



GUIDE FOR WELDING INSPECTION AND TEST PROCEDURES CSA STANDARD W178.1-2002

The attached information is provided in the hope that Welding Inspection Organizations will find it useful in compiling the procedures referenced in Clause 8 of CSA Standard W178.1. When approved these will become the day-to-day working procedures of the organization and their implementation will be the responsibility of the Welding Inspection Supervisor.

In preparing these procedures for the product categories named in W178.1, the following factors should be considered:

The welding inspection and test procedures:

- (a) must reflect the capabilities of the inspection personnel and the facilities available and must be readily understood by the inspector.
- (b) must be presented in a form readily adaptable for shop and field use.

Two copies of the draft procedures are to be sent to the Bureau's Head Office where they will be reviewed. If only minor (or no) changes are suggested, an approved copy is returned to the company and the second copy is retained by CWB. Should major changes be recommended, certain portions might need re-writing. You would then send these revised portions to the Bureau in duplicate for final review. There are three mandatory clauses which must appear in the procedures and they are identified below:

MANDATORY CLAUSES

- i) The standard welding inspection and test procedures of this firm are prepared in accordance with Sections 7 and 8 of CSA Standard W178.1. All weld inspection and testing will be performed in conformance with this code and to any revisions.
- ii) Any welding inspection or weld testing subcontracted by this firm shall be subcontracted to firms certified to CSA Standard W178.1.
- iii) Changes or additions to the company's CWB approved inspection procedures shall be submitted to the CWB for approval before being put into practice.

1. STANDARD VISUAL WELDING INSPECTION PROCEDURES

Clause 8.2 of the Standard will serve as a general guide to indicate a minimum requirement for each product category. A suggested procedure outline is given below in Part 3.

2. STANDARD DESTRUCTIVE AND NONDESTRUCTIVE TESTING PROCEDURES

These procedures shall include all of the essential operations for each destructive and nondestructive test to be used by the organization. Clause 9 of W178.1 on equipment maintenance and calibration shall form part of these procedures. A suggested procedure outline is given below in Part 3.

3. SUGGESTED PROCEDURE OUTLINE FOR WELDING INSPECTION AND TEST PROCEDURES

3.1 **Scope:** The scope should identify the inspection or test method and list the product categories to which it applies. For example, it could state that "this procedure is for the visual inspection of buildings and bridges".

3.1.1 Include the three mandatory clauses noted above.

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- 3.1.2 **References:** List the reference codes, standards and specifications (latest editions) related to the product categories and inspection or test methods identified in the Scope. Examples of standards for Buildings and Bridges would be CSA Standards W47.1 and W59 and AWS Standard D1.1. Reference standards for the various test methods should include ASME Section V and ASTM for nondestructive testing.
- 3.2 **Qualification of Inspection and Testing Procedures:** Include a statement that all welding inspection and weld testing procedures shall be approved by the Bureau prior to being put into practice.
- 3.3 **Personnel Certification:** State that personnel carrying out welding inspection and/or testing shall be certified in accordance with the requirements of CSA Standard W178.1 (namely CSA Standard W178.2 for welding inspectors and CGSB for NDT technicians).
- 3.4 **Test Equipment and Materials:** Each testing procedure must list the kinds of test equipment and materials that will be used to carry out the work in that test method. For example, in ultrasonic testing the procedure would identify the UT units, transducers, couplants, calibration blocks and related auxiliary equipment.

4. **NDT PROCEDURE TEST DATA**

The following Magnetic Particle Inspection example is used to provide a general guideline for companies planning to apply for certification in one or more NDT methods. The same kinds of information are required for all NDT methods.

- 4.1 **Equipment:** Identify the types of equipment and materials that will be used to carry out the work. Use manufacturers' names and model numbers. The equipment and materials list could include the wet bench, prods, yokes and coils and the various particle powders - visible, fluorescent, wet, dry.
- 4.2 **Calibration:** Identify equipment calibrations that must be carried out and how often such calibrations are required. State that records of all calibrations shall be maintained by the company. The lifting power of electromagnetic yokes and black light intensity are two examples of necessary calibrations. Equipment identification must be traceable to calibration records.
- 4.3 **Test Procedure:** Explain how a given test is to be carried out by the NDT technician. For example, the first step in the use of the MT wet bench could be to check the bath concentration. The basic operational guidelines for the use of any piece of equipment should be part of the company procedures.
- 4.4 **Reporting:** The NDT technician should be instructed in each procedure regarding what information must be included on the company report form in addition to the inspection results. How was the magnetic force applied? Was the wet or dry particle method used? Was it visible or fluorescent? Was demagnetization necessary, etc.?
- 4.5 **Typical Reference Specifications for Welding Inspection:**
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| (a) | CSA W47.1: | Certification of Companies for Fusion Welding of Steel Structures |
| (b) | CSA W59: | Welded Steel Construction. |
| (c) | AWS D1.1: | Structural Welding Code - Steel. |
| (d) | CSA Z183: | Oil Pipeline Systems. |
| (e) | CSA Z184: | Gas Pipeline Systems. |
| (f) | API 1104: | Standard for Welded Pipelines and Related Facilities. |
| (g) | ANSI B31.3: | Chemical Plant and Petroleum Refinery Piping. |
| (h) | ASME VIII: | Boiler and Pressure Vessel Code. |
| (i) | ASME IX: | Welding Qualifications, Boiler and Pressure Vessel Code. |
| (j) | ABS: | Rules for Building and Classing Steel Vessels. |
| (k) | AAR: | Association of American Railroads. |

5. **QUESTIONS?**

If you have any questions about preparing your procedures or about the W178.1 certification program, please contact the Canadian Welding Bureau. We will be pleased to assist you.