



Specific Accreditation Criteria

ISO/IEC 17025 Application Document

Infrastructure and Asset Integrity - Annex

Non-destructive Testing

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Non-destructive Testing

This document provides interpretative criteria and recommendations for the application of ISO/IEC 17025 for both applicant and accredited facilities involved in non-destructive testing.

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

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

5 Structural requirements

5.4

Organisation

The facility must detail the process for ensuring that the requirements for activities performed at work sites, covered in Appendix G of this Annex, are met and who is responsible for this.

Non-destructive testing (NDT) requires an appreciation of the manner in which certain defects might appear, as well as the impact of restrictions/limitations encountered during testing. Accordingly, witnessing of production testing is regarded as a fundamental aspect of NATA's NDT assessment program. Such witnessing of testing activity is normally undertaken in conjunction with initial assessments and reassessments, although special visits can also be undertaken for this purpose. Where witnessing of production testing cannot be arranged due to circumstances outside the control of the facility, it is expected that access to a plant item at a site located within reasonable proximity to the facility will be provided as an alternative. If such an alternative arrangement is invoked, a realistic 'job instruction pack' or equivalent is to be provided to the testing personnel, even if the job is purely for demonstration purposes. Witnessing of testing performed solely on specimens from the facility's library of test pieces is not an acceptable substitute for witnessing of production testing during the NATA assessment.

5.5

The facility shall identify (e.g. in its management system documentation or job descriptions) the individual(s) with responsibility for provision of technical control over testing activities. Further detail regarding provision of technical control in a NDT facility is covered under clause 6.2.

Provision of technical control

Although different individuals may be assigned responsibility for technical control over different types of testing, for any particular type of testing there must be a single person identified as having responsibility for provision of technical control (notwithstanding that there may also be defined delegates in case of absence).

Note Any division, group or individual within the organisation having the capacity to carry out NDT, but operating outside of the technical control processes and formal reporting lines that apply within the accredited facility, is not regarded as forming part of the scope of this accreditation.

The international standard for qualification and certification of NDT personnel, ISO 9712, provides a framework describing involvement of Level 3 certified personnel in the technical control of NDT facilities.

Accordingly, for each type of testing, the organisation must be able to demonstrate that the individual responsible for technical control over that testing has direct and ongoing involvement in the activities listed below:

- i) authorisation of technicians as competent to perform specific tests and/or to release test results;
- ii) writing or approving or reviewing test procedures as well as validating these as necessary;
- iii) monitoring the need for additional test procedures (in conjunction with the process for review of incoming work requests);
- iv) management of the in-house NDT competency program;
- v) monitoring of the quality of reporting of test data across the organisation;
- vi) ensuring field technical control (where applicable);
- vii) dealing with technical queries from testing personnel;
- viii) ensuring the integrity of processes for equipment commissioning and equipment performance checks.

Note: For facilities with multiple sites, these activities may be delegated to local personnel, provided that such delegations have been defined in job descriptions or similar.

From the above list, the designated Level 3 can delegate responsibilities for items v) to viii) to other personnel who have at least Level 2 certification in the primary test method.

If the organisation does not have Level 3 certified personnel in the relevant primary test method, then the facility shall ensure Level 3 coverage from another source (refer below to *Acceptable certification for Level 3 activities*) is available for technical control activities. This applies, as a minimum, in relation to the common NDT methods i.e. radiographic testing, ultrasonic testing, eddy current testing (other than coating thickness measurement), magnetic particle testing and penetrant testing. In addition, where the testing activities include the advanced ultrasonic techniques of phased array and/or time of flight diffraction, or radiographic techniques CR and DR for welds, the person responsible for the oversight of such tests shall hold an independent endorsement for these techniques that is equivalent to ISO 9712 Level 2 or higher.

Each facility is required to define the *nature and frequency* of the technical involvement of the Level 3 personnel. Where the Level 3 resource is not based at the facility, the circumstances requiring on-site involvement must be defined, including a minimum visit frequency in the absence of other triggers. Records of the Level 3 involvement shall be documented by the organisation and be available for assessments.

The required degree of direct involvement by the Level 3 resource will depend on many factors. In particular, the experience of the person responsible for day-to-day technical control in terms of both breadth and duration of their technical control experience will be critical in making an assessment of the adequacy of the Level 3 involvement. Other inputs to be considered when establishing the nature and frequency of Level 3 involvement will normally include the following:

- experience level of local fulltime staff;
- diversity and quantity of work undertaken;
- whether procedures are written generically or as item-specific instructions;
- the vulnerability of the local technical control arrangements in the absence of key staff;
- the extent to which technicians perform work at locations away from the base site;
- the nature and frequency of the competency assessment undertaken for technicians;

The facility must maintain records of the evaluation process leading to the defined requirements for Level 3 technical involvement and be able to demonstrate the involvement of the engaged Level 3 resource in this evaluation process.

The facility must also make provision for delegating the Level 3 responsibilities to cover periods of leave or other absences.

For NATA assessments, personnel representing the senior level of technical control for the site being assessed (which may be a delegated level of overall company technical control) must be present for the initial assessment or reassessments. Defined Level 3s within the organisation are required to be present at assessment/reassessment for the accredited site where they are normally based. Defined Level 3 personnel that are not normally based at an accredited site (for example, external consultants) are required to be present for each assessment/reassessment at the accredited site that has primary responsibility for technical control.

6 Resource requirements

6.2 Personnel

6.2.2

Acceptable certification for Level 3 activities

Level 3 coverage is required for the common NDT methods, as described under *Provision of technical control*. While certification for a given NDT method does not need to be specific to the particular industry sector(s) in which the facility operates, the facility must ensure that technical control personnel have expertise that is appropriate to the type of work undertaken by the facility. Facilities seeking to appoint an individual not holding ISO 9712 Level 3 certification for provision of Level 3 coverage must evaluate any such appointment in terms of the depth, rigor and integrity of the underlying certification process. Such evaluations will be subject to review at NATA assessments.

Note: There is no scope for facilities to claim or imply, on the basis of the NATA assessment process, that NATA has designated the equivalency of an alternative qualification to Level 3 ISO 9712 certification.

Qualifications for testing personnel

Personnel performing non-destructive tests shall hold qualifications as specified by the customer plus any additional qualifications specified in the contract, application standard or test method. In addition, a current certification in the applicable method is required when performing the NDT methods of radiographic testing (including CR/DR), ultrasonic testing (including phased array and time of flight diffraction), eddy current testing (other than coating thickness measurement), magnetic particle testing and penetrant testing.

Note: The facility is responsible for determining the need for any certification covering methods other than the common NDT methods listed above (for example, electromagnetic testing of wire rope), or specialised forms of certification within these methods (for example, ultrasonic examination of a specific weld geometry) if such requirements are not made clear within the testing contract, application standard or test method.

ISO 9712 NDT qualifications are commonly specified in Australia, however, where acceptable to the facility and permitted within the contract, application standard or test method, the following forms of certification may be considered as acceptable alternatives to ISO 9712 for performing non-destructive tests:

- certification to AS ISO 20807, where the certification scope matches the scope of the testing to be undertaken;
- AINDT qualifications (such as Technician or Technologist) which pre-date the ISO 9712 framework;

Note: While it is acknowledged that such qualifications do not involve periodic re-certification by practical examination, any testing personnel working in an accredited NDT facility are subject to ongoing competency assessment using test specimens with defined defects (refer to clause 7.7).

- ASNT 9712 (previously ASNT ACCP) or ASNT NDT certification issued directly by the American Society for Nondestructive Testing at the applicable level;
- qualifications issued by an employer under a recognised certification framework (including ASNT SNT-TC-1A) are acceptable, provided that the scheme is directly administered by the NDT facility and has been subject to on-site assessment and subsequent approval by an independent body within the past five years. The report from the independent body approving the SNT-TC-1A scheme must be authorised by a person, or persons, holding ISO 9712 (or equivalent) Level 3 qualifications in all relevant methods. To be considered independent, the assessing body would need to have no commercial or other interest in the company to be assessed outside of the assessment arrangements;
- other qualifications acceptable to the NDT facility's customer. This would apply in the case of a contract which included the right of the NDT facility's customer to determine acceptability of testing personnel qualifications. This would not apply, for example, to organisations testing their own products for internal

assurance, or where the direct customer is not the owner or purchaser of the items under test.

Under the ISO 9712 framework, NDT certification is provided at 3 qualification levels. For certification schemes following this structure, Level 2 certification is considered to be the minimum acceptable level for conducting testing where test procedures do not explicitly detail the test parameters to be used. This includes testing where personnel are working to the general requirements of a standard method (e.g. AS 2207) and are responsible for choosing test parameters (e.g. probe frequency, beam angle, etc.). Unless otherwise specified, Level 1 certification may be acceptable for tests of a repetitive routine nature if the test procedures specify all testing parameters and define the circumstances in which the testing personnel shall seek assistance or advice. In such cases, the procedures shall be documented and readily available to testing personnel. Level 1 certification is not appropriate where testing personnel are working to the general requirements of a method and are responsible for choosing test parameters. Level 1 certification is also not appropriate for ultrasonic thickness testing if it involves characterisation of material loss using angle probes, however, certification to AS ISO 20807 (which does not have defined certification levels) in Corrosion Mapping may be acceptable for such testing.

While certification for a given NDT method does not need to be specific to the particular industry sector(s) in which the facility operates, the facility must ensure that testing personnel are trained and competent in the specific work undertaken.

Where personnel are only involved in performing components of a test that are subject to later validation during the testing, and can be repeated if found to be invalid, certification in the method may not be necessary. This might apply to personnel performing radiographic exposure and processing, mechanised ultrasonic or Eddy Current Array scanning of an item, where remote interpretation of the resulting films or acquisition data files is undertaken by appropriately qualified personnel.

Testing personnel who are performing testing under the direct supervision of a qualified person at the job site also need not hold qualifications, however, the list of personnel within the job records must indicate that a qualified person supervised the work. Such supervision must at least be sufficient to ensure that the supervisor was in a position to rectify any errors or omissions in the technique(s) being used and able to evaluate the unqualified person's understanding and compliance of the technical aspects associated with the testing.

Training

ISO 9712 details specific training and experience requirements for the various levels of qualification. For testing personnel, there are also a range of human factors such as concentration, attention to detail, persistence in evaluating and interpreting findings, including use of alternative NDT methods, which can affect the quality of testing work and which are to a greater or lesser extent controllable through the provision of appropriate training. This can involve training personnel to recognise situations and conditions which could have an adverse effect on the testing and to take appropriate mitigation measures.

Where methods or techniques are used, which are not covered by ISO 9712 certification, the facility shall define the training and examination requirements for personnel. Records of training and examination shall be maintained by the facility.

Where testing is conducted by remote control at a distant location and the assessment of the acquired data is completed off-site (live or later), then the facility shall define the training and examination requirements for personnel assisting on-site for instrument handling. Records of training and examination shall be maintained by the facility.

6.2.3

Visual acuity

All testing personnel shall satisfy the requirements for vision as defined in ISO 9712. Testing personnel must also take any precautions necessary to ensure satisfactory visual acuity at the time of undertaking any NDT work.

Companies wishing to perform vision tests in-house shall provide a written procedure and hold the appropriate charts.

Field technical control

For providers of commercial NDT services, the majority of NDT is carried out in the field, typically without direct supervision by personnel responsible for technical control.

It is a requirement that NATA be notified of the establishment of certain types of work sites (see Appendix G).

Generally, for testing conducted away from the base site, field technical control is necessary to monitor the implementation of the company's procedures and policies in field testing situations. This will include technical supervisory visits for selected jobs and the witnessing of tests performed under typical test conditions in the field. The selection of jobs for field technical control evaluation must ensure that at least one job performed by each person approved to conduct unsupervised testing is subject to evaluation every year in at least one of the test methods.

While field technical control is not required for facilities where all testing is performed at the accredited base site, such facilities must still ensure that processes are in place for monitoring compliance with test procedure requirements.

Note: It is recommended that field technical control programs make allowance for the full range of testing techniques to be covered annually across the organisation, however, it is acknowledged this may be impractical if there are a large number of techniques undertaken and only a small number of technicians.

Personnel conducting field technical control evaluations shall be qualified in the particular test method being evaluated and be approved by the Level 3 resource as competent to carry out such evaluations. Records for such approval shall be maintained by the organisation.

Aspects of testing activity that would typically be addressed during field technical control evaluations include:

- review of job instructions issued to the testing personnel;

- availability of test standards and/or facility/client test procedures and relevant specifications at the job site (or via online access);
- suitability and condition of test equipment;
- review of on-site instrument set-up and/or equipment performance checking;
- observation of the performance of the test(s), including the time taken;
- review of records of the test, including any test results provided on-site (at the time of the test).

Records of the field technical control evaluation must be maintained. The facility shall also ensure that any deficiencies identified from technical control evaluations are managed in accordance with the relevant clauses of ISO/IEC 17025.

6.2.5

Personnel records

The following records are to be available for testing personnel and must be retained for the duration of employment and for at least three years after cessation of employment:

- copies of qualification/certification certificates and identification cards;
- current visual acuity;
- induction training in the facility's management system;
- assessment of knowledge of relevant test method requirements;
- assessment of ability to prepare clear and accurate records of testing;
- details of the NDT operator's knowledge of relevant standards and specifications;
- external and in-house training;
- duration (hours) of testing experience in individual methods;

Note: May not be required for those methods for which qualifications are held.

- categories of testing, including the test technique for which approval is granted to carry out unsupervised work (refer clause 6.2.6);
- records of participation in NDT competency audits (refer clause 7.7).

Note: Including sector details (castings, forgings, welds) for volumetric methods and relevant weld configurations in the case of ultrasonic weld testing.

6.2.6

Testing personnel approvals

Testing personnel may not work unsupervised and/or authorise the release of test results without first having been approved to do so by the authorised approver (as per ISO/IEC 17025 clause 6.2.6). In the NDT field, the authorised approver is a Level 3 certified in the primary test method and responsible for technical control. Any such approvals shall be given only after a review of all records listed under *Personnel records* has been performed by the individual(s) exercising technical control. In addition, a candidate must have satisfactorily completed an NDT competency assessment (or equivalent independent practical examination) for each relevant NDT method (and ultrasonic weld testing if this is to be included in the approval) prior to authorisation to work independently. The person exercising technical control must

determine whether the records available are sufficient to substantiate the proposal to work unsupervised for the requested tests or whether additional information and/or training is required.

When testing is performed under multiple international standards, the Level 3 must evaluate the tester's understanding of each applicable standard. For example, while magnetic particle testing using AC Yoke is common across standards and may warrant a general approval across the range of standards or company procedures, the same personnel may not be competent to operate an MPI bench. Similarly, UT certified personnel may be competent in AS 2207 but lack knowledge regarding different requirements specified in the ISO, AWS, or ASME standards. The same applies to RT personnel working under AS 2177, ISO 17636, or the subtle additional requirements in AS/NZS 2885.2 or ASME.

Therefore, it is recommended that facilities maintain clear approval records for unsupervised testing under each standard, the technique, or the company procedures based on these individual standards.

In the event of approval being granted, records of the approval process must include the following information:

- a record of review of the information submitted in support of the request;
- categories of testing, including the test technique for which approval has been granted to work independently and/or to release test results, and any applicable limitations;
- visual acuity assessment
- evidence of successful participation in competency assessment(s) within the last 5 years (refer clause 7.7).
- date(s) of approval together with the authorisation of the person responsible for technical control.

The approval process described above also applies in the case of requested extensions to existing approvals. In such cases, the records system must ensure that substantiating documentation for each separate request is retained and that the various approval dates for the separate areas of test coverage are detailed unambiguously.

Personnel holding an ISO 9712 Level 1 certification can be approved to work without supervision and/or to release test results only if the facility's records of approval for that person unambiguously reflect the limitations for operators working to Level 1 certification and that these limitations are adhered to in practice.

In cases where approval is withdrawn, for example, following the departure of an employee from the company, a record of the date the approval ceased must also be kept.

Where a technical controller responsible for the approval of the competence of testing personnel leaves the accredited facility, the incoming technical controller must review and re-endorse pre-existing approvals in order to enable appropriate accountability for the approvals to be maintained.

Any supervisory staff involved in allocation of work to testing personnel must have ready access to the current list of testing personnel approvals in order to avoid

allocation of work to unapproved personnel. A system for checking the authenticity of claimed qualifications and for monitoring the expiry dates of qualifications or certifications and visual acuity assessment must also be evident.

6.4 Equipment

6.4.4 Unless otherwise noted, the equipment performance checks detailed in Appendices A - F relevant to the NDT method shall be recorded. Some application codes require equipment checks to be undertaken more frequently than detailed in the relevant Appendix. The more stringent requirement shall apply.

Consumables

Consumables must be stored and used in accordance with the manufacturer's recommendations and should be discarded on the stated expiry date or recommended shelf life. Consumables used beyond the manufacturer's expiry date or recommended shelf life must be validated routinely prior to each use. The onus is on the facility to prove that consumables used beyond the manufacturer's recommended date do not adversely affect the outcome of the test.

6.5 Metrological traceability

As detailed under clause 7.6, NDT techniques are typically qualitative or semi-quantitative and therefore formal calibration in order to establish metrological traceability is not generally applicable.

7 Process requirements

7.2 Selection, verification and validation of methods

7.2.1 Selection and verification of methods

7.2.1.4

Technique compatibility

Different NDT methods may provide different results for an individual test item and that may give rise to complications in regard to compliance matters. An item may be found to comply with acceptance criteria when tested by one method, but fail to comply when tested by another. It is important to recognise that NDT methods are *complementary*, but are not necessarily *compatible*. For example, the detectability of volumetric defects is better than for planar defects when radiography is used, whereas ultrasonic testing is more likely to find planar defects. NDT facilities are obliged to make customers aware of the possibility of differing results arising from the application of different NDT methods.

Qualitative or screening techniques

Where condition assessment activity is undertaken using techniques covered by the scope of accreditation, test procedures used must be capable of defect detection and evaluation at a threshold which is consistent with techniques typically used for compliance testing of similar products. An exception to this requirement is where testing is carried out to an accredited qualitative or screening technique (used to

provide an indicative assessment of equipment condition). In such cases, the report must indicate that the detection threshold reflects defect-screening capability only.

Note: A facility may be able to demonstrate that testing equivalent to compliance test requirements can be achieved through the use of multiple NDT methods, even though each technique on its own might normally be regarded as a qualitative technique.

If a client requests an NDT company to perform testing to the client's in-house requirements, these not being of a standard equivalent to the requirements used for compliance testing of similar products, then acceptance of such work requests is not appropriate as it could diminish confidence in the integrity of the accredited testing services. Any such testing will not be recognised by NATA. Any organisation performing such work must ensure that the specific procedure(s) proposed is excluded from the scope of accreditation.

7.2.1.5 The facility must demonstrate that new work activities which fall outside the routine operational scope are technically reviewed in order to determine whether existing test methods are adequate for the work.

The availability of a specific facility procedure would be required in the following situations:

- where there is no published standard for the test method;
- where a published standard lists alternative approaches (e.g. AS 2207 has alternative criteria for scanning positions, evaluation criteria and sizing methods);

Note: In such cases, if the published standard is sufficiently detailed, facility methods referencing such standards may not require detail other than nominating which of the alternative testing approaches is to be used.

- where existing published standards or facility procedures, as applied to the specific item in question, would not provide sufficiently detailed instruction for the test to be duplicated if necessary;
- where the customer or contract requires a specific procedure;
- where the use of advanced equipment warrants additional instruction that cannot be considered as assumed knowledge for the testing personnel.

7.2.2 Method validation

7.2.2.1 Validation of a technique is required where aspects of techniques developed by the facility do not closely reflect a recognised published standard. For example, validation may need to be addressed where a technique has been developed for detecting a nominated discontinuity or discontinuities in a particular product and/or environment, such as for in-service testing carried out in order to detect the development of a specific defect in a particular location.

When a method is developed or technically revised, the facility must demonstrate that appropriate input has been provided by the relevant Level 3 resource.

7.5 Technical records

7.5.1

The records system must include the following testing information, where applicable:

- test item identification;
- test procedure identification;
- date and place of test;
- identity of the test method;
- any departures from test method requirements (i.e. due to unavoidable circumstances associated with the specific job);
- identity of the test equipment;
- application code/specification;
- original test observations and calculations, including description, size and location of discontinuities;

Note: Commonly recorded in photographic format, which can also be a customer requirement.

- test restrictions;
- any areas not able to be inspected;

Note: Commonly recorded in photographic format, which can also be a customer requirement.

- any repairs undertaken and areas retested;

Note: Commonly recorded in photographic format, which can also be a customer requirement.

- identity of the person performing the test;
- any other information specified in the test method, other contractual documents or relevant statutory regulations.

Note: Additional record requirements applicable to individual test methods are included in Appendices A-F.

7.6 Evaluation of measurement uncertainty

7.6.3 There are qualitative and quantitative components of uncertainty in NDT. The qualitative components relate to uncertainty of detection and the uncertainty of classification. The influence of these is typically of far greater significance than with the uncertainty of measurement. Such is the nature of the application of non-destructive testing methods that they are recognised as tests which have a degree of subjectivity such as to preclude application of uncertainty by a formal modelling and mathematical approach. There are many factors which vary from test to test and which contribute to the uncertainty of detection, uncertainty of classification and uncertainty of measurement. As a result, non-destructive tests are generally considered to be qualitative or semi-quantitative, notwithstanding that numerical values are frequently reported.

Facility staff should consider uncertainty of detection, classification and measurement in any review or new validation/verification carried out in relation to the

NDT techniques. Consideration must be given to the key components that will contribute to the estimation of the uncertainty of test results. Facilities should place particular emphasis on awareness by operators of issues relating to the probability of discontinuity detection in conjunction with the avoidance of false calls.

Formal estimation and reporting of measurement uncertainty is not required for qualitative or semi-quantitative tests, or for tests in which qualitative components are the major components of uncertainty. However, where situations arise that require compliance assessment in accordance with numerical test result criteria, measurement uncertainty must be considered.

Facilities will need to estimate the uncertainty of measurement for any tests that are considered to be quantitative and which do not comply with ISO/IEC 17025, clause 7.6.3, Note 1.

For qualitative or semi-quantitative tests it is expected that facilities identify those factors which contribute to uncertainty, to rank these based on importance and then take action to control them as far as is possible.

The influence of factors contributing to uncertainty in NDT may be minimised by actions and processes such as:

- use of correctly standardised equipment and performing periodic equipment performance checks;
- testing being performed by certified or qualified NDT operators;
- testing to well established standards;
- using complementary techniques in cases of difficult or unusual applications;
- use of a specialised technique specifically applicable to the application for which it is being used;
- process controls such as periodic processing of objects containing known discontinuities;
- testing in environmental conditions which are conducive to the testing operation (this is recognised as being frequently unobtainable);
- comprehensive training of staff;
- a rigorous NDT competency audit program;
- an in-depth understanding of the object under test (composition, modes of deterioration etc).

7.7 Assuring the validity of results

Facilities must have quality control activities to periodically assess testing competency. Specific requirements are outlined below.

7.7.1

Individual competency assessment

An NDT competency program, based on the use of test specimens with known defects, must be established with input from the relevant Level 3 resource to provide the following outcomes.

- A competency assessment is required for all personnel prior to approval to carry out unsupervised testing in the test method or technique where the testing

does not fall under a standard test method (e.g. Pulsed Eddy Current Testing)^{Note 1}. For ultrasonic weld testing, ultrasonic weld competency assessment involving representative weld geometries is required for personnel prior to authorisation to perform ultrasonic examination of welds^{Note 2}.

- Ongoing competency assessment is required for all personnel in each method that they perform, using product type(s) relevant to the testing performed by them, at least once every five years^{Note 1}. The more diverse the work, even if done infrequently, the more comprehensive should be the assessment program to cover all the work.

Note 1: Satisfactory participation in a practical examination for a qualification program, whether external or in-house, is considered to represent valid competency assessment for the personnel and methods involved.

Note 2: An ultrasonic weld competency assessment based on the most complex geometry that is expected to be tested by the individual may mean that assessment involving simpler geometries is not required.

Where facilities run in-house competency assessment programs, they must ensure that any test specimens used are adequately validated and that measures are in place to prevent unauthorised access to test specimens and associated records. Where it is impractical to provide a suitable range of test specimens, for example due to the nature of testing undertaken, alternative arrangements may be considered. In such cases, items available for testing in the normal course of the facility's operations may be tested by the candidate to be assessed, under supervision, and then subsequently re-tested by a person authorised by the facility for this purpose.

Instructions provided to personnel conducting an NDT competency assessment must include:

- NDT procedure to be used;
- the method(s) used to determine and verify the size and location of any discontinuity present in the test specimen;
- recording requirements;
- reporting requirements;
- acceptance criteria;
- time limitations.

Assessment of test results must be performed according to defined criteria.

Assessment records (including the test record sheet completed by the test personnel) shall be kept confidential and secured to prevent unauthorised access by other personnel in the organisation.

7.7.2

Facility assessment (external)

External competency assessment (or participation in inter-laboratory comparison) is complementary to the competency assessment of personnel (refer individual competency assessment in 7.7.1). While external and individual competency assessment both involve an assessment of the performance of the testing personnel,

external assessments also cover the effectiveness of organisational aspects that have a direct impact on competency. These aspects include job planning, equipment assurance, test record systems and the company reporting processes. Therefore, a comprehensive competency assessment program will normally include at least some provision for competency assessment by external providers, however, it is acknowledged that there are areas, such as wire rope testing, for which suitable external programs may not exist. In such circumstances, other forms of independent demonstration of competence for the testing activity may be considered.

The relevant Level 3 certified personnel are required to be involved in the development of the overall program to ensure that it meets the technical requirements of the facility.

Each facility must plan and participate in an external competency assessment (or inter-laboratory comparison) program at least once every two years, or document the basis for any contrary approach. The method of test and technique selected for the assessment should be relevant to the complexity of the facility's scope of work.

New applicant facilities must complete an external competency assessment prior to initial accreditation.

7.8 Reporting of results

7.8.1 General

7.8.1.3

Simplified reports

A simplified format for communicating test results may be used where a specific, written arrangement with the customer exists, however, the following items, at least, must be conveyed to the customer:

- identification of the test item;
- area(s) tested;
- test method identification, and any deviations from the method;
- test result(s);
- test restrictions (if applicable).

A simplified report must also make unambiguous reference to an identifiable document, such as the worksheet for the test, which must contain all additional information specified in the test method and ISO/IEC 17025.

Similarly, where an NDT facility is contracted to provide test data in a prescribed format (i.e. directly entered into the customer's asset integrity system) all additional information specified in either the test method or ISO/IEC 17025 must be accessible within the facility's record system.

Preliminary/on-site release of test results

Some customers require immediate notification of test results. Irrevocable decisions may be made on the basis of such on-site reporting and, therefore, if test results are conveyed to a customer at any stage during or after testing, the information must only be provided by a person authorised to do so by the person exercising technical

control for that testing. For cases where test data is being uploaded to the client in real time, any personnel carrying out such testing must be similarly authorised.

Any preliminary/on-site release of test results must ensure that the information specified for simplified reports is conveyed to the customer. Also, any further report which is subsequently issued must make reference to any previous on-site report or data transfer.

Asset inspection results

For equipment maintenance testing, it is common for NDT results to be included as one part of an overall asset inspection report. In such cases, where the facility wishes to make reference to accreditation, the results which are not covered by the facility's scope of accreditation must be clearly identified. Refer to *NATA's General Accreditation Criteria: Use of the NATA emblem, NATA endorsement and references to accreditation* for further information.

7.8.3 Specific requirements for test reports

7.8.3.1

Reporting in circumstances of non-compliance with accreditation criteria

Where mandatory testing requirements, such as the requirement for operators to hold appropriate qualifications, have not been met for a particular test covered by the facility's scope of accreditation, the report must include a statement which makes clear that NATA's requirements have not been met or that certain aspects of the test method have not been followed. Deviations from NATA's requirements should only apply due to unavoidable circumstances.

The above type of non-compliance is different from the routine test restrictions/limitations (e.g. access limitations) which might apply to an individual job and which can be reported as test restrictions rather than as test non-compliances.

7.8.6 Reporting statements of conformity

7.8.6.1 In NDT, compliance is most often based on a determination as to whether certain defect types are present or absent, rather than numerical test result criteria.

If compliance is to be determined in accordance with numerical test result criteria, then the measurement uncertainty shall be taken into account.

7.8.6.2 Where the requirements of ISO/IEC 17025 are not met, the report may indicate the need for referral to the customer's nominated personnel or the project principal.

7.8.7 Reporting opinions and interpretations

7.8.7.1 Discontinuity identification, reporting to product application code criteria, third party checking of NDT results and interpreting results to documented customer criteria are allowed to be reported within the scope of accreditation.

Commentary on other aspects relating to testing outcomes, such as defect severity assessment or recommendations regarding re-inspection intervals, would be acceptable provided that objective criteria for such judgments are defined, the personnel are explicitly authorised for making such judgments and the

qualifications/training required to make such judgments are defined and implemented.

Opinions regarding fitness for purpose of tested items or predictive opinions such as crack propagation rates, residual life estimates etc, shall not be included in test reports unless specifically identified within the report as being outside the scope of accreditation.

Appendix A: Radiographic testing technical requirements

This Appendix provides additional interpretation of the application of ISO/IEC 17025 for radiographic testing.

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

Scope of accreditation

Facilities may seek accreditation for only certain aspects of radiographic testing, for example, exposure and processing of radiographs, or interpretation only (where radiographs are supplied to the facility).

It is only acceptable for a facility to carry out interpretation of radiographs that have been taken and processed by another facility if the following conditions are met:

- the interpreter shall be provided with a copy of the job record and the exposure and processing details;
- the radiographic technique and the quality of the radiographs shall comply with the requirements of the relevant standard;
- adequate radiographic viewing equipment capable of viewing the maximum density allowed by the relevant specification/industry standard and test method standards shall be available;
- the report covering the interpretation shall identify the facility which produced the radiographs;
- radiographs shall remain the property of the facility responsible for taking and processing.

6 Resource requirements

6.3 Facilities and environmental conditions

6.3.1 Appropriate facilities shall be available for viewing radiographs under optimum conditions of illumination.

6.4 Equipment

6.4.1 X-ray equipment and radioactive sources shall be suitable for the materials to be examined. They should cover the expected thickness range and the shape, nature and location of items likely to be submitted for examination.

Pulsed or low intensity sources may be suitable for qualitative thickness assessment but are not considered suitable for examination of materials for other purposes, such as weld compliance testing.

6.4.10 The following equipment performance checks are provided as guidance. Any equipment requirements specified within the applicable product code and/or test standard are not affected by this guidance.

Item of equipment	Intervals	Procedures and comments
Film processing equipment	Dependent on use	Test check strip normally used.
Certified reference density strip	Refer to manufacturer's recommendation (typically 5 years from last calibration date)	Ensure storage away from light and not used for routine density checks.
Densitometer	Intervals to be sufficient to demonstrate stability of the unit	Can be checked using a certified reference density strip (acceptance criteria of ± 0.2 H & D units is typical).
Viewer	Intervals to be sufficient to demonstrate stability of the viewer brightness	Can be checked by measurement of light through a certified reference density strip (density of 3 or above), AS 2177 indicates that the luminance measurement shall be not less than 30 cd/m ² .
X-ray control panel	Initial and after repair	Statement of conformance of kV and mA readings from manufacturer is adequate. Where damage has occurred or inaccuracy is evident, rechecking is necessary.
Imaging Plates (for CR)	Before use	Checks for cleanliness, artifacts or signs of deterioration. If the image plate is deteriorated and cannot produce an acceptable Signal-to-Noise Ratio (SNR), it should be discarded and replaced.
Digital Detector Arrays (for DR)	Prior to use	Checks for bad pixels which could mask the image.
	Quarterly	Signal-to-Noise Ratio (SNR) consistency.
	Quarterly	Offset calibration to remove ghosting and image lag.

Viewing Monitors:	Initial and after repair	Statement of conformance for luminance, resolution, and greyscale. Where damage has occurred or inaccuracy is evident, rechecking is necessary
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Note: For further information regarding measurement of radiographic viewer brightness refer to NATA *Specific Accreditation Guidance: Infrastructure and Asset Integrity - Technical issues in NDT*.

7 Process requirements

7.2 Selection, verification and validation of methods

7.2.1 Selection and verification of methods

7.2.1.1 Procedures shall be followed which ensure satisfactory processing. As such, darkroom procedures are to be documented and include specific details of processing variables (e.g. strength and temperature of developer, time of development and amount of chemicals to be added). The bath temperature also needs to be monitored.

For CR/DR techniques, procedures shall be followed that detail the requirements for digital image acquisition and processing, including:

- some standards require a specific radiographic image quality level, which must be clearly defined in the procedure. For example, ISO 17636-2 specifies Class A as basic quality and Class B as improved quality;
- documented procedures for selecting exposure parameters (e.g. source type, kV, mAs);
- image quality requirements (minimum SNR_N value, minimum Sensitivity and SRB measurement);
- controls around the use of digital processing functions (e.g. filters, contrast adjustments);
- requirements for validating techniques, especially where they are not based on a published standard.

7.5 Technical records

7.5.1 Records for each job shall specifically include at least the following parameters to ensure that the test can be replicated, if necessary:

- source details;
- source-to-film distance;
- screen details;
- IQI details and sensitivity achieved;
- film type / image plate type;
- film density achieved / minimum SNR_N achieved;
- exposure details;
- processing details;

- detector type/model;
- pixel size;
- BSR (Basic Spatial Resolution);
- image processing parameters/filters used;
- Software and version used for acquisition and analysis.

Radiographs (film or digital) shall be retained for a minimum of four years. The method of storage should facilitate easy retrieval of radiographs. Adequate storage facilities shall be provided for unexposed and exposed film to prevent degradation.

Radiographic films remain the property of the facility as they are a primary test record. The testing service may lend the original radiographs to the customer, provided that:

- the testing service has rights of access to, and recall of, the radiographs;
- the customer agrees, in writing, to provide suitable storage facilities;
- the loan is recorded on the test report issued to the customer or other suitable record;
- acknowledgment of receipt of the radiographs and agreement to provide suitable storage facilities is forwarded to the facility by the customer (e.g. document transmittal form).

Where there are contractual arrangements that are not in accordance with the above requirements for retention of radiographs, it is the responsibility of the facility to advise NATA and to seek approval of any alternative arrangements.

7.7 Ensuring the validity of results

Checking the interpretation of radiographs (film or digital)

7.7.1 The extent of check viewing of radiographs required is dependent on the type of work being undertaken but must be sufficient to provide on-going evidence of a satisfactory radiographic viewing process.

Note: As a guide, assurance over the viewing process is unlikely to be achieved if the extent of check viewing is less than 2% for well controlled, repetitive work whilst for non-routine testing the extent may require to be greater than 20%, the percentage check viewed being dependent on the nature of the work.

Appendix B: Ultrasonic testing technical requirements

This Appendix provides additional interpretation of the application of ISO/IEC 17025 for ultrasonic testing, including conventional ultrasonic testing (UT), Phased Array Ultrasonic Testing (PAUT), and Time-of-Flight Diffraction (TOFD).

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

Scope of accreditation

Accreditation coverage for ultrasonic testing of welds on materials other than ferritic is considered to require specialist knowledge, skills, and equipment. In addition to the requirements for testing ferritic welds, facilities whose scope includes the testing of 'Welded joints - Stainless steel, austenitic and duplex materials', will be expected to demonstrate that they have procedures, equipment, technical knowledge and calibration materials suitable to produce acceptable results. The demonstration should involve testing of non-ferritic welds or, where this is not practicable, may be achieved by demonstration/discussion of examples of previous tests.

6 Resource requirements

6.4 Equipment

6.4.1 Ultrasonic equipment appropriate to each application shall be available.

The facility shall ensure that the range of probes, reference blocks (e.g. carbon steel, austenitic steel, aluminium), standards, etc. held by the facility covers the scope of accreditation.

Requirements for advanced UT equipment

Advanced ultrasonic testing equipment shall include but not limited to acquisition systems, transducers/probes, encoded scanning equipment and analysis software for the application of PAUT and TOFD. For such applications the facility shall ensure that:

- equipment used (e.g. phased array acquisition systems, scanners, encoders and TOFD acquisition systems) are appropriate for the scope of application;
- reference blocks or calibration blocks are suitable for the technique and comply with relevant standards (e.g. ISO 19675, ASME V, EN 583-2, ISO 16811);
- equipment is subject to regular performance checks that include key system parameters (e.g. vertical and horizontal linearity, focal law validation for PAUT, probe element functionality and performance, lateral/wedge delay for TOFD, and encoder accuracy for scanners);
- Software used for data acquisition and analysis is validated and version controlled. Any updates must be traceable and assessed for impact on inspection performance;
- operators are trained and certified in accordance with the applicable technique-specific certification scheme (e.g. ISO 9712 or equivalent).

6.4.10

Common equipment performance checks for conventional UT

The following equipment performance checks are provided as guidance. Any equipment requirements specified within the applicable product code and/or test standard are not affected by this guidance.

Item of equipment	Intervals	Procedures and comments
Standardisation & reference blocks	Prior to initial use	For standardisation blocks, a statement of compliance to AS 2083 or other applicable specification, supplied by the manufacturer is adequate. For standardisation blocks manufactured in-house, documented compliance with the relevant specification is required. For all blocks, dimensions shall be verified using appropriate measuring equipment. The measuring equipment to be used will be dependent on the accuracy specified.
	Periodic	Visual check on conditions.
Digital thickness meters	Part of job set-up (Before use/daily)	Job set-up requires checking at a range of thicknesses (e.g. AS 2083 block No. 7) and daily work records must identify the standardisation block used during set-up. Actual thickness readings for the set-up checks must be recorded periodically.
Ultrasonic units		
Must meet the requirements of test standards/methods used (see Note 1)		
horizontal linearity	As above (AS 2083 indicates 12 monthly checks), also see Note 2	Recorded as per AS 2083 or documented procedure.
vertical linearity	As above (AS 2083 indicates 12 monthly checks), also see Note 2	Recorded as per AS 2083 or documented procedure.

Item of equipment	Intervals	Procedures and comments
overall system gain	Prior to initial use, and after equipment repair	Recorded as per AS 2083 or documented procedure.
Probes Must meet the requirements of test standards/methods used (See Note 1)		
beam profile (where beam profile sizing methods are specified)	As above (AS 2083 indicates monthly checks if applicable)	Recorded as per AS 2083 or documented procedure.
resolution	As above (typically 3 monthly)	As required by relevant code (2.5 wavelengths is suitable where criteria are not specified).
probe index, beam angle and beam alignment	Part of job set-up (before use/daily)	Records not necessary unless specified in the procedure.
dead zone	Not applicable	Area of interest shall be outside dead zone.

Note 1: Where performance checking requirements are not specified in published standards/methods then manufacturer recommendations are to be taken into account by the facility when establishing their requirements for equipment checks.

Note 2: For digital flaw detectors, the period between successive linearity checks may be extended beyond these intervals if there is demonstrated history of stable linearity performance for these units.

Common equipment performance checks for PAUT and TOFD

The following equipment performance checks are provided as guidance. Any equipment requirements specified within the applicable product code and/or test standard are not affected by this guidance.

Item of equipment	Intervals	Procedures and comments
Phased Array UT instruments	Prior to use / 12-monthly	Verify focal law accuracy, wedge delay, probe integrity, and sectorial scan range and sensitivity levels. Record results. Use standardised test blocks (e.g. V1/PAC block).
TOFD instruments	Prior to use / 12-monthly	Verify lateral and depth calibration using known defect blocks. Scanner linearity and dead zone must be confirmed.
Scanners / Encoders	Prior to use and quarterly	Encoder accuracy shall be verified against known distances. Positional accuracy to be within specified tolerance (e.g. $\pm 1\%$).
Display/Analysis software	As updated or annually	Verify software revision. Confirm compatibility and performance consistency for flaw sizing and reporting.

7 Process requirements

7.5 Technical records

7.5.1 Records for each job shall specifically include at least the following parameters to ensure that the test can be replicated, if necessary:

- scanning sensitivity;
- evaluation sensitivity;
- surface preparation;
- scanning positions;
- sizing method;
- couplant type;
- scan plans and coverage (PAUT/TOFD);
- scan type (e.g. Sector scan, linear scan, TFM, PCI etc. for PAUT and parallel/non-parallel scan type for TOFD);
- wedge and probe parameters;
- scanner/encoder type and parameters;

- focal law parameters;
- scan datums;
- Software version and analysis method/settings.

Appendix C: Magnetic particle testing technical requirements

This Appendix provides additional interpretation of the application of ISO/IEC 17025 for magnetic particle testing.

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

6 Resource requirements

6.4 Equipment

6.4.10

Common equipment performance checks

The following equipment performance checks are provided as guidance. Any equipment requirements specified within the applicable product code and/or test standard are not affected by this guidance.

Item of equipment	Intervals	Procedures and comments
Magnetisation equipment		
To meet requirements of test methods used		
AC electromagnet (yoke)	As above - AS 1171: 6 monthly checks; Not specified in ISO 9934 but should be checked as per AS 1171	The test mass shall be initially verified as meeting the requirements of the test procedure. Lift test ≥ 4.5 kg at 75mm and 300mm pole space - using either test standard.
DC electromagnet (see Note 1)	As above - AS 1171: 6 monthly checks; Not specified in ISO 9934 but should be checked as per AS 1171	The test mass shall be initially verified as meeting the requirements of the test procedure. Lift test ≥ 18 kg (AS1171) at maximum pole spacing and where pole spacing is less than or equal to 75 mm, the magnet shall be capable of lifting ≥ 0.24 kg/mm pole spacing.
permanent magnet (see Note 1)	As above - AS 1171: monthly checks	As for DC electromagnets.

Item of equipment	Intervals	Procedures and comments
bench equipment	As above - AS 1171: 12 monthly checks	To meet test procedure requirements (for example, AS 1171).
White light meter	Not specified in AS 1171; ISO 9934 states to be carried out as per manufacturer requirements and in line with user QA system	May be checked in-house using a reference meter retained for this purpose only (see Note 2).
Black light	Weekly if in full time use, otherwise intervals to be sufficient to ensure achievement of light output requirements	To meet test requirements: Standards reference: 365nm, 10 W/m ² or 1000 mW/cm ² AS 1171: at a distance of 380mm ISO 9934 / ISO 3059: @surface
Black light meter	As per white light meter	As per white light meter

Note 1: For further information as to the applicability of DC magnetization (including the use of permanent magnets) refer to NATA *Specific Accreditation Guidance: Infrastructure and Asset Integrity - Technical issues in NDT*.

Note 2: Requirements for illumination conditions are indicative in the sense that a minimum threshold only is set; however, the influence of additional errors introduced by the use of transfer standards needs to be considered.

7 Process requirements

7.5 Technical records

7.5.1 Records for each job shall specifically include at least the following parameters to ensure that the test can be replicated, if necessary:

- surface condition of test specimen;
- test media type;
- current source;
- method of magnetisation
- method of surface preparation.

7.8 Reporting of results

7.8.1 General

7.8.1.2

Sensitivity

Surface coatings reduce the sensitivity of magnetic particle testing. In extreme cases, the reduction of sensitivity may completely negate the effectiveness of the test. For this reason, accreditation is not offered for magnetic particle testing over a surface coating (other than correctly applied white contrast coating). Any report for such testing must make clear that the work falls outside the scope of accreditation.

Appendix D: Penetrant testing technical requirements

This Appendix provides additional interpretation of the application of ISO/IEC 17025 for penetrant testing.

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

6 Resource requirements

6.4 Equipment

6.4.10

Common equipment performance checks

The following equipment performance checks are provided as guidance. Any equipment requirements specified within the applicable product code and/or test standard are not affected by this guidance.

Item of equipment	Intervals	Procedures and comments
White light meter	AS 2062: As recommended by manufacturer or intervals not exceeding 12 months (whichever is smaller); ISO 3452: At least once in 12 months; shall have calibration stickers affixed	May be checked in-house using a reference meter retained for this purpose only (see Note).
Black light	Weekly if in full time use, otherwise intervals to be sufficient to ensure achievement of light output	To meet test requirements: Standards reference: 365nm, 10 W/m ² or 1000 mW/cm ² AS 2062: at a distance of 380mm ISO 3452: @surface
Black light meter	As per white light meter	As per white light meter.

Note: Requirements for illumination conditions are indicative in the sense that a minimum threshold only is set; however, the influence of additional errors introduced by the use of transfer standards needs to be considered.

7 Process requirements

7.5 Technical records

7.5.1 Records for each job shall specifically include at least the following parameters to ensure that the test can be replicated, if necessary:

- test media type;
- method of surface preparation;
- contact time of penetrant;
- development time;
- emulsification time (where applicable).

Appendix E: Visual testing technical requirements

This appendix provides additional interpretation of the application of ISO/IEC 17025 for visual testing.

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

Scope of accreditation

Limited accreditation coverage for visual testing is offered as an adjunct to an overall NDT testing service to provide for the visual assessment of material characteristics of a test item while other non-destructive tests are being carried out on the item. Accordingly, the facility must hold accreditation for other NDT methods to be eligible for accreditation of visual testing under ISO/IEC 17025.

Note: In-service visual inspection of items as a stand-alone accreditation or of items which are painted or otherwise coated is offered only under NATA's Inspection Accreditation Program. Further information can be obtained from the Sector Manager, Inspection.

Visual testing is offered under ISO/IEC 17025 only where all aspects of the inspection:

- relate to characteristics or features of the material from which the inspected item has been fabricated and;
- are described within a written procedure that includes objective criteria for any acceptance/rejection decisions and does not involve any judgment requiring detailed knowledge relating to the type of item under test that is additional to what is defined in the relevant inspection procedure;
- meet any inspection code requirement for specific qualifications to be held by inspection personnel, for example, welding inspector qualifications.

Notes: Assessment of compliance with safety codes, regulatory labelling, the completeness of fittings, the integrity of coatings, adequacy of packaging for transport, for example, cannot be included under ISO/IEC 17025 as such inspections go beyond an assessment of the characteristics or features of the fabrication material.

Assessments relating to fitness-for-purpose or standards of workmanship typically require specific knowledge of the type of item being inspected, in which case they would not be permitted under ISO/IEC 17025. However, this may be acceptable where all aspects of the inspection are defined within the relevant testing procedure, and where limited to consideration of characteristics or features of the fabrication material. Visual testing of weld characteristics, for example, which may include dimensional checking of weld size, may be covered under ISO/IEC 17025 only to the extent that the testing procedure adequately defines all aspects of the testing.

Pre-service visual testing of welds shall be limited to the assessment of completed welds for compliance with published acceptance criteria. Visual testing under ISO/IEC 17025 shall not include assessment, or acceptance, of welding parameters or consumables.

Coverage for in-service visual testing is further limited to the specific service applications listed for the inspected items. This is because an in-service inspection procedure for an item in a particular environment may not be suitable for inspecting similar items in different in-service environments (different modes of material deterioration may need to be reflected in the inspection procedure, for example). Items which may be considered acceptable under ISO/IEC 17025 visual testing could include examination for the detection of in-service flaws such as cracks, mechanical damage or corrosion. However, classification of the type, or origin, of such flaws would not, generally, be covered under the scope of accreditation. Furthermore, investigative testing such as failure analysis would not be covered by ISO/IEC 17025.

6 Resource requirements

6.2 Personnel

6.2.5 Evidence of specific training in each applicable testing procedure must be available for any personnel authorised to conduct visual testing. If the applicable standard specifies a particular qualification, certification or minimum experience, then the testers shall satisfy these requirements except where they have explicit documented agreement from their client.

6.4 Equipment

6.4.4 Visual testing equipment (which may include rulers, tape measures, straight edges, welding gauges, pit gauges, templates and other items) shall be checked for serviceability before being placed in service. Periodic checks (at least annually) for damage, wear and legibility of markings and labels shall also be undertaken.

Records of initial conformance certificate (especially for weld gauges) and periodic verification shall be maintained and available for assessment.

Lighting conditions during visual testing must be in accordance with the requirements of the applicable standard (e.g. AS 3978). An appropriate light source providing an adequate intensity and direction of illumination shall be available for poorly lit areas.

7 Process requirements

7.5 Technical records

7.5.1 Records for each job shall specifically include at least the following parameters to ensure that the test can be replicated, if necessary:

- nature of the testing;
- conditions at time of testing including lighting, access limitations (e.g. component location, component geometry) and surface condition.
- If the applicable standard specifies minimum light intensity, then measurements of the lighting conditions shall be recorded in the test record sheet.

7.8 Reporting

7.8.1 General

7.8.1.2 Many items requiring visual testing are constructed from various components (for example a tank is typically constructed from several rolled sections joined by welds). In order to avoid any inference that an assessment has been made of the integrity of the combination of these components, an NDT report may report the material condition for each individual component (for example, specific welds and/or rolled sections) but not an assessment statement pertaining to the overall item. This would similarly apply to an item of plant machinery made up of various cast/rolled/forged components joined by fasteners and/or welds.

Appendix F: Electromagnetic testing technical requirements

This appendix provides additional interpretation of the application of ISO/IEC 17025 for electromagnetic testing.

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

6 Resource requirements

6.2 Personnel

6.2.5 Competency records for technicians carrying out coating thickness measurement are expected to include evidence of competency in the relevant test methods, equipment operation, recording and reporting requirements.

Specific training, certification and competency records (where applicable) in the advanced technique being used (e.g. eddy current array) is required. Competency must be demonstrated in developing setup files and analysing complex data sets.

6.4 Equipment

6.4.1 The range of instruments, probes and reference blocks/items held by the facility shall cover the scope of accreditation. Reference blocks/items shall have similar characteristics to the material under test.

A list of all reference blocks/items, including verification of notches or defects, metal composition, heat treatment etc. shall be maintained.

Conductivity standards shall have a certificate verifying their conductivity value.

When testing welds through conductive coatings, calibration blocks shall be available which have coatings with the same chemical composition, application process and thickness as the specimen under test.

6.4.10

Common equipment performance checks

The following equipment performance checks are provided as guidance. Any equipment requirements specified within the applicable product code and/or test standard are not affected by this guidance.

Item of equipment	Intervals	Procedures and comments
Standardisation/ reference items	Prior to initial use	For items manufactured in-house, compliance with the relevant specification must be established and documented. For all items, dimensions including slots, notches or other features shall be verified using appropriate measuring equipment. Material type (using a recognised classification system) is to be recorded.
	Periodic	Visual check of condition for wear and damage.
Conductivity Standards	Prior to initial use	Conductivity to be verified where required for compliance with Standards for conductivity testing
	During service	Where there is a possibility that conductivity may have changed due to environmental condition (e.g. elevated temperature) conductivity will need to be re-verified.
Test equipment	Initial and periodic (typically annual)	<p>Check equipment startup routine (if applicable).</p> <p>Check that limits of all controls are as per manufacturer's instructions.</p> <p>Check and record response using the standardization/reference item, which can be used as a datum for subsequent performance checks.</p> <p>Check gain linearity (eddy current phase analysis instruments only).</p>
	Before and during use	Standardise the equipment prior to use and check at periodic intervals throughout the test. Perform battery condition checks and sensitivity checks at suitable intervals and at the completion of the test.

Item of equipment	Intervals	Procedures and comments
Eddy current probes	Before use	Visual inspection of condition of the contact area of the sensing coil, leads and connectors. Check that the probe response using the inspection reference item satisfies the inspection procedure requirements.
Alternating Current Field Measurement (ACFM)	Before use	Function test
Eddy current array probes	Before use	

7 Process requirements

7.2 Selection, verification and validation of methods

7.2.1 Selection and verification of methods

7.2.1.1 Specific procedures or work instructions shall be available for eddy current testing of welds through conductive coatings. The procedure shall contain:

- details of conductive coating type(s) and maximum thickness(es);
- details of calibration blocks to be used;
- details of the method for measuring the thickness of conductive coatings on both the weld and calibration block.

Note: Standard methods using absolute/pencil probes used for measuring non-conductive coatings are not suitable for conductive coating thickness measurement.

7.5 Technical records

7.5.1 Records for each job shall specifically include at least the following parameters to ensure that the test can be replicated, if necessary:

- equipment settings (e.g. frequency, dB, filters, mixing);
- sensitivity setting (e.g. reference defect type/size);
- scanning pattern and scanning speed;
- surface condition of the test item;
- detailed instrument setup files and software configuration parameters;
- full details of the probe used (e.g. model, serial number, array configuration);
- data from calibration checks;
- Software version and settings used.

Appendix G: NDT work sites

Introduction

This Appendix details the types of testing that may be conducted away from a base site, and the procedures for establishment, notification and assessment of such testing.

Base site

The base site is the 'parent' facility that maintains technical control over work sites, including overall control of the management system and supervision of personnel.

Types of off-site work

The following table lists typical arrangements for work conducted by an NDT facility at off-site work locations. Two defined work site types (routine and major construction work site) require notification to NATA.

	Jobbing	Routine	Major construction
Examples	<ul style="list-style-type: none"> Fabrication / welding workshop In-service NDT 	Refinery maintenance contract	<ul style="list-style-type: none"> LNG site Offshore pipeline construction Mineral processing plant
Notification required?	No	Yes	Yes
Contractual arrangements	Ad hoc	Contract	Contract
Duration of work	May be open or defined	May be open or defined	Defined
Residence of personnel	Usually close to the base site, with mobilisation to work from base site.	FIFO or close to site. Mobilisation is usually direct to the work site.	FIFO or close to site. Mobilisation is usually direct to the work site.
Level 3 personnel	Not on site	Not necessarily on site	Not necessarily on site
Provision of technical control	Base site	Local personnel	Local personnel
Coordination of work	Base site	Site supervisor or equivalent	Site supervisor or equivalent
Operational control	Base site	Site supervisor or equivalent	Site supervisor or equivalent
Test reports	Issued by base site	Issued locally	Issued locally

	Jobbing	Routine	Major construction
Equipment	Brought to site	Some fixed equipment, e.g. exposure bay, dark room, etc. Portable equipment resides on site.	Some fixed equipment, e.g. exposure bay, dark room, etc. Portable equipment resides on site.
Work site listed in scope of accreditation?	No	Yes	Yes
NATA assessment	Covered at assessment of base site	More time at assessment of base site (half day or full day). Possible in-person or remote assessment.	In-person assessment, separate from the assessment of the base site.

Jobbing

‘Jobbing’ or ad hoc work is defined as a series of individual jobs where the work is performed on a call-out basis following separate work requests. Allocation of work requests, invoicing, test records, and reporting is coordinated and controlled by the base site.

Jobbing work is conducted by personnel normally located at the base site. Where jobbing personnel reside at some distance from the base site, they still must be made available during the assessment of the base site. All jobbing personnel must be adequately and directly controlled by the base site.

Jobbing work does not require specific consideration in terms of a defined work site. The *NATA Accreditation Criteria* applying to base sites are considered to adequately address such situations.

Exceptions

A site will not be classified as a defined work site under the following conditions:

- if coordination of work is for more than one project or location; or,
- if there is significant local control over crucial testing activities; or,
- if local practices limit NATA's ability to assess the effectiveness of technical oversight based solely on evaluations of the primary facility.

In general, a site to which either of the above points applies requires either branch site accreditation (as outlined in *General Accreditation Criteria: Accreditation of new branch sites*) or independent accreditation for work performed under its control.

Establishment and notification of work sites

Prior to the commencement of testing, and as soon as possible after the facility has decided to establish a work site, the facility must submit the notification form (*NDT Work Site Advice Form*) and associated supporting documentation to NATA. The received form will be evaluated by NATA and written acknowledgement of the establishment of the work site will be forwarded to the Authorised Representative.

Details of the approved work site will be publicly listed on the scope of accreditation for the base site.

When a work site ceases operation, the Authorised Representative is required to notify NATA within two weeks of closure.

Assessment of the base site

At the assessment of a base site, NATA will evaluate the facility's capability to establish and maintain work sites.

Records associated with work sites (either in operation or finished operations since the last assessment) may be reviewed. If NATA considers that additional assessment time is needed to review such records at the base site, then the facility will be notified of this in advance. Any additional assessment time will be chargeable as per the NATA Fee Schedule.

The assessment program will be reviewed following each assessment of the base site. The assessment program for the base site (including any associated work sites) will consider the range of activities undertaken, as well as the following factors:

- location and staffing arrangements;
- frequency of establishment of work sites;
- expected maximum staff numbers and the level of on-site supervision for work sites;
- satisfactory outcomes from NATA assessments of work sites conducted within the last 18 months, as determined by the following:
 - no reports have been needed to be withdrawn due to technical issues involving a work site;
 - no findings have been raised which reflect:
 - inadequate supervision;
 - deficiencies in regard to staff competency;
 - loss of control over equipment assurance activities;
 - loss of control over quality assurance activities.

Assessment of work sites

Major construction work sites

If NATA determines that an on-site visit is required, it is intended that this be undertaken as early as practicable in the course of each project. Such a chargeable assessment will generally be conducted within 2 to 6 months of the commencement of testing.

On-site project visits will be arranged through the NDT facility unless difficulties are cited in obtaining permission to access the site in a timely manner, in which case NATA may seek assistance from the site operator and/or asset owner.

If any nonconformities raised at the assessment are of a systemic nature, they must also be addressed at all other existing work sites under the control of the base site (if relevant, also at the base site itself).

Routine work sites

The assessment of these sites may be covered during the routine assessment of the base site, and additional time will be required (potentially a full day). Alternatively, NATA may conduct separate in-person or remote assessments of such sites. All additional time will be chargeable as per the NATA Fee Schedule.

Procedures covering work sites

The base site must have documented procedures that specifically outline technical control of work sites.

The management system of the base site shall include the following:

- 'setting up' and 'closing down' procedures for work sites;
- detailed contract review arrangements prior to acceptance of the work and development of a quality assurance plan for each work site;
- issuing and control of reports, including preliminary reports and the identification of the base site responsible for carrying out the testing;
- how the required level of technical control by the base site for the work site is established and allocated;
- how on-site audit and quality assurance activity requirements are established and delivered;
- availability and/or movement of equipment;
- records pertaining to equipment stored at the work site which is not currently in-use;
- verification of equipment performance and calibrations including any specialised requirements.

Work sites can only conduct tests for which the base site holds accreditation.

Additional visits and suspension options

Failure to comply with the requirements of this Appendix and/or the NATA Accreditation Criteria (e.g. evident lack of supervision or technical control of a work site) may result in a recommendation for a chargeable follow-up assessment or suspension of accreditation for the work site(s).

Depending on the quantity and severity of nonconformities raised by the NATA assessment team, facilities may be required to withdraw test reports issued by work sites.

Significant systemic nonconformities may result in suspending the accreditation of the base site, which includes suspending the accreditation status of all existing work sites.

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.

Standards

AS 1171	Non-destructive testing – Magnetic particle testing of ferromagnetic products, components and structures
AS 2083	Calibration blocks and their methods of use in ultrasonic testing
AS 2177	Non-destructive testing – Radiography of welded butt joints in metal
AS 2207	Non-destructive testing – Ultrasonic testing of fusion welded joints in carbon and low alloy steel
AS 3978	Non-destructive testing – Visual inspection of metal products and components
AS 4635	Non-destructive testing – Qualification of personnel for limited applications of non-destructive testing
AS ISO 20807	Non-destructive testing – Qualification of personnel for limited applications of non-destructive testing
AS/NZS 2885.2	Pipelines - Gas and liquid petroleum, Part 2: Welding
ASME V	Boiler and Presser Vessel Code BPVC Section V – Nondestructive Examination
EN 583-2	Non-destructive testing – Ultrasonic examination – Sensitivity and range setting
ISO 3059	Non-destructive testing – Penetrant testing and magnetic particle testing – Viewing conditions
ISO 3452	Non-destructive testing – Penetrant testing
ISO 9712	Non-destructive testing – Qualification and certification of personnel
ISO 9934	Non-destructive testing – Magnetic particle testing
ISO 16811	Non-destructive testing – Ultrasonic testing – Sensitivity and range setting
ISO 17636-2	Non-destructive testing of welds – Radiographic testing. Part 2: X- and gamma-ray techniques with digital detectors
ISO 19675	Non-destructive testing – Ultrasonic testing – Specification for a calibration block for phased array testing (PAUT)
ISO/IEC 17025	General requirements for the competence of testing and calibration laboratories

NATA publications

NATA Accreditation Criteria (NAC) package for Infrastructure and Asset Integrity

General Accreditation Criteria Accreditation of New Branch Sites

General Accreditation Criteria Use of the NATA emblem, NATA endorsement
and references to accreditation

Specific Accreditation Guidance Infrastructure and Asset Integrity, Technical
Issues in NDT

Other references

ASNT Recommended Practice, No. SNT-TC-1A

Amendment Table

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

Section or Clause	Amendment
Whole document	Editorial and minor text changes throughout the document to improve readability and clarity.
5.5	<p>Explicitly stated that a facility shall have Level 3 coverage with reference to <i>Acceptable certification for Level 3 activities</i> (Clause 6.2.2).</p> <p>Upgraded from an expectation to a requirement that Level 3 personnel must hold independent endorsement for advanced ultrasonic techniques (PAUT and TOFD) and advanced radiographic techniques (CR/DR), equivalent to ISO 9712 Level 2 or higher.</p>
6.2.2	<p>Updated details regarding certifications that may be considered acceptable alternatives to ISO 9712.</p> <p>Added clarification on training requirements for methods or techniques not covered by ISO 9712 certification, and where technicians providing on-site assistance with data acquisition for off-site evaluation (real time or subsequent review).</p>
6.2.6	Included information on approving testing personnel for specific test standards to ensure awareness of possible variations across different standards.
6.4.4	Included guidance regarding expired NDT consumables.
7.7.1	Clarified requirements for ongoing competency assessments (in-house or external) and for competency assessments outside standard test methods.
7.7.2	Updated requirement to complete external competency assessment prior to initial accreditation
Appendix A: Radiographic testing technical requirements	
6.4.10	Updated equipment performance checks to include the advanced techniques CR and DR.
7.2.1.1	Updated requirements for procedures for CR/DR techniques.
7.5.1	Updated requirements for the content of technical records related to CR/DR techniques.

Appendix B: Ultrasonic testing technical requirements	
Scope of accreditation	Added clarification on the scope and requirements for testing non-ferritic welds (e.g. stainless steel and duplex alloys).
6.4.10	Updated equipment requirements and equipment performance checks included for the advanced ultrasonics techniques PAUT and TOFD.
7.5.1	Updated requirements for the content of technical records related to PAUT and TOFD.
Appendix C: Magnetic particle testing technical requirements	
6.4.10	Added information regarding performance checks.
Appendix D: Penetrant testing technical requirements	
6.4.10	Added information regarding performance checks.
Appendix E: Visual testing technical requirements	
Scope of accreditation	Added clarification regarding limitations of pre-service and in-service visual testing accredited under ISO/IEC 17025.
6.2.5	Added information regarding personnel training conducting visual testing.
6.4.4	Added requirements regarding equipment checks.
7.5.1	Additional requirement to record lighting conditions if specified in the test standard.
Appendix F: Electromagnetic testing technical requirements	
6.2.5	Added requirements regarding training certification and competency when performing advanced methods.
6.4.1	Added information when testing through conductive coatings is performed.
6.4.10	Updated equipment performance checks for advanced techniques.
7.2	Requirements added regarding procedures for eddy current testing of welds through conductive coatings.
7.5.1	Updated requirements for the content of technical records.

Appendix G: NDT work sites

- Comprehensive editorial revisions to improve clarity and readability.
- Redefined criteria for types of off-site work (jobbing, routine, and major construction), including a comparison table with typical characteristics for each category and the notification requirements to NATA.
- Work sites (routine and major construction) will be visible on the scope of accreditation for the base site.