SECTION 01 4000

QUALITY REQUIREMENTS [NON-NUCLEAR]

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LANL MASTER SPECIFICATION SECTION

Word file at <https://engstandards.lanl.gov>

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| Rev. 8 Summary of Changes: Removed QA program requirements to deconflict with Exhibit H. Test & Inspection Plan requirements and roles revised. Clarified design change and NCR process to account for unexpected time-sensitive field conditions. Added calibration and setpoint requirements. Other changes throughout. |

This version of Section 01 4000 is to be used for non-nuclear projects including projects in nuclear facilities that only involve ML-4 Work. This version may also be used for ML-3 non-nuclear work; however, the Project Engineer shall coordinate with the designated Quality Assurance representative / QSME to determine the appropriate quality requirements and associated submittals that are applicable to the ML-3 non-nuclear work and edit this specification section.

In the title of this section at the top of the page, delete “[NON-NUCLEAR]”. It is not part of the title referenced by other sections. Other sections refer to this one as “01 4000, Quality Requirements” and so this title must match for consistency.

This template must be edited for each project. In doing so, the user must add the project-specific requirements. Brackets are used in the text to indicate designer choices or locations where text must be supplied by the author. Once the choice is made or text supplied, remove the brackets. This section must also be edited to delete requirements for processes, items, or designs that are not included in the project. Author notes, given between asterisks such as this one, must also be deleted. To seek a variance from requirements that are applicable, contact the Engineering Standards Manual (ESM) General POC. Please contact POC with suggestions for improvement as well.

When assembling a specification package, include applicable sections from all Divisions, especially Division 1, General requirements.

Submittals required by this section shall be routed for review and approval under the 01 4000 Section for LANL documentation purposes, except where otherwise noted.

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1. GENERAL
	1. SUMMARY
		1. This section includes quality assurance (QA) requirements for ML-4 [and ML-3 non-nuclear] items and services. Requirements are driven, in part by DOE Order 414.1D, *Quality Assurance*; SD330, *Los Alamos National Laboratory Quality Assurance Program*; the LANL Engineering Standards Manual, Chapters 16, IBC Program (International Building Code); and 15–Commissioning. In accordance with DOE Order 414.1D, the consensus standard from which quality requirements are derived and included based on a graded application is ASME NQA-1, 2008 with the 2009 addenda.
			1. ML-4: Non-Safety. System, structures, and components (SSCs) shall be constructed and/or procured using the applicable codes and standards and the general QA requirements provided in this section. ML-4 work shall be performed in accordance with the [approved Subcontractor’s Quality Assurance Program], requirements of this specification, and documented processes that are compliant with DOE Order 414.1D.
			2. [ML-3 Non-Nuclear: SSCs designated as ML-3 that are not associated with Hazard Category 2 or 3 and less than hazard category 3 nuclear facilities (i.e., not designated as Other Hazard Controls or Defense-In-Depth SSCs).]
		2. The terms “Quality Requirements” and “Quality Assurance” are synonymous and are used interchangeably in this specification. Quality Assurance applies to all Work types using a risk-based graded approach.
		3. Construction and commissioning activities shall be performed under a Quality Assurance Program and associated implementing procedures that have been reviewed and approved by LANL prior to performing work.
	2. DEFINITIONS
		1. Hold Point: A mandatory verification point in the progression of a process activity that cannot be passed without being released by the responsible party that established the hold point. A hold point cannot be bypassed without the specific release by the designating organization by an approved Hold Point Waiver.
		2. International Building Code (IBC): Published by International Code Council (ICC).
		3. International Code Council (ICC): Publisher of IBC and parent of ICC-ES.
		4. Installer: An installer is the Construction Subcontractor or another entity engaged by the Construction Subcontractor or engaged by LANL, either as an employee, lower tier construction subcontractor or subcontractor to a lower tier construction subcontractor, to perform a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.
		5. LANL Building Official (LBO): LANL’s Authority for the Building Program as detailed in the Engineering Standards Manual Chapter 16, *IBC Program*.
		6. Measuring and Test Equipment (M&TE): Devices or systems used to calibrate, measure, gage, test, or inspect to control or acquire data to verify conformance to specified requirements.
		7. Management Level (ML): Grading based on an estimation of consequences of failure to LANL as an institution, which helps in establishing the degree of technical/administrative oversight and control (e.g., quality assurance/quality control) required to ensure that SSCs are capable of meeting their required function in the protection of the public, worker, environment, classified and special nuclear material (SNM) assets, and/or their ability to support meeting high-level institutional mission requirements.

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Delete next paragraph if project does not require mockups. Revise if any mockups are to be constructed at an off-site location.

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* + 1. Mockups: Full-size, physical assemblies that may be constructed on site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not samples. Approved mockups establish the standard by which the work will be judged.
		2. Nationally Recognized Testing Laboratory (NRTL): A nationally recognized testing laboratory according to 29 CFR 1910.7.
		3. National Voluntary Laboratory Accreditation Program (NVLAP): A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
		4. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
		5. Product Testing: Tests and inspections to establish product performance and compliance with industry standards that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to the LBO.
		6. Quality Assurance (QA): All those planned and systematic actions necessary to provide adequate confidence that a structure, system, or component will perform satisfactorily in service.
		7. Quality Control (QC): Specific planned and systematic actions objectively verifying that quality has been achieved including but not limited to tests, inspections, and related actions.
		8. Source Verification: Planned and documented acceptance activities performed by qualified personnel at the manufacturer’s or supplier’s location, usually during the manufacturing or procurement process before shipment.
		9. SSI: Statement of Special Inspections. An inspection plan exclusively for the requirements of IBC Chapter 17, per ESM Chapter 16, IBC-IP, Att. B template.
		10. Subcontractor: The entity performing fabrication or physical construction activity and may also perform delegated design activities; normally the general contractor (a subcontractor to DOE).
		11. Testing Agency: A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.
		12. Test and Inspection Plan (TIP): Test and Inspection Plan with the following distinctions inherent in its development:
			1. TIP Template: A comprehensive list of tests and inspections invoked by LANL’s adopted codes, standards, and DOE directives. The TIP Template is not specific to a project and is available electronically within Chapter 16 of the ESM.
			2. TIP: A detailed plan identifying all applicable tests and inspections for a project as well as how those tests and inspections integrate into a Work Breakdown Structure or Construction Schedule, submitted by the constructor.
		13. Witness Point: A verification point in the sequence of work which is designated for LANL to do monitoring and which Work may proceed after notification of the designated organization.
		14. Work Breakdown Structure: A installation-oriented hierarchical decomposition of the work to be executed by the constructor throughout the construction phase.
	1. CONFLICTING REQUIREMENTS
		1. General: If compliance with two or more requirements sets and/or standards is specified and the requirements sets and/or standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to LANL for a decision before proceeding.
		2. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. Specified numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to LANL for a decision before proceeding.
	2. ACTION SUBMITTALS

All items in this section shall be submitted under this specification section except where noted otherwise.

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Quality plans are typically not required for LANL self-perform work. For subcontracted work, this quality plan submittal would augment any bid-provided plan with details as described below, unless the Subcontractor’s quality plan is sufficient on its own. Author shall consult with Quality SME with procurement and subcontract technical representative (STR). For very simple projects, the plan may not even be necessary.

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* + 1. [Project Quality Assurance Plan: Subcontractor shall submit a Project-Specific Quality Assurance/Quality Control (QA/QC) Plan in accordance with Exhibit H for review and approval by LANL prior to performing quality affecting Work. For this subcontract, quality affecting Work includes siting, designing, procuring, fabricating, constructing, handling, shipping, receiving, storing, cleaning, erecting, installing, inspecting, testing, repairing, modifying, and decommissioning. The Plan shall address how the Subcontractor implements the requirements of Exhibit H and this specification Section (01-4000). The Plan shall identify key positions and roles and responsibilities and reference the specific quality related implementing procedures and forms applicable to the Work and any lower tier Subcontractors. The Plan shall reference the Test and Inspection Plan (TIP) described below and discuss execution and documentation of required tests and inspections.]
		2. Licenses, Certifications, and Qualification Data: Name and address of Testing Agencies to be utilized on the project. The testing agencies will be reviewed to verify that they have been approved by the LBO in accordance with Article 1.7, Qualification Requirements. Submit copies of licenses, certifications, correspondence, records, and similar documents used to establish compliance with standards and regulations that pertain to performance of the Work. Submit per Section 01 3300 procedures. Do not submit with reference to this section (01 4000), but rather to every spec Div. 02–48 section to which they apply.
		3. Construction Schedule: Submit to the subcontract technical representative (STR) and members of the integrated project team (IPT) identified by the STR the following:
			1. Three-week look-ahead of upcoming work activities including inspection expectations.
			2. Provide a minimum of 48-hour notice to the appropriate inspection authority or testing agency for scheduling tests and inspections of the need for the inspection (i.e., hold and witness points) unless spec section specifically indicates otherwise. Shorter notice may result in delay of inspection or testing service.

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1. TIPs are typically not required for lower-risk work; see ESM Ch. 16 (e.g., IBC-GEN) minimum threshold and delete when not required.
2. For self-performed work, the responsible engineer who is typically a field engineer but can be a system engineer, design engineer or any individual designated by management will develop a project-specific TIP that not only identifies the applicable tests and inspections based on project scope, but also integrates test and inspection requirements within a Work Breakdown Structure for the project. The draft TIP will be provided to the LANL construction organization for review and, once acceptable to them (and AHJs/engineering), issued and maintained by ES Field Engineering on behalf of constructor (e.g., LOG or MSS).

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* + 1. Test and Inspection Plan (TIP): Submit a TIP as described below:

The TIP template outlining common test and inspection requirements for LANL construction projects, organized by construction installation type, is available in electronic form in the ESM Ch 16 and shall be edited by the Constructor to reflect project scope. The Constructor shall provide a TIP a minimum of 30 days prior to commencement of the Work. LANL will review and may add additional inspections and witness or hold points. The TIP shall include inspections required by specifications, applicable codes, and applicable standards in tabular form and shall be integrated with a Work Breakdown Structure (WBS) or within a 30 day look ahead to identify milestones/prerequisites for each test and inspection:

* + - 1. Test or inspection ID.
			2. Brief description of the test or inspection.
			3. Identify if inspection or test is a witness or hold point.
			4. Entity responsible for performing each test and inspection (e.g., subcontractor qualified personnel, third party inspector, LANL building inspector, LBO-approved special inspector, or structural engineer-of-record)
			5. Reference to code, standard, or specification requiring the test or inspection.
		1. Test and Inspection Reports: Submit per 01 3300 procedures. Do not submit with reference to this Section (01 4000), but rather to each and every Div. 02–48 section to which they apply. Prepare and submit certified (signed/endorsed) written Test and Inspection reports that include but is not limited to the following applicable items: [The list below should be revised to suit the project.]
			1. Date of issue
			2. Project title and number
			3. Name, address, and contact information of organization performing test or inspection
			4. Dates, times (as applicable) and location of samples, tests, or inspections
			5. Description of the work, test boundaries, test, and inspection method
			6. Identification of product and specification section
			7. Complete test or inspection data
			8. Test and inspection results, comparison with acceptance criteria and tolerances, and an interpretation of test results to assure that test requirements have been satisfied
			9. Reference to information on action taken in connection with test deviations and inspection non-conformances
			10. Record of temperature, weather conditions, and other pertinent test conditions at time of sample taking and testing and inspecting, if relevant
			11. Listing of M&TE including serial number, and calibration due date for all test and inspection equipment that requires calibration
			12. Name, signature, and date of responsible inspector or test authority and a certification statement that indicates whether tested or inspected work complies with the project requirements (i.e., adopted codes, standards, and DOE directives and any additional Subcontract requirements); report shall be signed by the professional certifying that the tests submitted either complies with the requirements, or comments on the outcome of the test, as applicable. It is the responsibility of the Subcontractor to confirm that the report has been signed and that LANL STR acknowledges the outcome of the tests or inspection.
			13. Recommendations on retesting and re-inspecting.
		2. For IBC Work, for each subtier Subcontractor responsible for the fabrication or erection of a main wind- or seismic-force-resisting system, designated seismic system, or a wind- or seismic-resisting component listed in the Statement of Special Inspections, submit a Statement of Responsibility per ESM Chapter 16 Section IP Att. H prior to the commencement of Work. Submit per Section 01 3300 procedures. Do not submit with reference to this section (01 4000), but rather to each spec Div. 02–48 section to which they apply.
		3. Intended penetrations through concrete when field routing (for structural SME review).
	1. QUALITY ASSURANCE
		1. General QA Requirements
			1. Work (including software and firmware work activities) shall be performed, at a minimum, in accordance with the requirements of the Exhibit H for the Subcontract and the Subcontractor’s approved QA Program.
			2. All work shall be performed in accordance with Subcontractor’s Quality Assurance Program [and the Project Specific QA/QC Plan] as reviewed and approved by LANL.
			3. Work shall be performed in accordance with the approved design documents. Design questions and design change requests must be transmitted in accordance with Subcontract requirements via formal documents such as requests for information (RFI), engineering requests for information (ERFI), field change requests (FCR) or design revision notification (DRN) for construction work, or subcontractor deviation disposition request (SDDR, Form 2178) for fabrication of engineered equipment. No design changes will be implemented unless formally approved by the engineer of record (EOR) and subsequently by LANL through one of the above documented processes. An RFI is not a change document and is not to be used to implement design changes.
			4. If an immediate design decision or change is necessary due to the time sensitivity of a work task (e.g., placement of concrete), design changes may be implemented in the field with engagement from the EOR and approval by the LANL design authority representative (DAR) prior to approval of a formal design change document. The design change shall be documented (i.e., via FCR or DRN) by the close of the following business day of the change.
			5. Tools, gages, instruments, and other measuring and test equipment used for acceptance determinations shall be controlled, calibrated with NIST or other industry recognized national or international traceable standards, at specific periods, adjusted, and maintained to required accuracy limits.
			6. Items that do not conform to specified requirements shall be controlled to prevent inadvertent installation or use. Controls shall provide for identification, documentation, evaluation, segregation when practical, disposition of nonconforming items, and for notification to affected organizations in accordance with the contract Exhibit H. Continuing work with nonconforming item(s) without a fully dispositioned nonconformance report (NCR) is at the discretion of the Subcontractor. However, rework or repair, up to and including replacement, may be required contingent upon subsequent NCR disposition. In certain circumstances, proceeding with work using known nonconforming item(s) may be preferable where failure to proceed could prove more impactful than the original nonconformance (e.g., a concrete cold joint due to delayed concrete pours) and requires the initiation of an NCR by the close of the following business day.
			7. The LANL STR may pause work on affected systems, structures, or components for unresolved or ongoing quality concerns. Notification will be provided by LANL to Subcontractor specifying the quality concern. Subcontractor shall respond within 24 hours with proposed corrective action, time frame for implementation, and identify impact to other related Work.
	2. QUALITY CONTROL
		1. General QC Requirements
			1. Subcontractor Responsibilities:
				1. Engage a qualified, LBO-approved, testing agency to perform quality-control work.
				2. Subcontractor shall not employ the same entity engaged by LANL, unless agreed to in writing by LANL prior to contract award.
				3. Notify LANL STR at least 48 hours in advance of the time when work will be performed that requires testing or inspecting, unless otherwise indicated in individual sections. Note that testing and inspections identified as LANL witness or hold points require additional notification.
				4. Provide inspector’s access to Approved for Construction documentation and associated acceptance criteria.
				5. Submit a certified (signed/endorsed) written report of each quality-control test or inspection per this section.
				6. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in submittal procedures of Section 01 3300.
			2. Subcontractor shall inspect and document acceptance of work in accordance with [the approved QA\QC plan as applicable and procedures and technical requirements] prior to notifying LANL of readiness for LANL required inspection. The first line confirmation of compliance with technical requirements is the responsibility of Subcontractor QA/QC personnel, not LANL personnel.
			3. Subcontractor shall verify, inspect, and document that systems are complete, constructed, and configured per Approved for Construction drawings and specifications including any design changes prior to commencement of acceptance testing activities. Verification of system completion is a Hold Point to be validated by LANL prior to authorization of acceptance testing by Subcontractor.
			4. Testing Agency Responsibilities (for services retained by Subcontractor): Cooperate with AE and Subcontractor in performance of duties. Provide qualified personnel to perform required tests and inspections. The Subcontractor’s Testing Agency shall:
				1. Notify AE and Subcontractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
				2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
				3. Submit a certified (signed/endorsed) written report of each test, inspection, and similar quality-control service through Subcontractor.
				4. Conduct and interpret tests and inspections and state in each report whether tested and inspected Work complies with or deviates from requirements.
				5. Not release, revoke, alter, or increase the Subcontract Document requirements or approve or accept any portion of the Work unless it conforms to the LBO approved subcontract documents.
				6. Not perform any duties of Subcontractor.
			5. Control and Storage of All Items
				1. For all items, controls shall be established to assure that only correct and accepted items are used or installed and that those items conform to approved submittals, as applicable. Identification shall be maintained on the items or in documents traceable to the items, or in a manner that assures that identification is established and maintained.
				2. For items that require receipt inspection, items procured shall be stored/staged outside of the construction site boundary, in designated areas for completion of receipt inspection activities prior to moving them within the construction area for installation.
				3. Costs associated with storage/handling of items to be stored on LANL property are the responsibility of Subcontractor.
				4. Subcontractor shall control the handling, receiving, storage, cleaning, packaging, shipping, and preservation of items to prevent damage or loss and to minimize deterioration. Handling, storage, and shipping of items shall be conducted in accordance with established work and inspection instructions, drawings, specifications, shipment instructions, or other pertinent documents or procedures specified for use in conducting the activity.
			6. Associated Services (actions and efforts of Subcontractor): Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide auxiliary services as requested. Notify agency in advance of operations to permit assignment of personnel. Provide the following:
				1. Access to the work
				2. Incidental labor and facilities necessary to facilitate tests and inspections
				3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples
				4. Facilities for storage and field curing of test samples
				5. Delivery of samples to testing agencies
	3. QUALIFICATION REQUIREMENTS
		1. Qualification requirements specified below establish the minimum qualification levels for the skills or organizations listed; individual specification sections detail additional requirements.

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If more detailed requirements are needed for paragraph B below, add this information to specific individual sections. Examples include Installer employing workers trained and approved by manufacturer, Installer being acceptable to manufacturer, and Installer being an authorized representative of manufacturer for both installation and maintenance.

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* + 1. Installer: The installer shall have experience in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this project, whose work has resulted in construction with a record of successful in-service performance.
		2. Manufacturer: A firm with experience in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
		3. Fabricator: The fabricator shall have experience in producing products similar to those indicated for this project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
		4. Steel Fabricator Qualifications: Firms performing structural fabrication subject to IBC Chapter 17 shall be approved by the LBO prior to performing work. In cases where the desired fabricators are not LBO-approved and with LBO permission, Subcontractor shall arrange for the IBC-related activities to be inspected during fabrication in the shop by an LBO-approved special inspector.
		5. Professional Engineer: An engineer registered to practice in New Mexico and experienced and registered as providing engineering services of the discipline and kind indicated.
		6. Testing Agency: An NRTL, NVLAP, or other independent agency with the experience and capability to conduct the tests and inspections indicated, as documented according to ASTM E329, *Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection*; with the additional qualifications specified in individual Sections; and approved by the LBO per ESM Chapter 16, Section IBC-TIA. Subcontractor shall utilize only LBO-approved testing agencies.
		7. Inspection and Test Personnel: Personnel who conduct inspections and tests must be qualified in accordance with the applicable code, standard, regulation, specification, Subcontractor’s QA Program and Procedures, Exhibit H, and/or other Subcontract requirements. Prior to assigning personnel to perform inspection and test activities, Subcontractor shall determine and document that the individuals have the experience or training commensurate with the scope, complexity, or special nature of the activities. Inspection for acceptance shall be performed by qualified persons other than those who performed or directly supervised the work being inspected.
	1. PRECONSTRUCTION TESTS
		1. Preconstruction Testing: Where a testing agency performs preconstruction testing, comply with the following:
			1. Subcontractor responsibilities include the following:
				1. Provide test specimens representative of proposed products and construction.

Submit the specimens in a timely manner with sufficient time, to prevent delaying the work, for testing and analyzing results.

Provide configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate the capability of products to comply with performance requirements.

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Subparagraph below attempts to ensure that tested assemblies will be representative of actual construction. This requirement may complicate testing and add cost.

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Build site-assembled test assemblies and mockups using installers who will perform same tasks for the project.

Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed work.

When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups. Do not reuse products on the project.

* + - 1. Testing Agency Responsibilities:
				1. Submit a certified (signed/endorsed) written report of each test, inspection, and similar quality-assurance service to LANL with copy to Subcontractor.

Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the subcontract documents.

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Delete paragraph and subparagraphs below if not required. If retaining, indicate location, size, and other details of specific mockups on Drawings or in individual specification sections. Revise wording if only one mockup is required.

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* + 1. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish as required to comply with the following requirements, using materials indicated for the completed Work:
			1. Build mockups in location and of size indicated.
			2. Notify LANL a minimum of 7days in advance of dates and times when mockups will be constructed.
			3. Demonstrate the proposed range of aesthetic effects and workmanship.
			4. Obtain LANL’s approval of mockups before starting Work, fabrication, or construction. Allow LANL 7days for initial review and each re-review of each mockup.
			5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
			6. Demolish and remove mockups when directed, unless otherwise indicated.
	1. SPECIAL INSPECTIONS AND TESTS
		1. LANL will conduct Special Inspections in accordance with the SSI. Special Inspections shall not be conducted by Subcontractor or Test Agency hired by Subcontractor.
		2. Onsite Special Inspectors are provided by LANL at LANL expense.
		3. For offsite fabrication work where Subcontractor does not choose a LANL (LBO)-approved fabricator, special inspection by LANL or LANL-approved agency is at Subcontractor’s expense.
		4. Regardless of location, third-party testing and nondestructive examination (NDE) is at Subcontractor’s expense.
		5. Structural steel fabricators whose work includes seismic-force-resisting structures (SFRS) or demand-critical welds are subject to project-specific IBC reviews and approvals for processes, procedures, qualifications and materials prior to start and may require Source Verification/shop inspections by LANL- approved IBC Inspectors prior to, during, or post fabrication.
1. PRODUCTS (Not Used)
2. EXECUTION
	* 1. Work shall only be accomplished to LANL-approved, controlled design (specifications, drawings, and amendments to same such as field change requests, subcontractor deviation disposition requests, etc.), of which a copy of latest must be maintained on the work site by Subcontractor.
		2. This design, along with the Subcontract and applicable codes and standards included in the subcontract, specifications, and drawings shall be complied with and must be contractually “passed-down” to any sub-tier fabricators, testing agencies, or others subcontracted or assigned by the Subcontractor.
	1. ACCEPTABLE TESTING AGENCIES
		1. Approved IBC listing in Engineering Standards Manual Chapter 16.
		2. LBO approval does not negate Subcontractors’ responsibility to assure fabricators, testing, and NDE agencies perform correctly.
	2. CALIBRATION AND SETPOINT ADJUSTMENT
		1. Calibration: Where the design or operability requires initial or subsequent SSC calibration:
			1. Verify the instrument details (e.g., manufacturer, model number, size, material of construction, range, etc.) against the design.

2.    Verify tools, gages, instruments, and other measuring and test equipment (M&TE) used for acceptance determinations is calibrated per the Quality Assurance article (e.g., 1.5.A.5) of this specification section).

3. Subject the component under calibration to input variations at a number of test points (ascending and descending) to sufficiently verify its response over the full span. The following test points shall be used when no other specific direction is given in the applicable procedure or work document:

1. Switches – Trip and reset. Switches for which no reset value is specified or which have fixed dead band, the reset value shall be documented on the calibration record for reference.
2. Valves – Full open/Full closed; modulating valves shall also be verified at mid-travel (50%).
3. Mechanical and Electrical Indicator and/or Transmitters – at or near (within 10%) 0, 20, 40, 60, 80, and at or near 100% of span or reading increasing and 80, 60, 40, 20 and at or near 0% of span or reading decreasing.

Note: The instrumentation calibration range is specified per the process operation or conditions requirements. The range covers the abnormal and normal operation conditions as well as the set points but cannot be over-ranged; otherwise, the calibration values will not work for the set point calculation/equations.

* + 1. Setpoint implementation:
1. Install/implement setpoints provided in the design.  Where the design lacks clear direction on such, request from design agency; adjustable devices including switches, valves, indicators, transmitters, and controllers shall not be turned over to LANL without setpoints established and working as intended.
2. Provide as-left condition of setpoints as a deliverable to Design Agency and LANL.
	1. REPAIR AND PROTECTION
		1. Protect construction exposed by or for quality-control service activities.
		2. Repair and protection are Subcontractor's responsibility, regardless of the assignment of responsibility for quality-control services.
		3. Comply with all LANL standard procedures and processes as specified in the Subcontract including safety, quality (such as hold tags), environmental, and other signs, tags, warnings, etc. For building work, Subcontractors shall comply with the applicable requirements of the IBC (and IEBC, as applicable) as amended by LANL in Engineering Standards Manual Chapter 16 including IBC-GEN Attachment A, LANL Building Code (LBC) and Attachment B, LANL Existing Building Code (LEBC). Where the LANL Standards including this chapter invoke the IBC, interpret to mean this LANL version of the Building Code.

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 4000 (non-nuclear) Rev. 8, dated 7 September 2022.