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Requirements for Development Specification Sections

1 Scope

Provide a clear, concise abstract of the coverage of the specification.

2 Applicable documents

All and only those documents referenced in Section 3, 4, 5 and 7 of the specification shall be listed in Section 2 of the specification. If numerous, Section 2 may reference an appendix or other appropriate document containing a complete listing. References shall be confined to documents currently available at the time of issuance of the current revision of the specification.

3 Requirements

The essential requirements and descriptions that apply to performance and design of the subsystem covered by the specification shall be stated in this section. This section is intended to indicate, as definitively as practicable, the minimum requirements that a subsystem must meet to be acceptable. The Requirements section shall be so written that compliance with all requirements will assure the suitability of the subsystem for its intended purpose, and non-compliance with any requirement will indicate unsuitability for the intended purpose. Only those requirements shall be specified that are necessary and practicably attainable.

This section shall contain the following:

a. The performance and design requirements for the subsystem.

b. The performance requirements related to manning, operating, maintaining, and logistically supporting the subsystem to the extent these requirements define or constrain design of the subsystem.

c. The design constraints and standards necessary to assure compatibility of subsystem components.

d. The principal interfaces between the subsystem being specified and other subsystems with which it must be compatible.

e. The major components of the subsystem and the principal interfaces between such major components.

f. The allocation of performance to, and the specific design constraints peculiar to, each major component.

g. The identification and relationship of major components that comprise the subsystem.

h. The identification and use of Government furnished property to be designed into and delivered with the subsystem, or to be used with the subsystem.

Unless purely descriptive by nature, requirements shall be stated in quantitative physical terms with tolerances which can be verified by subsequent analytical test, demonstrative data, or inspection of the subsystem and related supporting engineering data. Requirements stated herein shall be the basis for, and verifiable by the tests specified in Section 4 of the specification.

3.1 Subsystem definition

Provide a comprehensive definition of the subsystem to be developed.

3.1.1 Subsystem diagrams

This paragraph will cover the top-level functional flow diagrams of the subsystem and include diagrammatic presentations to the level required to identify all essential functions.

As an example, a functional flow diagram for the entire system is provided in the GRD.

3.1.2 Interface definition

This paragraph shall cover the functional and physical interfaces between (a) this subsystem and other subsystems, i.e. primary interfaces and (b) the major components within this subsystem, i.e. secondary interfaces. The functional interfaces shall be specified in quantitative terms. Physical interface relationships shall be expressed in terms of dimensions with tolerances. This paragraph shall incorporate, either directly or by reference, interface control drawings, and other engineering data as necessary to define all functional and physical interfaces required to make the subsystem compatible with other subsystems and to make its major components compatible within the subsystem.

3.1.3 Major component list

This paragraph shall include a complete list of all major components, as they become known, which comprise the subsystem with their identification documents arranged in an indentured relationship.

This section defines the major components to which performance and physical characteristics will be allocated.

3.1.4 Government furnished property list

This paragraph shall list the Government furnished property which the subsystem shall be designed to incorporate. Legacy equipment would be listed here.

3.2 Characteristics

3.2.1 Performance

This paragraph shall include those performance requirements which are to be demonstrated by quality conformance inspections in Section 4 of the specification. The performance characteristics paragraph shall state what the subsystem shall do, including both upper and lower performance limits.

3.2.2 Physical characteristics

This paragraph shall include the following as applicable:

a. Weight limits.

b. Dimensional limitations including access for maintenance.

c. Requirements for transport and storage.

3.2.3 Reliability

This paragraph shall include any reliability requirements which apply such as those which flow down from the GRD. This section is optional in the absence of allocated requirements in the GRD.

3.2.4 Maintainability

This paragraph shall include any maintainability requirements which apply such as those which flow down from the GRD. Qualitative requirements for accessibility, modular construction, test points, and other design requirements may be specified as required. This section is optional in the absence of allocated requirements in the GRD.

3.2.5 Environmental conditions

Environments that the system or equipment is expected to experience in shipment, storage, service, and use shall be specified. Where applicable, it shall be specified whether the equipment will be required to meet or be protected against specified environmental conditions. Subparagraphs shall be included as necessary to cover environmental conditions such as: climate, shock, vibration, etc.

3.2.6 Transportability

Any special requirements for transportability and materials handling shall be specified under this heading.

3.3 Design and construction

This paragraph shall specify minimum design and construction standards applicable in the design of this subsystem. To the maximum extent possible, these requirements shall be specified by reference to the established laboratory and industry standards and specifications.

3.3.1 Materials, processes, and parts

This paragraph shall specify those subsystem-peculiar requirements governing use of materials, parts, and processes to be used in the design of the subsystem. It shall also contain specifications as necessary for particular materials and processes to be utilized in the design of the subsystem. Special attention shall be directed to prevent unnecessary use of toxic products and formulations. In addition, requirements for the use of standard and commercial parts for which qualified products lists have been established shall be specified in this paragraph.

3.3.2 Electromagnetic radiation

This paragraph, if provided, shall contain requirements pertaining to electromagnetic radiation. It shall cover both the environment in which the subsystem operates as well as that which it generates.

3.3.3 Nameplates and product marking

This paragraph shall contain requirements for nameplates, part marking, serial and lot number marking, and all other identifying markings required for the subsystem and its component parts.

3.3.4 Workmanship

This paragraph, if provided, shall contain workmanship requirements for development models of equipments to be produced during development, including requirements for manufacture by production techniques, if applicable.

3.3.5 Interchangeability

Not required. *Parts with the same part number are by definition interchangeable.*

3.3.6 Safety

This paragraph shall specify requirements to preclude or limit hazards to personnel and equipment. To the extent practicable, these requirements shall be imposed by citing established and recognized standards, such as ESHD 5008 - PPPL Environment, Safety, and Health Directives. Appropriate paragraphs of the system specification (GRD) shall be cited, such paragraphs being amended on "add" or "delete" basis for applicability to the subsystem. Limiting safety characteristics peculiar to the subsystem due to hazards in assembly, disassembly, test, transport, storage, operation or maintenance shall be stated when covered neither by standard industrial or service practices nor by the system specification. "Fail-safe" and emergency operating restrictions shall be included where applicable. These shall include interlocks and emergency and standby circuits required to either prevent injury or provide for recovery of the subsystem in the event of failure.

3.3.7 Human performance/human engineering

Not required.

3.4 Documentation

Requirements for documenting the design shall be specified in general terms in development specifications. Requirements shall specify types of documents required for design review and approval, manufacture or procurement, testing, inspection, installation, operation, maintenance, and logistic support as appropriate.

3.5 Logistics

Not required.

3.6 Personnel and training

Not required.

3.7 Major component characteristics

This paragraph shall include a subparagraph for each major component listed in paragraph 3.1.3. In stating requirements for the various major components, it should be recognized that verification may necessarily need to be accomplished following the delivery, installation, and checkout of the parts constituting the major components. The functional relationship may be such that verification of requirements specified for a major component can only be accomplished when the units, assemblies, or parts which comprise the major component are assembled into the subsystem. For each major component, a separate paragraph shall be prepared specifying the performance and physical characteristics.

Performance and physical characteristics are allocated from the subsystem to the major components in this paragraph.

3.8 Precedence

This paragraph shall establish the order of precedence of this specification relative to referenced documents.

4 Quality assurance provisions

Requirements for formal tests/verifications of subsystem performance and design characteristics and operability shall be specified in this paragraph. Tests/verifications specified herein shall

include subsystem and component design evaluation and operational capability verification. Subparagraphs under this section shall include:

a. Reliability testing with respect to subsystem and component reliability (if quantitative requirements are specified in Section 3.2.3.

b. Engineering evaluation and test requirements to the level of detail necessary to define the extent of the test program and the objectives of the tests. The specific elements to be included in the test shall be specified. If data generated during the progress of tests specified herein is to be recognized as formal verification that specified requirements in Section 3 of the specification have been satisfied, the test objectives shall so state.

c. Qualification testing of the subsystem and critical components.

d. Installation testing and checkout, such as continuity checking, interface mating, major component operation in the installed environment, support equipment compatibility, and documentation verification.

e. Formal test verification of performance characteristics to demonstrate that subsystem requirements in Section 0 of the specification have been satisfied.

4.1 General

This paragraph shall discuss the philosophy of testing, location for performance of tests, and other information related to subsystem testing not covered elsewhere.

4.1.1 Responsibility for tests

This paragraph shall assign responsibilities for performance of tests to each agency, Laboratory or contractor, as applicable.

4.1.2 Special tests and examinations

This paragraph is optional in the development specification, and, when used, would generally cover testing requirements for qualification evaluation for selection of parts, components, or equipments to be used in the system.

4.2 Quality conformance inspections

This paragraph shall cover, or reference, test and inspection requirements necessary to determine if all requirements of Section 3 of the specification have been achieved. Insofar as practical, tests shall be arranged in a logical order for sequential performance.

5 Preparation for delivery

This section shall provide guidance for the preparation of equipment for delivery. Such guidance will be peculiar to the subsystem being specified and other than standard practice.

6 Notes

The contents of this section are not contractually binding. Any information which should be made known as background information may be included herein.

7 Appendices

This section of the specification shall contain requirements which are contractually a part of the specification but which, for convenience in specification maintenance, are incorporated herein;

e.g., requirements of a temporary nature or for limited effectivity. Where parameters are placed in an appendix, the paragraph of the appendix shall be referenced in the main body of the subsystem specification in the place where the parameter would normally have been specified.