



Welding Engineers NEWSLETTER Fall 2022

We are pleased to present the CWB Fall 2022 Welding Engineers Newsletter. In this edition, you will find the latest news about CWB procedures and welding consumables certification department and information on the upcoming forum.

In this edition you will also find:

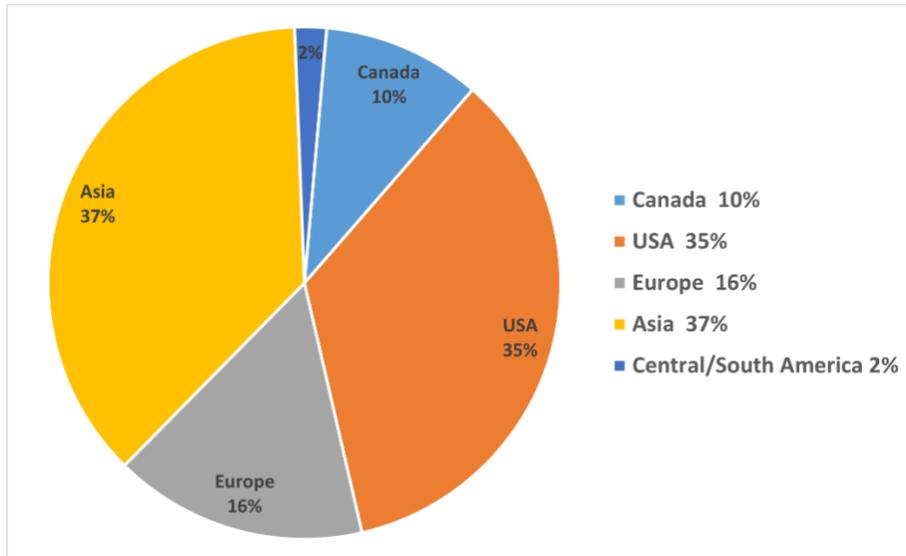
- Welding of Open Web Steel Joists
- Pulsed Welding Procedure Data Sheets
- Use of Proprietary Shielding Gases

CWB Procedures and Electrodes Department – Year in Review (FY 2022):

The first newsletter published in Fall 2020 explained how the CWB procedure department operates. In this edition, we will summarize the performance of the department during the last fiscal year, from April 2021 to March 2022. Over this twelve-month period the procedure department received a total of 12,300 submissions (number of emails received by the department relating to welding procedures), the average number of working days between the reception and our review/response to the submissions was under 1.4 days. It is worth mentioning that to process those 12,300 submissions we had to review over 37,000 welding procedure data sheets (WPDS) and 2,300 procedure qualification reports (PQR).

CWB Procedure Department April 2021 to March 2022	
Total received during FY22	12,300
Average respond time (days)	1.4
# of WPDS reviewed	37,279
# of PQR processed	2,341

At the end of the fiscal year 2022, there were a total of 2,461 welding consumables certified by us from 120 welding consumable POMs in 26 countries. Below is a graphical representation showing where these certified welding consumables are coming from:



Welding of Open Web Steel Joists

The open web steel joist (OWSJ) is a lightweight steel truss consisting, in the standard form, of parallel chords and a triangulated web system, proportioned to span between bearing points. The main function of an OWSJ is to provide direct support for the roof or floor deck and to transfer the load imposed on the deck to the structural frame, i.e., beam and column.

CSA Standard S16 requires that certified companies have welding procedures specific to the welding of open web steel joists. Prequalification of flare-bevel groove welds is not applicable to the fabrication of open web steel joists as per CSA Standard W59.

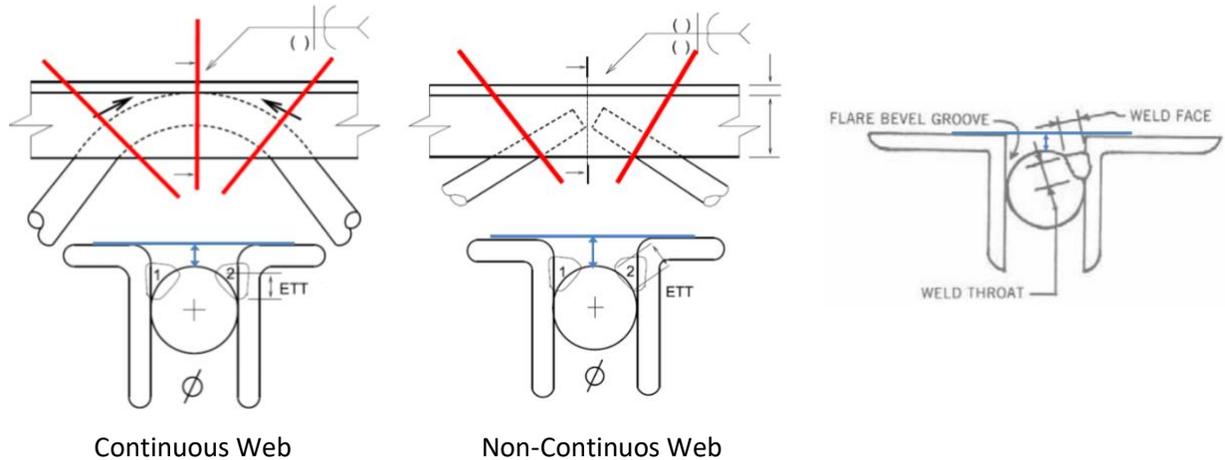
Welding procedure data sheets for OWSJ should include the following specific information.

- Top and bottom chord angle leg size range.
- Top and bottom chord angle thickness range.
- Web bar diameter range or, alternatively, sizes and thickness for angle type or HSS web.
- Information on web and chord positioning, e.g., the height from the top of the chord to the web rod. A typical dimension is acceptable.
- The required effective throat thickness (ETT), weld face width (W), and weld length (L)

When procedure qualification testing (PQT) is conducted, the chord angle and web dimensions, including the web/chord position, shall be verified, and documented on the procedure qualification record (PQR) in addition to all other relevant information.

As part of the testing and evaluation of the PQT, the following dimensions shall be measured and recorded on the PQR:

- Effective throat thickness (ETT)
- Weld face width (W)
- Weld length (L)
- Location of extracted macro etch tests are described in the sketches below



When conducting procedure qualification testing for open web steel joists, the test assemblies should simulate the actual production joints, accessibility to the welds in the required position, and use of actual work/travel angles. Separate tests are required for continuous and non-continuous web, rod, or bar configurations. Three macros per continuous web assembly (one in the center of the bend part and two at the point of the furthest access for welding), and two macros per non-continuous web assembly (at the point of the furthest access for welding) are extracted. At least two specimens are prepared: the first with the smallest bar diameter and the second with the largest bar diameter. The thickest chord member applicable to each web diagonal is used in both cases. A supplementary specimen may be prepared if there is a change in essential variables from smallest to largest diameter.

Pulsed Welding Procedure Data Sheets

If pulsed welding is utilized, the pulsed welding machine, make, model, and program setting numbers with trim (if applicable) need to be provided on the data sheets. For manual pulsed machines, the following should be provided on a data sheet at a minimum:

- Peak Current
- Background Current
- Peak or Pulse Time, and Background Time
- Pulse Frequency

Change in the pulsed machine make, model, or program setting number is not an essential variable in CSA Standard W47.1, W47.2, or W186. However, the burden of proof for the equivalency is on the retained welding engineer. At this point, no equivalency has been established between proprietary pulsed processes, e.g., Lincoln STT, Fronius CMT, Panasonic SAW-P, etc.

As discussed in the past, for GMAW pulsed prequalification, the minimum wire feed speed, as required by clause 10.5.3.8 of CSA Standard W59:2018 for flat, horizontal, and overhead, shall be as follows (for all shielding gases):

Electrode Size	Minimum Wire Feed Speed
0.9 mm	400 ipm (10 m/min)
1.0 mm	350 ipm (8.9 m/min)
1.2 mm	250 ipm (6.3 m/min)
1.4 mm	225 ipm (5.7 m/min)
1.6 mm	190 ipm (4.8 m/min)

Use of Proprietary Shielding Gases

A certified fabricator may submit WPDSs showing either the trade name, e.g., BLUESHIELD 7, Ferrolite C8, etc., or the corresponding shielding gas composition, e.g., Ar + 15%CO₂. When a welding procedure is submitted for review with a proprietary shielding gas, it can be accepted based on prequalification or a procedure qualification test (new test, previous test, or accumulated tests), same as any other WPDSs. But the proprietary shielding gas must meet the following.

For the carbon and low-alloy steel FCAW and MCAW electrodes are certified using the minimum and the maximum oxygen equivalent (OE) of the shielding gases range applicable to the product, if the proprietary shielding gas fall within that range, no additional certification test is required. If the proprietary gas falls outside that range, then the electrode must be certified with that specific shielding gas as a pair. This can be verified by checking the CWB website at <https://www.cwbgroup.org/certification-and-qualification/certified-directory-search/consumables>.

Carbon steel GMAW welding consumables are certified with 100% CO₂ and as per Clause 7.3 of CSA Standard W48:2018 these welding consumables are also considered certified for the use of other shielding gases within the limitations of the oxygen equivalent (OE). If the proprietary gas does not meet the acceptable range of CSA W48, the electrode must be certified using this proprietary gas as a pair. Again, this can be verified by visiting CWB website.

For aluminum, the electrode certification is not dependent on the shielding gas, and all welding procedures must be qualified for the specific shielding gas.

Welding Engineer Forum

In the summer of 2021, we had over 60 welding engineers attending our welding engineer forum. During the forum, some of the topics discussed were ranging from unlisted base metal, PQT limitations, WeldEye, PQT from other organizations, sharing welding procedure between fabricators, and Q&A session, For further information, please visit the welding engineer webpage at: <https://www.cwbgroup.org/certification-and-qualification/welding-engineers>

We are examining the current format of our welding engineer forum. We are considering forming several small groups to promote discussions; we will keep you informed.

Thank you,

CWB Procedures & Electrodes Certification Team