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HOKLAS Supplementary Criteria No. 15

Construction Materials Test Category – Accreditation of Non-destructive Tests of Metallic Materials and Welds

0 Introduction

(a) This document serves to clarify and supplement the requirements of ISO/IEC 17025:2017 and HKAS Policy Document No. 1 for accreditation of laboratories performing non-destructive tests (NDT) of metallic materials and welds under the test category of ‘Construction Materials’. It shall be read in conjunction with the current issue of ISO/IEC 17025:2017 and other relevant accreditation criteria documents. The following sections set out specific technical criteria for NDT which include, but not limited to, the following methods:

- Liquid Penetrant Testing (PT)
- Magnetic Particle Testing (MT)
- Radiographic Testing (RT)
- Ultrasonic Testing (UT)
- Visual Examination (VE)

(b) In addition to the requirements stipulated in this document, an accredited laboratory shall comply with all specific requirements of the relevant test standards.

1 Scope

(No additional explanation)

2 Normative references

(No additional explanation)

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3 Terms and definitions

(No additional explanation)

4 General requirements

(No additional explanation)

5 Structural requirements

(No additional explanation)

6 Resource requirements

6.1 General

(No additional explanation)

6.2 Personnel

6.2.1 An approved signatory with overall responsibility for the operation of the accredited laboratories on NDT methods shall fulfil the necessary competence requirements and have the technical knowledge to ensure that the test is performed in accordance with test method(s), and HKAS requirements are met. A person holding a valid certificate of Level 3 in applicable NDT method(s) issued under a recognized certification scheme (e.g. PCN Level 3, ASNT Level 3 or equivalent) by an accredited personnel certification body operating personnel certification system in accordance with international standard (e.g. BS EN ISO 9712 or equivalent), and having at least 4 years of experience in managing a quality management system satisfies these requirements for MT, PT, RT and UT. A person certified to at least the Certified Welding Inspector of the American Welding Society (AWS), the Welding Inspector of The Welding Institute's Certification Scheme for Welding and Inspection Personnel (TWI's CSWIP), or equivalent and having at least 4 years of experience in managing a quality management system satisfies these requirements for VE.

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- 6.2.2 An approved signatory holding a valid certificate as mentioned in Clause 6.2.1 above shall successfully passed the relevant practical examination in applicable NDT method(s). Otherwise, an approved signatory shall meet the relevant qualifications of testing operators in Clause 6.2.4 below as evidenced by (past) evidence(s) of his/her practical qualification(s) in applicable NDT method(s).
- 6.2.3 Testing operators shall normally be supervised by a suitably qualified supervisor having the necessary qualifications, experience and technical knowledge. The qualified supervisor shall meet the relevant qualifications in Clauses 6.2.1 and 6.2.2 above. The number of qualified supervisors shall be at least one for laboratories employing less than 20 testing operators. The number of supervisors shall be at least two for laboratories employing in the range of 20 and 38 testing operators. In other words, the ratio of supervisor to testing operators shall be 1 to 19.
- 6.2.4 Testing operators shall have the necessary qualifications, experience and technical knowledge. A person holding a valid certificate of Level 2 in applicable NDT method(s) issued under a recognized certification scheme (e.g. PCN Level 2, ACCP Level 2 or equivalent) by an accredited personnel certification body operating personnel certification system in accordance with international standard (e.g. BS EN ISO 9712 or equivalent) satisfies these requirements for MT, PT, RT and UT. A person certified to at least the Certified Associate Welding Inspector of the AWS, the Visual Welding Inspector of TWI's CSWIP, or equivalent satisfies these requirements for VE. Each laboratory shall evaluate the technical competence of its test operators for NDT of metallic materials and/or welds and keep a list of qualified operators for NDT of metallic materials and/or welds who are permitted to perform the test(s) and sign the worksheets. Record of assessing the competence of the qualified operator(s) shall be kept and ready for examination during each HKAS assessment or upon request by HKAS. (Note: SNT-TC-1A Level 2 will not be accepted as the qualification for qualified operators after 1.1.2005).
- 6.2.5 Laboratories are required to demonstrate that all personnel hold appropriate personnel certificate(s) and have received training in accordance with a

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documented programme, and that they possess a current certificate demonstrating their competence. Up-to-date records of all staff qualifications and training, clearly indicating whether a staff member can interpret the results in addition to carrying out examinations, shall be maintained by the laboratory. The records shall also indicate which members are considered competent to approve procedures, techniques and method sheets.

6.3 Facilities and environmental conditions

(No additional explanation)

6.4 Equipment

(No additional explanation)

6.5 Metrological traceability

6.5.1 Where a laboratory has the necessary reference standard or reference material, suitably controlled environment and competent staff, it may perform in-house calibration/verification for its working equipment. Documented internal calibration/verification procedures shall be ready for examination during each HKAS assessment visit. HKAS Executive may require the laboratory to provide the calibration/verification procedures in the briefing notes to the assessment team.

6.6 Externally provided products and services

(No additional explanation)

7 Process requirements

7.1 Review of requests, tenders and contracts

(No additional explanation)

7.2 Selection, verification and validation methods

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(No additional explanation)

7.3 Sampling

(No additional explanation)

7.4 Handling of test or calibration items

7.4.1 Items to be tested shall be identified throughout the examination process and records on the traceability of test results shall be kept. Identification shall be such that the areas specifically examined (e.g. welded seams), can be identified against the corresponding test results.

7.4.2 The method of identification shall not damage the item in question, e.g. halogen free markers may be needed for some components.

7.4.3 Methods for the identification and location of reportable defects and, where appropriate, for segregation of defective components shall be clearly defined.

7.5 Technical records

7.5.1 Before conducting NDT of welds, a laboratory shall obtain evidences from its customers or confirm with its customers that the requirements on delay/holding time are met. Such evidences/confirmation records shall be kept properly and ready for examination during HKAS assessments or upon request by HKAS. Without those records, the test is NOT classified as an accredited test under HOKLAS and the test results shall NOT be reported in an endorsed test report.

7.6 Evaluation of measurement uncertainty

(No additional explanation)

7.7 Ensuring the validity of results

7.7.1 An applicant or accredited laboratory shall conform to the proficiency testing requirements as stipulated in HOKLAS SC-33.

7.7.2 NDT of metallic materials and welds is considered as a test area for the

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purpose of determining the proficiency testing activities required by HOKLAS SC-33.

7.8 Reporting of results

(No additional explanation)

7.9 Complaints

(No additional explanation)

7.10 Nonconforming work

(No additional explanation)

7.11 Control of data and information management

(No additional explanation)

8 Management system requirements

(No additional explanation)

Appendix A

SPECIFIC CALIBRATION / VERIFICATION REQUIREMENTS

This appendix lists the specific calibration/verification requirements for equipment of NDT for metallic materials and welds.

Type of equipment	Recommended maximum period between successive calibrations/verification	Recommended calibration/verification procedure or guidance documents and equipment requirements
Ultrasonic Test		
Probe and sensory electronics (setting up the assembly)	Each time before use	Reference standard calibration blocks or calibration blocks
Reference standard calibration blocks (eg. V1/A2, IOW, V2/A4, Step Wedge & A7 blocks) (Material properties)	Initial	Conformance to a relevant standard, or evidenced by a reputable manufacturer's certificate
Reference standard calibration blocks (eg. V1/A2, IOW, V2/A4, Step Wedge & A7 blocks) (Surface conditions)	Each time before use	Visual examination for deterioration such as corrosion or mechanical damage
Reference standard calibration blocks (Radius and other Dimensional checks)	8 years	By a 'competent calibration body' as defined in Clause 2.1 of HOKLAS SC-02
Calibration blocks (For use on site, eg. V2/A4 block)	Initial	By a 'competent calibration body' as defined in Clause 2.1 of HOKLAS SC-02
	1 year	Check dimensions against appropriate reference standard calibration blocks
Specific calibration blocks (Material properties eg. DAC block)	Initial	Manufacturer's materials certificate
Specific calibration blocks (Surface conditions, eg. DAC block)	Each time before use	Visual examination for deterioration such as corrosion or mechanical damage
Specific calibration blocks (Dimensions, eg. DAC block)	1 year	Check dimensions using calibrated measuring devices
Ultrasonic test sets (testing units, probes and connecting cables)		

Type of equipment	Recommended maximum period between successive calibrations/verification	Recommended calibration/verification procedure or guidance documents and equipment requirements
(a) visual check for damage	Each time before use	Visual examination of all units and associated equipment.
(b) linearity of time base	Each time before use	Calibration blocks with conformance to a relevant standard
(c) linearity of equipment gain	Each time before use	Calibration blocks with conformance to a relevant standard
Ultrasonic probes (Performance characteristic)		
(a) probe index	Each time before use	Calibration blocks with conformance to a relevant standard
(b) probe beam angle	Each time before use	Calibration blocks with conformance to a relevant standard
(c) probe beam alignment (squint)	Each time before use	Calibration blocks with conformance to a relevant standard
(d) transfer correction	Each time before use	Calibration blocks with conformance to a relevant standard
(e) sensitivity and signal to noise ratio	Monthly	Calibration blocks with conformance to a relevant standard
(f) probe beam profile	Monthly	Calibration blocks with conformance to a relevant standard
(g) overall system gain	Monthly	Calibration blocks with conformance to a relevant standard
Ultrasonic flaw detectors	2 years	By a 'competent calibration body' as defined in Clause 2.1 of HOKLAS SC-02

Type of equipment	Recommended maximum period between successive calibrations/verification	Recommended calibration/verification procedure or guidance documents and equipment requirements
Magnetic Particle Test		
Solids content of magnetic inks	Each batch	Manufacturer's certificate with conformance to a standard (e.g. BS, ASTM or EN)
	A representative sample from each batch	Check the solid contents in accordance with a relevant standard
Fluorescent inks and powders (check light illumination at inspection surface)	Each time before test	Check the intensity of UV(A) light using a UV(A) light meter with conformance to a relevant standard
Fluorescent inks and powders (check ambient white light level at inspection surface)	Each time before test	Check the ambient white light level using a white light meter with conformance to a relevant standard
Non-fluorescent inks and powders (check light illumination at inspection surface)	Each time before test	Check the intensity of illumination using a white light meter with conformance to a relevant standard
UV(A) light meter (reference)	1 year	By a 'competent calibration body' as defined in Clause 2.1 of HOKLAS SC-02
UV(A) light meter (working)	1 month	Check against a reference meter
White light meter (reference)	1 year	By a 'competent calibration body' as defined in Clause 2.1 of HOKLAS SC-02
White light meter (working)	1 month	Check against a reference meter
Permanent magnets and magnetic yokes	Each time before test	Check by measuring the lifting power or pull-off force in accordance with a relevant standard
Weights (for checking strength of magnets)	2 years	Calibrate by means of a suitable balance.
Flux direction	Each time before test	Using a flux indicator to check the direction of flux according

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Type of equipment	Recommended maximum period between successive calibrations/verification	Recommended calibration/verification procedure or guidance documents and equipment requirements
		to a relevant standard
Flux indicator	Initial	A certificate from a reputable manufacturer
Sensitivity of the indications of a magnetic ink	3 months	Using appropriate test pieces in accordance with a relevant standard

Type of equipment	Recommended maximum period between successive calibrations/verification	Recommended calibration/verification procedure or guidance documents and equipment requirements
Liquid Penetrant Test		
Liquid penetrant	Each batch	Manufacturer's certificate with conformance to a relevant standard
Fluorescent penetrant (check light illumination at inspection surface)	Each time before test	Check the intensity of UV(A) light using a UV(A) light meter with conformance to a relevant standard
Fluorescent penetrant (check ambient white light level at inspection surface)	Each time before test	Check the ambient white light level using a white light meter with conformance to a relevant standard
Non-fluorescent (i.e. colour contrast) penetrant (check light illumination at inspection surface)	Each time before test	Check the intensity of illumination using a white light meter with conformance to a relevant standard
UV(A) light meter (reference)	1 year	By a 'competent calibration body' as defined in Clause 2.1 of HOKLAS SC-02
UV(A) light meter (working)	1 month	Check against a reference meter
White light meter (reference)	1 year	By a 'competent calibration body' as defined in Clause 2.1 of HOKLAS SC-02
White light meter (working)	1 month	Check against a reference meter

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Type of equipment	Recommended maximum period between successive calibrations/verification	Recommended calibration/verification procedure or guidance documents and equipment requirements
Radiographic Test		
X-ray equipment	1 year	Check focal spot size in accordance with a relevant standard
Pinhole plate (if required in a standard) (for checking focal spot size)	10 years	By a 'competent calibration body' as defined in Clause 2.1 of HOKLAS SC-02
Penumbra (if required in a standard) (Geometrical unsharpness)	Each time before test	Check focus-to-film distance with a relevant standard
Isotope	Initial	Manufacturer's certification and accompanied by a decay chart and official record of dimensions
Gamma ray exposure calculator	Initial	Manufacturer's certificate or using appropriate checking methods
Radiograph (Each batch)	Initial	Check the fogged density on a non-exposed sample taken from a batch
Image Quality Indicator (IQI)	Initial	Manufacturer's certificate with conformance to relevant standards
Radiographic film (Classification and use)	Initial	Classify in accordance with a relevant standard and use it on a rotational basis
Radiographic film (Processing)	Each time after use	Process the film in accordance with recommendations by the film manufacturer
Radiographs (After processing)	Each time before interpretation	Check the density using densitometers or film density strips and verify the quality of image using IQI
Densitometer	1 month	Calibrate against a reference density strip

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Type of equipment	Recommended maximum period between successive calibrations/verification	Recommended calibration/verification procedure or guidance documents and equipment requirements
Film density strip (Reference)	5 years	A certificate from a reputable manufacturer
Radiograph survey meter	1 year	By a laboratory recognized by the Radiation Board