The following was submitted by member Phil Nolan of StructureAll Ltd.

Welding of Structural Steel

In accordance with Article 4.3.4.1. of the National Building Code of Canada (NBC) 1995, buildings and their structural members made of structural steel must be designed in conformance with CSA-S16.1 "Limit States Design of Steel Structures."

Clause 24.3 of this standard requires fabricators and erectors responsible for welding steel structures to be certified by the Canadian Welding Bureau, to the requirements of CSA-W47.1 "Certification of Companies for Fusion Welding of Steel Structures" (Division 1 or Division 2.1) and CSA-W55.3 "Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings" as applicable.

Designs under Part 4 of the NBC 1995 must be completed, stamped and sealed by a professional designer (registered architect or professional engineer). The professional designer takes responsibility for both the plans and specifications. The designer is expected to prepare the project documents so that the requirements of the NBC and the referenced documents are followed, and to review construction to determine conformance with the design. The designer should ask for documentation that a welding company is certified on each project involving welding of structural steel, and be prepared to provide this information to a building official upon request.

The Canadian Institute of Steel Construction produces the *Handbook of Steel Construction*. The Seventh Edition (2000) includes and is based on CAN/CSA-S16.1-94. The Eighth Edition, which will include CSA-S16-01, changes to the properties and dimensions of W-shapes, and updated tables, is currently being prepared. The Handbook also includes commentary, information and guidance for designers, and the Code of Standard Practice for Steel Structures. The Code of Standard Practice defines "structural steel" and "miscellaneous metals." It outlines suggested lists of structural steel and miscellaneous metals in Section 2 "Classification of Materials" and in Appendices A and F. But the Code clearly places reliance on the designer's structural drawings and tender specifications for definition of the materials, fabrication and erection.

National Master Specifications help to remind designers and specification writers that welding of structural steel in buildings must be done by an appropriately certified welding company.

• Section 05121 "Structural Steel for Buildings" covers structural sections indicated on drawings and non-standard stairs not covered in Section 05510. Section 05210 covers steel joists. Section 05310 covers steel decking. Section 05411 covers wind-load bearing steel stud systems. These sections specify that welding companies must be certified by the Canadian Welding Bureau as Division 1 or 2.1 under CSAW47.1 and /or CSA-W55.3.

• Section 05500 “Metal Fabrications” covers items such as angle lintels, pipe railings, corner guards, access ladders, trench covers and frames, and channel frames that are not specifically covered in other sections. This section requires that welding work is done Steel Construction (Metal Arc Welding)” which in turn requires certification of welding companies to CSA-W47.1.

• Section 05510 “Metal Stairs and Ladders” covers industrial, service and commercial steel stairs and ladders that are not covered in Section 05121. This section is intended for projects where stairs and ladders are premanufactured off-site. This section requires that welding work is done in accordance with CSA-W59 which in turn requires certification of welding companies to CSAW47.1. It also requires that the fabricator’s shop drawings bear the stamp of a professional engineer which in turn leads us back to design in accordance with CSA-S16 and the requirement for certified welding companies.

The Canadian Welding Bureau (CWB) is accredited by the Standards Council of Canada as a Certification Body. The CWB posts lists of certified welding companies, sorted by the type of certification, at www.cwbgroup.com. The site also provides a search feature so that an engineer or building official can easily verify the qualification of a bidder or contractor.

These requirements for professional designers and certified welding companies apply equally to new steel structures and to additions and renovations involving steel structures in existing buildings. For example, when a new work platform or stair is needed in a large industrial plant, there may be a desire to use in-house designers and welders. This is only acceptable if the designer is qualified to complete this type of design and the company is certified to complete this type of welding. A pressure welder may be qualified under American Society of Mechanical Engineers (ASME) rules to complete welding on pressure vessels and piping, but this qualification does not meet the certification requirements for welding of structural steel.

To help professional designers and building officials determine whether welding of a steel element in a building must be done by a certified welding company (regardless of whether the element is considered structural steel or miscellaneous metal), the following questions should be answered:

• Does the member need to be designed using Part 4 of the NBC and thus CSA S16?

• Is the member attached to the building?

• Does the member carry a load due to use and occupancy, snow, rain, wind, earth pressure, groundwater, weight of the building components, earthquakes, etc.?

• Could someone who is using the building be injured if the member fails?

If the answers are yes to these questions, then a certified welding company will be required. §