INDUSTRIAL LASER SOLUTIONS

Laser Welding Standards Reference

International Standards & Australian Cross-Reference — Including Handheld Laser Welding Acceptance

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Overview

This document provides a reference guide to international and Australian welding standards governing laser welding processes — including the current acceptance status of handheld laser welding. Industrial Laser Solutions (ILS) has prepared this document to support customers navigating compliance requirements for laser welding in structural, pressure vessel, and manufacturing applications.

Australia adopts ISO standards directly (prefixed AS/NZS ISO), meaning international laser welding standards carry equal standing under Australian law and procurement requirements. Where ISO does not exist, ASME standards are widely referenced — particularly in oil & gas, processing, and resources sectors.

Equipment Notice

IMPORTANT NOTICE — Equipment-Specific Testing

The qualification testing and compliance pathways referenced throughout this document were carried out using IPG LightWELD handheld laser welding systems. Results, weld quality outcomes, and compliance suitability may not be equivalent when using other handheld laser welding equipment from alternative manufacturers. ILS strongly recommends that any alternative system undergo independent WPS/WPQR qualification testing in accordance with the applicable standards before being relied upon for compliance purposes. Contact ILS for guidance on equipment selection and qualification support.

Key Finding: Handheld Laser Welding Acceptance

The most significant recent development is the formal acceptance of handheld laser welding under ASME BPVC Section IX (2023 & 2025 Edition). This is a production-ready compliance pathway available now.

KEY FINDING — ASME BPVC Section IX QW-358 (2023 & 2025 Edition)

Handheld laser welding is explicitly accepted for boilers, pressure vessels and process piping under ASME BPVC Section IX. The 2023 edition added QW-358 specifically for handheld laser welding — with IPG LightWELD technology referenced in the qualification provisions. Acceptance criteria include shear and tensile strength tests.

Australia uses ASME BPVC extensively in oil & gas, processing, and resources sectors. This is a live, usable compliance pathway now — not theoretical.

Summary: Standard-by-Standard Handheld Status

Standard	Used in Australia?	Laser Types	Handheld Status
ASME BPVC Section IX (2023 & 2025)	Yes — PV & Piping	All	✅ EXPLICITLY ACCEPTED — QW-358 added for handheld. IPG LightWELD specifically recognised.
ISO 15614-11:2025	Yes — ISO adoption	All	✅ IMPLICITLY ACCEPTED — technology agnostic; no handheld exclusion. Qualify WPS/WPQR and it applies.
AS/NZS ISO 3834	Yes — quality system	All	✅ IMPLICITLY ACCEPTED — covers all fusion welding; no delivery method restriction.
AS/NZS 1554 (Structural Steel)	Yes — structural	All	✅ IMPLICITLY ACCEPTED — no exclusion; accepted via qualified WPS procedure.
AS/NZS 1665 (Structural Aluminium)	Yes — structural	All	✅ IMPLICITLY ACCEPTED — no exclusion; accepted via qualified WPS procedure.
ISO 15609-6 (WPS Format)	Yes — ISO adoption	All	✅ IMPLICITLY ACCEPTED — WPS document format for laser welding; no delivery method restriction.
AWS D17.1 (Aerospace)	Some sectors	All	⚠️ IN PROGRESS — task group drafting handheld provisions within D17.1:2024. Several years to completion.
AWS C7.4:AMD1-2025	US-spec contracts	All incl. fibre, CO2, disk, diode	⚠️ NOT YET EXPLICIT — written for mechanised/robotic. 2025 amendment working toward handheld inclusion.
AWS D1.1 (Structural Steel)	Some sectors	All	⚠️ NOT YET EXPLICIT — no prequalified laser pathway; engineer-of-record acceptance required via WPS/PQR.

Australian Compliance Pathway for Laser Welding

The following steps outline how a customer achieves compliance for laser welding — handheld or automated — under Australian and international standards. ILS can assist with documentation strategy and referrals to Weld Australia-accredited inspectors.

Step	Standard	Action Required
1	**ISO 15609-6**	Develop a Welding Procedure Specification (WPS) for the specific laser welding application — material, thickness, joint type, parameters.
2	**ISO 15614-11:2025**	Qualify the WPS via a Welding Procedure Qualification Record (WPQR). Test welds are examined by destructive and non-destructive testing. Applies to both handheld and automated laser systems.
3	**AS/NZS ISO 3834**	Certify the quality management system to ISO 3834-2 (Comprehensive) or 3834-3 (Standard) depending on application criticality. Required for AS 4100:2020 higher construction categories.

Step	Standard	Action Required
4	**ISO 14732 / AS/NZS 9606-1**	Qualify welding operators (automated/robotic per ISO 14732) or welders (handheld per AS/NZS 9606-1, process i52) against the approved WPS.
5	**ASME Sec IX QW-358 (if PV/Boiler)**	For pressure vessel and boiler work: additionally qualify under ASME BPVC Section IX QW-358 which explicitly covers handheld laser welding. Acceptance criteria include shear and tensile strength tests.
6	**AS 3992**	For pressure vessel and boiler work in Australia: AS 3992 (Pressure Equipment — Welding & Brazing Qualification) refers users to ASME Section IX for laser welding qualification.

Full Standards Reference

Comprehensive reference across laser-specific, quality system, structural, pressure vessel, and safety standards applicable in Australia.

Standard	Body	Application	Notes
LASER WELDING — SPECIFIC STANDARDS			
ISO 15614-11:2025	ISO	LBW Procedure Qualification	Primary global WPS/WPQR standard for laser & electron beam welding. Revised 2025. Adopted in Australia via ISO pathway. All laser types, all delivery methods including handheld.
ISO 15614-14	ISO	Laser-Arc Hybrid Welding	Covers laser-arc hybrid welding of steels and nickel alloys. Adopted in Australia.
ISO 15609-6	ISO	Laser WPS Document Format	Defines the WPS format specifically for laser beam welding. Used alongside ISO 15614-11.
BS EN ISO 15614-11:2025	BSI (UK/EU)	LBW Procedure Qualification	Same as ISO 15614-11. Relevant for ILS customers exporting to UK/EU markets.
AWS C7.4/C7.4M:AMD1-2025	AWS (USA)	Process Spec & Operator Qual	Covers CO2, Nd:YAG, Fibre, Disk, Diode — pulsed, CW, QCW. Amended Aug 2025. Written for mechanised/robotic; handheld provisions in progress.
QUALITY SYSTEM STANDARDS (Fusion Welding — Laser Included)			
AS/NZS ISO 3834	Stds Australia	Fusion Welding Quality System	Directly adopted. Globally recognised quality benchmark. Covers all fusion welding including laser — handheld and automated. Required for ISO 3834-2 or 3834-3 certification.
ISO 15607	ISO	WPS Framework	Parent standard to the 15614 series. Defines the framework for welding procedure specifications. Adopted in Australia.
ISO 14732	ISO	Operator Qualification (Auto)	Qualification of welding operators for mechanised and automated welding. Relevant to robotic laser welding and handheld where operator skill is assessed.
AS/NZS 9606-1	ISO	Welder Qualification (Manual)	Qualification of welders for manual welding. 2017 edition may be used. Relevant to welding process number i52 where welder skill is assessed for handheld laser applications.
STRUCTURAL WELDING STANDARDS (Laser Accepted via WPS Qualification)			
AS/NZS 1554.1	Stds Australia	Structural Steel — General	Most widely used Australian structural welding standard. Laser accepted when procedure is qualified per ISO 15614-11. No delivery method exclusion.

Standard	Body	Application	Notes
AS/NZS 1554.2	Stds Australia	High Fatigue Loading Structures	Structures subject to high levels of fatigue loading — bridges, cranes, dynamic applications. Laser accepted with qualification.
AS/NZS 1554.4	Stds Australia	High-Strength Steels (700–900 MPa)	Critical for Hardox-type and wear-resistant steel applications. Laser accepted with qualified procedure.
AS/NZS 1554.6	Stds Australia	Structural Steel — Stainless	Use for welding of stainless steel structures. Laser accepted under the innovation provisions when procedure is qualified as specified within the standard.
AS/NZS 1554.7	Stds Australia	Structural Steel — Sheet Steels	Use for welding of light gauge steels. Laser accepted under the innovation provisions when procedure is qualified as specified within the standard.
AS/NZS 1665	Stds Australia	Structural Aluminium	Welding of aluminium structures. Laser accepted via qualified WPS procedure with no delivery method exclusion.
AS 4100:2020 (Amdt 2, 2024)	Stds Australia	Steel Structures Design	Mandatory NDT requirements updated 2024. Requires ISO 3834-3 minimum certification for higher construction categories.
AS 3992	Stds Australia	Pressure Equipment	Welding & brazing qualification for pressure equipment. Laser accepted via qualified procedure. Refers users to ASME Section IX for laser welding qualification.
PRESSURE VESSEL & PIPING — ASME STANDARDS (Used Widely in Australia)			
ASME BPVC Section IX (2023 & 2025)	ASME (USA)	Welding Quals — PV/Boilers	★ EXPLICITLY accepts handheld laser welding via QW-358 (2023 & 2025). Used across oil & gas, processing, and resources in Australia. IPG LightWELD referenced in qualification provisions.
ASME BPVC Section VIII	ASME (USA)	Pressure Vessel Construction	Used alongside Section IX for pressure vessel fabrication.
ASME B31.3	ASME (USA)	Process Piping	Laser welding accepted with a qualified procedure under Section IX QW-358.
LASER SAFETY STANDARDS (Australia)			
AS/NZS IEC 60825-1	Stds Australia/IEC	Laser Product Safety	Governs laser product classification and safety requirements for all industrial lasers. Laser Safety Officer (LSO) required.
AS/NZS 60825-4	Stds Australia/IEC	Laser Guards	Requirements for laser enclosures and safety barriers.
AS/NZS ISO 19818.1:2023 / AS/NZS 1337.4	Stds Australia	Eye Protection	AS/NZS ISO 19818.1:2023 is the current laser eye protection standard. AS/NZS 1337.4 is the equivalent to European EN207.

Laser Types — All Covered

All major standards (ISO 15614-11, AWS C7.4, AS/NZS ISO 3834) are laser-technology agnostic. The following are all covered without distinction:

- Fibre Laser — including IPG LightWELD (handheld) and IPG high-power industrial systems
- CO_2 Laser
- Nd:YAG / Disk Laser
- Diode Laser
- Quasi-CW (QCW) and Pulsed Laser systems

Standards qualify the resulting weld — not the equipment used to produce it. No laser source has a standards advantage over another.

How Industrial Laser Solutions Can Help

ILS provides more than equipment supply. We support customers through the full compliance journey:

- Standards navigation — identifying which standards apply to your specific application
- WPS documentation strategy — advising on the correct approach for your production environment
- Referral to Weld Australia-accredited inspectors for WPQR testing
- Equipment selection matched to compliance requirements and industry application
- Ongoing support for AS/NZS ISO 3834 quality system development

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