SECTION 01 4000

QUALITY REQUIREMENTS

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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 Button, then Word Options, then Display, then the Hidden text check box.

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

**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 in the project -- and specifier’s notes such as these.   To seek a variance from requirements in the specifications that are applicable, contact the Engineering Standards Manual (ESM) 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.

Specification developed for ML-4 projects.

For ML-1, 2, and 3 applications, additional requirements and independent reviews should be added if increased confidence in procurement or execution is desired; see ESM Chapter 1, Section Z10 Specifications and Quality sections. ALSO – design agency must coordinate this section with the 838c form and Exhibit H which are used primarily for such projects.

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Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

1. GENERAL
	* + 1. SUMMARY
				1. This Section includes requirements for construction quality assurance and quality control driven, in part, by Engineering Standards Manual Chapter 16-IBC Program (International Building Code). <http://engstandards.lanl.gov/ESM_Chapters.shtml#esm16>
				2. Testing and inspecting services contracted by the Subcontractor are required to verify compliance with Drawings and Specification and for production of standard products and the Special Inspection required by the IBC. LANL will perform oversight inspections of these services. None of these LANL QA services relieve the Subcontractor of responsibility for compliance with the Subcontract Documents.

Retain three subparagraphs below to clarify applicability of provisions in this Section. Revise to suit Project. Coordinate revisions with the General Conditions and other Division 01 Sections.

Requirements for Subcontractor to provide quality-assurance and -control services may be supplemented by provisions of other sections.

Other Sections may contain QA activities specific to those work results.

Subcontractor is responsible to assure that any activities sub-contracted to lower-tier Subcontractors or agencies are contractually “passed-down” and Subcontractor shall assure that their sub-tier entities follow these requirements.

* + - 1. DEFINITIONS
				1. 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.
				2. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
				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.

Delete next 2 paragraphs if Project does not require mockups. Revise if any mockups are to be constructed at an off-site location.

* + - * 1. Laboratory Mockups: Full-size, physical assemblies that are constructed at testing facility to verify performance characteristics
				2. 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.
				3. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
				4. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
				5. 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.
				6. 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.
				7. 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 complies with requirements.
				8. Quality-Control 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. Services do not include subcontract enforcement activities performed by LANL Subcontract Tech Rep (STR).
				9. Source Quality-Control Testing: Tests and inspections that are performed at the source; i.e., plant, mill, factory, or shop.
				10. SSI: Statement of Special Inspections. An inspection plan exclusively for the requirements of IBC Chapter 17, per ESM Ch 16 IBC-IP Att H template.
				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 and developed by Project (normally design professional in responsible charge) per ESM Ch 16 IBC-IP Att I template.
			1. CONFLICTING REQUIREMENTS

First paragraph and subparagraph below may resolve problems that sometimes arise when using referenced standards.

* + - * 1. 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.
				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.

Insert an article on special compliance with a governing code only if necessary. Such provisions belong in the Supplementary Conditions.

* + - 1. ACTION SUBMITTALS
				1. 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 Section 1.5 A.6.
				2. Submit design/research reports/test data supporting the use of alternate materials/methods of construction not specifically prescribed by the IBC such as rebar couplers, rebar splices and post-installed anchors.  Such alternate materials/methods of construction must be approved by the LBO.  ICC Evaluation Services ES reports covering the testing of materials within the parameters of the materials intended use can be construed to have LBO approval.

Retain paragraph and subparagraphs below if retained in "Quality Control" Article.

* + - * 1. Test and Inspection Plan: Include with overall project construction schedule or submit separate schedule within [**30**] <**Insert number**> days prior to commencement of the Work. This can be built upon the Project (normally design agency) initiated Test and inspection plan (TIP) and Statement of Special Inspections (SSI) if present (electronic files available). For TIP, add any remaining tests and inspections required by specifications and standards or other intended inspections in tabular form and include the following:

Revise list below to suit Project.

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., LANL Inspector, LBO-approved Special Inspector, or Structural Engineer-of-Record)
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

LANL will review and may add additional inspections and hold points.

Subcontractor’s TIP may be produced and maintained separately from design agency’s TIP with written permission of the LANL Chief Inspector.

* + - * 1. 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.

Schedule times for tests, inspections, obtaining samples, and similar activities.

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. See Evaluations.

* + - * 1. Reports: Prepare and submit certified written Test and Inspection reports that include the following:

Revise list below to suit Project.

Date of issue.

Project title and number.

Name, address, and telephone number of testing agency.

Dates and locations of samples and tests or inspections.

Names of individuals making tests and inspections.

Description of the Work and test and inspection method.

Identification of product and Specification Section.

Complete test or inspection data.

Test and inspection results and an interpretation of test results.

Record of temperature and weather conditions at time of sample taking and testing and inspecting, if relevant.

Comments or professional opinion on whether tested or inspected Work complies with the Subcontract requirements.

Name and signature of responsible inspector.

Recommendations on retesting and re-inspecting.

Retain general requirements in paragraph below. Specific submittals may be specified in other Sections.

* + - * 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.
			1. QUALITY ASSURANCE
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 first paragraph 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 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 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 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, or 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. As an alternative, LANL may provide Special Inspectors in-shop at Subcontractor’s expense. Note: Special Inspection or shop approval not required for burning and cutting of mild steel (e.g., ASTM A36)If other design professionals are indicated in Specification Sections, insert qualifications here.
			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.

\*\*\*\*\*Delete Paragraph below if LANL is to provide all testing services (not common)\*\*\*\*\*

* + - 1. 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] [LANL may provide such testing at Subcontractor’s expense**.**]
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:

Subcontractor responsibilities include the following:

Provide test specimens representative of proposed products and construction.

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

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

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

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.]

Testing Agency Responsibilities: Submit a certified 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.

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:

Build mockups in location and of size indicated.

Notify LANL [**7**] <**Insert number**> days in advance of dates and times when mockups will be constructed.

Demonstrate the proposed range of aesthetic effects and workmanship.

Obtain LANL’s approval of mockups before starting work, fabrication, or construction. Allow [**7**] <**Insert number**> days for initial review and each re-review of each mockup.

Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

Demolish and remove mockups when directed, unless otherwise indicated.

Retain subparagraph below as the default requirement and add specific requirements in individual Specification Sections.

1. Subcontractor Procedures: The following must be approved by LANL before related work begins:

Receipt inspection procedures

Quality Assurance Manual

Quality Control Manual/ Shop Fabrication Procedures

Material Control Procedures

Nonconformance procedures

If needed, insert requirements for mockups that comprise products and materials from multiple Specification Sections.

* + - 1. QUALITY CONTROL

Retain paragraph and subparagraphs below if some Sections designate LANL as responsible for tests and inspections.

* + - * 1. LANL Responsibilities: Where quality-control services are indicated as LANL's responsibility, LANL will engage a qualified testing agency to perform these services.

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.

Retain first paragraph and subparagraphs below for projects where Subcontractor is responsible for providing quality-control services. See Evaluations.

* + - * 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.

Engage a qualified, LBO-approved, testing agency to perform quality-control services.

Retain first subparagraph below to assure validity of agencies' reports.

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

Subcontractor shall pass quality requirements down to lower-tier subcontractors and shall enforce such requirements.

Notify LANL STR at least [**24**] <**Insert number**> hours in advance of time when Work that requires testing or inspecting will be performed, unless otherwise indicated in individual Sections.

Provide access to approved designs. The Subcontractor is responsible for providing inspectors with access to approved design.

Submit a certified written report, in duplicate, of each quality-control service.

Testing and inspecting requested by Subcontractor and not required by the Subcontract Documents are at Subcontractor’s expense.

Submit additional copies of each written report to LANL, when so directed.

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 [Exhibit I][Section 01 3300].

 Retain paragraph below (if not covered in the General Conditions) and insert special Project requirements. Additional requirements might include AE's or Construction Manager's right to require use of a different laboratory for retesting and reinspecting.

* + - * 1. 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.

 Retain first paragraph and subparagraphs below if Subcontractor engages testing agency.

* + - * 1. 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.

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 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.

Do not release, revoke, alter, or increase the Subcontract Document requirements or approve or accept any portion of the Work.

Do not perform any duties of Subcontractor.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*Delete Associated Services paragraph if not needed\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

* + - * 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:

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.

Retain paragraph and subparagraph below if quality-control services by testing agencies are extensive and job progress might be hindered if services are not carefully managed. Revise 30-day period below to suit Project. Consider requiring submittal concurrently with Subcontractor's Construction Schedule. Schedule below is not the Design Professional’s Test and Inspection Plan required by LANL as a condition for design approval. See Evaluations.

* + - 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.

The IBC requires both periodic and continuous special inspections for certain types of construction. Verify requirements with ESM Ch 16.

* + - * 1. Onsite Special Inspectors are provided by LANL at LANL expense.
				2. 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.
				3. Regardless of location, third-party testing and NDE is at Subcontractor’s expense.
				4. 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.
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 Notices and Requests, Supplier Deviation 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. Work shall comply with the design processes and work processes described in the LANL Quality Assurance Program (QAP) document or the LANL QA-PQ approved Subcontractor QAP document.
			2. ACCEPTABLE TESTING AGENCIES
				1. Approved IBC listing at <http://engstandards.lanl.gov/ESM_Chapters.shtml#esm16>
				2. LBO approval does not negate Subcontractors’ responsibility to assure that fabricators, testing, and NDE agencies perform correctly.
			3. REPAIR AND PROTECTION
				1. On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

Retain subparagraph above or below. Above is for simple projects that do not include a "Cutting and Patching" Section and relies on patching and repair materials being the same as for new construction.

* + - * 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 Appendices A and B. 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 REFERENCE IS FOR LANL USE ONLY

This project specification is based on LANL Master Specification 01 4000 Rev. 6, dated May 27, 2014.