SECTION 01 4444

OFFSITE WELDING & JOINING REQUIREMENTS

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| New in this revision: Submittals clarified, including that they be sent with the Div 02-50 Section to which they pertain; clarified inspection requirements; numerous other minor changes throughout. |

Template available online at <http://engstandards.lanl.gov/specs.shtml>

In Word, USE TOOLS-OPTIONS-VIEW-HIDDEN TEXT TO SEE blue Authors notes

**This Section includes administrative and procedural requirements for offsite welding activities. This section is designed to be used in conjunction with other LANL sections that invoke project-specific requirements as well as applicable codes & standards for welding.**

This template must be edited for each project.  In doing so, specifier must add job-specific requirements.  Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.  Once the choice is made or text supplied, remove the brackets. The specifications must also be edited to delete specification requirements for processes, items, or designs that are not included in the project -- and specifier’s notes such as these.   To seek a variance from requirements in the specifications that are applicable, contact the Engineering Standards Manual (ESM) Welding [POC](http://engstandards.lanl.gov/ESM_Chapters.shtml#esm13). Please contact POC with suggestions for improvement as well.  
  
When assembling a specification package, include applicable specifications from all Divisions, especially Division 1, General requirements.  
  
Specification suitable for ML-1 through ML-4 projects.  
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Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

1. GENERAL
   * + 1. SUMMARY
          1. This Section includes requirements for offsite welding and joining as required by other sections of the Specification:

Section includes items designed for LANL—i.e., engineered items.

Exception: Stair units under 36 inches (these are low risk).

Section is not applicable to manufactured commercial items where a part or model number exists and there is no customization (thus truly “commercial-off-the-shelf—COTS”); here, welding requirements are not subject to LANL approval.

* + - * 1. Pressure-retaining, code-stamped items shall only be welded on by organizations with the applicable ASME or National Board Certificate(s) of Authorization. Certificate holders are organizations that have been authorized by the ASME or The National Board to perform various activities in accordance with the requirements of the ASME Boiler and Pressure Vessel Code or The National Board.
        2. Onsite welding shall be in accordance with applicable codes and Section 01 4455, *Onsite Welding and Joining Requirements,* which invokes and implements the LANL Welding Program (ESM Chapter 13).
        3. The LANL Welding Program and General Welding Standards (GWSs) referenced are available here: <http://engstandards.lanl.gov/ESM_Chapters.shtml#esm13>
      1. SUBMITTALS
         1. The following documents shall be submitted and approved by LANL Welding Program SME prior to the start of welding. Submit per 01 3300 procedures.  Do not submit with reference to this Section (01 4444), but rather to each and every spec Div 02–50 section to which they apply. The following documents are discussed in greater detail later in this Section.

Welding/Brazing/Bonding Procedure Specifications with the associated Procedure Qualification Records (PQRs)

Welder/Brazer/Bonder Performance Qualification Records (WPQR) and continuity logs/statement if welding certifications are greater than six months old.

Weld Filler Material Control Procedure for high risk applications

Filler Material Certified Material Test Reports (CMTRs) for high risk applications

Post-Weld Heat Treatment Procedures (where applicable)

Inspector qualification records

Inspection Procedures where required by code

Inspection reports and weld maps

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Delete Design article if design is provided by LANL. When all welding is to a code, delete second half of design article regarding non-code equivalent work.

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* + - 1. Design - Design of welded Structures, Systems and Components (SSC) shall meet the requirements of LANL ESM and or as a minimum identify applicable codes and standards including requirements of graded application. For welding activities that would normally fall outside the defined scope of specified national consensus codes and standards for fabrication and welding, such codes and standards shall be adopted and used to the extent possible.

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*Note- Numerous codes & standards define graded approaches which specify multiple levels of welding requirements. Designs which specify the codes & standards listed below shall also specify service or category and applicable welding requirements these codes identify:*

* + - * *ASME B31.1 – Material, Temperature & Pressure*
      * *ASME B31.3 – Service Categories D, Normal, M, & High Pressure*
      * *ASME B31.5 – Safety Group A3 & B3*
      * *49 CFR Part 192 -- Class, location*
      * *AWS D1.1 – Static, Cyclic, and Tubular Structures*
      * *AWS D1.6 – Static, Cyclic*

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* + - * 1. Engineering drawings shall specify all fillet weld sizes and partial penetration weld sizes.
        2. Shop drawings shall show weld symbols and requirements to define the work and enable design review and inspection this shall include fillet weld sizes and partial penetration weld sizes.
        3. Applications that are not similar in materials or processes to a specified Code or Standard shall define and produce the following:

Design basis; i.e., mechanical properties, part geometry, acceptance criteria.

A method to verify that the welding procedure can produce acceptable welds.

A method to demonstrate that the welder has the skill to produce sound welds in accordance with the specified welding procedure (reference LANL [GWS 1-02](https://www.lanl.gov/orgs/eng/engstandards/ESM_Ch13.shtml#ch13_vol1), *Administrative Control of Welding and Brazing (e.g., para 5.3.B in r7*).

Identify methods and define inspections required to judge welds against predetermined acceptance criteria.

Provide documentation that these objectives have been defined and identified.

* + - 1. Qualified Procedures - Welding shall be performed in accordance with properly qualified and approved welding procedure specifications (WPS) that have been qualified in accordance with applicable codes and standards:
         1. AWS Standard Welding Procedure Specifications and documented prequalified welding procedures may be used as allowed by applicable codes and standards.
         2. For any nuclear safety or similar work only: WPSs used on structures, systems and components (SSC) which are designated ML‑1 (or safety class) or ML-2 (or safety significant) shall be approved by LANL Welding Program Administrator prior to welding.
         3. Critical and seismic load-resisting system (SLRS) structural WPSs shall be approved by LANL Welding Program Administrator prior to welding.
         4. Heat treating as required.
         5. ASME Code and R-stamped welded components shall be approved by LANL Welding Program Administrator prior to welding.
      2. Joining (solvent bonding, adhesive, and electro-fusion joints): When required by consensus codes and standards (e.g., ASME B31.3 & 49 CFR Part 192), joining shall be done by qualified personnel following approved procedures.
      3. Certified Personnel - Welding and brazing shall be performed by certified welders and brazers who have demonstrated their welding brazing qualifications by test.
      4. Control of Consumables - Consumable welding materials shall be properly procured, received, stored, controlled, and issued to ensure weld quality and prevent use by unqualified personnel (ref. LANL ESM Ch. 13 GWS 1-03).

For SSCs that are designated ML-1 or ML-2, welding consumables shall be provided with Certified Material Test Reports (CMTRs) traceable by heat/lot number to the point-of-use.

CMTRs shall meet the requirements of AWS A5.XX Standards for Welding Filler Materials. Reports shall detail physical and chemical properties of the material(s) and be in accordance with the applicable national or international material standards (e.g., ASTM, ASME) for the material type.  CMTRs must be the results of test performed by the material manufacturer or by a material verification process, if such a process is allowed by the standard governing the material type, and must specify the test method and the source of the acceptance criteria.  Each CMTR must be signed by an authorized representative of the testing entity, be traceable to the materials delivered via heat, lot, or other identification, and must meet any content requirements of the applicable national or international standards invoked for the material type. Filler material inspection records shall be submitted and accepted prior to start of affected work.

* + - 1. Welding inspection - shall be performed by qualified personnel in accordance with applicable consensus codes and standards, and as specified in design drawings and/or specifications in the absence of applicable codes and standards.

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*Caution - Numerous codes & standards define two levels of inspection. Examples of this are AWS D1.1 & AWS D1.6, ASME B31.1 & B31.3*

*Construction or fabrications designed to these codes shall be coordinated between the Subcontractor/fabricator and LANL Project Team for the required OWNER Inspection of in-process and final welding inspections. LANL Project Team may assign LANL to perform both construction/fabrication & owners inspections.*

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* + - * 1. Inspector Qualification/Certification – When inspectors are required to be qualified/certified by the referenced code & standard, submit qualification/certification records for:

Visual Inspectors (for welding & bonding)

NDE Inspectors

* + - * 1. Welding inspections required by consensus codes and standards or design shall be documented. Welding Inspection Reports shall identify at least the following:

Method, type, date, and extent of inspection or test.

Acceptance/rejection as based on the criteria specified by the design documents; reference to information on action taken in connection with nonconformances.

Code or standard used for acceptance and class, category, or service.

Record attributes inspected and severity.

Identification and location of welds inspected (e.g., maps).

M&TE – Identification and date of calibration expiration for measuring and test equipment used.

Name, date, & signature of person who performed the inspection.

Ref. ESM, Chapter 13, Volume 1, GWS 1-02 on Inspector’s qualification level.

* + - * 1. Inspection Procedures - When inspection procedures are required by the referenced code & standard submit inspection procedures.

NDE Procedure Qualification Records - When inspection procedures are required to be qualified by the referenced code & standard submit procedure qualification records.

* + - * 1. Inspection results, including weld maps, shall be documented and provided within one day after completion of associated inspection work.
        2. When applicable codes and standards specify two levels of inspection, the qualification of the owner’s inspector and inspections will be done by LANL as specified in ESM, Chapter 13, Volume 1, GWS 1-02 (e.g., Para. 5.9); see: <http://engstandards.lanl.gov/esm/welding/vol1>
        3. LANL reserves the right of access to all welding locations and to have its own qualified inspectors and personnel present during all welding activities.

At least five working days’ notice is required prior to inspection & testing activities planned by the fabricator so that LANL can arrange for its staff’s participation.

Hold Points shall be identified in the construction/fabrication schedule to allow for LANL’s inspection activities.

* + - 1. Subcontracted Welding
         1. Welding activities shall have all specifications, drawings and their applicable requirements flowed down to any sub-tier subcontractors who perform those activities.
      2. RECORDS
         1. The following documents shall be collected and maintained in the project files:

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| Project Record Item | 01 4444 Reference |
| Welding/brazing/bonding procedure specifications used (e.g., Subcontractor’s or LANL WPS/BPS and PQR) | 1.4 |
| Welder/brazer/bonder performance qualification records (WPQR) | 1.6 |
| Inspector/NDT tech. qualification records | 1.8.A |
| Inspection reports including weld maps | 1.8.B, D |
| Inspection procedures | 1.8.C |
| For nuclear safety and similar projects (ML-1, ML-2, safety class, and safety significant SSCs), CMTRs of filler material traceable to weld in which consumed | 1.7.1 |
| Heat treatment charts or records as required | 1.2 |

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

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Do not delete the following reference information:

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THE FOLLOWING STATEMENT IS FOR LANL USE ONLY

This project specification section is based on LANL Master Specification Section 01 4444 Rev. 2, dated May 24, 2021.