reference standards (b) Used as working equipment	Five years Two years	Or more frequent as appropriate to usage.
<b>Hardness Testers for Metals</b> (a) Brinell, Vickers and Rockwell machines (b) Portable Brinell microscopes (c) Diamond indenters	Daily check when in use One year partial Three years (complete) One year (with calibrated graticule) *One year (inspection)	BS EN 10003/AS 1816.2 (Brinell) BS EN ISO 6507/AS 1817.2 (Vickers) BS EN 10109/AS 1815.1 (Rockwell)
<b>Hardness Testers for Rubber Plastics and Ebonite</b> (a) Dead weight testers for rubber (b) Dead weight testers for plastics (c) Meters (durometers) for rubber	Three years Three years Frequent checks by user on reference hardness blocks	BS 903 Methods N, A, L, M
<b>Hydrometers</b>	*Five years (one point)	BS 718
<b>Hygrometers</b> (a) Assman hygrometers and sling type (b) Recorders accurate to $\pm 1\%$ RH (c) Other recorders including hair types (d) Digital instruments	*Six months Five years (complete) Two years Weekly (with Assman hygrometer) One year	Compare thermometers at ambient with wick dry. ASTM E77
<b>Impact Testing Machines</b> (Pendulum type) (a) Charpy, Izod and Universal testers for metals (b) Charpy and Izod testers for plastics (c) Notching tools	Frequent inspection by user. One year (complete calibration) Frequent inspection by user. One year (partial calibration) Five years (complete calibration)	AS 1544.4 and BS EN 10045-2 Include verification using standard test pieces appropriate to required operating range(s). AS 1146.3 Check regularly and whenever reground.

Type of Equipment	Period between successive calibrations	Calibration procedures and equipment requirements
<b>Length Measuring Devices</b>		
(a) Linearly Variable Differential Transformers	Daily or whenever used	Check against length standard such as a micrometer setting bar.
(b) Micrometers (hand) (i) For measurement of diameters smaller than 2.5mm and thickness less than 1.3mm	*Five years (complete)	AS 2102. See IANZ Technical Guide AS TG 1 <i>Simple Linear Measurement Instruments</i> .
For measurement of diameters down to 2.5mm and thickness down to 1.3mm	*Five years (reference)	See IANZ Technical Guide AS TG 1 <i>Simple Linear Measurement Instruments</i> .
(c) Rules	*Five years (reference)	See IANZ Technical Guide AS TG 1 <i>Simple Linear Measurement Instruments</i> for requirements for in-house use (non-reference).
(d) Callipers – Vernier/Dial (i) Reference (ii) Working	*Three years (reference) *Annual	Against a reference length standard such as gauge bars.
<b>Masses</b>		
(a) Reference masses of integral construction stainless steel or nickel-chromium alloy	Five years	<i>NB: Separate criteria apply to check masses used to calibrate balances with accuracy <b>not better than 0.5%</b>. (Contact IANZ for details).</i>
(b) Masses of screw knob or sealed plug construction, made of stainless steel, nichrome, plated brass or other non-corrodible highly finished material	Three years	
(c) Masses of cast iron, carbon steel, or unplated brass	*One year (if calibrated to 1 in 104) *Five years (if calibrated to 1 in 103)	ASTM E617 See MSL Technical Guide 7. "Calibrating Standard Weights"
<b>Nuclear Densometers</b>		
	*Daily	Standard count (comparison against rolling average).
	*Six monthly	Drift and stability checks.
	Two yearly	Full calibration to NZS4407.4.2.4.



<b>Type of Equipment</b>	<b>Period between successive calibrations</b>	<b>Calibration procedures and equipment requirements</b>

Type of Equipment	Period between successive calibrations	Calibration procedures and equipment requirements
<b>Proving Devices for calibration of force testing machines</b>		
TYPE 1 – Elastic devices		
(a) Dial gauge for deflection measurement	Two years	
(b) Micrometer screw for deflection measurement (mechanical or optical indication)	Five years	
(c) Electrical deflection measurement	Two years	
TYPE 2 – Proving levers	Two years	
TYPE 3 – Weights	Five years	
<b>Sieves</b>		
(a) Reference	* Initial	Test sieves manufactured in accordance with BS 410 by Endecotts Ltd are acceptable without further calibration. Sieves from other manufacturers may be acceptable if the manufacturers' certificates indicate traceability of calibration to an acceptable national standard of measurement.
(b) Working	*One year or less dependent on usage	When in use all sieves should be monitored for wear either by the use of a stable standard sand sample which is periodically sieved, or by comparison with a reference set of sieves. As stated in BS 410, it is usual for sieves with aperture sizes larger than 3.35mm to be checked using engineers' gauges.
<b>Soil Testing Machines</b>		
(a) Force measurement	Two years	
(b) Displacement measurement	As for appropriate instrument (e.g. dial gauge, micrometer, LVDT)	
(c) Pressure measurement	As for pressure and vacuum gauges (hardness of rubber base)	

Type of Equipment	Period between successive calibrations	Calibration procedures and equipment requirements
<b>Squares</b>		
(a) Reference	Five years	Against a reference square.
(b) Working	*Annual	
<b>Stop Watches and Clocks</b>		
(a) Electric	*Twelve months	See MSL Technical Guide 8. "Calibration of Stop-watches" Comparison against radio time "pips", Telecom talking clock, or Teletext timer.
(b) Mechanical	*Three months	
<b>Straight Edges</b>		
(a) Reference	Five years	
<b>Strain Rate Meters</b>		
	*Six months (using stop watch)	
<b>Tachometer Calibrators</b>		
(Tuning devices)	Five years	
<b>Tachometers</b>		
	One year	BS 3403
<b>Thermometers</b>		
(a) Reference liquid-in-glass	Five years (complete) *Six months (check ice point immediately after initial calibration then at least every six months)	See MSL Technical Guide TG1 – "The Ice Point"
(b) Working liquid-in-glass	Five years (complete) *Six months (check ice point immediately after initial calibration then at least every six months)	
or alternatively	Inter-compare with reference thermometer at points in the working range every six months	See IANZ Technical Guide AS TG 3 Working Thermometers – Calibration Procedures.
(c) Electronic (sensors that are thermocouples, thermistors, or other integrated circuit devices)	One year (full calibration)	
(d) Resistance	Five years (full calibration), or when ice point drift is more than five times the uncertainty of calibration. Check at ice point before use or at least every six months.	Working hand held resistance thermometers can be checked using the alternative procedure above for glass thermometers.

Type of Equipment	Period between successive calibrations	Calibration procedures and equipment requirements
<p><b>Thickness Gauges</b> (for compressible materials)</p> <p><b>Volumetric glassware</b></p> <p>(a) Flasks, pipette, burettes and measuring cylinders used for reference purposes</p> <p>(b) Working flasks, pipettes burettes, measuring cylinders</p> <p>(c) Density bottles</p>	<p>Two years</p> <p>*Five years</p> <p>*On commissioning</p> <p>*Two years</p>	<p>Dial gauge, dimensions and pressure of foot.</p> <p>AS 2163 to 2167</p> <p>Cross check by weighing with distilled water. See MSL Technical Guide TG17 "Measuring Volume by Weighing Water "</p>

## **APPENDIX 4**

### **ASSOCIATED AND SUBSIDIARY LABORATORIES**

#### **Branch Laboratories**

If an accredited organisation has two or more sites each of which can accept new clients or new work without reference to any of the others, then each site is considered to be a separate organisation and separate applications for accreditation are required from each location together with the appropriate fees.

#### **Temporary Laboratories**

If an organisation is required to establish a subsidiary facility to service a particular project or location it is termed a temporary facility and the following procedures apply. Temporary laboratories are divided into three categories according to the length of time for which they are established. These categories are as follows:

- (a) If a temporary facility is established by an accredited organisation for less than two months this is regarded as a routine on-site project. Such projects are covered by the accredited organisation's accreditation and if the temporary facility complies with IANZ criteria for accreditation then reports issued by a signatory of the temporary facility may be IANZ endorsed.
  
- (b) If a temporary facility is established for a period between two months and twelve months it will be regarded as a field facility. When a field facility is established IANZ must be informed, an Accreditation Questionnaire must be completed, and the following additional information must be supplied:
  - (i) Field facility's location
  - (ii) Expected duration of the work or project
  - (iii) details of the work involved
  - (iv) Name and background details of the person in charge of the facility
  - (v) Staff complement at the facility
  - (vi) Details of the accommodation and equipment provided for the facility
  - (vii) Volume of work to be undertaken.

Upon receipt of this information and payment of a special assessment fee an assessment of the field facility is arranged. If this assessment so recommends, the facility will be empowered to issue IANZ endorsed reports under the accreditation of the base organisation. In such cases it is essential that an IANZ approved signatory from the base accredited organisation provides close supervision of the field facility's activities and that documentary evidence of this supervision is maintained.

- (c) When a temporary facility is to be established for a period in excess of 12 months it is regarded as being a separate organisation in its own right. A separate accreditation must therefore be sought and the appropriate fees paid.

It should be noted that the field laboratories detailed in (b) above would normally be expected to confine their activities to the work associated with the projects they are established to service. If a field facility is empowered to accept new commissions from clients in its locality without reference to the base accredited organisation then such a facility will be regarded as falling with category (c).