Preparing Activity: NASA Superseding
UFGS-01 83 00.07 40 (February 2012)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2023
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SECTION 01 83 00.07 40

RELIABILITY CENTERED ACCEPTANCE FOR FACILITY SHELLS
02/18

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NOTE: This guide specification covers the requirements for Reliability Centered Building and Equipment Acceptance for Facility Shell Systems (foundations, structure, walls, openings, roofs, insulation, and vapor barrier systems, etc.). The contents universally apply to building envelope systems and may be used by other organizations, if deemed beneficial.

Refer to Section 01 83 13.07 40 RELIABILITY CENTERED ACCEPTANCE FOR SUPERSTRUCTURE PERFORMANCE REQUIREMENTS for externally exposed structures such as communication towers, launch facilities; and partially open shelters such as those for fueling chemical storage, as well as underground special structures for explosives and ordinance.

Refer to Section 01 86 12.07 40 RELIABILITY CENTERED ACCEPTANCE FOR MECHANICAL SYSTEMS for HVAC and plumbing systems.

Refer to Section 01 86 26.07 40 RELIABILITY CENTERED ACCEPTANCE FOR ELECTRICAL SYSTEMS for facility electrical power and distribution systems.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for

this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).
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PART 1 GENERAL

1.1 REFERENCES

****
NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.
****

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

RCBEA GUIDE	(2004) NASA Reliability Centered Building and Equipment Acceptance Guide

1.2 SUBMITTALS

****
NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a “G” to an item, if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for

Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

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Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Material, Equipment, and Fixture Lists[; G[, [____]]]

Quality Control Plan[; G[, [____]]]

SD-02 Shop Drawings

Fabrication Drawings[; G[, [____]]]

Layout Drawings[; G[, [____]]]

SD-03 Product Data

Manufacturer's Catalog Data[; G[, [____]]]

Specific Equipment Data[; G[, [____]]]

Spare Parts List[; G[, [____]]]

Warranty[; G[, [____]]]

SD-04 Samples

Samples[; G[, [____]]]

SD-06 Test Reports

Infrared Thermography Test[; G[, [____]]]

Ultrasonic (Airborne) Test[; G[, [____]]]

Visual Inspection[; G[, [____]]]

SD-07 Certificates

Certificates[; G[, [____]]]

SD-08 Manufacturer's Instructions

Manufacturer's Instructions[; G[, [____]]]

SD-10 Operation and Maintenance Data

Operations and Maintenance Manuals[; G[, [____]]]

SD-11 Closeout Submittals

Acceptance Documentation[; G[, [____]]]

Baseline Data Report[; G[, [____]]]

1.3 QUALITY CONTROL

Submit a Quality Control plan outlining the intended methods of receiving, testing, and installing equipment and structural components. The RCBEA GUIDE specifies minimum requirments for test equipment. To ensure that the results are accurate and consistent, use personnel who have veen trained and certified in the application of appropriate acceptance testing PT&I technologies for acceptance testing. Submit the following as part of the quality control plan for all required acceptance testing:

a. List of test equipment used, including the manufacturer, model number, calibration date, certificate of calibration, and serial number.

b. Certificates showing the qualifications and certifications of test personnel .

1.4 WARRANTY

Submit a workmanship and performance warranty directly to the Government for the work performed for a period at least [1][_____] year[s] from the date of Government acceptance of the work. Perform corrective action that becomes necessary because of defective materials and workmanship while the system is under warranty within [7][_____] calendar days of notification, unless additional time is approved by the Contracting Officer. Failure to perform repairs within the specified period constitutes grounds for having the corrective action and repairs performed by others and billing the cost to the Contractor. Provide a contractor installation warranty that covers a period of at least [1][_____] year.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

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NOTE: This guide specification is not intended to limit the inspection and acceptance process to the use of Predictive Testing & Inspection (PT&I) techniques. This guide is intended to supplement comprehensive and detailed commissioning and quality control specifications.

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This guide specification establishes acceptance requirements to ensure building envelope systems meet installtion requirements and contain no identifiable defects that waste energy or will shorten the useable design life of the facility, including facility wall and opening systems (windows, doors, hatches), as well as facility roofing systems. These requirements utilize PT&I technologies and are essential elements in the Government's Reliability Centered Building and Equipment Acceptance (RCBEA) Program.

2.2 PRODUCT DATA

Before starting work, submit material, equipment, and fixture lists for equipment, structural components, materials, and fixtures planned for use to complete the job. Include the item's description, quantity, manufacturer's style or catalog numbers, and specification and drawing reference numbers. List construction equipment to be used.

Provide product samples for roof, wall, and insulation system components, including samples of roof membrane materials, underlayment, flashing, insulation, roof and wall penetrations, fasteners, and finish color swatches, for the Contracting Officer's approval before starting work or ordering materials. Size samples to clearly illustrate product features and characteristics.

2.2.1 Manufacturer's Product Data

Include the manufacturer's standard catalog data at least [5 weeks][_____] before the purchase or installation of a particular component, highlighted to show material, size, options, and equipment performance data charts and curves in sufficient detail to demonstrate compliance with contract requirements. Include the manufacturer's recommended installation instructions and procedures.[If vibration isolation is specified for a unit, include vibration isolator literature containing catalog cuts and certification that the isolation characteristics of the isolators provided meet the manufacturer's recommendations.] Submit product data for each specified component.

Submit fabrication drawings for equipment and structural components. Ensure that drawings contain details on fabrication and assembly to be performed in the factory.

Submit manufacturer's catalog data for the following:

a. Roofs, walls, and insulation

b. Automated openings operation and closure

c. Sound attenuation systems

d. Acoustical performance

e. Facility air quality evaluation

2.2.2 Certification Data

Submit certificates for the following, showing conformance with test requirements and laboratory certifications.

a. Roofs, walls, and insulation

b. Acoustical performance

c. Facility air quality evaluation

d. Openings (infiltration, energy transmission)

2.2.3 Specific Equipment Data

Submit the following information for equipment and structural components: location of installation,Identification number, date of installation (required or actual acceptance date), and reference drawing number. Unless explicitly stated in the manufacturer's submitted literature, submit the following specific equipment data:

a. Roofs, walls, and insulation

(1) Type of roofing system and insulation system installed (type)

b. Acoustical performance

(1) Finishes rating (type)

(2) Volume levels tested

c. Facility air quality evaluation

(1) Completed facility, furnished and equipped

(2) Simulated occupancy levels

d. Openings

(1) Results of checking doors, windows, and hatches for infiltration and energy transmission levels

2.2.4 Extra Materials

Submit spare parts list data for each item of material and equipment specified, after approval of detail drawings and at least [_____] months before the date of beneficial occupancy. List parts and supplies, providing current unit prices and sources of supply, and list spare parts recommended for 12 months of operation. List parts that the manufacturer recommends replacing after [1] [and] [_____] years of service.

PART 3 EXECUTION

3.1 EXAMINATION

Perform visual inspection on the equipment and structural components listed below. Correct abnormalities or defects as directed by the Contracting Officer.

a. Roofs, walls, and insulation

b. Automated openings operation and closure

3.2 INSTALLATION

Submit layout drawings for installed equipment and structural components, including assembly drawings, manufacturer's instructions, installation details, and connection diagrams.

3.3 FIELD QUALITY CONTROL AND ACCEPTANCE TESTING

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NOTE: The acceptance criteria, as defined in this specification, may also be used to establish the required baselines for future maintenance.

At the Government's option, the Government may elect to have acceptance testing performed by Goverment or designated third-party personnel intead of the Contractor. This option can be exercised on a case-by-case basis. Regardless of who performs the acceptance testing, the Contractor's compliance with the requirements of acceptance is mandatory.

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Deliver completed facility, fixtures, furnishings, equipment and services that meet the contract requirements and specifications. Ensure that materials, furnishings, fixtures, and equipment are free of latent manufacturing and installation defects. Perform acceptance testing as defined in this specification and the RCBEA GUIDE, using both traditional and PT&I technologies. The Government will observe and monitor the acceptance testing, analysis, and documentation as part of the Government's Quality Assurance Program. Satisfactory completion of acceptance requirements is required to obtain Government approval and acceptance of the Contractor's work.

3.3.1 Predictive Testing and Inspection Tests

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NOTE: Predictive Testing and Inspection (PT&I) involves the use of acceptance and inspection techniques that are nonintrusive and nondestructive in order to avoid introducing problems. It also involves the use of data collection devices, data analysis, and computer databases to store and trend information. Typical PT&I technologies used during equipment and structural component acceptance include: infrared thermography, airborne ultrasonics, integrity testing, and verification of liquid levels and relief devices.

The PT&I tests prescribed in this section are MANDATORY for all assets and systems identified as Critical, Configured, or Mission-Essential. Do not remove the requirement from this specification. If the system is noncritical, nonconfigured, and not mission-essential, use sound engineering discretion to assess the value of adding these additional test and acceptance requirements.

Enhanced acceptance criteria may increase contractor cost. It is not the intent of these acceptance

criteria to unnecessarily drive up the cost of equipment installations and contractor work. If the cost of the added inspections and the cost of enhanced equipment designs outweigh their performance and life-cycle value, then do not use overly restrictive acceptance criteria. The acceptance criteria should define the "minimum" limits essential for a high-quality installation. See the RCBEA Guide for additional information regarding cost feasibility of PT&I.

****

Perform the following PT&I tests in accordance with the requirements and criteria established in the RCBEA GUIDE. Include test point locations in submitted reports.

a. Perform Infrared Thermography Test for:

(1) Roofs, walls, insulation, and openings

(a) Perform a thermographic survey of the building envelope using infrared thermography as part of the prebeneficial occupancy to check for voids in insulation or wetted insulation. In addition, check for air gaps in building joints, including seams, door frames, and window frames using the appropriate procedures specified in the RCBEA GUIDE.

(b) The Government may elect to perform a thermographic survey on the installed structural components after [90][_____] days of operation or [90][_____] days from the installation acceptance date, but no later than one year from this date. If deficiencies are identified within the warranty period for the construction contract, correct defects at no additional cost to the Government.

b. Perform Facility Air Quality Evaluation [_____] for:

(1) [_____]

(2) [_____]

(3) [_____]

c. Perform Ultrasonic (Airborne) Test for:

(1) Roofs, walls, and insulation

(2) Openings, seals, and joints

3.3.2 Baseline Data from Verification Testing

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NOTE: PT&I data allows for effective planning and scheduling of maintenance or repairs so that consequences from failure can be minimized or eliminated. For PT&I data to be effective, initial baseline data, normally taken at inception, is needed for comparisons and trending. From an equipment acceptance perspective, PT&I tests have become one of the most effective methods for testing

new and in-service equipment for hidden defects.

Ensuring that facilities and equipment meet acceptance criteria and obtaining and documenting critical baseline data is extremely important during the construction phase. As RCM decisions are made later in the life cycle, it becomes more difficult to achieve the maximum possible benefit from Reliability Centered Maintenance programs.

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After PT&I tests have been completed, submit baseline data report to the Contracting Officer. Summarize performance data, set points, operating parameters, and PT&I test results obtained for equipment and building systems. Provide reports with a cover letter/sheet clearly marked with the System name, Date, and the words "[Preliminary] [Final] Test Report Data - Forward to the [Systems Engineer] [Condition Monitoring Office] [Predictive Testing Group] [_____] for inclusion in the Maintenance Information Database."

3.4 OPERATIONS AND MAINTENANCE

Submit manufacturer's operations and maintenance manuals for the following equipment:

a. Roofs, walls, and insulation

b. Tanks and storage tanks, pressurized

c. Tanks and storage tanks, unpressurized

Submit [six][_____] complete copies of operations and maintenance manuals in bound 216 by 279 8-1/2 inch by 11 inch booklets listing step-by-step procedures required for system startup, operation, abnormal shutdown, emergency shutdown, and normal shutdown. Include the manufacturer's name, model number, parts list, routine maintenance procedures, possible breakdowns and repairs, trouble-shooting guide, and briefly describe tiems of equipment, indicating the basic operating features. Include piping and equipment layouts and simplified wiring and control diagrams that show the system as installed. Where available, provide technical manuals in electronic format with Standard Graphics Markup Language. When publications are provided in electronic format , only two copies of the document are required. Submit operations and maintenance manuals [30][_____] calendar days before testing equipment.

3.5 ACCEPTANCE DOCUMENTATION

Upon completion of the project and acceptance testing, the Contracting Officer will provide acceptance documentation to the Contractor. Complete, sign, and date this documentation and submit the documentation to the Contracting Officer for processing and approval.

-- End of Section --