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USACE / NAVFAC / AFCEC / NASA **UFGS-01 83 13.07 40 (February 2012)**
Change 1 - 02/15

Preparing Activity: NASA **Superseding**
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UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2017
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SECTION 01 83 13.07 40

RELIABILITY CENTERED ACCEPTANCE FOR SUPERSTRUCTURE PERFORMANCE REQUIREMENTS
02/12

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NOTE: This guide specification covers the requirements for Reliability Centered Building and Equipment Acceptance for Superstructures Performance requirements (bridges, cranes, towers, locks, storage tanks, etc.). The contents universally apply to structural systems and may be utilized by other organizations, if deemed beneficial.

Refer to Section 01 83 00.07 40 RELIABILITY CENTERED ACCEPTANCE FOR FACILITY SHELLS (foundations, structure, walls, openings, roofs, insulation and vapor barrier systems, etc.).

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 items(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.
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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

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NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project.

The Guide Specification technical editors have designated 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 submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation 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.

Use the "S" Classification only in SD-11 Closeout Submittals. An "S" following a submittal item indicates that the submittal is required for the Sustainability Notebook to fulfill federally mandated sustainable requirements in accordance with Section 01 33 29 SUSTAINABILITY REPORTING.

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" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.][for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submittals with an "S" are for inclusion in the Sustainability Notebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. 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

Alignment (Laser preferred)[; G[, [____]]]

Balance Test and Measurement[; G[, [____]]]

Hydrostatic Test[; G[, [____]]]

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

Mechanical Performance Test[; G[, [____]]]

Tank Integrity Test[; G[, [____]]]

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

Verification of Liquid Level[; G[, [____]]]

Verification of Relief Devices[; 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 testing and test equipment requirements. Use certified personnel trained in the appropriate acceptance testing PT&I technologies to ensure that the results are accurate and consistent. Submit the following as part of the quality control plan for all required acceptance testing:

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

b. Certificates of test personnel qualifications and certifications.

1.4 WARRANTY

Furnish workmanship and performance warranty for the work performed for a period not less than [1][_____] years from the date of Government acceptance of the work; issued directly to the Government. Perform corrective action that becomes necessary because of defective materials and workmanship while system is under warranty [7][_____] days after notification, unless additional time is approved by the Contracting Officer. Failure to perform repairs within the specified period of time constitutes grounds for having the corrective action and repairs performed by others and the cost billed to the Contractor. Provide a [1][_____]

year(s) minimum contractor installation warranty.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

This guide specification establishes acceptance requirements to ensure all equipment and structural systems installed by the Contractor have been installed properly and contain no identifiable defects that will shorten the design life of the equipment or structure. These requirements utilize Predictive Testing & Inspection (PT&I) technologies and are essential elements in the Government's Reliability Centered Building and Equipment Acceptance Program.

This guide specification is not intended to limit the inspection and acceptance process to the use of PT&I techniques. This guide is intended to supplement comprehensive and detailed commissioning and quality control specifications.

2.2 PRODUCT DATA

Submit material, equipment, and fixture lists for all equipment, structural components, materials, and fixtures planned for use to complete the job before commencing work. Include at a minimum, the item's description, quantity, manufacturer's style or catalog numbers, and specification and drawing reference numbers. Provide a complete list of construction equipment to be used.

Provide product samples for structural system components, at a minimum include [_____] [penetrations][, fasteners][, and finish color swatches] for Contracting Officer approval prior to commencing work or ordering materials. Size samples to clearly illustrate product features and characteristics.

2.2.1 Manufacturer's Product Data

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

Submit fabrication drawings for equipment and structural components consisting of fabrication and assembly details to be performed in the factory.

Submit manufacturer's catalog data (as applicable) for the following equipment and structural components:

[a. Cranes

][b. Structural Components

][c. Tanks and Storage Tank Pressurized

][d. Tanks and Storage Tank Unpressurized

][e. Towers

][f. [_____]

]2.2.2 Certification Data

Submit applicable certificates for the equipment and structural components listed below showing conformance with test requirements, laboratory certifications, etc. as required by the project specification.

[a. Cranes

][b. Structural Components

][c. Tanks and Storage Tank Pressurized

][d. Tanks and Storage Tank Unpressurized

][e. Towers

]2.2.3 Specific Equipment Data

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

[a. Cranes

][(1) Alignment (Laser preferred)

][(2) Balance Test and Measurement

][(3) Mechanical Performance Test

][b. Tanks and Storage Tank Pressurized

][(1) Tank Identification (type)

][(2) Volume

][(3) Hydrostatic Test

][c. Tanks and Storage Tank Unpressurized

][(1) Tank Identification (storage solution type)

][(2) Volume in U.S. gallons

][(3) Hydrostatic Test

][d. Structural Components

][(1) Alignment (Laser preferred)

][(2) Infrared Thermography Test

]2.2.4 Extra Materials

Submit spare parts list data for each different item of material and equipment specified, after approval of detail drawings and not later than [_____] months prior to the date of beneficial occupancy. Include in the data a complete list of parts and supplies, with current unit prices and source of supply, a recommended spare parts list for 12 months operation, and a list of the parts recommended by the manufacturer to be replaced after [1] [and] [_____] year(s) of service.

PART 3 EXECUTION

3.1 EXAMINATION

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

[a. Cranes

][b. Structural Components

][c. Tanks and Storage Tank Pressurized

][d. Tanks and Storage Tank Unpressurized

][e. Towers

]3.2 INSTALLATION

Submit layout drawings for all installed equipment and structural components consisting of equipment layouts including assembly, applicable 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, Government may elect not to have the Contractor perform acceptance testing, but instead the acceptance testing may be performed either by Government personnel or other designated third party personnel. This option can be exercised on a case-by-case basis. Regardless of who performs the acceptance testing, Contractor compliance with the requirements of acceptance is still mandatory.

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Deliver equipment and services that meet the contract requirements and specifications. Ensure all equipment is free of latent manufacturing and installation defects, and acceptance criteria are met. Perform acceptance testing as defined in this specification 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 all 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 non-intrusive and non-destructive 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 includes, but is not limited to: 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. Unless the PT&I test is designated as "optional", do not remove the requirement from this specification. If the system is non-critical, non-configured, and not mission essential, use sound engineering discretion to assess the value of adding these additional test and acceptance requirements.

Enhanced acceptance criteria may have an impact on contractor cost, and therefore 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 obviously requiring overly restrictive acceptance criteria should not be used. The acceptance criteria should define the “minimum” limits essential for a good, quality installation. See the RCBEA GUIDE for additional information regarding cost feasibility of PT&I.

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

a. Perform Alignment (Laser preferred) for:

(1) Structural Components

Perform an alignment survey/test of the structural components as part of the prebeneficial use to check for desired levelness, voids in components and/or the presence of contact gaps.

b. Perform Infrared Thermography Test for:

(1) Structural Components

Perform a thermographic survey of the structural components infrared thermography as part of the prebeneficial use to check for voids in components and/or the presence of contact gaps.

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

c. Perform Tank Integrity Test for:

(1) Tanks and Storage Tank Pressurized

(2) Tanks and Storage Tank Unpressurized

d. Perform Ultrasonic (Airborne) Test for:

(1) Weldments [optional]

e. Perform Verification of Liquid Level for:

(1) Tanks and Storage Tank Pressurized

(2) Tanks and Storage Tank Unpressurized

f. Perform Verification of Relief Devices for:

(1) Tanks and Storage Tank Pressurized

(2) Tanks and Storage Tank Unpressurized

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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Upon completion of all PT&I tests submit baseline data report to the Contracting Officer. Include a summary of all 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. Cranes

][b. Tanks and Storage Tank Pressurized

][c. Tanks and Storage Tank Unpressurized

] Submit [six][_____] complete copies of operations and maintenance manuals [in bound 216 by 279 8-1/2 by 11 inch booklets] [electronic copies as directed by the Contracting Officer] 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 a brief description of all equipment and their basic operating features. Include piping and equipment layouts and simplified wiring and control diagrams of the system as installed. Where available, provide technical manuals in electronic format with Standard Graphics Markup Language. When electronic format publications are provided, only [two][_____] copies of the document are required. Submit operations and maintenance manuals [30][_____] calendar days prior to testing any 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 back to the Contracting Officer for processing and approval.

-- End of Section --