SECTION 01 4000

QUALITY REQUIREMENTS [NUCLEAR PROJECTS VERSION]

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LANL MASTER SPECIFICATION SECTION

NUCLEAR PROJECTS VERSION] above when editing this section. Other sections refer to “01 4000 Quality Requirements” and this title needs to match them.

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

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| Rev. 1 Summary of Changes: Removed self-perform usage. Reduced 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. Eliminated VIT template. Other changes throughout. |

**No self-perform usage: This section includes administrative and procedural requirements for facility construction QA and QC performed by Subcontractors. This section should not be used for work performed by LANL; such work will be to the applicable LANL and facility programs, procedures, and work instructions.**

This version of Section 01 4000 is to be used for nuclear projects (i.e., new Hazard Category 2 or 3 nuclear facilities and less-than-hazard-category-3 nuclear facilities, and modifications to same) that may include ML-1 through ML-4 Work. This Section includes quality requirements beyond those required to comply with codes and standards to provide increased confidence in areas including but not limited to procurement, storage and handling, installation and testing, and documentation required for ML-1, 2, and 3 nuclear applications. ML-4 requirements are also included to allow the design agency to include only one version of 01 4000 within a specification package. If only ML-4 Work is included, use the non-nuclear version of the 01 4000 section rather than this one.

The Project Engineer must work with the designated Quality Assurance Rep/QSME to determine the appropriate quality requirements and associated submittals including those associated with design build subcontracts that may require additional quality requirements not currently included within this template.

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 lines of asterisks such as this one, must also be deleted. To seek variance from requirements that are applicable, contact the Engineering Standards Manual (ESM) [General POC](https://engstandards.lanl.gov/POCs.shtml#gen). Please contact POC with suggestions for improvement as well.

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1. GENERAL.
   1. SUMMARY
      1. This section includes quality assurance (QA) requirements for a new nuclear facility or modification to a nuclear facility designated as Hazard Category 2 or 3 and less-than-hazard-category-3 nuclear facilities. Requirements are driven, in part, by 10 CFR 830.122; 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); 15–Commissioning; and 21–Software; and ASME NQA-1 2008 with the NQA-1 2009 addenda (hereafter “NQA-1”).
      2. Attachment A to this section provides a list of Specification sections and the Management Level (ML) that are applicable to each.
      3. The functional (safety) classification of individual items and components are specified throughout individual Specification sections and Drawings as [Safety Class (SC), Safety Significant (SS), OHC=Other Hazard Controls, Defense-in-Depth (DID), Other ML-3, or Non-Safety (NS)].

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Delete ML designations below and throughout the Section that are not included within the Scope of Work.

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* + 1. Structures, Systems, and Components (SSCs) are specified throughout the individual Specification sections with MLs of [ML-1 through ML-4] and summarized by Specification Section in Attachment A. The QA/QC requirements are aligned with the significance of the assigned ML with ML-1 being the most significant.
       1. ML-4 = Non-Safety. SSCs shall be constructed and/or procured using the applicable codes and standards and the general QA requirements provided in this section.
       2. ML-3 = Those SSCs that are defined as Other Hazard Controls or Defense-in-Depth from Safety Analysis or failure of an SSC in less-than-hazard-category-3 nuclear facility leads to a radiological release. ML-3 may also be assigned based on elevated concerns for programmatic mission/life cycle, safeguards and security, or the environment. ML-3 SSCs shall be constructed and/or procured using the applicable codes and standards, the general QA requirements provided in this section, the ML-3-specific requirements provided in this section, and the equipment-specific specifications. The ML-3 requirements are based on a graded approach to the requirements provided in ASME NQA-1.
       3. ML-2 = Safety Significant (SS). These SSCs are Safety Related and shall be constructed and procured using the applicable codes and standards, the requirements provided in in this section, and the requirements provided in ASME NQA-1.
       4. ML-1 = Safety Class (SC). Same requirements stated for ML-2 above.
    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, as applicable, shall be performed under a Quality Assurance Program and associated implementing procedures that have been reviewed and approved by LANL prior to performing Work.
  1. DEFINITIONS
     1. Certificate of Conformance (COC): A document signed or otherwise authenticated by an authorized individual certifying the degree to which items or services meet the specified requirements (ref. Section 01 4216, Definitions).
     2. Certification Document:  A document, regardless of title, signed or otherwise authenticated by an authorized representative of the certifying entity, certifying that a particular batch, lot, item, or service was manufactured/performed in accordance with and/or meets specific requirements contained in applicable codes, standards, specifications, or other published requirements.  Examples include: Certificate of Test, Certificate of Analysis, Certificate of Compliance. (ref. 01 4216)
     3. Certified Mill Test Report (CMTR). Reports detailing physical and chemical properties of the material(s) for which they are required, and in accordance with the applicable national or international material standards (e.g., ASTM, ANSI) for the material type. CMTRs (material or mill) 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. (ref. 01 4216)
     4. Commercial Grade Dedication (CGD): An acceptance process performed in accordance with ASME NQA-1A 2009, Part II, Subpart 2.14 to provide reasonable assurance that a commercial grade item or service will perform its intended safety function and, in this respect is deemed equivalent to an item or service designed and manufactured or provided under the requirements of NQA-1.
     5. Commercial Grade Item: A structure, system, or component, or part thereof, that affects its safety function and that was not designed and/or manufactured in accordance with the requirements of ASME NQA-1.
     6. 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.
     7. International Building Code (IBC): Published by International Code Council (ICC)
     8. International Code Council (ICC): Publisher of IBC and parent of ICC-ES.
     9. Installer: An installer is the Construction Subcontractor or another entity engaged by the Construction Subcontractor or LANL, either as an employee or 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.
     10. LANL Building Official (LBO): LANL’s Authority for the Building Program as detailed in the Engineering Standards Manual Chapter 16, *IBC Program*.
     11. 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.
     12. Management Level: 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 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 are 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. Safety Related Terms (Nuclear context):
       1. Other Hazard Controls (OHCs) or Defense-in-Depth (DID): Preventive or mitigative controls that do not rise to the level of SC or SS but still enhance the safety of the facility. These controls are identified in the hazard evaluation table, but not explicitly credited with a SC/SS designation as identified in the DSA. Such controls are maintained in accordance with safety management programs. Other hazard controls are expected to be designed to the applicable industry code/standard for the given type of non-safety SSC (from DOE-STD-3009-2014).
       2. Other ML-3: SSCs designated as ML-3 due to programmatic mission, safeguards and security, radiological release, or environmental risk.
       3. Non-Safety (NS): ML-4 SSCs
       4. Safety Related: SSCs designated as SC, SS, OHC, DID, or Other ML-3.
       5. Safety Significant (SS): SSCs that are not designated as safety-class SSCs but whose preventive or mitigative function is a major contributor to defense in depth and/or worker safety as determined from safety analyses. Support systems have the potential to be Safety Significant as well.
       6. Safety Class (SC): SSCs, including portions of process systems, whose preventive or mitigative function is necessary to limit radioactive hazardous material exposure to the public, as determined from safety analyses.
    9. 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.
    10. 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.
    11. Subcontractor: The entity performing fabrication or physical construction activity and may also perform delegated design activities; normally the general contractor (a subcontractor to DOE). Sometimes called the “constructor.”
    12. 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.
    13. 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 in ESM [Chapter 16](https://engstandards.lanl.gov/POCs.shtml#ibc).
        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.
    14. 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.
    15. Work Breakdown Structure: An 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 subsection shall be submitted under this Specification section except where noted otherwise.

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This quality plan submittal would augment any bid-provided plan/program with details as described below. Author shall consult with Quality SME and with procurement and subcontract technical representative (STR) to determine the requirements for the Project Quality Assurance Plan submittal.

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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 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) including application of the graded approach associated with each Management Level. 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 Specification 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 notice (minimum of 48-hours for on-site at LANL and 7 days for off-site) to the appropriate inspection authority or testing agency for scheduling tests and inspections (i.e., hold and witness points) unless spec section specifically indicates otherwise. Shorter notice may result in delay of inspection or testing service.
    4. 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 [Chapter 16](https://engstandards.lanl.gov/POCs.shtml#ibc) and shall be edited by the Subcontractor to reflect project scope. The Subcontractor 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 and applicable codes and standards in tabular form and shall be integrated with a Work Breakdown Structure (WBS) or within a 30-day lookahead 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
    5. 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 are 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.
    6. 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.
  1. QUALITY ASSURANCE
     1. General QA Requirements (applicable to all Work including ML-3 and ML-4 performed at a nuclear facility).
        1. Work (including software and firmware Work activities) shall be performed, at a minimum, in accordance with documented processes that meet 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 traceable standards, at specific periods, adjusted, and maintained to required accuracy limits.
        6. Nonconformance: 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 Subcontract Exhibit H.

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. Continuing work with nonconforming item(s) without a fully dispositioned nonconformance report (NCR) is at the discretion of the Subcontractor, requires approval by LANL, and may require processing of a Conditional Release by LANL. Rework or repair, up to and including replacement, may be required contingent upon subsequent NCR disposition.

* + - 1. 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.
    1. QA Requirements for Items that are Safety Class or Safety Significant (i.e., ML-1 and ML-2)
       1. At a minimum apply the QA requirements identified in 1.5.A above and as follows.
       2. Supplier/Vendors for ML-1 and 2 SSCs or safety software shall be on the Subcontractor’s approved Suppliers List or materials/items/services shall be procured under an approved Commercial Grade Dedication (CGD) program. Refer to Subcontract Exhibit H for additional requirements, as applicable.
  1. QUALITY CONTROL
     1. General QC Requirements (applicable to all Work including ML-4)
        1. LANL Responsibilities: Agencies performing inspections as required by the IBC Chapter 17 *Special Inspections and Tests* and IBC Section 110 *Inspections* must be independent of the Subcontractor performing the work. These inspections may be performed by qualified LBO inspectors or a Subcontractor approved by the LBO as an Approved Agency (i.e. approved 3rd Party Inspection Agencies). The agency performing these inspections cannot be employed by the construction subcontractor, i.e., the General Contractor (GC) or one of their sub-tier Subcontractors.
        2. Subcontractor Responsibilities: Tests and inspections in TIP, SSI, and elsewhere in Specifications and Drawings that are not explicitly assigned to LANL are Subcontractor's responsibility. Unless otherwise indicated, provide quality-control services specified.
           1. Engage a qualified, LBO-approved, testing agency to perform quality-control Work.

Subcontractor shall not employ the same entity engaged by LANL, unless agreed to in writing by LANL prior to contract award.

Notify LANL STR at least 48 hours in advance of the time when Work requiring testing or inspecting will be performed, unless otherwise indicated in individual Sections. Note that testing and inspections identified as LANL Witness or Hold Points require additional notification.

Provide inspectors with access to Approved for Construction documentation and associated acceptance criteria.

Submit a certified (signed/endorsed) written report of each quality-control test or inspection per this Section.

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.

* + - 1. Subcontractor shall inspect and document acceptance of Work in accordance with Subcontractor’s Project Specific QA/QC Plan 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.
      2. 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.
      3. 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.

Determine the location from which test samples will be taken and in which in-situ tests are conducted.

Submit a certified (signed/endorsed) written report of each test, inspection, and similar quality-control service through Subcontractor.

Conduct and interpret tests and inspections and state in each report whether tested and inspected Work complies with or deviates from requirements.

Not release, revoke, alter, or increase the Subcontract Document requirements or approve or accept any portion of the Work on LANL’s behalf.

Not perform any duties of Subcontractor.

* + - 1. 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.

Costs associated with storage/handling of items to be stored on LANL property are the responsibility of Subcontractor.

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.

Items shall be segregated based on the ML of the item.

* + - 1. Non-Conforming Items
         1. Subcontractor shall evaluate and notify LANL of each nonconformance against items and services that do not meet procurement document requirements in accordance with and using Form 2276, Subcontractor Nonconformance Report as described in the Subcontract Exhibit H. Note that this form is required to document and obtain LANL concurrence of resolution of Subcontractor nonconformances. It may be used in conjunction with Subcontractor nonconformance forms and procedures.

Subcontractor shall not take action that affects or resolves nonconformances without approval from LANL as described in the Form 2276 instructions.

Subcontractor shall maintain records of any nonconformances in accordance with their LANL approved QA Program and applicable procedures.

Subcontractor shall allow for the return of any materials determined by LANL to be nonconforming as a result of LANL’s acceptance activities.

* + - 1. 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

Incidental labor and facilities necessary to facilitate tests and inspections.

Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.

Facilities for storage and field curing of test samples.

Delivery of samples to testing agencies.

* + 1. QC Requirements for ML-3 Items
       1. Apply the QC requirements identified in 1.6.A - General QC Requirements and as follows.
       2. Items of production (batch, lot, component, part) shall be identified from the initial receipt and fabrication of the items up to and including the installation and use for all materials and components that require a CMTR per specifications.
       3. Receiving Items
          1. Identification shall meet the requirements of NQA-1 Part II, Subpart 2.2 *Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage, and Handling of Items for Nuclear Facilities*.
          2. Verify that the identification and markings are in accordance with applicable codes, specifications, approved submittals, purchase orders, and drawings (document with pictures when possible).

Verify, by examining manufacturer documentation, that the item received was fabricated, tested, and inspected prior to shipment in accordance with the applicable code, specification, approved submittals, purchase order, or drawing. Verification of these requirements and confirmation that all required submittals for the item have been reviewed and approved by LANL shall be performed prior to installation of the item. Receiving inspection shall verify by objective evidence at a minimum the following and determine acceptance per the approved submittals, technical specifications and drawings, or other applicable requirements:

Configuration

Identification including Part Numbers and Markings per applicable code or standard

Dimension, physical, and other characteristics

Freedom from shipping damage

Cleanliness

Freedom from Suspect/Counterfeit items

Items shall be labeled and controlled in accordance with their receipt inspection status.

Items are inspected in accordance with the requirements of ASME NQA-1, Part II, Subpart 2.2, Part 502, *Receiving Inspection Requirements*, as applicable.

* + - 1. Storage and Control of Items
         1. Storage and handling shall meet the requirements of NQA-1 Part II, Subpart 2.2 *Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage, and Handling of Items for Nuclear Facilities* and Subcontractor’s Quality Assurance Program. Classification (i.e., Level A, B, C, or D) of individual items is typically provided by the EOR as specified in the technical specifications for the item. In cases where the classification is not provided, Subcontractor shall notify and request clarification of classification from LANL.
         2. ML-3 components shall be stored, handled, and controlled in accordance with the manufacture’s standard or minimum requirements, and the Level A, B, C, or D requirements provided in ASME NQA-1 Part II, Subpart 2.2 and as required by the Specification.

Items shall be segregated and marked per their inspection and acceptance status.

* + 1. QC Requirements for Safety Class or Safety Significant Items (i.e., ML-1 and ML-2)  
         
       Apply the QC requirements identified in 1.6.A – General QC Requirements and 1.6.B QC Requirements for ML-3 items and the following:
       1. Items of production (batch, lot, component, part) shall be identified from the initial receipt and fabrication of the items up to and including the installation and use.
       2. Comply with approved Commercial Grade Dedication Plans, as applicable.
  1. QUALIFICATION REQUIREMENTS
     1. Qualification requirements specified below establish the minimum qualification levels for the skills or organizations listed; individual Specification sections specify 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: A firm with 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 pre-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 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 and test for acceptance shall be performed by qualified persons other than those who performed or directly supervised the Work being inspected or tested.
  1. PRECONSTRUCTION TESTS
     1. Preconstruction Testing: Where 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 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 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 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 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 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 7 days 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. General
      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.
      3. Work shall comply with the LANL-approved Project-Specific QA/QC Plan.
   2. ACCEPTABLE TESTING AGENCIES
      1. LBO-approved listing in Engineering Standards Manual [Chapter 16](https://engstandards.lanl.gov/ESM_Chapters.shtml#esm16).
      2. LBO approval does not negate Subcontractors’ responsibility to assure fabricators, testing, and NDE agencies perform correctly.
   3. 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. Subcontractors must 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 Att. A: LANL Building Code (LBC) and Att. B: LANL Existing Building Code (LEBC). Where the LANL Standards including Chapter 16 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 (nuclear projects version) Rev. 1, dated January 18, 2023.

| The example table below included as Attachment A shall be edited to include those Specification Sections included within the scope of the Subcontract and shall designate the associated ML for each Specification Section.  **Attachment A**  **[example to be edited for specific project Specification Sections and/or scope withing same]**  **Specification Sections and associated Management Levels** | | | |
| --- | --- | --- | --- |
| **Specification No.** | **Title** | **ML-4** | **ML-3** |
| 01 2500 | Substitution Procedures | X | X |
| 01 3300 | Submittal Procedures | X | X |
| 01 3545 | Water Discharge Requirements | X |  |
| 01 4000 | Quality Requirements | X | X |
| 01 4444 | Offsite Welding and joining Requirements: General Welding requirements | X | X |
| 10 4400 | Fire Protection Specialties | X |  |
| 11 5000 | Drum Tumbler Enclosure Fabrication |  | X |
| 11 5100 | Drum Transport and Tumbling System | X |  |
| 13 4800 | Sound, Vibration, and Seismic Control |  | X |
| 21 1313 | Wet Pipe Sprinkler Systems - Normal Confidence |  | X |
| 22 0529 | Hangers and Supports for Plumbing Piping and Equipment | X | X |
| 22 0548 | Vibration and Seismic Controls for Plumbing, Piping and Equipment | X | X |
| 22 0554 | Identification for Plumbing, HVAC, and Fire Piping and Equipment | X |  |
| 22 0713 | Plumbing and HVAC Insulation | X |  |
| 22 0813 | Testing Piping Systems | X | X |
| 22 0816 | Disinfection of Potable Water Piping | X |  |
| 22 1100 | Facility Water Distribution | X |  |
| 22 1316 | Sanitary Waste and Vent Piping | X |  |
| 22 1413 | Facility Storm Drainage Piping | X |  |
| 22 1500 | Compressed Air Systems | X |  |
| 22 3700 | Domestic Water Heaters | X |  |
| 22 4200 | Plumbing Fixtures | X |  |
| 23 0593 | Testing, Adjusting, and Balancing for HVAC |  | X |
| 23 2113 | Hydronic Piping | X |  |
| 23 2300 | Refrigerant Piping | X |  |
| 23 2500 | HVAC Water Treatment | X |  |
| 23 3101 | HVAC Ducts |  | X |
| 23 3225 | Bag in Bag out Housings |  | X |
| 23 3300 | Air Duct Accessories |  | X |