



Elevating and Amusement Devices Safety Division	Ref. No.: 533 / 12	Rev. No.:
Advisory Bulletin	Date: March 2, 2012	Date:

Subject: Welding and Non-destructive Testing of Structural Steel Repairs of Cracks in Existing Welds or Parent Metal
Applicable to: Amusement Device Mechanics, Contractors, Consultants, and Owners

1. INTRODUCTION & INTERPRETATION

1.1. Background

As part of a the Risk Reduction Group (RRG) discussion on Aging Rides (that included participants from across North America, and was hosted by TSSA), a recommendation was brought forward to create awareness and provide consistency around the proper maintenance of existing amusement rides or devices (amusement devices) with respect to **Welding and Non-Destructive Testing of Structural Steel Repairs**.

1.2. Welding Procedures and Non-Destructive Testing (NDT) of Welds

1.2.1. Welding Procedures

The method to repair a crack in a **weld** or the **parent metal** of structural steel on an amusement device must be specified (provided or approved) by the manufacturer/designer of the amusement device, since the equipment manufacturer/ designer has the intimate knowledge of the loads on the specific structural members of an amusement device.

Where the manufacturer/designer no longer exists or is unavailable a Professional Engineer may fulfill these requirements.

1.2.2. Non-Destructive Testing (NDT) of Welds

The requirement to NDT a weld repair is generally determined by the manufacturer/designer and/or the engineer who specified the weld particulars utilizing their knowledge of the structure and stresses transmitted to the weld area.

In jurisdictions enforcing CSA requirements, where NDT is undertaken, it must be conducted by an organization certified to **W178.1-08 – Certification of Welding Inspection Organizations**. The individual conducting the NDT needs to be certified to **W178.2-08 Certification of Welding Inspectors**.

1.3. Welding Qualifications

1.3.1. Certification

The person or organization carrying out welding must be certified in accordance with **CSA W47.1-09 Certification of companies for fusion welding of steel**.

Such certification includes that companies, individuals or organizations meet the following three elements;

- employs qualified welders,
- employs qualified supervisory / engineering personnel,
- follows Canadian Welding Bureau (CWB) accepted welding procedures.

CWB welding procedures must conform to requirements in **CSA W59-03 (R2008) – Welded Steel Construction (Metal Arc Welding)**.

Note: To operate a ride or device in Ontario that has undergone a weld repair done in a jurisdiction not enforcing CSA welding standards, the weld repair shall be made to an acceptable/equivalent standard (eg AWS). The Owner is responsible to ensure and demonstrate (if requested) that the repair (and NDT if required) was done in accordance with the referenced CSA or equivalent standards.

1.3.2. Division 1, 2, or 3

Companies certified to W47.1 can choose to be certified to one of the following three divisions:

Division 1:

- To be certified in Division 1, the company must employ on a full-time basis a registered professional engineer(s) responsible for welding related activities specified by the company.

Division 2:

- To be certified in Division 2, the company must retain on a part-time basis a registered professional engineer(s) responsible for welding related activities specified by the company.

Division 3:

- To be certified in Division 3 the company is not required to have a weld engineer where a welding Supervisor is responsible for all welding related activities specified by the company.

1.3.3. Components of Certification

Qualified Welders:

- Welders must pass a practical test (as defined by the certification standard) in order to obtain a qualification or welding "ticket".

Qualified Supervisory Personnel:

- CSA W47.1 certified companies must employ/retain a CWB qualified Welding Engineer (Division 1 and 2 only)
- CSA W47.1 certified companies must employ a welding supervisor (for Divisions 1 and 2 the engineer can act as both weld engineer and supervisor)
- CSA W47.1 outlines the experience and education requirements for qualification of these individuals.
- Weld supervisors ensure welders are qualified and that weld procedures are followed.

Welding Procedures:

- Each company must document the welds they make with welding procedures
- Each Welding Procedure Specifications must be signed and/or sealed by the designated engineer for Division 1 and 2 companies, or the Welding Supervisor for Division 3 companies.

2. RECORDS

The maintenance records of an amusement device or ride need to include all supporting documentation related to repairs - including welding repairs.

The Owner is responsible to ensure that welding repairs are done in accordance with the referenced standards, and may be asked to demonstrate compliance.

3. REFERENCED DOCUMENTATION

The following documents were used in drafting this advisory;

- Ontario Regulation 221/01 Amusement Devices
- Amusement Devices Code Adoption Document June 2001
- CSA W47.1-09 Certification of Companies for Fusion Welding of Steel
- CSA W59-03 (R2008) – Welded Steel Construction (Metal Arc Welding)
- CSA W178.1-08 Certification of Welding Inspection Organizations
- CSA W178.2-08 Certification of Welding Inspectors
- CSA Z267-00 Safety Code for Amusement Rides and Devices

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This Bulletin has been developed in consultation with the RRG on Aging Rides.