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CSA Standard W47.1 Laser Beam Welding Process: Welding Procedures and Performance Qualification

Canadian Welding Bureau (CWB) is making the Canadian welding sector aware of the permission to use laser beam welding (LBW) process under the certification scheme of CSA W47.1 and W47.2.

What is Laser Beam Welding (LBW)?

Laser beam welding (LBW) is a fusion welding method that joins metal pieces using a laser beam. It has gained popularity over the years due to its precision, which allows for better quality welds, faster throughput, reduced post-processing costs and access to new domains of application. Recently, there has been an increased interest in handheld laser welding equipment, with fabricators reaching out to CWB for qualifications of their welding procedures and welding personnel.

Is LBW permitted under CSA W47.1 or W47.2?

Yes. Although (LBW) is not explicitly specified in CSA Standard W47.1 or CSA W47.2, Clause 9.2.1 and Clause 11.2.5 of CSA Standard W47.1-2019, and Clause 9.2.2.5 of CSA W47.2-2020 permit other welding processes for the qualification of their personnel respective welding procedures.

What do I have to do to include LBW as part of my CSA W47.1 or CSA W47.2 Certification?

Like any other welding process, a certified company needs to have an approved Welding Procedure Specification (WPS) and approved welding procedures data sheets (WPDS) to cover LBW and ensure that all welders/welding operators that will use LBW are qualified. Below is some additional information related to this requirement.

To initiate the laser beam welding procedure qualification process, a Welding Procedure Specification (WPS) and applicable Welding Procedure Data Sheets (WPDSs) specifying LBW shall be submitted for review and approval to our procedure department. As part of the certification program these documents will be reviewed by our team of engineers and when will be accepted and stamped by the CWB, they will be considered registered and archived in the company's file with the CWB. All the provisions for prequalification specified in CSA Standard W47.1 and CSA Standard W59 will not be applied to the LBW process, hence the company will be required to perform procedure qualification testing(s) as required.

CSA Standard W47.1 does not specify essential variables specific for LBW and for this reason it is suggested to reference on the WPS and WPDSs one of the following standards along with CSA Standard W47.1 or CSA W47.2 as applicable.

AWS C7.4 – "Process Specification and Operator Qualification for Laser Beam Welding"
AWS B2.1 – "Specification for Welding Procedure and Performance Qualification"

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ISO 15609-4 – "Laser Beam Welding"

ISO 15614-11 – "Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 11: Electron and laser beam welding"

LBW can be in the form of autogenous process, meaning it does not require filler material. However, if a filler material is used, it will require to be CWB-certified. Certified wires can be used for welding carbon and stainless steels with any shielding gas composition, such as 100% Nitrogen for stainless steel alloys. When welding mild steel with B-G 49A 3 C1 S6 (ER49S-6 or ER70S-6) using 100% Nitrogen, the wire-gas combination is not certified, and qualification shall be required in accordance with Clause 11.8.2(b) of CSA Standard W47.1.

Welding personnel using LBW will be required to obtain qualification in accordance with CSA Standard W47.1 by using an alternate test assembly (CWB Form 161). The alternate test assembly can specify one of the standard test assemblies of Figure 6, 7, 8, 9, 11 and 12 or by replicating the actual production joint used in production and specified on the Procedure Qualification Record (PQR) tested to qualify the preliminary Welding Procedure Data Sheet(s).

I want to include LBW as part of my CSA W47.1 or CSA W47.2 Certification but need more help. What should I do?

CWB Applicant and Certified clients or other interested parties, like retained engineers may contact the CWB Procedures Department (procedures@cwbgroup.org) should they have any questions on integrating LBW into their certified welding operations.