1. (normative)  
   Design definition file (DDF) - DRD
   1. DRD identification
      1. Requirement identification and source document

This DRD is called from ECSS-E-ST-10, requirements 5.3.1c, 5.3.1f, 5.4.1.1b and 5.4.1.4a.

* + 1. Purpose and objective

The objective of the design definition file (DDF) is to establish the technical definition of a system or product that complies with its technical requirements specification (as defined in ECSS-E-ST-10-06 Annex A).

The design definition file is a basic structure referring to all information relative to the functional and physical architectures and characteristics of a system or product, necessary for its identification, manufacturing, utilization, support, configuration management and removal from service.

The DDF is a collection of all documentation that establishes the system or product characteristics such as lower level technical specifications, design and interface description, drawings, electrical schematics, specified constraints (e.g. on materials, manufacturing, processes, and logistic).

It details the as-designed configuration baseline (as defined in ECSS-M-ST-40) of the system or product and is built up and updated under the responsibility of the team in charge of system engineering. It is the technical baseline for the production, assembly, integration and test, operations and maintenance of the product.

The DDF, the technical requirements specification, and the Design Justification File (as defined in ECSS-E-ST-10 Annex K) are the basic documents used for product development. They are interrelated such as:

* the design (i.e. DDF) is the response to the requirements stated in the TS,
* the justification (i.e. DJF) demonstrates the conformance of the design (i.e. DDF) to the requirements stated in the TS.

1. The DDF is a logical file covering all TS disciplines required for the considered system. In general, the elements of the DDF are “rolled out” as separate documents.
   1. Expected response
      1. Scope and content

Introduction

The DDF shall contain a description of the purpose, objective and the reason prompting its preparation (e.g. programme or project reference and phase).

Applicable and reference documents

The DDF shall contain the list of applicable and reference documents, used in support to the generation of the document.

The DDF shall include the reference to the following applicable documents:

Business agreement

System engineering plan (as defined in ECSS-E-ST-10 Annex D)

Coordinate system document (as defined in ECSS-E-ST-10-09 Annex A)

Technical requirements specification (TS)

Product assurance plan

Configuration management plan (as defined in ECSS-M-ST-40)

Configuration status report (as defined in ECSS-M-ST-40).

The DDF shall refer to DDFs of next higher and lower level products.

Summary of the project and technical requirements

The DDF shall contain a brief description of the product and of the main technical requirements throughout its life cycle phases (e.g. launch, deployed, operations, end-of-life).

The DDF shall contain the description of the system or product design documentation, based on the product tree (as defined in ECSS-M-ST-10) and also include, or refer to, the specifications tree (as defined in ECSS-E-ST-10 Annex J).

The DDF of a system shall contain at least the technical requirements specifications of the elements in which the system is broken down

Functional description

Functional architecture

The DDF shall contain the description of the functional architecture of the system or product i.e. the arrangement of functions, their sub-functions and interfaces (internal and external), and the performance requirements to satisfy the requirements of the TS.

The DDF shall present the data and their flow interchanged between the different functions, the conditions for control, and the execution sequencing for the different operational modes and states.

1. The Functional Architecture is an output of the functional analysis process (as defined in ECSS-E-ST-10 clause 5.3.1a)

Function tree

The DDF shall contain or refer to the system or product function tree, the latter conforming to ECSS-E-ST-10 Annex H.

Description of functional chains

The DDF shall describe the functional chains that contribute to the realization of the functional requirements of the TS and their contributing functions, consider the different operational modes and states, and indicate the selected physical implementation for each of the functions.

Physical description

Physical architecture

The DDF shall contain the description of physical architecture of the system or product i.e. the arrangement of elements, their decomposition, interfaces (internal and external), and physical constraints, which form the basis of a system or product design to satisfy the functional architecture and the technical requirements.

1. The Physical Architecture is an output of the preliminary design definition activities (as defined in clause 5.3.1f).

Product tree

The DDF shall contain or refer to the product tree of the system or product, as defined in ECSS-M-ST-10 Annex B.

1. The Product Tree is a breakdown of the Physical Architecture.

Specification tree

The DDF shall contain or refer to the specification tree of the system or product, the latter conforming to Annex J.

Description of elements of the physical architecture

The DDF shall provide

the nomenclature of the system or product,

the overall system or product drawings,

for each element of the system, the description of the different constituents of the physical architecture,

the characteristics of the respective elements,

their configuration management identifier (e.g. hardware part number, software version number, drawings number, electrical schematics numbers).

The DDF shall reference any documentation containing detailed technical descriptions and associated matrices to ensure overall consistency and completeness.

Description of interfaces

The DDF shall describe the physical and functional characteristics of the internal and external interfaces of the system and refer to the relevant IRD and ICD, conforming to Annex A of ECSS-E-ST-10-24.

System technical budget, margins and deviations

The DDF shall present the budget allocation of the technical parameters of the system and provide the actual status of the system margins, and deviations.

The DDF shall contain or refer to the system or product technical budget, the latter conforming to Annex I.

System design constraints

Constraints for production

The DDF shall present the constraints induced by the system or product design definition on the production activities e.g. operational allowable envelopes, restrictions on assembling sequences, procedures and testing modes, exclusion zones, manufacturing environmental conditions, and conditions for procurement.

Constraints for operation

The DDF shall present the constraints induced by the system or product design definition on the implementation of the operations e.g. operational allowable envelopes, restrictions on operating modes, and exclusion zones.

Constraints for transportation and storage

The DDF shall present the constraints induced by the system or product design definition on the transportation activities and during the periods of storage of the product e.g. allowable envelopes, restrictions on transportation and storage, exclusion zones, packaging, shock levels, temperature environments, humidity, cleanliness, regulations, and dangerous materials.

Constraints for maintainability

The DDF shall present the constraints induced by the system or product design definition on the maintenance activities and procedures e.g. operational allowable envelopes, accessibility, tooling, support materials, parts availability, and deliveries.

Engineering data repository

The DDF shall contain the information on the system or product engineering data repository that contains the complete set of design parameters, or a reference to it.

1. Information about the set of design parameters is provided in ECSS-E-TM-10-10.

Conclusion

The DDF shall list and summarize all deviations of the design with respect to the technical specifications and constraints induced by the system or product design definition.

* + 1. Special remarks

None.