STAINLESS STRUCTURALS
SPECIAL PROFILES IN STEEL

FABRICATION GUIDE - LASER FUSED STAINLESS STEEL PROFILES

Applicable Standards: ASTM A1069 / ASTM A1123 | **Welding Code:** AWS D1.6

Base Material & Product Definition

ASTM A1069 and ASTM A1123 profiles are manufactured from ASTM A240 austenitic stainless steel plate (typically Types 304/L or 316/L). The laser fusion process produces a monolithic structural member without altering base-metal classification or weldability.

Welding Code Compliance

All fabrication welding shall conform to AWS D1.6. Base metals fall within AWS Group A or B, permitting use of prequalified WPS's per Clause 3. Conventional matching filler metals (ER/E308L or ER/E316L) shall be used.

Laser Seam Performance

The laser fusion seam is a complete joint penetration (CJP) weld and behaves identically to base metal. Connection elements may be welded directly over the seam. Minimal heat input results in low residual stress and improved dimensional stability.

Fabrication Advantages

Parallel flanges eliminate beveled washers. Square corners (≤ 0.02 in radius) simplify plate fit-up. Pickled or blasted surface condition is weld-ready upon delivery.

Recommended Drawing Note

Fabrication of ASTM A1069 / ASTM A1123 laser-fused stainless steel profiles shall be performed in accordance with AWS D1.6 using standard prequalified welding procedures applicable to ASTM A240 base materials.

Fabrication FAQ's

Fabrication and Inspection Considerations for Laser-Fused Profiles

Question	Technical Response
Do laser fusion seams require grinding prior to attaching stiffeners or connection plates?	No. Laser fusion seams typically exhibit less than 1 mm of weld reinforcement. In the vast majority of structural applications, this does not interfere with fit-up and does not require grinding.
Is the laser fusion seam brittle or susceptible to cracking?	No. The rapid solidification associated with laser welding produces a fine-grained microstructure. Mechanical properties, impact toughness, and corrosion resistance meet or exceed those of the ASTM A240 base material.
Can ASTM A1069 / A1123 profiles be cut using conventional shop methods?	Yes. Laser-fused profiles may be cut using plasma, laser, waterjet, or mechanical saws in the same manner as standard stainless steel plate.
Will welding over the laser seam cause distortion or seam separation?	No. The laser fusion seam is a complete joint penetration (CJP) weld formed during manufacturing. Due to the low residual stress of laser fusion, downstream welding typically results in less distortion than hot-rolled or conventionally welded members.
Are special inspection procedures required for the laser fusion seam?	No. The laser fusion seam is part of the manufactured product. Standard AWS D1.6 inspection requirements apply only to fabrication welding performed by the fabricator. No additional seam-specific inspection is required.

TECHNICAL APPENDIX – LASER-FUSED STAINLESS STRUCTURAL MEMBERS

ASTM A1069 vs ASTM A1123

ASTM A1069 covers laser-fused stainless structural shapes including I-shapes, channels, angles, and tees. ASTM A1123 covers laser-fused hollow structural sections (HSS). Both standards reference ASTM A240 plate as the governing base material.

Laser Fusion vs Conventional Fabrication

Laser fusion utilizes high energy density with extremely low total heat input, producing narrow heat affected zones and minimizing residual stress while achieving complete joint penetration.

Metallurgical Characteristics

Rapid solidification produces a fine-grained microstructure. Mechanical properties, corrosion resistance, and toughness meet or exceed base plate values.

Residual Stress and Distortion

Laser-fused members exhibit lower residual stress than hot-rolled or conventionally welded shapes, improving straightness during cutting, welding, and erection.

Inspection and Code Acceptance

The laser seam is a manufacturing CJP weld; no special inspection beyond AWS D1.6 requirements is required for downstream fabrication welding.

Engineer of Record Guidance

ASTM A1069 and A1123 members may be specified using standard stainless structural design assumptions without reduction factors or special detailing provisions.