SECTION 01 4000

QUALITY REQUIREMENTS [NON-NUCLEAR PROJECTS VERSION]

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LANL MASTER SPECIFICATION

Author: Delete [NON-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 <http://engstandards.lanl.gov>

TO SEE the blue Authors notes

In Word2003, USE TOOLS-OPTIONS-VIEW-HIDDEN TEXT

In Word2007, click the Microsoft Office ButtonButton image, then Word Options, then Display, then the Hidden text check box.

In Word2010, click paragraph symbol ¶ in Home/Paragraph menu block.

**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 Section includes administrative and procedural requirements for facility construction quality assurance and quality control. For programmatic equipment fabrication and installation it may be used and modified as needed.**

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 or applicable to the scope or project.   To seek a variance from requirements in the specifications that are applicable, contact the Engineering Standards Manual (ESM) General [POC](http://engstandards.lanl.gov/POCs.shtml#gen). 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.

**The Design Agency must coordinate this section with the requirements to be included in Exhibit H which specify additional Subcontract QA requirements. One key aspect that may require editing is the requirement for the Subcontractor to have and submit for LANL approval their Quality Assurance Program and/or a Project-Specific Quality Assurance Plan. The Design Agency shall work with the designated Quality Assurance Rep/QSME to determine the appropriate quality requirements and associated submittals including those associated with design build subcontracts which may require additional quality requirements not currently included within this master specification.**\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

1. GENERAL
   * + 1. SUMMARY
2. This Section includes quality assurance (QA) requirements for ML-4 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.

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. ML-4 Work shall be performed in accordance with the [approved Subcontractor’s Quality Assurance Program and] requirements of this specification and documented processes that are compliant with DOE Order 414.1D.

1. 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. [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 as specified in Exhibit H of the Subcontract.]
   * + 1. DEFINITIONS
2. 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. It is mandatory that the Subcontractor formally (in writing) notify the LANL STR five (5) working days in advance of all Hold Points. A Hold Point cannot be bypassed without the specific release by the designating organization by an approved Hold Point Waiver.
3. IBC: International Building Code, published by ICC.
4. ICC: International Code Council, publisher of IBC and parent of ICC-ES.
5. Installer/Applicator/Erector: Sub-tier subcontractor or another entity engaged by Subcontractor as an employee, or lower-tier subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
6. LANL Building Official (LBO): LANL’s Authority for the Building Program as detailed in the Engineering Standards Manual Chapter 16–IBC Program.
7. Measuring and Test Equipment (M&TE): Devices or systems used to calibrate, measure, gage, test, or inspect in order to control or acquire data to verify conformance to specified requirements.
8. 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.

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

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. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
3. 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 Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction meets requirements.
7. Quality Control (QC) Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements.
8. Source Quality-Control Testing: Tests and inspections that are performed at the source; e.g., plant, mill, factory, or shop.
9. SSI: Statement of Special Inspections. An inspection plan exclusively for the requirements of IBC Chapter 17, per ESM Chapter 16 IBC-IP Att. H template.
10. Subcontractor: The entity performing fabrication or physical construction activity; normally the general contractor (a subcontractor to DOE), but when LANL is self-performing the Work, LANL takes this role.
11. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
12. TIP: Test and inspection plan for Subcontractor’s work based on the Specifications and Drawings.
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. It’s mandatory that the Subcontractor formally notify the LANL STR two (2) business days in advance of all Witness points, or within a time period agreed to by LANL.
    * + 1. CONFLICTING REQUIREMENTS
14. General: If compliance with two or more standards is specified and the 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.
15. 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.
    * + 1. ACTION SUBMITTALS
16. [Project Quality Assurance Plan: Subcontractor shall submit a Project Quality Assurance Plan for review and approval by LANL prior to performing quality affecting Work. Quality affecting work includes siting, designing, procuring, fabricating, constructing, handling, shipping, receiving, storing, cleaning, erecting, installing, inspecting, testing, repairing, modifying, and decommissioning. The Project Quality Assurance Plan shall detail the Subcontractor’s quality assurance and QC implementation strategy for the Work. 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. If quality affecting changes other than minor changes are made to the Project Quality Assurance Plan, they shall be submitted to LANL for approval prior to implementation.]
17. 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.
18. Test and Inspection Plan (TIP): An initial TIP is developed during design by the design agency and provided to Subcontractor (electronic file available). The initial TIP shall be built upon by Subcontractor to include a comprehensive listing of tests and inspections required by the specifications and Statement of Special Inspections (SSI). Provide TIP within 30 days prior to commencement of the Work included in the TIP. LANL will review and may add additional inspections and witness or hold points. TIP shall include inspections required by specifications and standards in tabular form and include the following:
    1. Specification Section number and title.
    2. Description, type, and periodicity of test and inspection
    3. Applicable standards.
    4. Test and inspection methods.
    5. Number of tests and inspections required.
    6. Time schedule or time span for tests and inspections.
    7. Entity responsible for performing tests and inspections (e.g., Subcontractor qualified personnel, LANL Inspector, LBO-approved Special Inspector, or Structural Engineer-of-Record)
    8. Requirements for obtaining samples.
    9. Unique characteristics of each quality-control service.
    10. Responsibility for who will witness.
    11. Witness, Hold Point
19. Coordination by Subcontractor: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
    1. Schedule times for tests, inspections, obtaining samples, and similar activities.
    2. Distribute schedule to LANL, AE, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.Revise paragraph and subparagraphs below to suit Project. In the case of multiple subcontracts, consider assigning responsibility for coordination of submittals to one subcontract.
20. Test and Inspection Reports: Prepare and submit certified (signed/endorsed) written Test and Inspection reports that include the following:

Revise list below to suit Project.

* 1. Date of issue.
  2. Project title and number.
  3. Name, address, and telephone number of organization performing tests.
  4. Dates and locations of samples and tests or inspections.
  5. Names of individuals making tests and inspections.
  6. Description of the Work, test boundaries, and test and inspection method.
  7. Identification of product and Specification Section.
  8. Complete test or inspection data.
  9. Test and inspection results, comparison with acceptance criteria and tolerances, and an interpretation of test results to assure that test requirements have been satisfied.
  10. Reference to information on action taken in connection with test deviations and inspection non-conformances.
  11. Record of temperature, weather conditions, and other pertinent test conditions at time of sample taking and testing and inspecting, if relevant.
  12. Certification statement that indicates whether tested or inspected Work complies with the Subcontract requirements. Report shall be signed by the professional certifying that the tests submitted either complies with the Subcontract 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. Name, signature, and date of responsible inspector or test authority.
  14. Recommendations on retesting and re-inspecting.
  15. Listing of M&TE including serial number, and calibration due date for all test and inspection equipment that requires calibration.

1. Licenses and Certificates: For LANL's records, 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.
2. For IBC work, each Subcontractor and subtier 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 must submit a Statement of Responsibility per ESM Chapter 16 Section IP Att H to LANL as a submittal prior to the commencement of work.

## QUALITY ASSURANCE

1. General QA Requirements
   1. Work (including software and firmware work activities) shall be performed, at a minimum, in accordance with documented processes that meet the criteria of DOE O 414.1D through implementation of the specific Exhibit H of 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 Quality Assurance Plan as approved by LANL. In accordance with Exhibit H, if quality affecting changes are made to Subcontractor’s QA Program following LANL approval, they shall be submitted to LANL for approval prior to implementation.]
   3. [Subcontractor/Supplier Quality Assurance Program shall be sufficient to control design, materials, procurement, preparation, fabrication, constructing, installation, repairing, special processes, inspection, testing, cleaning, erecting, installing, handling, packaging, and shipping (as applicable), records to ensure production of an acceptable finished product.]

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Right-of-access provisions specified below should be included for ML-4 Work in a nuclear facility but may be deleted for non-nuclear ML-4 work unless required by the Project or Design Agency. Such provisions already exist generally in the Terms and Conditions exhibits.

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* 1. [Subcontractor shall provide for access to its facility and records for the following source activities: Inspection, testing, verification, surveillance, or audit by DOE/NNSA and LANL representatives, LANL’s designated representative, or other parties authorized by LANL (i.e., Subcontractors and sub-tier Subcontractors).]
  2. Subcontractor is responsible for including (i.e., flowing down) the quality assurance requirements herein in its lower-tier subcontracts and monitoring and enforcing such performance to the extent necessary to ensure Subcontractor’s compliance with these requirements.
  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), Field Change Requests (FCR) 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 LANL. Note: An RFI is not a change document and is not to be used to implement design changes.
  4. Applicable design bases and other requirements necessary to assure adequate quality shall be included or referenced in documents for procurement of items and services.
  5. The preparation, issue, and change of documents that specify quality requirements or prescribe activities affecting quality such as instructions, procedures, and drawings shall be controlled by Subcontractor to ensure that correct documents are being employed in the performance of the Work.
  6. Subcontractor shall verify and document that an item or service being furnished complies with the procurement requirements and approved submittals prior to installation. For certain items (circuit breakers, fasteners, and permanently installed hoisting, lifting, and rigging equipment) this verification shall be performed in accordance with Subcontractor’s receipt/receiving inspection program.
  7. Inspections required to verify conformance of an item or activity to specified requirements or continued acceptability of items in service shall be planned and executed by Subcontractor. Inspection results shall be documented by Subcontractor.
  8. Subcontractor shall plan, execute and document tests in accordance with test requirements and acceptance criteria*.*
  9. 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.
  10. 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.
  11. LANL 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.  Note this provision is in addition to and separate of the Nonconformance Reporting process and may be implemented for in process Work.
      + 1. QUALITY CONTROL

1. General QC Requirements
   1. 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.

Retain subparagraph below if some Sections require an independent testing agency to perform certain tests and inspections

1. Engage a qualified, LBO-approved, testing agency to perform quality-control services.
   1. Subcontractor shall not employ the same entity engaged by LANL, unless agreed to in writing by LANL.
   2. Notify LANL STR at least 24 hours in advance of the time when Work that requires testing or inspecting will be performed, unless otherwise indicated in individual Sections.
   3. Provide access to approved designs. The Subcontractor is responsible for providing inspectors with access to approved design.
   4. Submit a certified (signed/endorsed) written report per this Section of each quality-control service.
   5. Testing and inspections requested by Subcontractor and not required by the Subcontract Documents are at Subcontractor’s expense.
   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 Section 01 3300.
   7. Subcontractor shall inspect and document acceptance of Work in accordance with [Subcontractor’s Project QA Plan] and procedures and technical requirements prior to notifying LANL of readiness for LANL required inspection. First line confirmation of compliance with technical requirements is the responsibility of Subcontractor QA/QC personnel, not LANL personnel.
2. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Subcontract Documents will be charged to Subcontractor**,** and the Subcontract Sum will be adjusted by Change Order.
   1. Subcontractor shall verify, inspect, and document that systems are complete, constructed, and configured per 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.
   2. Retesting/Re-inspecting: Provide, at Subcontractor’s expense, quality-control services for retesting and re-inspecting, for replacement construction Work resulting from work that failed to comply with the Subcontract Documents.
   3. Testing Agency Responsibilities (services retained by Subcontractor): Cooperate with AE and Subcontractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
3. Notify AE and Subcontractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
   1. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
   2. Submit a certified (signed/endorsed) written report of each test, inspection, and similar quality-control service through Subcontractor.
   3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
   4. Do not release, revoke, alter, or increase the Subcontract Document requirements or approve or accept any portion of the Work.
   5. Do not perform any duties of Subcontractor.
   6. Suspect/Counterfeit Items (S/CI): The Subcontractor shall develop and implement effective controls for the detection and prevention of S/CI that meet the applicable requirements of DOE O414.1D to prevent the introduction of S/CI to LANL facilities. Refer to latest DOE Handbook DOE-HDBK-1221, *Suspect/Counterfeit Items Resource Handbook* for further information.
4. Types of material, parts, and components known to have been misrepresented include but are not limited to fasteners, such as bolts, nuts, and washers; cranes and hoists, as well as other hoisting, rigging, or lifting equipment; valves; pipe and fittings; flanges; electrical equipment and devices; plates, bars, shapes, channel members, and to structural items, and welding rods and electrodes.
5. An item that does not conform to established requirements is not normally considered and S/CI if the nonconformity results from one or more of the following conditions:
6. Defects resulting from inadequate design or production QC,
7. Damage during shipping, handling, or storage,
8. Improper installation,
9. Deterioration during service,
10. Degradation during removal,
11. Failure resulting from aging or misapplication, or
12. Other similar causes, which do not involve a misrepresentation about nature, quality, form, or function.
    1. Control and Storage of All Items
13. For all items, controls shall be established to assure that only correct and accepted items are used or installed. 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.
    1. Items procured will be stored/staged for use, outside of the construction site boundary, as designated areas for completion of receipt inspection activities. Items in these areas will be identified, controlled, and stored according to approved procedure/processes in compliance with the requirements of the subcontract.
    2. Costs associated with storage/handling of items to be stored on LANL property are the responsibility of Subcontractor.
    3. 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.
    4. Non-Conforming Items
14. Subcontractor shall evaluate and notify LANL of each nonconformance against items and services that do not meet procurement document requirements within three (3) working days of discovery in accordance with Subcontract requirements. This includes, but is not limited to, nonconformance with documentation requirements and technical or material requirements, including situations where an item may be restored so as to function unimpaired, but it does not meet the original subcontract/design requirement.
    1. Notice of a nonconformance shall consist of a written description of the nonconformance (with sketches and pictures highlighting the nonconforming condition) and when available, an assessment of the cause and the proposed disposition/corrective action, including technical justifications for any proposed Use-As-Is or Repair dispositions.
    2. In cases where the Subcontractor proposes a Use-As-Is or Repair disposition, the disposition of the nonconformance will be approved by LANL with corresponding disposition implementation verified. Such Use-As-Is or Repair nonconformance documentation will be supplied by Subcontractor to LANL and *all* records of nonconformance shall be maintained by the Subcontractor.
    3. Subcontractor shall allow for the return of any materials determined by LANL to be nonconforming as a result of Subcontractor’s receipt inspection.
    4. Subcontractor shall provide and process all NCRs records in accordance with Exhibit H [and Subcontractor’s approved Project Quality Assurance Plan].
    5. 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:
15. Access to the Work.
    1. Incidental labor and facilities necessary to facilitate tests and inspections.
    2. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
    3. Facilities for storage and field curing of test samples.
    4. Delivery of samples to testing agencies.
       * 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.

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.

* + - * 1. Installer: A firm or individual with 5 years of 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 5 years of 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 5 years of 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. 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. Engineering services are defined as those performed for installation of systems, assembly, or product design that is similar to those indicated for this Project in material, design, and extent.
        6. Testing Agency: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and approved by the LBO per Eng. Standards Manual 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, or other Subcontract requirement. Prior to assigning personnel to perform inspection and test activities, supervision 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 testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
   1. Subcontractor responsibilities include the following:
2. Provide test specimens representative of proposed products and construction.
3. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
4. Provide configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.

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

1. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
2. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
3. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups. Do not reuse products on Project.
   1. Testing Agency Responsibilities:
4. Submit a certified (signed/endorsed) written report of each test, inspection, and similar quality-assurance service to LANL with copy to Subcontractor.
5. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Subcontract Documents.

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.

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 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 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. Special Inspections will be conducted by LANL or LANL-approved agency where indicated in individual Specification Sections and in accordance with the SSI.
           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 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 shop inspections by LANL- approved IBC Inspectors prior to, during, or post fabrication.
2. PRODUCTS   
   (Not Used)
3. EXECUTION
   * + 1. Work shall only be accomplished to LANL-approved, controlled design (Specifications, Drawings, and amendments to same such as Field Change Notices and Requests, Supplier Deviation Disposition Requests, etc.), of which a copy of latest must be maintained on the work site by Subcontractor.
          1. 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.
       2. ACCEPTABLE TESTING AGENCIES
          1. Approved IBC listing in Engineering Standards Manual [Chapter 16](http://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. 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 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 version) Rev. 7, dated November 7, 2017.