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HOKLAS Supplementary Criteria No. 15

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

1 INTRODUCTION

1.1 This criteria document serves to clarify and supplement the requirements of ISO/IEC 17025 for the accreditation of non-destructive tests (NDT) of metallic materials and welds under the test category of Construction Materials. This criteria document shall be read in conjunction with ISO/IEC 17025, HKAS Policy Document No. 1 and relevant HKAS and HOKLAS criteria documents. The following sections set out specific technical criteria for the non-destructive tests 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)

1.2 Laboratories shall also comply with the requirements of applicable test standards in addition to the requirements specified in this document.

2 PERSONNEL

2.1 An **approved signatory** with overall responsibility for the operation of the accredited laboratories on NDT methods shall fulfil the necessary competence requirements (e.g. education, qualification, training, technical knowledge, skills and experience) 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

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of Level 3 in applicable NDT method(s) issued under a recognized certification scheme (e.g. PCN Level 3, ASNT Level 3 or equivalent), or by an accredited personnel certification body or its corresponding authorised qualification body(ies) 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 the Certified Welding Inspector of the American Welding Society, the Welding Inspector of The Welding Institute's Certification Scheme for Welding and Inspection Personnel, or equivalent and having at least 4 years of experience in managing a quality and management system satisfies these requirements for VE.

2.2 Testing operators shall normally be supervised by a suitably **qualified supervisor** having the necessary qualifications, experience and technical knowledge. A person holding a valid certificate of Level 3 in applicable NDT method(s) issued under a recognized certification scheme, or by an accredited personnel certification body or its corresponding authorised qualification body(ies) 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 holding appropriate valid certified welding inspector certification under a recognized certification scheme satisfies these requirements for VE. 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.

2.3 **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), or by an accredited personnel certification body or its corresponding authorised qualification body(ies) 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 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 non-destructive tests of metallic materials and/or welds and keeps a list of qualified operators for

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non-destructive tests 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 approved operators after 1.1.2005).

- 2.4 Laboratories are required to demonstrate that all personnel hold appropriate personnel certificate(s) and have received training in accordance with a 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.
- 2.5 For each NDT method (e.g. MT, PT, RT, UT and VE) used by the laboratory, staff member qualifications to the appropriate level shall be demonstrated by a valid certificate issued under a recognized certification scheme, or by an accredited personnel certification body or its corresponding authorised qualification body(ies) operating personnel certification system in accordance with international standard (e.g. BS EN ISO 9712 or equivalent).

3 EQUIPMENT AND METROLOGICAL TRACEABILITY

- 3.1 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.

4 HANDLING OF TEST ITEMS AND TECHNICAL RECORDS

- 4.1 Items to be tested shall be identified throughout the examination process and records

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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.

- 4.2 The method of identification shall not damage the item in question, e.g. halogen free markers may be needed for some components.
- 4.3 Methods for the identification and location of reportable defects and, where appropriate, for segregation of defective components shall be clearly defined.
- 4.4 The status of the test item, (e.g. accepted, rejected, tested, not tested) shall be clearly indicated at all times.

5 ENSURING THE VALIDITY OF RESULTS

- 5.1 An applicant or accredited laboratory shall conform to the proficiency testing requirements as stipulated in HOKLAS SC-33.
- 5.2 As far as the minimum proficiency testing requirements are concerned, non-destructive tests for metallic materials and weld are considered as a test area.

Appendix A

SPECIFIC CALIBRATION / VERIFICATION REQUIREMENTS

This appendix lists the specific calibration/verification requirements for equipment of non-destructive tests for metallic material and weld.

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 EN 27963 or BS 2704 or equivalent, 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 to BS 2704, EN 27963 or equivalent.
(c) linearity of equipment gain	Each time before use	Calibration blocks to BS 2704, EN 27963 or equivalent.
Ultrasonic probes (Performance characteristic)		
(a) probe index	Each time before use	Calibration blocks to BS 2704, EN 27963 or equivalent.
(b) probe beam angle	Each time before use	Calibration blocks to BS 2704, EN 27963 or equivalent.
(c) probe beam alignment (squint)	Each time before use	Calibration blocks to BS 2704, EN 27963 or equivalent.
(d) transfer correction	Each time before use	Calibration blocks to BS 2704, BS EN 583-2 or equivalent.
(e) sensitivity and signal to noise ratio	Monthly	Calibration blocks to BS 2704, EN 27963 or equivalent.
(f) probe beam profile	Monthly	Calibration blocks to BS 2704 or equivalent.
(g) overall system gain	Monthly	Calibration blocks to BS 2704, EN 27963 or equivalent.
Ultrasonic flaw detectors	2 years	By a 'competent calibration body' as defined in Clause 2.1 of HOKLAS SC-02 to BS4331 or equivalent

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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 (at the test surface)	Each time before test	Check intensity of UV(A) light using a UV(A) light meter with conformance to a relevant standard
Fluorescent inks and powders (ambient white light level)	Each time before test	Check the ambient white light level using a white light meter
Non-fluorescent inks and powders (at the inspection surface)	Each time before test	Check the level of illumination using a white light meter
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 to a relevant standard
Flux indicator	Initial	A certificate from a reputable

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Type of equipment	Recommended maximum period between successive calibrations/verification	Recommended calibration/verification procedure or guidance documents and equipment requirements
Sensitivity of the indications of a magnetic ink	3 months	<p>manufacturer</p> <p>Using appropriate test pieces in accordance with a relevant standard</p>

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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 examination (check light illumination at inspection surface)	Each time before test	Check intensity of UV(A) light using a UV(A) light meter
Non-fluorescent (ie colour contrast) penetrant examination (check light illumination at inspection surface)	Each time before test	Check intensity of illumination using a white light meter
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

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	BS 2600 : 1983 Figure 2 & Clause A.8 or to 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
Film density strip	5 years	A certificate from a reputable

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Type of equipment	Recommended maximum period between successive calibrations/verification	Recommended calibration/verification procedure or guidance documents and equipment requirements
(Reference)		manufacturer
Radiograph survey meter	1 year	By a laboratory recognized by the Radiation Board