



**ACCREDITATION SCHEME FOR INSPECTION BODIES**

**TECHNICAL NOTE: SS 01**  
**SPECIFIC REQUIREMENTS FOR THE**  
**ACCREDITATION OF INSPECTION**  
**BODIES IN STRUCTURAL STEELWORK**

Technical Note - SS 01, 09 July 2018  
The SAC Accreditation Programme is managed by Enterprise Singapore

© All rights reserved

## **1. INTRODUCTION**

- 1.1 The purpose of inspections is to determine the conditions of structural steelworks for conformance with standards or other normative documents and/or general requirements.
- 1.2 The field of structural steelwork inspection covers the inspection of various stages of structural steelwork fabrication, erection and protection. It may include review of relevant procedures and processes prior to any inspection activities.
- 1.3 This technical note (SS 01) should be read in conjunction with documents listed in the Reference section and government regulations when applicable.
- 1.4 Supplementary information for specific areas of inspection may be published as other Technical Notes.
- 1.5 The inspection report produced by an accredited inspection body for the scope of accredited inspection activities shall be an SAC-endorsed report.

## **2. EQUIPMENT**

- 2.1 Equipment which affect results that are critical to the conclusion of the examination shall be appropriate for the particular inspection to be performed.
- 2.2 Inspectors shall ensure that all equipment, including equipment not under the charge of the inspection body, used during inspection work are calibrated and traceable to the SI unit. Calibration shall be performed by recognized accredited laboratories<sup>1</sup> or the National Measurement Institute who is a member of the BIPM<sup>2</sup> MRA where possible. The inspectors shall ensure that the acceptance of calibration reports be based on the measurement traceability as specified in SAC-SINGLAS 006: Traceability of Measurement.
- 2.3 Where calibration facilities are not available, in house calibration shall be validated using well recognized methods.

## **3. TESTING**

- 3.1 Analytical testing is a laboratory activity and therefore does not come within the scope of ISO/IEC 17020. Examples of analytical testing are chemical or metallurgical analysis.

---

<sup>1</sup> *Recognised accredited laboratories refer to those accredited by SAC-SINGLAS or its MRA partners.*

<sup>2</sup> *BIPM MRA refers to listing of signatories maintained by the International Bureau of Weights and Measures (BIPM) and publicly available on the BIPM website: <http://www.bipm.fr>*

- 3.2 Where analytical testing is required to support the inspection activities, the inspection body shall ensure that the testing is performed by an accredited laboratory whenever possible and the tests performed are accredited. The inspection body shall ensure that it receives SAC-endorsed test reports from accredited laboratories where available.
- 3.3 When an organisation is providing analytical testing and inspection for the same project, the organisation has to ensure that there is sufficient independence between the two activities (e.g. results of inspection activities and testing activities should not be approved by the same person).
- 3.4 Functional testing forms a normal part of the activities of an inspection body and is therefore within the scope of ISO/IEC 17020. An example of functional testing is mock-up test

## **4 INSPECTION PERSONNEL**

### **4.1 INSPECTORS**

- 4.1.1 Inspectors shall be suitably qualified and have sufficient relevant experience in their scope of inspection. Example: in welding metallurgies, fabrication and erection procedures and processes, destructive and non-destructive testing. Welding inspectors should have general knowledge in protective treatment systems.
- 4.1.2 Inspectors must be familiar with the relevant standards or codes used in the inspection activities.
- 4.1.3 Inspection bodies shall note that qualification requirements of inspectors may be superseded or limited by the regulatory requirements of the countries where the inspection is carried out.
- 4.1.4 Inspection bodies shall maintain records of inspectors' qualifications, training and experience. The records shall include how and when each inspector is authorized by the inspection bodies to perform specific inspection or testing.
- 4.1.5 All approved signatories shall be assessed by the assessment team prior to award of accreditation. Subsequent assessment will consist of sampling of approved signatories.
- 4.1.6 The assessment team will assess the nominated approved signatories. Those assessed to be competent in their area of inspection will be submitted to the Council Committee for Inspection for endorsement as approved signatories.
- 4.1.7 Approved signatories are to sign on endorsed inspection report for inspection performed by themselves or where they have direct supervision of the inspection work.

### **4.2 QUALIFICATION CATEGORIES FOR INSPECTORS**

#### 4.2.1 Category A

Senior Certified Welding Inspector shall as a minimum have the following:

- a. Senior Welding Inspector Qualification;
  - AWS, Senior Certified Welding Inspector, or
  - TWI, Senior Welding Inspector, or
  - BINDT, Weld Inspection Level 3

and

- b. Minimum 5 years inspection experience in structural steelwork, comprising minimum 2 years of Senior Certified Welding Inspector experience in building structural steelwork fabrication and erection inspection in Singapore;

and

- c. Degree or diploma in relevant engineering discipline from an institute of learning recognised by the relevant regulatory authority.

#### 4.2.2 Category B

Certified Welding inspectors shall as a minimum have the following:

- a. Welding Inspector Qualification;
  - AWS, Certified Welding Inspector, or
  - TWI, Welding Inspector, or
  - BINDT, Weld Inspection Level 2

and

- b. Minimum 4 years inspection experience in structural steelwork, comprising minimum 2 years of Certified Welding Inspector experience in building structural steelwork fabrication and erection inspection in Singapore.

and

- c. Degree or diploma in relevant engineering discipline from an institute of learning recognised by the relevant regulatory authority.

#### 4.2.3 Category C

Assistant Welding Inspector shall as a minimum have the following:

- a. Assistant Welding Inspector Qualification;
  - AWS, Certified Associate Welding Inspector, or
  - TWI, Visual Welding Inspector, or
  - BINDT, Weld Inspection Level 1

and

- b. At least 2 years relevant experience in building structural steelwork.

4.2.4 Category C inspectors are to inspect under the direct supervision of either a category B or category A inspector.

4.2.5 Only Category A and Category B inspectors can be granted approved signatories

### 5.3 SCOPE OF INSPECTION

5.3.1 The scope of inspection listed in Table 1 and Table 2 are extracted from National Productivity and Quality Specification (NPQS) for new Structural Steelwork. The scope of inspection listed in Table 3 is for re-used steel materials.

5.3.2 The inspection list is not exhaustive and users may add areas of inspection based on their own needs.

5.3.3 Table 1 below lists the typical scope of inspection performed by inspectors for new Structural Steelwork inspection.

Table 1

1	Review the quality manual
2	Pre-inspection meeting and surveillance of fabricator facilities/plants
3	Review fabrication and erection procedures
4.	Review of welding procedures specification, procedure qualification records, welder and welding operator qualification records.
5	Verify weld joints for inspection and testing. Witness non-destructive testing if required.
6	Review all documents and records including but not limiting to Dimensions, Procedures and Testing.
7	Verify all welding procedure and welder qualification records at site.
8	Review of material test certificates/records, verify or inspect material and witness pre-treatment processes, if any.

9	Inspect delivered structural members for damage due to handling and transportation.
10	Perform visual inspection and verify dimensional records.
11	Inspect the assembly of structural members at erection site prior to welding.
12	Witness cutting/edge joint preparations, verify joint geometry and inspect fit-up conditions.
13	Verify that welding processes are carried out in accordance with the approved welding procedures, codes/standards and relevant documents.
14	Inspect all welds.
15	Final inspection of all structural members.

5.3.4 Category A inspectors are expected to perform the inspection listed under Item 1 to item 16 of Table 1.

5.3.5 Category B inspectors are expected to perform the inspection listed under Item 4 to Item 16 of Table 1.

5.3.6 Category C inspectors are expected to perform the inspection listed under Item 4 to Item 16 of Table 1 under the supervision of Category A or Category B inspector.

5.3.7 Table 2 below lists the additional scope of inspection for new Structural Steelwork which is not covered in Table 1. The inspectors are allowed to perform this scope of inspection provided they have the relevant qualifications or experiences.

Table 2

1	Review inspection & test plans.
2	Witness procedure trail of stud welding process.
3	Witness/check bolts tightening.
4	Witness fireproofing mock-up test as well as laboratory tests.
5	Witness and inspect the application of fireproofing works.
6	Witness blasting & painting processes.
7	Inspect painted product.
8	Witness galvanizing processes.
9	Inspect galvanizing works.
10	Inspect all remaining site painting/galvanizing and witness repairing of all protective treatment works.

5.3.8 Table 3 below lists the typical scope of inspection performed by inspectors on re-used steel materials in compliance with the current version of Section 06 in BC 1 Design Guide on Use of Alternative Structural Steel to BS 5950 and Eurocode 3.

1	<u>Quality System</u> Review Quality Assurance System Review inspection and test plan on re-used steel materials
2	<u>Reusability Assessment</u> Assess overall condition of re-used steel materials. which include but not limited to a)Surface Condition (extent and depth of corrosion) b)Sectional Dimensions c)Shape & Straightness d)Bolts & Welded Connections e)Interlock of sheet piles
3	<u>Material Reusability</u> Witness maintenance and repair of damaged or corroded re-used steel materials Review modification works, welding and repair procedure Witness application of protective treatment
4	<u>Material Traceability</u> Witness identification and marking of re-used steel materials
5	Review storage of re-used steel materials
6	Review inventory records of movement of re-used steel materials
7	Review all test and inspection records

## 6. INSPECTION METHODS AND PROCEDURES

- 6.1 The inspection body shall have detailed procedures and instructions for the application of the appropriate regulations, codes of practice, standards, specifications, guidance documents and customer requirements.
- 6.2 Where risk based inspection (RBI) techniques are used to establish the nature and frequency of inspections, the inspection body shall document the techniques used in procedures including a demonstrable justification for using the technique.
- 6.3 Standards and codes, and other technical literature applicable to the design, construction, operation, inspection and repair of structural steelworks and their components within the accredited scope shall be maintained up to date and be readily available to the staff.

## **7 FORMAT OF ACCREDITATION SCOPE**

The scope of accreditation is granted only for specific items, materials or systems being inspected. An example of the accreditation scope is attached in Appendix 1.

## **8 REFERENCE**

- a) ISO/IEC 17020:2012 – Conformity Assessment-Requirements for the operation of various types of bodies performing inspection
- b) ILAC P15:06/2012 – Application of ISO/IEC 17020:2012 for the Accreditation of Inspection Bodies SAC-SINGLAS 006: Traceability of Measurement
- c) National Productivity and Quality specifications (NPQS) (C5-10 & C5-20)
- d) American Welding Society(AWS) – Certified Welding Inspectors (AWS QC1)
- e) TWI Certification Ltd - Certification Scheme for Welding and Inspection Personnel (CSWIP-WI-6-92).
- f) The British Institute of Non-Destructive Testing (BINDT) – Certification of Personnel for Weld Inspection (PCN WI)
- g) BCA BC 1:2012 – Design Guide on Use of Alternative Structural Steel to BS 5950 and Eurocode 3
- h) Workplace Safety and Health Act (Chapter 354A):2009
- i) Workplace Safety and Health (General Provisions) Regulations 2011



## Appendix 1

Inspection body: Type A or B or C

Type of Inspection	Type and Range of Inspection	Inspection Method, Codes or Standards Used
a. New Structural Steelwork Inspection	<ul style="list-style-type: none"> <li>i) Project Quality Plan</li> <li>ii) Facilities /Plant Audit</li> <li>iii) Fabrication/erection procedures review</li> <li>iv) Welding procedures</li> <li>v) Welders' qualification</li> <li>vi) Dimensional inspection</li> <li>vii) Inspection of welds</li> <li>viii) Bolt tightening</li> </ul>	
b. Coating Inspection	<ul style="list-style-type: none"> <li>i) Fire proofing</li> <li>ii) Paint coating</li> <li>iii) Galvanised coating</li> </ul>	
c. Re-used Steel Materials Inspection	<ul style="list-style-type: none"> <li>i) Review Quality System</li> <li>ii) Conduct Reusability Assessment</li> <li>iii) Verify Material Reusability</li> <li>iv) Verify Material Traceability</li> <li>v) Review storage of re-used steel materials</li> <li>vi) Review inventory records of movement of re-used steel materials</li> <li>vii) Review all test and inspection records</li> </ul>	

### Approved signatories

Mr [Signatory A] (Category A)

- for item A,B & C

Mr [Signatory B] (Category B)

- for item A(iv-viii)

### **NOTE :**

#### **Type A inspection body**

The inspection body providing "third party" services.

#### **Type B inspection body**

The inspection body which forms a separate and identifiable part of an organisation involved in the design, manufacture, supply, installation, use or maintenance of the item it inspects and has been established to supply inspection services to its parent organisation.

**Type C inspection body**

The inspection body which is involved in the design, manufacture, supply, installation, use or maintenance of the items it inspects or of similar competitive items and may supply inspection services to other parties not being its parent organisation.