

**MPR 8823.1
REVISION B**

**EFFECTIVE DATE: September 27, 2004
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MARSHALL PROCEDURAL REQUIREMENTS

AD01

DESIGN CONTROL OF FACILITIES

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DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Canceled)	Document Revision	Effective Date	Description
Baseline		12/13/99	
Revision	A	6/14/01	Extensive rewrite to incorporate ISO 9001:2000.
Revision	B	9/27/2004	Changed title to "Marshall Procedural Requirements." Changed "MPG" to "MPR," "will" to "shall," and "must" to "shall" in various paragraphs. Reflects minor editorial changes.

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PREFACE

P.1 PURPOSE

This procedure defines the methods and responsibilities for design control of facility designs at the Marshall Space Flight Center (MSFC).

P.2 APPLICABILITY

This procedure applies to facility design activities performed at or under the direction of MSFC.

P.3 AUTHORITY

NPD 8820.2, "Design and Construction of Facilities"

P.4 APPLICABLE DOCUMENTS

- a. NPR 1441.1, "NASA Records Retention Schedules"
- b. MPR 1440.2, "MSFC Records Management Program"
- c. MPR 5000.1, "Purchasing"

P.5 REFERENCES

None

P.6 CANCELLATION

MPG 8823.1A dated June 14, 2001

Original signed by
Robin N. Henderson for

David A. King
Director

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DOCUMENT CONTENT

1. DEFINITIONS

- 1.1 Design and Development Input. Functional, special, statutory, regulatory, and performance requirements that the product has to meet.
- 1.2 Design Organization. The MSFC or contractor organization responsible for the design. The design organization may use a qualified design firm for the design production.
- 1.3 Design and Development Output/Product. Result of the design process such as design drawings, specifications, sketches, instructions, etc. The design output is the product for this procedure.
- 1.4 Design and Development Process. An organized effort by qualified personnel to create design output that produces a product that meets the design input requirements.
- 1.5 Facility. Land, buildings, structures, and other real property improvements including utility systems and collateral equipment. The term does not include operating materials, supplies, special tooling, special test equipment, flight hardware, and noncapitalized equipment. The term facility is used in connection with land, buildings (facilities having the basic function to enclose usable space), structures (facilities having the basic function of a research or operational activity), and other real property improvements.
- 1.6 Product User. The MSFC or contractor organization that requests facility design services from the design organization.
- 1.7 Design and Development Validation. Confirmation by examination and objective evidence that specified requirements for the design output/product are fulfilled. Design validation is performed after design completion and prior to release for purchasing of facility construction.
- 1.8 Design and Development Review/Verification. Confirmation by examination and objective evidence that specified requirements for the design product have been fulfilled during the design process. Design review/verification is performed at the appropriate stages of the design (e.g., design reviews).

2. RESPONSIBILITIES

- 2.1 Product User shall:
- 2.1.1 Request design services from the design organization. Design requests shall be documented.
- 2.1.2 Provide functional, special, and performance requirements that the product shall meet.

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Product requirements shall be reviewed for adequacy. Requirements shall be complete, unambiguous, and not in conflict with each other. Product requirements shall be documented.

2.1.3 Participate in design reviews to verify the design meets all users' requirements at the various stages of the design process. Design verification, including any necessary actions, shall be documented.

2.1.4 Validate the design at design completion to ensure the product conforms to the defined user's requirements. Design validation, including any necessary actions, shall be documented.

2.2 Design Organization shall:

2.2.1 Establish and maintain plans and procedures to plan and control the design and development of facility designs in order to ensure the product user's requirements are met. Plans and procedures shall:

2.2.1.1 Determine the design and development stages and the review, verification, and validation that are appropriate to each design.

2.2.1.2 Determine the responsibilities and authorities for design and development.

2.2.1.3 Provide for updating, as appropriate, the planning output as the design and development progresses.

2.2.1.4 Be documented by the design organization and approved by the Manager, Facilities Engineering Department (FED).

2.2.2 Assign qualified personnel, equipped with adequate resources, to each design activity.

2.2.3 Provide facility design input requirements relating to the product, including facility statutory and regulatory requirements and other facility requirements essential for design and development. Where applicable, facility design input requirements shall include information derived from previous similar designs. Facility design input requirements shall be complete, unambiguous, and not in conflict with each other. Facility design input requirements shall be reviewed for adequacy and documented.

2.2.4 Review design inputs and resolve conflicting requirements with the responsible organizations.

2.2.5 Conduct and participate in systemic design/verification reviews. The reviews shall verify the design meets all input requirements and shall identify any problems requiring necessary actions. Design review/verification, including any necessary actions, shall be documented.

2.2.6 Manage interfaces between different groups involved in design and development to ensure communication and clear assignment of responsibilities.

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2.2.7 Ensure the design output/validation documents are reviewed and validated by applicable organizations prior to release to make certain that the input requirements are met and the appropriate information for purchasing, acceptance and safe and proper use is included.

2.2.8 Ensure the output documents are capable of fulfilling the requirements for the specified or intended use.

2.2.9 Ensure the design output/validation, including any necessary actions, is documented.

2.2.10 Review, verify, validate, and approve design changes, as appropriate, before implementation. The review of the design changes includes evaluation of the impact of the change to the final product. Records of the results of review of changes and any necessary actions shall be documented.

2.2.11 Ensure that the responsible organizations are informed of design changes that affect the responsible organization's design input.

2.2.12 Establish the records retention schedules, disposition, and the records custodian or a link where this information is available. (See paragraph 4, "Records.")

2.3 Manager, FED, or designee, shall review and approve the design organization's plans and procedures for control, verification, and validation of facilities designs.

2.4 Manager, Environmental Engineering Department, or designee, shall:

2.4.1 Provide environmental design input requirements relating to the product, including applicable statutory and regulatory requirements and other environmental requirements essential for design and development. Environmental design input requirements shall be complete, unambiguous, and not in conflict with each other. Environmental design input requirements shall be reviewed for adequacy and documented.

2.4.2 Participate in design reviews to verify the design meets environmental statutory and regulatory requirements at the various stages of the design process. Design verification, including any necessary actions, shall be documented.

2.4.3 Review and validate design output prior to release by the design organization when required by the design organization's approved plans and procedures. Design validation, including any necessary actions, shall be documented.

2.5 Director, Safety and Mission Assurance Directorate, or designee shall:

2.5.1 Provide institutional safety design input requirements relating to the product, including applicable statutory and regulatory requirements and other institutional safety requirements

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essential for design and development. Safety design input requirements shall be complete, unambiguous, and not in conflict with each other. Safety design input requirements shall be documented.

2.5.2 Participate in design reviews to verify the design meets institutional safety statutory and regulatory requirements at the various stages of the design process. Design verification, including any necessary actions, shall be documented.

2.5.3 Review and validate design output prior to release by the design organization when required by the design organization’s approved plans and procedures. Design validation, including any necessary actions, shall be documented.

2.6 Construction Organization shall purchase and accept facility construction in accordance with MPR 5000.1.

3. PROCEDURES

3.1 Design and Development Planning

Actionee

Action

Design Organization

Shall establish and maintain plans and procedures to plan and control the design and development of facility designs in order to ensure the product user’s requirements are met. The plans and procedures shall address the management of interfaces between groups involved in the design and development to ensure communication and clear assignment of responsibilities. Plans and procedures shall determine the design and development stages and the review, verification and validation that are appropriate to each design. Plans and procedures shall determine the responsibilities and authorities for design and development and shall be documented by the design organization and approved by the Manager, FED.

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3.2 Design and Development Input

<u>Actionee</u>		<u>Action</u>
Product User	3.2.1	Shall request design services from the design organization.
Product User	3.2.2	Shall provide the design organization with the functional, special, and performance requirements that the product shall meet.
Environmental	3.2.3	Shall provide the design organization with environmental design input requirements relating to the product, including applicable statutory and regulatory requirements and other environmental requirements essential for design and development.
Safety	3.2.4	Shall provide institutional safety design input requirements relating to the product, including applicable statutory and regulatory requirements and other institutional safety requirements essential for design and development.
Design Organization	3.2.5	Shall provide design input requirements relating to the product, including applicable facility statutory and regulatory requirements and other facility requirements essential for design and development. Where applicable, facility design input requirements shall include information derived from previous similar designs.
	3.2.6	Shall review design inputs and resolves conflicting, incomplete, or ambiguous requirements with the responsible organizations.

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3.3 Design Reviews/Verification

<u>Actionee</u>		<u>Action</u>
Design Organization	3.3.1	Shall conduct and document design reviews/verification.
Product User/ Environmental/Safety/ Design Organization	3.3.2	Shall participate in design reviews to ensure design-stage output meets design input.

3.4 Design and Output/Validation

<u>Actionee</u>		<u>Action</u>
Design Organization	3.4.1	Shall ensure the design output is documented in terms that can be verified against design input requirements and validated prior to release for purchasing of facility construction.
	3.4.2	Shall verify the design output meets the design and development input requirements.
	3.4.3	Shall verify the design output contains or makes reference to acceptance criteria.
	3.4.4	Shall ensure that the design output includes the appropriate information for purchasing.
	3.4.5	Shall ensure the design output documents are reviewed and validated by the applicable organizations prior to release for procurement of facility construction.
	3.4.6	Shall identify those characteristics of the design that are crucial to the safe and proper functioning of the facility.
	Product User/ Environmental/Safety	3.4.7

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the design organization’s approved plans and procedures.

3.5 Design Changes

Actionee

Action

Design Organization

3.5.1

Shall review, verify validate and approve design changes, as appropriate, before implementation. Evaluates impact of the change on the final product.

3.5.2

Shall ensure that the responsible organizations are informed of design changes that affect the responsible organization’s design input.

3.6 Facility Construction

Actionee

Action

Construction Organization

Shall purchase facility construction in accordance with MPR 5000.1. The design output shall be used as the description of work for purchasing and accepting facility construction.

4. RECORDS

Records shall be retained in accordance with MPR 1440.2. The records required by other procedures referenced herein are not included in this section. The records retention schedules, disposition, and records custodian or a link (identification) to where this information is available shall be defined in the design organization’s plans and procedures (see paragraph 2.2.12). The records required by this procedure are as follows:

4.1 “Design Requests” (paragraph 2.1.1): The record control organization for this record is the design organization.

4.2 “Product Requirements” (paragraphs 2.1.2, 2.2.3, 2.4.1, and 2.5.1): The record control organization for this record is the design organization.

4.3 “Design Verification/Reviews” (paragraphs 2.1.3, 2.2.5, 2.4.2, and 2.5.2): The record control organization for this record is the design organization.

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4.4 “Design Validation” (paragraphs 2.1.4, 2.2.9, 2.4.3, and 2.5.3): The record control organization for this record is the design organization.

4.5 “Design Changes” (paragraph 2.2.10): The record control organization for this record is the design organization.

5. FLOW DIAGRAM

None