

MQP Level 3

Design Review Procedure

This document defines the procedure for System Design Reviews (SDR) performed by the ITER Organization (IO) and Domestic Agencies (DA) on the ITER Systems design. This document defines also a simplified process and a document-only review for lower levels Design Reviews.

Approval Process			
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Change Log			
Design Review Procedure (2832CF)			
Version	Latest Status	Issue Date	Description of Change
v1.0	Signed	08 Apr 2008	
v1.1	Signed	21 Apr 2008	
v1.2	Signed	28 Apr 2008	
v1.3	In Work	29 Apr 2008	
v1.4	In Work	01 Jul 2008	
v1.5	In Work	01 Jul 2008	
v1.6	Signed	01 Jul 2008	
v1.7	Approved	10 Jul 2008	
v1.8	In Work	15 Oct 2008	
v1.9	Approved	24 Oct 2008	
v1.10	Signed	15 May 2009	
v1.11	Signed	06 Aug 2009	Incorporated organization changes, action tracking system, design review checklists, review panel report, and a statement of review panel members.
v1.12	Approved	11 Dec 2009	Incorporated QA comments (that is, description of CDR and PDR, and application of checklists), RH Compatibility Procedure, System Structural Integrity Report and System Load Specification.
v1.13	In Work	24 Nov 2010	Draft version for pre-review.
v2.0	Signed	14 Dec 2010	For clarity purpose, Design Review procedure Version 1.13 has been split in 3 separate documents: 1) Top level considerations (Objectives, various DRs, authorities (approval, etc), roles...), 2) how to perform activities [this procedure] and 3) guidelines for the maturity of documents at each stage (CDR, PDR and FDR).
v2.1	Signed	29 Jun 2011	Simplified version worked out by TF-CIE incorporating a Design Review simplified workflow
v2.2	Signed	17 Jan 2012	Comments made on v 2.1 taken into account (mainly QA comments)
v3.0	Disapproved	27 Feb 2012	Same version as v2.2 (add new reviewers and change approver). Plus Design Developer can be invited for clarification during the chit merging and categorization
v3.1	Approved	30 Nov 2012	Incorporated comments from v3.0, TF3 ITER_D_A6SMQN - Task Force 3 - Final report and ITER_D_C2HS2K - 2012 Management System Audit 47 - Design Review Process. Aligned with the Design Review Management Plan [1]
v3.2	Approved	01 Jul 2014	Updated to align with current requirements; <ul style="list-style-type: none"> Minor comments from last version v3.1, New organization: CIEH replaced by DIPH or Chief engineer, CEA participation as decommissioning experts (new terms of reference from AIF), Alignment with the Design Plan expected from each System-RO (as a consequence Appendix B has been removed) Use of the new MQP template (as a consequence some Sections have been re-distributed)
v4.0	Revision Required	19 Oct 2016	Main changes are: <ul style="list-style-type: none"> Update of acronyms and alignment with names of the units, Incorporation in the procedure of some elements already implemented (list of qualified Chairs...) Better definition of the timing in the preparation of the design review meeting and the issuance of documents, Better definition of the content of the input package, the content of the Chit, the review and approval of the generated documents. Request that the draft action plan is produced before the end of the review in a "Close-Out session".

			Overall this update is incorporating recommendation from some experts (Tom Todd, Franck Casella,...)
v4.1	Approved	02 Dec 2016	Procedure was updated according to reviewer's comments.
v4.2	Revision Required	06 Dec 2019	Updated to account for the IO organization effective Jan. 2020
v4.3	Approved	17 Dec 2019	Aligned with new IO Organization, defined SIRO role in support to the Design Developer, input data package connected to DPP, added SCOD reviewer role in the notification and close-out report, CIOH as approver of the Chair selection, established a preparation meeting 24 weeks before the design review meeting, clarified VCM/DCM, implemented workflow changes and clarifications, added management documentation and completed their SoA.
v5.0	Signed	13 Jan 2021	As per approved MQP doc request https://user.iter.org/?uid=4HFYT9 the changes of these version are described through the intermediate v. 4.2 and approved v. 4.3 made in the course of re-org. This new major version 5.0 is for review by DAs.
v6.0	Signed	10 Mar 2021	Adapted roles and responsibilities in the procedure for the use by the DAs Added Appendix 2 to define the provisions for the use by the DA of this procedure Added Appendix 3 defining requirements for acceptance of DA procedure when use for the execution of ITER Design Reviews Aligned the T0-24w meeting with what we are doing Added the Combined FDR+EWP review as requested by WI for CRR [QXW4K] Added "output" documents with reference to templates Added a paragraph on the Sign-Off Authority (as the current SOA points to this procedure for that)
v6.1	Revision Required	31 Mar 2021	Took into account comments received on v6.0. In particular redefined the T0-24W meeting and the role of CIO for it, and specified that the combined FDR+EWP review is not applicable to the DAS. Other minor changes in the attached track change version in metadata of this document.
v6.2	Approved	15 Apr 2021	Comments from USDA, EUDA and CNDA on version v6.1 were considered A track change version vs v6.1 is provided in the metadata
v6.3	Signed	06 May 2021	As per approved MQP doc request 57VN9P the changes are: "LoD-IDP" (list of documents of the Input Data Package) changed to "IDP-List", Design Developer and Design Coordinator shall be independent from the Panel Members (incl. Chair) Design Review Secretary, Chair and other Panel members are proposed by the Design Coordinator in agreement with the Design Approver, in the Notification (approved by CIOH) SDR is called by Design coordinator (instead of Design Developer) DCM status is reported by Design developer (instead of SIRO) Statement "Documents of the Input Data Package shall be approved by the entity in charge of producing them" moved to section: "2 weeks minimum before the SDR meeting" Chit Owner proposes the closure of Chits (instead of design Developer) Reminded in section 7.9 that the "Combined FDR+EWP review" is not applicable to the DA. Remove all the Design Developer's roles for the T0-24w preparation (section 10.1) and in Appendix 2 After PA, all the "design review management documents" are written by the Design Coordinator (instead of Design Developer)
v6.4	Approved	18 May 2021	Incorporated USDA's agreed changes on v6.3
v7.0	Approved	08 Nov 2024	As per CCMAF the changes are: - update as per IO 2023-Reorg (implementation of Deviation request to MQP documents describing responsibilities modified for the 2023 Re-

			<p>organization (8Z7X9Q))</p> <ul style="list-style-type: none"> - introduction of "document-based only review" for lower-level systems/component review - introduction of Kick-off Meeting (optional) prior Design Review meeting - alignment with F4E Process - change of approval (closure) of Cat.1 chits from Design Approver to Chair - change of approval of closeout report from Design Approver to CID Head - simplification of the readiness assessment chapter - clarifications on roles & responsibilities between IO and DAs (for DA design reviews)
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1 Purpose

This document defines the procedure for **System Design Reviews (SDR)** performed by the **ITER Organization (IO)** and **Domestic Agencies (DA)** on the ITER Systems design. This document defines also a simplified process and a document-only review for lower levels Design Reviews.

This procedure is a MQP-Level 3 procedure in the Design Control Process. It is a daughter document of the Design Verification and Validation Procedure-MQP Level 2 [1].

The [Design Review Portal](#) provides information related to the System Design Reviews: applicable and reference documents, guidelines and templates, scopes, calendar, inputs and outputs of the reviews.

Note: In this document:

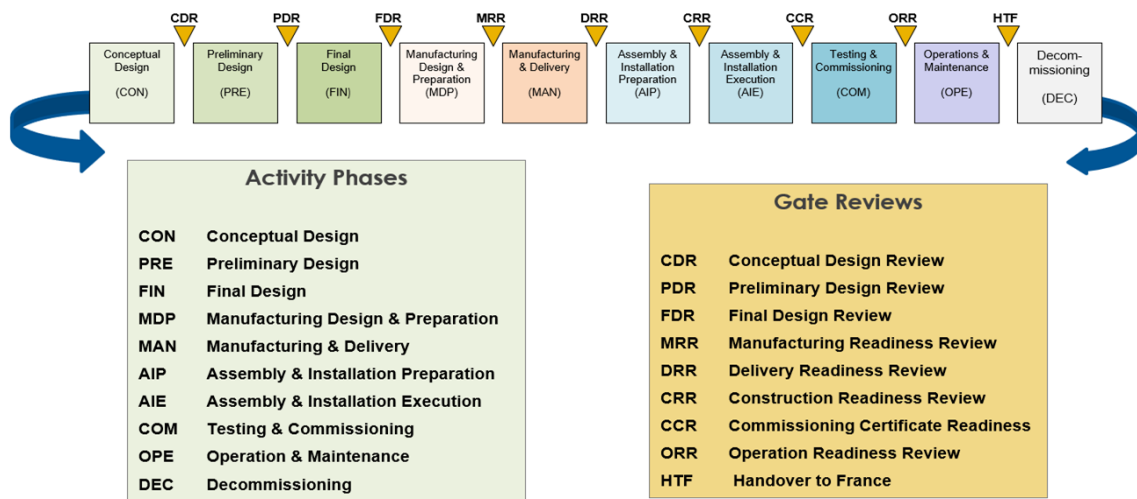
- The Design Developer is the IO-TRO prior to the PA signature and the DA-TRO / DA contractor TRO after PA signature, unless otherwise defined herein.
- The Design Approver is within the IO prior to the PA signature. This role is split in two roles after PA signature (see Appendix 2).
- This note does not apply to Built-To-Print PAs where Design Developer and Design Approver are always IO staff.
- The terms “Domestic Agency” (DA) and Procurement Arrangement (PA) can be respectively replaced by IO-Contractor and IO-Contract in case of design developed through IO in-cash procurement.

2 Scope

This procedure applies to the review of the design outputs achieved at the end of the design activity phases (Conceptual Design, Preliminary Design and Final Design activity phases):

- Conceptual Design Review (CDR) at the completion of the Conceptual Design phase, to authorize the Design Developer to proceed to the Preliminary Design phase,
- Preliminary Design Review (PDR) during the design phase, if required, to authorize the Design Developer to proceed to the Final Design phase,
- Final Design Review (FDR) at the completion of the Final Design phase, to authorize the Design Developer to proceed to the Manufacturing Design & Preparation Phase.

These are three of the phase gate reviews defined in the PMP [7].



This procedure shall be applied for the review of the design of the ITER Configuration Items (Systems and Sub-systems), where Configuration items normally correspond to PBS level 1 nodes or PBS L2 nodes.

The procedure can also be applied for the review of the design of lower-level Structures, Systems or Components (SSCs-typically PBS level 3 and below) for which the simplified workflow (**Section 7.8**) can be used.

The list of SDRs and applicable workflows shall be identified in the yearly ITER Design Review Plan [10] managed by CID.

This procedure is used by IO as a tool to verify, accept and authorize the design from internal (IO) and external Design Entities (DA and IO-Contractors).

In case the design development is given to an external design entity, the SDR also supports:

- the verification of the documents to be approved by IO (safety, integration or documents to be sent as input to any other DA or IO-Contractor),
- the release by IO of an Hold Point (Authorization To Proceed) after IO acceptance of the design output.

This SDR procedure can be used:

- by IO before PA signature ,
- by DAs after PA signature with provisions indicated in Appendix 2.
- By Contractors, for in-cash contracts when contractor is in charge of design development

2.1 PICs and PIAs

When the SSC design includes Protection Important Components or/and involves Protection Important Activities, the design review conducted by the Nuclear Operator is a surveillance of the activity “*Definition and design-basis studies for systems and components including PIC components*” in agreement with article 2.2.2, 2.5.1 and 2.5.2 of Order dated 7th February 2012 and it is part of a global Technical Check of the PIA associated to design development.

2.2 Extent of the review

The extent of the review depends on the stage of the design activities. It is responsibility of the Design Approver in charge of the structure/system/component (SSC) to be reviewed, in agreement with the CIDH, to define the scope and objectives of the SDR, the parts of the design which are out of scope and the relationship with other design reviews to ensure that the full scope is addressed. These objectives shall be stated in the SDR Notification. As much as possible, the scope of review shall cover a full Configuration Item (SSC) and splitting design reviews in small parts should be avoided.

In particular, the organisation of Design Reviews at lower level does not discharge from holding the design Reviews at the highest level covering the full scope of the Configuration Item.

2.3 Planning and Scheduling

The Design Reviews shall be executed in accordance with the yearly ITER Design Review Plan [10], which lists the Design Reviews according to their features, shows their logical sequence and the link to the Project Milestones and phases:

- Level: Plant level, System level, Sub-system or below,
- Scope: PBS,
- Kind: CDR, PDR, FDR, MRR (*),
- Master Schedule Milestones they contribute to achieve,
- QA and Safety related attributes: PIC/PIA/SR, PE/NPE, QC,
- IO Unit or external organization in charge of the SDR.

The yearly ITER Design Review Plan gives the official list of all SDRs to be organized for the Project and controlled by IO or DAs.

(*) The MRRs are listed in the yearly ITER Design Review Plan for completeness, the SDR procedure does not apply to the MRR itself.

3 Definitions and acronyms

3.1 Definitions

Below is the list of definitions specific to this procedure. For Nuclear Safety Common definitions, see [ITER_D_RLZXMV - Nuclear safety common definitions](#),

Action Item:

Action/task to be completed to respond to any issue raised during the review using Chit form. An Action Item can be linked to several Chits and vice-versa.

Action Plan:

List of Action Items to resolve the Chits. This Plan shows for each Chit, the action to be done by the responsible for the action and the due date for completion approval.

Appealing process:

Process to be used by the Design Coordinator to ask for the authorization to close the Design Review without having closed all the relevant Chits.

Chit:

Specific form [and by extension its contents] used to collect remarks (requests for additional work, comments, proposals for improvement, etc.), to propose possible solutions, to review and approve them by the Chairperson with support of panel members, to link them to Actions Plan and to record their closure.

Closed Session:

Timeslot at the end of **each day of the SDR Meeting** where the Panel summarises the activities and findings of the day and processes the Chits.

Close-Out Report:

Document proposing the closure of the SDR and providing (or not) authorization to proceed with the next design phase on the basis of evidence that all required Chits have been closed.

In addition, the Close-Out Report refers to the current Action Plan showing remaining actions for not resolved category 2 chits (if any).

(Note: for CDR and PDR, all Cat.1 Chits shall be closed; for FDR all Cat. 1 and Cat. 2 Chits shall be closed).

Close Out session:

Timeslot after the last closed session and before debriefing where the Panel makes the final decision on at minimum Chits Cat. 1 and their resolution actions in the draft Action Plan. The Design Developer, the Design Coordinator and Chit submitters shall be invited.

Debriefing:

Open session at the end of the SDR meeting where the Panel presents conclusions of the review meeting to all the participants.

Design Compliance Matrix (DCM):

The DCM is a tool that traces the compliance demonstration of the system's design with its RQs.

Note: For some DAs the DCM may have a different name or even a slightly different format, nevertheless their content is equivalent (ex: DCM in EUDA = VCD QUAL (Verification Control Document – Qualification and VCM in EUDA = VCD ACC (Verification Control Document Acceptance)).

Design Entity:

Legal entity in charge of developing the design i.e. IO, DA, IO contractors, DA contractors.

Design Plan (PBS):

Overall planning including all design activities regarding certain scope. This Plan shows for the scope the list of technical and technical management documents to be issued during the design, how, by when and by whom, and their maturity (preliminary, consolidated, complete) at the end of a given design phase. It gives also specific attributes for document control and verification and identifies design reviews documents.

Design Review Notification:

Formal announcement to the ITER Project of the organization of a System Design Review.

NB: At F4E, this is also called Design Review Plan

Design Review Period:

Period of time between the start of the Preparation Phase and the Approval of the Close-Out Report. This period is composed of 3 phases: Preparation Phase (from about 12 weeks before the SDR meeting to the distribution of the Input Data Package), the Design Review Phase (from the distribution of the Input Data Package to the Approval of the Panel Report), the Chit Resolution Phase (from the Approval of the Panel report to the Approval of the Close-Out report).

Design Review Phase:

Period of time between the distribution of the Input Data Package and the approval of the Panel Report.

Design Review Portal:

A website controlling the overall SDR activity and which gives additional guidelines and templates (Notification, Agenda, Panel Report, Close-Out Report, etc.).

Document:

Any design/engineering data (Files, Documents, Schematics, CAD Model, Drawings, etc...).

External design Entities:

Design organizations external to IO i.e. Domestic Agencies (DAs), IO Direct contractors or subcontractors.

Engineering Work Package (EWP):

A dossier of engineering documentation produced within the IO that is used to develop Construction Work Packages. An EWP defines the scope of work related to the assembly and installation of components and systems.

Input Data Package:

Set of approved documents with their version number, submitted as input to the SDR. The Input Data Package is defined by a List of Documents of Input Data Package (IDP-List)

Panel Report:

Report produced by the Chair to summarise the outcome of the SDR Meeting and to provide recommendations on how to proceed.

Safety:

In this document Safety used in isolation should be understood as including Nuclear Safety, Radiation Safety, Beryllium Safety, Environment Protection, Nuclear Pressurized Equipment/Pressurized Equipment (NPE, PE), Occupational Health Safety (OHS) and Security.

Stakeholders:

The SDR stakeholders are the Panel Members and all the informed people as defined in the Notification.

Configuration item [3]:

Configuration item designates the set of technical end-products (system/sub-system) at PBS level 1 or s level 2 (and sometimes level 3) where it has been chosen to have a set of Technical Requirement Specifications (SRD, sub-SRD), Interface Control (ICDs, IS), CMMs (i.e. CI level 1). Currently about 450 Configuration Items are defined to cover the ITER Facility.

Transverse Functions [11]:

The Transverse Functions are introduced in the ITER SEMP with the aim to clarify how specific project-level technical requirements (P-RQs) are defined, implemented, verified and controlled within the Project.

For each TF, a Transverse Function Officer (TF-O) is identified with the responsibility to coordinate the implementation of the P-RQs allocated to the TF by:

- Writing or supporting the writing of the Project Requirements;
- Defining the strategy to propagate the requirements or constraints to the systems (direct propagation or transformation of the PR into applicable requirements for the systems) ;
- When needed, translating the Transverse P-RQ to the PBS level through suitable analysis;
- Controlling that the requirements or constraints are properly implemented in the design of the systems ;

Verifying the requirements that must be implemented at ITER level, rather than being specific to particular equipment and subsystems (e.g. General Safety Objectives).

3.2 Acronyms

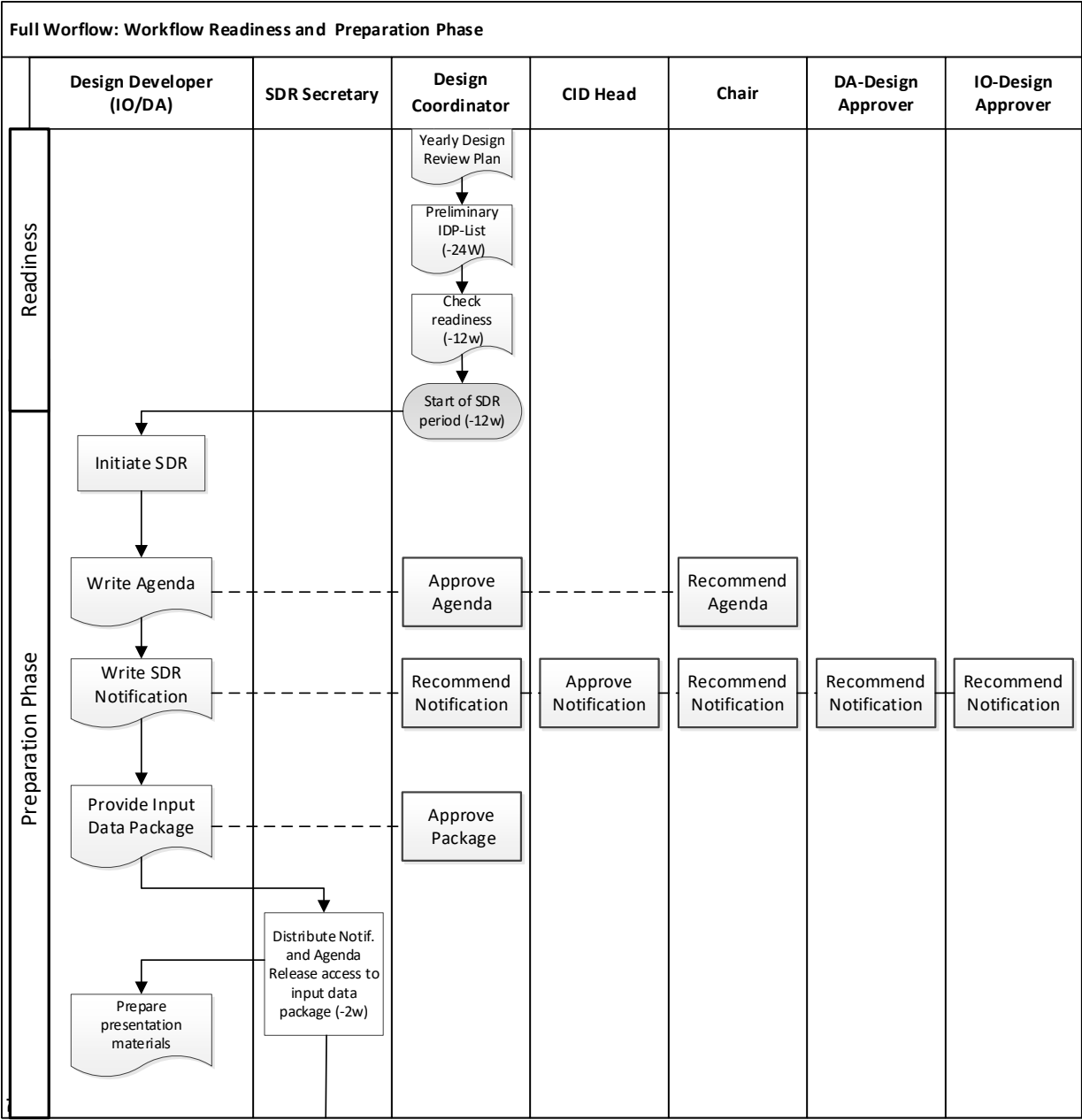
For other ITER Abbreviations see [ITER_D_2MU6W5 - ITER Abbreviations](#)

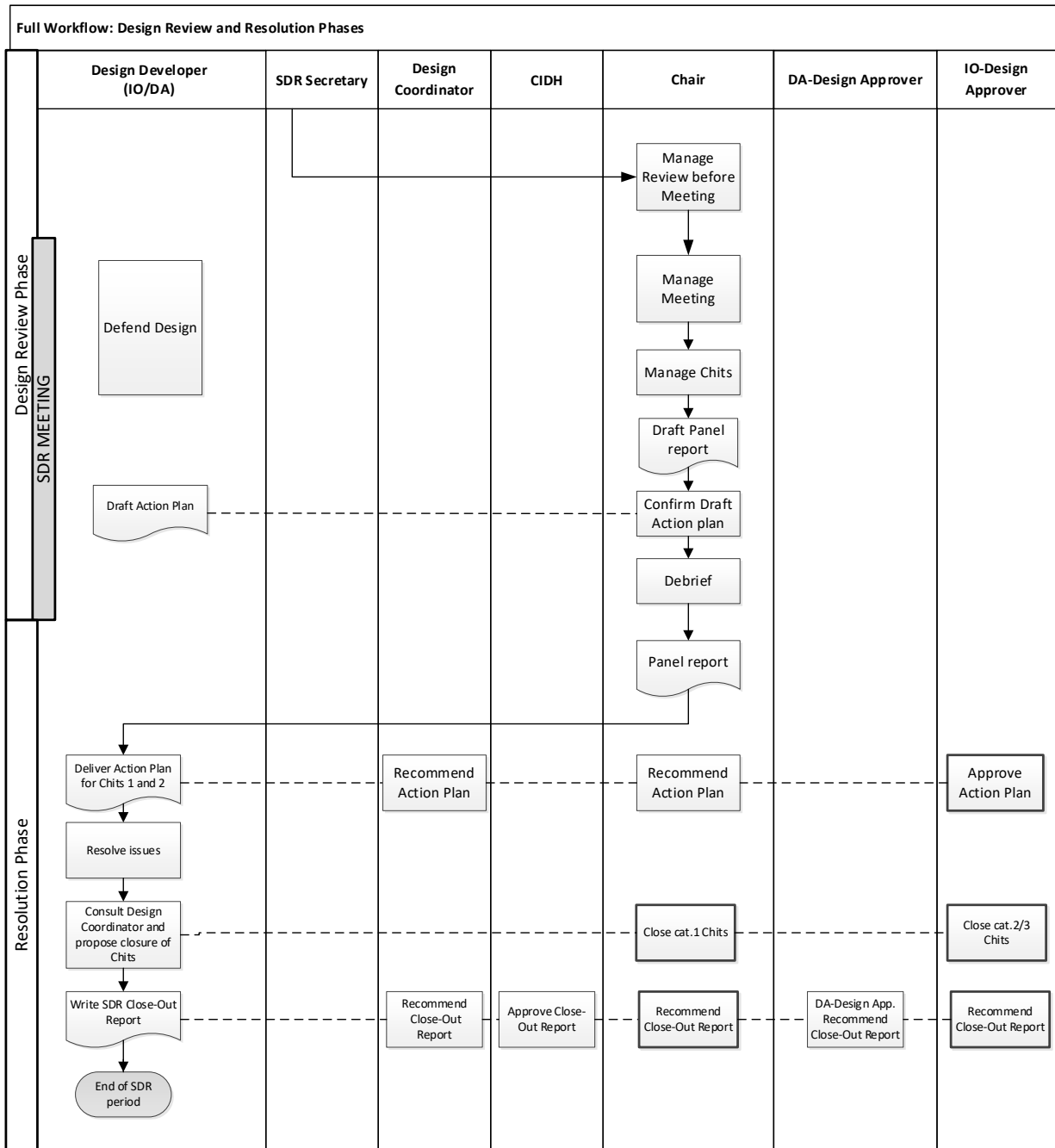
AD	Applicable Documents	OHS	Occupational Health & Safety (IO)
ATP	Authorization-To-Proceed	PA	Procurement Arrangement (between IO and DAs)
Cat.	Category	PCDH	Plant Control Design Handbook
CD/CDR	Conceptual Design/Conceptual Design Review	PCR	Project Change Request
CEA	Commissariat à l’Energie Atomique	PD/PDR	Preliminary Design/Preliminary Design Review
CI	Configuration Item	PE/NPE	Pressurized Equipment/Nuclear Pressurized Equipment
CIDH	Central Integration Division Head	PIA	Protection Important Activity
CMM	Configuration Management Model	PIC	Protection Important Component
CMO	Construction Management Office (IO)	PIM	Project Issue Management
DA	Domestic Agency	PMP	Project Management Plan
DECO	Design Coordinator (from Design Office)	PR	Project Requirements document
DIR	Design Integration Review	QARO	Quality Assurance Responsible Officer
DCM	Design Compliance Matrix	QC	Quality Class
DD	Detailed Design	QMD	Quality Management Division (IO)
DDD	Design Description Document	RO	Responsible Officer
DIRO	Design Integration Responsible Officer	ROX	Return Of Experience
DPP	Document Production Plan	RQs	Requirements
DR	Deviation Request	SCD	Science Division (IO)
DWS	Detailed Working Schedule	SDP	System Design Process
		SIRO	System Integration Responsible Officer (IO)
FD/FDR	Final Design/ Final Design Review	SES	Security & Safety Section
FS	Functional Specification	SLS	System Load Specification
I&C	Instrumentation and Control	SMDD	System for Management of Drawings and Diagrams
ICD	Interface Control Document	SOA	Sign-Off Authority
ICM	Interface Compliance Matrix	SQD	Safety and Quality Department (IO)
ICP	ITER Collaborative Platform	SR	Safety Relevant
IDM	ITER Document Management system	SRO	Safety Responsible Officer (IO)
IDP	Input Data Package	SSC	Structure, System and Component
IS	Interface Sheet	TF	Transverse Function
LoD	List of Deliverables (from DA)	TRO	Technical Responsible Officer
IDP-List	List of Documents of Input Data Package	TRS	Technical Requirements Specification
MRR	Manufacturing Readiness Review	UID	Unique Identifier
NCR	Non-Conformance Report		

4 Reference Documents

	IDM UID	Title
[1]	<u>R3KD8C</u>	<u>Design Verification and Validation Procedure</u>
[2]	<u>3CNWMT</u>	<u>Design Integration Review Procedure</u>
[3]	<u>4CK4MT</u>	<u>ITER System Design Process (SDP) Working Instruction</u>
[4]	<u>43S7GL</u>	<u>Expected content of System Design deliverables</u>
[5]	<u>27LH2V</u>	<u>Plant Control Design Handbook</u>
[6]	<u>2EXFXU</u>	<u>Sign-Off Authority (SOA) for Project Documents</u>
[7]	<u>2NCR3F</u>	<u>ITER Project Management Plan (PMP)</u>
[8]	<u>2F68EX</u>	<u>ITER Systems Engineering Management Plan (SEMP)</u>
[9]	<u>2M9BHD</u>	<u>GIN 024 - Duties and Responsibilities of the ITER Organization System Integration Responsible Officer (SIRO)</u>
[10]	<u>UZ9ZJG</u>	<u>Yearly ITER Design Review Plans</u> (folder)
[11]	<u>SLPJRN</u>	<u>List of Transverse Functions Design Plans</u>
[12]	<u>KXS5NV</u>	<u>Design Review Chairman List</u>
[13]	<u>T8FDWN</u>	<u>List of PBS Design Plans</u>
[14]	<u>QXW4K</u>	<u>Working Instruction for Construction Readiness Review</u>
[15]	<u>U34ACR</u>	<u>Design Planning Procedure</u>
[16]	<u>B6ZAYS</u>	Nominative list of TF Officers

5 Workflow diagram





6 Responsibilities

6.1 Design Developer

The Design Developer designates the technical person within the design entity (IO or DA for FS and DD PAs) who is responsible for developing the design according to the System Design Process [3].

Before the PA signature the Design Developer is the IO System TRO or the IO Sub-system TRO (also called PBS-TRO) under the monitoring of the Design Coordinator.

After the signature of PA (for FS and DD PAs), the Design Developer is the DA TRO or designated person (also called DA-Design Developer) under the monitoring of the Design Coordinator.

The Design Developer supports the Design Coordinator for the inputs to the review (preparation of administrative documents, availability of approved documents, presentations).

6.2 Design Coordinator

In the context of this procedure, the Design Coordinator is the person responsible for the execution of the System design and the execution of the SDRs. This role shall not be confused with Design Coordinator (DECO) i.e a Design Office position for the management of CAD data.

The Design Coordinator shall manage his/her project i.e. the monitoring of the design development activities according to the agreed work plan (Design Plan [13], Document Production Plan and detailed working schedule) and related procedures so that the design is delivered on time for the SDR.

The Design Coordinator is responsible for the organization of the review i.e. making sure that things happen and is supported by the Design Developer for the inputs to the review (notification, design documents, presentations, etc.).

The Design Coordinator is responsible for the organization of the review of interfaces or a Design Integration Review (DIR) [2] before the SDR, for the definition and acceptance of corrective actions after review and for the acceptance of the design after the review according to approved procedures.

The Design Coordinator shall ensure that all SDR documents & data are properly managed and recorded in the Configuration Management Tool.

In addition, for IO design reviews, the Design Coordinator proposes the Chair and the Secretary in agreement with the Design Approver, shall make sure they are trained and shall get confirmation if needed from the Design Review Manager.

Prior PA signature, the Design Coordinator is a Project Leader or delegate. After PA signature, the Design Coordinator is by default the IO PA TRO.

The tasks of Design Coordinator can be partially transferred to the DA PA TRO, if there is a mutual agreement between both parties. In such case, the roles and responsibilities are split into two, as follow:

- For management documents where Design Coordinator is author, the DA PA TRO (DA Design Coordinator) is set as author and IO PA TRO (IO Design Coordinator) as mandatory reviewer.
- For management documents where Design Coordinator is reviewer, the DA PA TRO and IO PA TRO are set as mandatory reviewers

- For management documents where Design Coordinator is approver, the DA PA TRO is set as mandatory reviewer and IO PA TRO as approver

The detailed SOA of all management documents is defined in section 10.4

6.3 Design Approver

The Design Approver is the duly authorized person to approve the system design on behalf of his/her organization. Within the IO, the System Design Approver is the Program Manager of the related system (or delegate).

The Design Approver shall ensure that the system design is developed within the cost and schedule constraints, by competent people, with appropriate resources and according to approved processes (specifically System Design and Design Review Processes).

The Design Approver shall ensure that the SDR is done according to the SDR procedure.

The IO-Design Approver shall recommend the results of the review (Close-Out Report) prior the approval by CID Head.

Note: After PA signature the Design Approver role is split in two roles (see Appendix 2)

6.4 Central Integration Division Head (CIDH)

The CID responsibility in the management of the Design is defined in the ITER Project Management Plan (PMP) [7].

For the SDR process the CID Head shall control that the SDRs are executed according to the yearly ITER Design Review Plan [10], in compliance with this Procedure and that the SDR is completed within the given time constraint and take necessary mitigation measures.

The CID Head is responsible for appoint the Chair (via Notification approval) and for approving key SDR documents such as Notification and Close-out Report.

In case of appeal, (see 7.7.3) the CIDH approves the IO Design Developer's proposal for appealing process.

6.5 System Integration Responsible Officer –SIRO

In execution of his/her duties the Design Coordinator is supported by the Systems Integration Responsible Officer (SIRO) allocated to the PBS [9].

During the design review preparation, the SIRO will participate to the preparation of the documents for the management of the interfaces with other systems (Interface Control Documents-ICD, Interface Sheets-IS and Interface Compliance Matrix-ICM).

During the design reviews the SIRO will present the status of the ICD and IS (at CDR, PDR and FDR) and the status of ICM (at FDR or MRR).

6.6 Design Review Manager

The Design Review (Process) Manager is the person responsible to support the CIDH and SDR process owner for the control of the SDR process.

The Design Review Manager coordinates the preparation of the yearly Design Review Plan (author or co-author), defines the SDR process and writes procedures, ensures the support to users (training, coaching) and the production of progress reports to the CIDH and Senior Management. The Design Review Manager administrates the SDR Portal and the SDR database and checks SDR management documents from process viewpoint.

Note: This is primarily an IO role but can be supported/delegated to DA (to be commonly agreed between IO and DA Design Review Management Teams).

6.7 Design Review Secretary

The Design Review Secretary (called in short “Secretary”) is proposed by the Design Coordinator in agreement with the Design Approver and approved by the CIDH in the Notification. The Design Review Secretary records the results of the meeting and enables the Chair to maintain focus on the meeting. The Design Review Secretary should also provide logistics and review organization support to the Design Coordinator with the additional support of an Administrative Secretary.

The Secretary shall be a technical qualified person with good knowledge of the system to be reviewed. A representative from the design team can be Secretary.

The Secretary shall make sure that relevant documents are distributed and accessible to the SDR stakeholders, that the stakeholders are informed and ensures that anybody can issue e-Chits.

The Secretary shall track the confirmation by the Panel members of their attendance to the review (whether they are mandatory or optional members).

6.8 Review Chairperson

The Review Chairperson is a technically and managerially qualified person not working on the system to be reviewed.

The Chairperson is appointed in the Notification by the CIDH based on a proposal from the Design Coordinator in agreement with the Design Approver from the list of qualified Chairs [12]). Other Chairs can be proposed providing their nomination is justified and agreed with the CIDH before issuing the Notification.

SDR Chair shall preferably be the same for all the reviews (CDR, PDR and FDR) to ensure continuity and effectiveness in the review process.

The Chair shall be **hierarchically independent** from the Design Approver (i.e. the Chair shall belong to another Program than the one lead by the Design Approver, or be external to IO).

In the SDR the Chair shall:

- agree on the selection of Panel members
- review and recommend the Notification and Agenda in preparation of the review
- ensure that the Panel Members perform their review mainly before the meeting
- ensure that the SDR agenda is followed
- chair the SDR meeting

- work with the design team and Design Coordinator to review, merge, categorize and accept the chits for action
- ensure that relevant issues from the meeting are recorded
- ensure that actions and recommendations from earlier meetings have been satisfactorily addressed and closed, as appropriate
- decide if Minutes of Meeting are necessary
- review and approve the record of meeting (Minutes of meeting if necessary)
- ensure that the meeting's minutes (if needed) are issued to designated persons
- issue the draft of the Panel Report
- monitor the production of the draft Action Plan
- Close the Cat.1 Chits

For the SDR process, the Chair shall assign review tasks to Panel members in their area of responsibility/expertise.

6.9 Review Panel

The Review Panel members shall be selected considering the type of SSC to be reviewed, its Quality Class and Safety Class, and the scope of the SDR.

The Panel shall be composed of technical experts, who shall:

- have comparable experience and technical competence as the Design Developer;
- collectively have the breadth of expertise needed to competently review all aspects of the design against the ITER top-level requirements: Safety, Integration, Construction, Operation, Maintenance and Decommissioning;
- be independent from the IO and DA design teams in charge of the design;
- be informed about this procedure;
- follow strictly this procedure;
- be knowledgeable about ITER Design Integration requirements;
- support the Chair in identifying the issues and categorizing the Chits.

It is advisable that the composition of the Review Panel should remain the same throughout the progress of the project, to ensure a more efficient monitoring.

The role of the Panel members is to support the Chair for:

- the review of the Input Data Package in their domain of expertise before the SDR meeting;
- the assessment of the achieved design maturity for the considered design phase and of the remaining technical risks;
- the assessment of the soundness of the selected design option against ITER top-level requirements: Safety, Integration, Constructability, Operability, Maintainability and Decommissioning.

The IO-Quality Assurance Responsible Officer (IO-QARO) shall be one of the Review Panel members who is responsible for supporting and assessing the proper implementation of this procedure.

The table hereafter gives the typical composition of Review Panel:

Full List of Panel experts / representatives	Participation for IO SDRs / DA SDRs (<i>except F4E</i>)	Participation for F4E SDRs
Review Chair (Chairperson)	M	M
IO-Nuclear Safety (SRO)	M	M
IO/QA representative (QARO)	M	M
IO/Health and Safety (OHS RO)	M	M
IO/Design Integration (SIRO (1))	M	M
IO/Assembly & Installation	O (M for FDR)	O (M for FDR)
IO/Operations [CP/CIC/INP]	M	M
IO/Science [DG/SID/SCD]	O	O
IO/Maintenance [CP/CIC/INP/MG]	O	O
IO/Main Interfacing System Representatives	O	O
IO/Controls [CP/CIC]	O	O
Other Technical Experts (2)	O	O
Concerned DA (3)	M	
F4E Senior Technical Officer (from a different PA)		M
F4E System Integration and Performance (SIP) Group representative		M
F4E Fusion Technology (FT) & Engineering Department representative		M
Decommissioning CEA expert (4)	O	O

Table 1: Composition of Review Panel and participation

Note: The [ITER_D_2EXFXU - Sign-Off Authority \(SOA\) for Project Documents](#) [6] gives in its Appendix 3, the detailed list of ROs who could be contacted according to involved PBS or disciplines.

“M” and “O” are attributes of the participation

M = *Mandatory participation.* The participation to the Panel is mandatory unless duly justified and agreed with the CIDH. Deviation to the Panel composition once agreed shall be justified in the Notification.

O = *Optional participation.* The responsible of the relevant function is invited as optional participant but he/she decides if he/she wants to participate or not. Evidence of their choice to participate or not shall be included in the notification.

The CIDH can request change of the Panel composition or attribute of the member. (e.g. change an Optional Panel member by a Mandatory Panel member and vice-versa) in the Notification.

(1) DIRO (Design Integration-RO) when SIRO (System Integration-RO) does not belong to CID

(2) Design Approver may decide additional participation to the Review Panel, in agreement with the Design Coordinator.

(3) Prior to the PA, for systems to be procured in-kind, a representative of each DA in charge of the procurement appointed by the affected DA Head.

(4) As the result of an agreement between IO and the Host Country, CEA experts are designated by the Agence ITER-France Director or representative to participate in the SDRs. The CEA experts or their representatives can make recommendations to IO regarding decommissioning and raise issues whenever necessary. The decision to implement these recommendations or address these issues is IO's responsibility through the transverse function "decommissioning".

Panel members should be made available for the full duration of the meeting, including close session and debriefing.

The Panel composition is proposed in the SDR Notification. Technical Experts' area of expertise shall be detailed.

7 System Design Reviews (SDR) Process

7.1 SDR Objectives

The general objectives of SDR are to ensure the suitability, adequacy and effectiveness of the system design to achieve the requirements. In particular, the development of the interfaces with other systems and that the parent requirements are still achievable shall be checked (Design Integration Review [2]) before the start of the SDR.

For the three main SDRs, these objectives are:

Conceptual Design Review

A formal design review meeting conducted at an early stage of the design phase to assess that the requirements of the system are properly defined, verified, are complete and properly documented in the system requirement specification (SRD), the boundaries of the systems have been established, the overall design, construction and operation risks have been identified and are minimised in the selected concept.

Preliminary Design Review

A formal design review meeting conducted during the development phase of the design to monitor the progress of the design and to assure that the requirements are properly defined, verified and properly documented in the sub-system requirement specification (sub-SRD); the layout and interfaces have been fixed; a design concept that meets those requirements has been developed and supporting analyses and R&D are being carried out; outstanding design, construction and operation risks are identified and mitigated; and a firm basis exists to proceed with final (detailed) design.

Final Design Review

A formal design review meeting conducted to assure that the detailed design solution is complete, verified and properly documented in lower-level requirement specifications (product specification), according to the planned maturity.

The detailed criteria for passing design gates for each design document at any PBS node level are given in Appendix 1 and in [4].

7.2 SDR gates

SDRs are held at the end of the design phases (Conceptual, Preliminary and Final Design phases) to support the authorisation of the design by the IO-CID Head.

The Design Coordinator calls for a SDR at the end of a given Design Phase, to assess, on the basis of a set of relevant documents, if the design is consistent, complete and mature enough to authorize proceeding to the next phase, specifically:

- to assess whether the proposed design output meets the design input requirements, that the design inputs requirements have been fully addressed, and that the design process was adequate for the complexity, quality and safety importance of the system/sub-system;
- to assess the evidence to support the verification of the design performance;
- to appraise the status of the design in terms of completeness and quality of the design output (drawings, models, documents and specifications);

- to discuss critical points and provide recommendations as required for achieving the design input requirements;
- to assess whether the proposed solution is the most cost and time effective solution to achieve the product requirements;
- to assess cost, risk and schedule impacts when required.

A SDR shall globally address design solutions, assess remaining technical risks and prioritize mitigation or corrective actions, but shall not focus on the review of individual documents.

A SDR finishes when the IO-CID Head approves the SDR Close-Out Report and gives the Authorization To Proceed-ATP to the next phase.

7.3 SDR prerequisites

The Design Coordinator with the help of all the Design Developers shall **identify the key SDRs** to be held in his/her Design Plan [15].

Based on all the Design Plans, a yearly ITER Design Review Plan is produced in a rolling wave approach [10].

SDRs scopes at lower levels than PBS level 1 shall be defined to cover the entire design of the system (PBS level 1 or sometimes level 2) and be consistent with the design review flow logic.

SDRs are called at the end of a given design phase when the design has reached the maturity defined in the agreed Design Plan incl. Document Production Plan (for IO Design Developer), or the List of Deliverables (for the DA Design Developer).

SDRs shall be performed using the workflow described in the **Section 5**, but if the design scope concerns a PBS element at level 3 or below, or a simple sub-system (not innovative or for which one has a good ROX), the Design Coordinator can propose a simplified SDR (See **Section 7.8**). This proposal should be defined when issuing the yearly ITER Design Review Plan and confirmed when issuing the Notification.

SDRs identified in the yearly ITER Design Review Plan **shall use the [Design Review Portal](#)** for their management.

SDRs **shall use the [IO E-Chit Application](#)**, which allows an automated tracking and processing of Chits.

The Design Review Manager shall define and maintain a list of qualified **SDR Chairpersons** and provide appropriate training to Chairpersons and SDR Secretaries. Training shall include SDR Chairmanship, briefing on the requirements included in this procedure, chits categorization and on tools provided for the design review execution.

7.4 Exemption

In some cases, a SDR can be exempted. For simple systems with limited interfaces, PDR can be merged with FDR, when all the conditions shown below are met simultaneously:

- The system to be reviewed is at low risk (i.e. using only already validated concepts and technologies);
- Preliminary Design and Final Design phases are carried out by the same Design Entity;
- No innovative components require qualification tests before FDR;

Each exemption shall be justified by the Design Coordinator in the yearly ITER Design Review Plan and confirmed in the Notification.

7.5 Readiness

The list of documents to be part of the Input Data Package shall be available about 6 months before the SDR meeting. This IDP List is preliminary at that stage i.e. only listing design documents that are already available/ to be updated / to be created.

Twelve (12) weeks before the SDR meeting, the Design Coordinator with the support of the Design Developer shall identify which documents are available or not for the **assessment of the SDR readiness**.

The SDR readiness assessment shall focus on the following points:

- **action items and open Chits** coming from former SDRs
- **Open/ closed Project Change Requests (PCR)**
- Status of the **Interfaces (ICD/IS)**
- Status of the **Design Compliance Matrix**.
- Status of design documentation (**IDP-List**)

7.6 Specific monitoring for selected SDRs

CIDH establishes the list of critical SDRs in the yearly ITER Design Review Plan. These SDRs will be subject to a monitoring of the development of the Input Data Package (IDP), starting 24w before the SDR meeting.

This monitoring is achieved either by the organization of a preparation meeting (called T0-24W meeting) or by a simple review of the proposed IDP-List:

- A. In case of preparation meeting, twenty-four (24) weeks before the SDR meeting,** CID/DRM will organize it with the support of the Design Coordinator (or delegated IO-TRO).

This preparation meeting involves all the Panel Members (including chair) and some other IO-stakeholders if a need for clarification is identified in their field of activity.

CID/DRM will ensure the logistics and the conclusion of the meeting.

Objectives of the preparation meeting are to:

- IO-TRO to clearly **define the scope** of the system for the intended SDR (ex: PBS tree coverage), present the plan/logic how and when the overall system will be developed

(design, manufacturing, construction, commissioning), and how this SDR achieves milestone of the main system,

- IO-TRO to present remaining technical risks or issues,
- Stakeholders to ensure a preliminary review of the IDP-List i.e. not a detailed review of the documents but more about the identification of documents that shall be created or revised, and comments on important points to be treated. Justifications shall be given when documents are not planned to be produced,
- Stakeholders to identify any missing input data from interfacing system, and assess the need of integration review or simple review of interfaces,
- Stakeholders to check that the suitable Assembly & Installation documents have been identified,
- Construction representatives to assess if a separate constructability review is needed,
- Stakeholders to review the plan for verification of critical documents,
- All attendees to plan required corrective actions, and arrangements until SDR meeting.

The IDP-List shall be prepared by the Design Coordinator (or delegated TRO) with CID/DRM and submitted to the preparation meeting stakeholders 2 weeks before the T0-24w meeting.

CID/DRM will Chair the meeting, prepare the Agenda and will issue a short Minutes of Meeting which summarizes the key decisions and actions.

CID/DRM will ensure the record of the Agenda, Presentations and Minutes of the meeting.

- B. In case of simple IDP-List review** (i.e. no preparation meeting), the IDP-List shall be prepared by the Design Coordinator (or delegated TRO) with CID/DRM 24 Weeks before the SDR meeting.

In both cases the preliminary IDP-List is submitted for review to all Panel Members and approved by the Design Coordinator.

7.7 SDR Full Workflow

7.7.1 *Preparation phase (from about 12 weeks before the SDR meeting (readiness) to the distribution of the Input Data Package)*

1. **12 weeks before the SDR meeting**, the Design Review meeting preparation is initiated by the Design Coordinator supported by the Design Developer in accordance with the approved yearly ITER Design Review Plan [10] and after a positive assessment of the readiness by the Design Coordinator who should use the Design Review Checklists as a guideline. Note: The actual Design review Checklist is completed by the Chair together with Panel Members.
2. **10 weeks before the SDR meeting**, the SDR Secretary submits **the draft SDR Notification** (see Section 10 for SOA) in IDM for review, using the template [D2D57E](#). The SDR Notification includes:
 - the date, time and venue of the meeting;

- objectives for the SDR meeting;
- scope and out-of-scope definition
- link to the **SDR Input Data Package** submitted to the review.
At this stage, the SDR IDP list shall contain all documents that will be assessed by the Panel
- Status of open chits from former SDRs
- Status on Deviation Requests (DR) and Non-Conformities (NCR) on the reviewed system;
- Status on PCR (including any change to the input requirements);
- Proposed list of participants: Panel members and people to be informed (incl. managers of the Panel members), all Interfacing System ROs and all Transverse Function ROs (see [16] and [8])
- Link to the Agenda

CIDH gives the authorization to proceed (or not) to the SDR through the approval of Notification.

In addition, the **draft Agenda** shall be prepared (see Section 10 for SOA) using the template [UZAADV](#). Sufficient time for the various SDR activities shall be considered (presentations, closed sessions including adequate time in the close-out session for the drafting of the SDR Panel Report and Action Plan, debriefing...).

3. **6 weeks minimum before FDR (Final Design Review) meeting**, the Design Coordinator shall contact DIRO or DIS Section Leader (exceptionally, SIRO can be contacted when only functional review is needed) to organize a Design Integration Review (as per DIR procedure [2]). The scope and boundaries of the DIR are jointly defined by Design Coordinator and DIRO / SIRO.
NB: DIR is mandatory for FDR. For CDR, PDR, the same process can be applied if necessary.
4. SDR Input Data Package is defined by a list of technical documents (including versions) developed during the design phase. This set of documents developed according to the Document Production Plan should provide evidence that the design meets the requirements and the design maturity expected at the end of the design phase is achieved [4].
5. If the Design Approver or CIDH judges that the progress and the maturity of mandatory documentation are not adequate for the concerned SDR to take place, then the SDR meeting shall be postponed.

In particular, unless otherwise agreed with CIDH:

- NCRs on PIC & SR SSCs shall be closed before any SDR on them;
- PCR/DR impacting the system or its interfaces shall be closed before the FDR or at the latest before the Build-to-Print design is Authorized To Proceed for

Manufacturing Design and Preparation activity phase (i.e. when the FDR Close-Out Report is approved).

2 weeks minimum before the SDR meeting the SDR Secretary sends the final approved Notification, IDP-List (using template [TWW7AY](#)) and Agenda to the participants (via Microsoft Outlook or equivalent) and shall perform a final check that each Panel members' or their delegates' is available. At that stage, documents in the Input Data Package shall be approved by the entity (IO or DA) in charge of producing them and available in IO IDM/SMDD¹.

6. The SDR Secretary gives view access to the Input Data Package documents in IDM/SMDD to all participants and informed people (in particular for external members (CEA, DA, etc.) and for restricted access documents. He/she ensures that the E-Chit Application is open to anybody for the issuance of Chits (in particular all Stakeholders).
7. Change to the list and contents of documents of the Input Data Package shall not be allowed from the moment the Input Data Package is distributed for review (i.e. 2 weeks before the SDR meeting). until the approval of the Panel Report
8. The Design Coordinator, in coordination with the SDR Secretary, may organize **an SDR Presentation Meeting (or "Kick-off Meeting")** at this time (2 weeks minimum before the SDR meeting) in order to introduce the SDR scope and the contents of the Input Data Package to the SDR Panel, to facilitate their review.
9. The Design Coordinator and Design Developer prepare presentation materials and can involve other persons involved in the design execution activities.
10. The Design Developer shall present critical aspects of his/her design, supported by other presenters with specific emphasis on issues and uncertainties identified from the Design Compliance Matrix (DCM).

7.7.2 Design Review phase (from the distribution of the Input Data Package to the Approval of the Panel Report)

1. After release, all the stakeholders shall review the documents before the SDR meeting according to their expertise and the tasks allocated by the Chair.
2. ***The Constructability, Operability and Maintainability representatives*** (IO/Assembly & Installation and IO/Operations Panel members) shall prepare their finding reports to be presented/discussed at the SDR meeting.
3. **(Date of the SDR Meeting):** The Chair shall manage the meeting, moderate the discussions ensuring that the focus stays on the design assessment and that all participants can provide their inputs and try to reach consensus in the review team in case of different opinions. If consensus cannot be reached the Chair reports minority as well as majority view(s) in the Panel Report, however final decision is left to the Chair but for Safety Chits.

¹ For IO produced documents, the documentation shall be in Approved state prior the SDR meeting.
For DA/Contractor produced documents, the documentation shall be approved by the DA/Contractor and shall be In Signed state in IO IDM/SMDD prior the SDR meeting.

4. All Chits issued during the SDR shall be submitted using the E-Chit application that shall be opened for Chit submission when the Input Data Package is delivered (i.e. 2 weeks before the SDR meeting) and the Chit submission shall be closed before the last closed session.
A Chit shall clearly define an issue and should be quantitative, directly applicable to the scope of the review and should propose possible corrective actions including criteria for Chit closure.
5. When the Chit affects integration aspects or design work of many systems the Secretary shall formally send the Chit to the CIDH and Design Review Manager for resolution in the appropriate forum (e.g. PIM Project Issue Management). The chit can be closed when the PIM issue is closed.
6. The Chair in consultation with the Review Panel **shall drop** a Chit if one of the following situations arises:
 - The Chit is in contrast with the Project Requirement and/or with the System Requirement Document;
 - The Chit requires information already provided in the SDR input data package;
 - The Chit requires a higher level of maturity of a document, which is not consistent with the recommended maturities specified in the Design Plan incl. Document Production Plan;
 - The Chit is not within the scope of the SDR; In such case, the Secretary shall send the Chit to Design Review Manager.
 - The Chit has already been addressed.
7. The Chair in consultation with the Review Panel **shall merge and categorize Chits** according to Table 2 below. The Chair shall read each Chit and the corrective action proposed and if needed rephrase them with the Chit issuer for a better understanding.
8. The Chair shall **prepare and issue a draft of the SDR Panel Report (using template [D2FJNJ](#)) before the end of the meeting**. To that aim, adequate time and a dedicated closed session shall be included in the SDR Agenda at the end of each day. The SDR Panel Report shall contain a summary of the outcome of the SDR, the list of Chits 1, 2 and 3, any deviation from the Agenda and Notification (on the scope and participants in particular), and the link to the draft Action Plan. In the close-out session, if needed, the Chair should invite the originators of the Chits to explain their Chits to the Design Developer and the Design Coordinator for clarification purpose, to finalize the categorization of the Chits and to ensure that the Chits are assigned to the proper organization. It is of utmost importance that the Chits are clearly formulated and applicable, correctly classified and assigned, and acceptance criteria are accurate and realistic taking into account Project constraints. The Panel Report agreed with Panel members shall be issued within 1 week after the SDR meeting. The Design Review Checklist should be completed by the Panel and attached to the Panel report or be issued as a standalone document. In case of major issue, an immediate summary note shall be sent by the Chair to CID Head and Design Approver.
9. The Nuclear Safety representative (IO-SRO) decision prevails on the Chair in case of disagreement on the categorization or the dropping of Safety Chits.

Chit Category	Description
Category 1	They shall address only major design issues, such as lack of verification evidence (e.g. unsuccessful prototype results) that the Design Solution can meet a specified requirement. They shall be resolved prior closure of the design review (i.e. approval of Close-out report).
Category 2	They shall address design issues of enough significance to require Action Plan and formal resolution tracking. For CDR and PDR gates, their resolution is not required prior closure of the design review. All unresolved Cat. 2 Chits (1) shall be re-assessed at the next SDR. For FDR, their resolution is required prior closure of the design review.
Category 3	Recorded in the Panel Report but not requiring formal tracking and action.

Table 2: Chit categorization

(1) In case of SDR followed by a PA, any unresolved Chits Cat. 1 (subject to appealing process) and Cat. 2 shall be identified and resolution agreed with the DA in the Close-Out Report, recommended by the DA representative.

10. Closed Session:

At the end of **each day of the SDR Meeting**, a closed session shall be organised between the Panel members, where the Panel summarises the activities and findings of the day and processes the Chits (categorisation, merging, dropping...). If needed, chit submitter (not belonging to the Panel) can be invited to further clarify his/her chit.

The Secretary can also participate in the Closed Session.

11. Close-out session

A Close-out session shall be planned with the Design Developer and Design Coordinator to review and agree on the corrective actions (for cat.1 Chits and Safety Chits at least). A draft Action Plan shall be delivered.

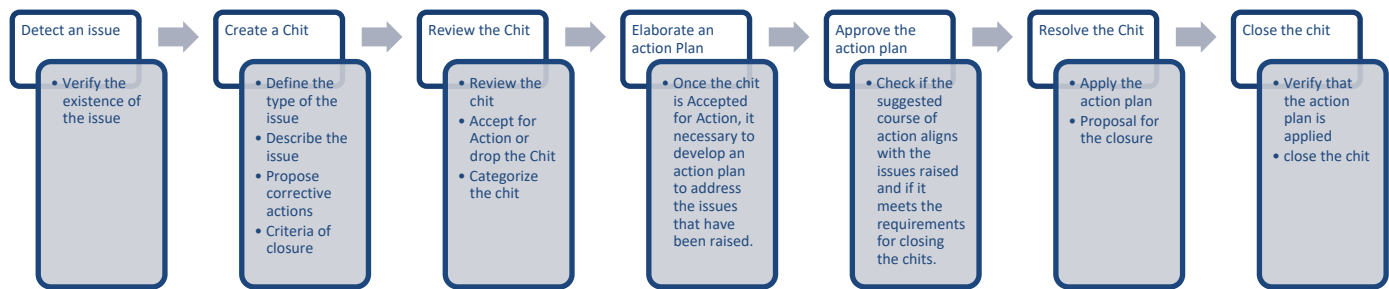
Decision taken on Safety Chits shall be recommended by the IO-SRO.

12. Debriefing:

The Chair shall present to all the participants the results of the meeting during the SDR debriefing.

7.7.3 Chit Resolution phase

The workflow of a Chit is presented below:



1. The Chit resolution phase starts after the approval of the Action Plan and finishes with the approval of close-out report which gives the Authorization to Proceed to the next Design phase.
2. The Design Developer, in agreement with the Design Coordinator, proposes **the closure of Chits**, giving evidence of their resolution.:

- a. For Chit cat 1, the closure is under responsibility of Chair.

NB: In case the Chair is not working for ITER project anymore, the chits can be closed by CID Head instead.

NB2: in case of disagreement between Design Team and Chair on closure of a chit, topic shall be escalated to CID Head, as its role of Design Authority.

- b. For Chit cat 2 and cat.3, the closure is under responsibility of Design Approver

3. **Appealing process**: In exceptional cases, the Design Developer, in agreement with the Design Coordinator and the IO-Design Approver, may propose together with a justification and Action Plan, to close the SDR (i.e. to approve the Close-Out Report) without having resolved the required Chits (i.e. all Chit 1 for all SDRs and Chit1+Chit 2 for closing the FDR). An Action Plan to resolve these Chits shall be presented. This proposal is made to the **CIDH** (after recommendation by the relevant SRO for Safety Chits). The decision together with the justification and Action Plan (for Chits which are resolved after the SDR closure) must be recorded in the Close-Out Report..

(*) See definitions.

4. **Within 2 weeks after the SDR meeting**, the Action Plan prepared during the SDR shall be finalised and delivered in IDM, consistent with budget and schedule, including **actions items description** in the ITER Actions Database (or other tool accepted by CID/DRM). Final assignment of the actions is defined by the Design Approver and Action-Plan is distributed to Action-ROs.

5. The Action Plan to resolve the chits shall identify due dates, criteria for closure of the issue and the competent stakeholder(s) for reviewing the action completion.
6. The Design Coordinator shall ensure that the persons assigned to the actions execute the Action Plan timely and that the Chits are closed with evidence of the work done and a reference to the updated documents in the E-chit application.
7. **3 weeks before** the design approval milestone, the **SDR Close-Out Report shall be prepared (using template [D2DHAT](#))** ; this SDR Close-Out Report shall:
 - Provide evidence that all Cat. 1 Chits (plus Cat. 2 Chits if FDR) have been resolved and the Action Plan has been executed;
 - Propose the closure of the SDR;
 - Include the list of design documents reviewed at the SDR (and updated after Chits resolution), with their approved or accepted versions which are the basis for the execution of the next phase;
 - Changes to the Input Data Package documents due to Chit resolution are explained and traced in the Close-Out Report;
 - Other approved changes not resulting from SDR shall be identified and explained in the Close-Out Report;
 - Describe the status of remaining Chits and action plans for their resolution during the next design phase.
8. The CID Head approves the SDR Close-Out Report after Design Approver and Control & Integrated Commissioning Program Manager (and IO-SRO for PIC and SR SSCs) recommendations. A Handover Package shall be prepared in the Configuration Management Tool to authorise the set of technical documents, as output of the SDR and populate the Technical Baseline as appropriate.
9. This Approval acknowledges the completion of the SDR and gives the Authorization to Proceed to the next development phase²³.

7.8 Simplified SDR

Design reviews on lower level SSCs can use the simplified SDR which relaxes requirements on the organization and execution of the SDR:

- Reduced number of reviewers of key documents (Notification, Panel Report and Close-Out Report)
- Reduction of the number of participants (panel members)

² Next development phase is preliminary design phase for CDR, final design phase for PDR, manufacturing preparation phase for FDR

³ In case of DA Design Reviews, other internal steps might be required after closeout report prior giving authorization to proceed to next development phase. (e.g. steering committee decision...)

- Agenda and Notification can be merged, or Agenda can be directly included in the Meeting invitation (Outlook)
- Additional flexibility on the timeline to produce the notification, agenda and IDP List
- Panel Report and Close-out report can be merged, if there is no blocking issue.

However, requirements concerning the production and management of the design documents (Input Data Package) remain the same. In particular, the E-Chit tool shall be used to ensure proper traceability.

The Design Coordinator should meet the Design Review Manager to agree about the Simplified SDR / Document-only review Notification, and further simplifications in the process (e.g. possibility to merge some management documents).

In the Notification for the simplified SDR, the Author indicates the full list of Panel members roles (see Table 1 in **Section 6.9**) and for each of them, whether they are invited or not. For each non-invited Panel member, a justification shall be given and recorded in the Notification.

7.8.1 Document-only review

In addition to the points above, if duly justified, the independent review by a panel can be skipped, meaning no design review meeting and no involvement of panel members (including chair). In such case, the SDR is mainly a control point, to ensure that all design documents have been correctly produced, reviewed and approved, and that the system is ready to move to the next development phase.

The SDRs that follow the simplified process / document-only review:

- shall be proposed by the Design Coordinator
- should be identified in the yearly ITER **Design Review Plan**
- shall be agreed by CID Head (by approval of the Notification).
- shall be closed through approval of a closeout report

8 Links with other processes

8.1 Document Management

This procedure uses the [ITER_D_22K5JQ - Document Management Procedure](#) for the production of individual documents and their SOA: [ITER_D_2EXFXU - Sign-Off Authority \(SOA\) for Project Documents](#).

8.2 Configuration Management

This procedure produces validated data for the configuration baselining after approval of the Close-Out Report see [ITER_D_TZY7YV - Procedure for Configuration Control, Review and Audit](#)

8.3 Other Design Control processes

- **Design Planning process**: The SDRs and their scopes, the management documents, are input for the SDR procedure, and shall be planned according to the [ITER_D_U34ACR - Design Planning Procedure \[15\]](#)
- **Design Input Control and Development processes**: The Input Data Package is composed of documents developed during the Design Input Control and Design Development processes consistently with [ITER_D_U34CSG - Design Input Control Procedure](#) and [ITER_D_U34DDZ - Design Development Procedure](#)
- **Design Interface Control process**: This procedure should be compliant with [ITER_D_28VNJG - Design Interface Control Procedure](#).
- **Design Change Control process**: This procedure should be compliant with [ITER_D_U2QPDS - Design Change Control Procedure](#).

9 Outputs

All SDR management documents shall be produced, reviewed and approved directly in IO IDM.

Generic Name of the output	Template UID	Output storage	IDM, doc type	Specific Title	Accountable team for output	Retention period
Review Agenda (T0-24W Agenda)	<u>3FESBX</u>	IDM PBS-RO files	<u>[DR]-Agenda</u>	PBS-xx.xx_PBSname_FD R_T0-24w_Agenda	PBS-team	Project lifecycle
Review Presentation (T0-24W Presentations)	<u>3KC6YC</u>	IDM PBS-RO files	<u>[DR]-Presentation</u>	PBS-xx.xx_PBSname_FD R_T0-24w_Presentation Title	PBS-team	Project lifecycle
Review Minutes of Meeting (T0-24W Minutes of Meeting)	N/A	IDM PBS-RO files	<u>[DR]-Minutes of Meeting</u>	PBS-xx.xx_PBSname_FD R_T0-24w_MoMs	PBS-team	Project lifecycle
Review Notification	<u>D2D57E</u>	IDM PBS-RO files	<u>[D]-Plan</u>	PBS-xx.xx_PBSname_FD R_Design_Review_Notification	PBS-team	Project lifecycle
Reports supporting SDR readiness (if issued separately from Notification)	<u>N/A</u>	PBS-RO files in IDM	<u>[PRO-IO-DR]-Report *</u>	PBS-xx.xx_PBSname_FD R_Interfaces_Status_Report	PBS-team	Project lifecycle
Review Input Data Package (<i>IDP-List</i>)	<u>TWW7AY</u>	PBS-RO files in IDM	<u>[D]-List</u>	PBS-xx.xx_PBSname_FD R_Design_Review_Input_Data_Package	PBS-team	Project lifecycle
Review Agenda	<u>CDR-D23MNT</u> <u>PDR-D275WB</u> <u>FDR-D27KD8</u>	PBS-RO files in IDM	<u>[DR]-Agenda</u>	PBS-xx.xx_PBSname_FD R_Design_Review_Agenda	PBS-team	Project lifecycle
Review Presentation	N/A	PBS-RO files in IDM	<u>[DR]-Presentation</u>	PBS-xx.xx_PBSname_FD R_Design_Review_Presentation Title	PBS-team	Project lifecycle
Review Chit	<u>3XKZFP</u> in ICP	E-Chit Application	N/A	N/A	PBS-team	Project lifecycle
Design Review Chit Closure Report	N/A	PBS-RO files in IDM	<u>[PRO-IO-DR]-Report *</u>	PBS-xx.xx_PBSname_FD R_Design_Review_Chit_Closure_Report	PBS-team	Project lifecycle
Review Minutes of Meeting (optional for SDR)	<u>D2FNX7</u>	PBS-RO files in IDM	<u>[DR]-Minutes of Meeting</u>	PBS-xx.xx_PBSname_FD R_Design_Review_MoMs	PBS-team	Project lifecycle
Review Panel Report	<u>D2FJNJ</u>	PBS-RO files in IDM	<u>[PRO-IO-DR]-Report *</u>	PBS-xx.xx_PBSname_FD	PBS-team	Project lifecycle

Generic Name of the output	Template UID	Output storage	IDM, doc type	Specific Title	Accountable team for output	Retention period
				R_Design_Review_Panel_Report		
Review Action Plan	<u>RFM3N3</u>	PBS-RO files in IDM	<u>[D]-Plan</u>	PBS-xx.xx_PBSname_FD R_Design_Action_Plan	PBS-team	Project lifecycle
Review Close-Out Report	<u>D2DHAT</u>	PBS-RO files in IDM	[PRO-IO-DR]-Report *	PBS-xx.xx_PBSname_FD R_Design_Review_Close-Out_Report	PBS-team	Project lifecycle
Review Checklist	<u>2M7PJQ</u>	PBS-RO files in IDM	[PRO-IO-DR]-Report *	PBS-xx.xx_PBSname_FD R_Design_Review_Checklist	PBS-team	Project lifecycle

Table 3: Output documents

10 Sign-Off Authority

10.1 Specific monitoring of selected SDRs (SDR management documents)

Output	Author(s)	Mandatory Reviewer(s)	Approver	Informed
T0-24W Meeting Agenda	Design Review Mngr + Design Coordinator	N/A	Design Coordinator Line Manager	All attendees
T0-24W Presentations	Design Coordinator	N/A	N/A	All attendees
T0-24W Minutes of Meeting	Design Review Mngr	Chair	Design Coordinator	All attendees
Preliminary IDP-List	Design Coordinator	All Panel Members Design Review Manager	Design Coordinator Line Manager	N/A

NB: As defined in Appendix 2, even for DA design reviews, the outputs above are produced by IO.

10.2 IO Design Reviews

By default, the roles are as follow (to be confirmed in Notification):

- Design Developer: IO TRO
- Design Coordinator: Project Leader
- Design Approver: Program Manager

Output	Author(s)	Mandatory Reviewer(s)	Approver	Informed
Reports supporting SDR readiness (not mandatory)	Design Developer	Design Review Manager Design Coordinator	CID Head	
Interface Status Report	SIRO	Design Developer	SIS Section Leader	
SDR Notification (includes links to IDP-List)	Design Developer	Chair Design Coordinator Design Approver Design Review Manager CIC Program Manager ⁴ SIRO ⁴	CID Head	All the Panel members and their line managers. TFROs Ref. [16] (Others as per template)
Meeting Agenda	Design Developer	Chair Design Review Manager	Design Coordinator	
Input Data Package (IDP-List) when issued for review	Design Developer	Design Review Manager SIRO	Design Coordinator	Panel Members
Chit definition (<i>in E-chit app</i>)	Chit Submitter	Impacted Panel member ⁵	Chair	
Chit closure (<i>in E-chit app</i>)	Design Developer	N/A	Chair (for cat1) Design Approver (for cat 2 & 3)	
Chit closure report (<i>if separate document</i>)	Design Developer	Chit submitter Design Coordinator	Chair (for cat1) Design Approver (for cat 2 & 3)	Chair
Minutes of SDR Meeting (optional [Chair decision])	SDR Secretary	Design Coordinator	Chair	
Panel Report (incl. list of Chits and completed Checklist)	Chair	Panel members ⁴ Design Review Manager Design Coordinator	Design Approver	Design Developer
Action Plan and Action Report	Design Developer	Design Coordinator Design Review Manager Chair IO-SRO for PIC/SR ⁶	Design Approver	Action-ROs
Close-Out Report	Design Developer	Chair Design Coordinator Design Approver Design Review Manager CIC Program Manager ⁴ SIRO ⁴	CID Head	All Panel members

⁴ Not required for Simplified workflow

⁵ Chits can be approved by the Chair one day after the Chit submission even if the Panel members have not recommended.

⁶ IO-SRO: If the “review” functionality is not available in the Action Item Application, the description of the action is first reviewed in IDM before being submitted.

Output	Author(s)	Mandatory Reviewer(s)	Approver	Informed
		IO-SRO for PIC/SR		

10.3 DA Design Review (without Design coordinator involvement from DA)

More information on potential involvement of Design Coordination by DA in §6.2 and App 2.

By default, the roles are as follow (to be confirmed in Notification):

- Design Developer: DA PA TRO or delegate.
- Design Coordinator: IO PA TRO
- IO Design Approver: Program Manager

Output	Author(s)	Mandatory Reviewer(s)	Approver	Informed
Reports supporting SDR readiness (not mandatory)	Design Coordinator	Design Review Manager	CID Head	
Interface Status Report	SIRO	Design Coordinator	SIS Section Leader	
SDR Notification (includes links to IDP-List)	Design Coordinator	Chair IO Design Approver DA Design Approver Design Review Manager CIC Program Manager ⁴ SIRO ⁴	CID Head	All the Panel members and their line managers. TFROs Ref. [16] (Others as per template)
Meeting Agenda	Design Coordinator	Chair Design Review Manager	Design Coordinator Line Manager	
Input Data Package (IDP-List) when issued for review	Coordinator	Design Review Manager SIRO	Design Coordinator Line Manager	Panel Members
Chit definition (<i>in E-chit app</i>)	Chit Submitter	Impacted Panel member ⁵	Chair	
Chit closure (<i>in E-chit app</i>)	Design Developer	N/A	Chair (for cat1) IO Design Approver (for cat 2 & 3)	
Chit closure report (<i>if separate document</i>)	Design Coordinator	Chit submitter	Chair (for cat1) IO Design Approver (for cat 2 & 3)	Chair
Minutes of SDR Meeting (optional [Chair decision])	SDR Secretary	Design Coordinator	Chair	
Panel Report (incl. list of Chits and completed Checklist)	Chair	Panel members ⁴ Design Review Manager Design Coordinator	IO Design Approver	Design Developer
Action Plan and Action Report	Design Coordinator	Chair Design Review Manager IO-SRO for PIC/SR ⁶	IO Design Approver	Action-ROs
Close-Out Report	Design Developer	Chair Design Coordinator IO Design Approver DA Design Approver Design Review Manager CIC Program Manager ⁴ SIRO ⁴ IO-SRO for PIC/SR	CID Head	All Panel members

⁴ Not required for Simplified workflow

⁵ Chits can be approved by the Chair one day after the Chit submission even if the Panel members have not recommended.

⁶ IO-SRO: If the “review” functionality is not available in the Action Item Application, the description of the action is first reviewed in IDM before being submitted.

10.4 DA Design (with Design coordinator involvement from DA)

More information on potential involvement of Design Coordination by DA in §6.2 and App 2.

By default, the roles are as follow (to be confirmed in Notification):

- Design Developer: DA TRO or delegate.
- Design Coordinator: DA PA TRO
- Design Coordinator: IO PA TRO
- IO Design Approver: Program Manager

Output	Author(s)	Mandatory Reviewer(s)	Approver	Informed
Reports supporting SDR readiness (not mandatory)	DA Design Coordinator	Design Review Manager IO Design Coordinator	CID Head	
Interface Status Report	SIRO	IO Design Coordinator	SIS Section Leader	
SDR Notification (includes links to IDP-List)	DA Design Coordinator	Chair IO Design Coordinator DA Design Approver IO Design Approver Design Review Manager CIC Program Manager ⁴ SIRO ⁴	CID Head	All the Panel members and their line managers. (Others as per template)
Meeting Agenda	DA Design Coordinator	Chair Design Review Manager	IO Design Coordinator	
Input Data Package (IDP-List) when issued for review	DA Design Coordinator	Design Review Manager SIRO	IO Design Coordinator	Panel Members
Chit definition (<i>in E-chit app</i>)	Chit Submitter	Impacted Panel member ⁵	Chair	
Chit closure (<i>in E-chit app</i>)	Design Developer	N/A	Chair (for cat1) IO Design Approver (for cat 2 & 3)	
Chit closure report (if separate document)	DA Design Coordinator	Chit submitter IO Design Coordinator	Chair (for cat1) IO Design Approver (for cat 2 & 3)	Chair
Minutes of SDR Meeting (optional [Chair decision])	SDR Secretary	DA Design Coordinator IO Design Coordinator	Chair	
Panel Report (incl. list of Chits and completed Checklist)	Chair	Panel members ⁴ Design Review Manager IO Design Coordinator DA Design Coordinator	IO Design Approver	Design Developer
Action Plan and Action Report	DA Design Coordinator	Chair IO Design Coordinator Design Review Manager IO-SRO for PIC/SR ⁶	IO Design Approver	Action-ROs
Close-Out Report	DA Design Coordinator	Chair IO Design Coordinator	CID Head	All Panel members

⁴ Not required for Simplified workflow

Output	Author(s)	Mandatory Reviewer(s)	Approver	Informed
		IO Design Approver DA Design Approver Design Review Manager CIC Program Manager ⁴ SIRO ⁴ IO-SRO for PIC/SR		

11 Records

When the SDR is finished (i.e. after the Close-Out Report is approved), the Design Coordinator shall ensure that all SDR management documents (see **Section 9&10**) and System Design documents are recorded in IO ICP according to the document management and configuration management procedures.

The retention period of all these documents shall be the duration of the ITER Project.

⁵ Chits can be approved by the Chair one day after the Chit submission even if the Panel members have not recommended.

⁶ IO-SRO: If the “review” functionality is not available in the Action Item Application, the description of the action is first reviewed in IDM before being submitted.

Appendix 1: Input Data Package

The IDP-List is, at its final stage, mapped to actual IO documents or to DA Deliverables (defined from the LoD). When one of the items from Table 5 is not covered by an IDP-List item, a short justification that this is acceptable shall be provided in the input package document.

Each document in the IDP-List should be delivered with the maturity indicated in “[Expected content of System Design deliverables](#)” [4].

The key documents for the SDR are:

- System Requirement Document-SRD and System Load Specification-SLS of the system/sub-system/materiel to be reviewed, the System Design Description-DDD of the system/sub-system/materiel as the umbrella document giving a summary of what has been achieved in each domain and identifying supporting documents;
- Design Compliance Matrix-DCM of the system/sub-system/materiel as document showing propagation/not propagation of requirements into the design;
- Report on Project Change Request-PCR;
- Report on action items and Chits from previous SDR;
- Report on Deviation Request-DR and NCR;
- Report on Interfaces development from the review of Interfaces or Design Integration Review-DIR.

The DPP gives the detailed list of documents for each document type. This list is consistent with SDP-WI [3]

“[Expected content of System Design deliverables](#)” [4] gives detailed information on the Table below.

Document Types	Design Phases		
	Conceptual	Preliminary	Final
Requirements			
System Requirements Document	Complete		
Interface Control Documents (*)	Complete		
Interface Sheet (*)	Preliminary	Consolidated	Complete (1)
Configuration Management Model (*)	Preliminary	Consolidated	Complete
System Load Specifications	Preliminary	Consolidated	Complete
Description			
System Design Description	Preliminary	Consolidated	Complete
System Functional Analysis	Preliminary	Complete	Minimal update
System Detailed Performance Definition	If useful	Preliminary	Complete
Process Flow Diagram	Complete	Minimal update	
Single Line Diagram (SLD)	Preliminary	Complete	Minimal update
Other Diagrams (P&ID, CBD, I&C architecture)		Preliminary	Complete
Other Control and Instrumentation Documents, see list in PCDH [5]		Preliminary	Consolidated
System Layout Drawing (*)	Preliminary	Consolidated	Complete
Mechanical Engineering Model & Drawings (*)		Preliminary (2)	Complete (2)
Component List	Preliminary	Consolidated	Complete
Component Technical Specifications		Preliminary	Complete

Document Types	Design Phases		
	Conceptual	Preliminary	Final
Manufacturing and Installation			
System Integrated Logistics Support Plan		Preliminary	Complete
Factory Qualification Tests Plan (for prototypes)		Preliminary	Complete
Acceptance Plan (FAT, SAT)		Preliminary	Consolidated
On Site Assembly Plan		Preliminary	Complete
Manufacturing and Installation Drawings			Consolidated
Justification			
Design Compliance Matrix (DCM)	Preliminary	Consolidated	Complete
Interface Compliance Matrix (ICM)			Complete
Design Justification Plan	Preliminary	Complete	Minimal update
Engineering Analysis Reports and Calculation Notes	At any stage of the design to support justification		
Structural Integrity Report	Preliminary	Consolidated	Complete
Previous ROX and R&D	If useful	If useful	If useful
Qualification Plan		Preliminary	Preliminary
Commissioning, Operation and Maintenance, Decommissioning			
Requirement Validation Matrix (RVM)		At each stage	At each stage
On Site Testing and Commissioning Plan		Preliminary	Complete
Concept of Operation		Preliminary	Complete
System Maintenance and In-Service Inspection Plan		Preliminary	Complete
Decommissioning Plan		Preliminary	Complete
Design Management			
Cost and Schedule – Risks Assessment	At each stage		
Work Plan / Design Plan	At each stage		

(*) Documents generally provided as input for the Design Integration Review

Table 5: Maturity of System Design Documents at the end of the Design Phases

- (1) Complete as far as possible depending on the maturity of the interfacing system,
- (2) 3D CATIA models in the “In-Check” status”

Appendix 2: Provisions when the DA uses the IO Procedure

List of customizations of the procedure that shall be applied when the DA uses the IO Procedure after PA signature.

1) People for the roles:

Roles	People after PA signature	Comment
Design Developer	DA-Design Developer (i.e. DA-TRO)	
Design Coordinator	IO-PA-TRO by default	Becomes responsible for some management documents (see Section 10)
	DA-PA-TRO	If common agreement between both parties, Design Coordinator role can be partially done by DA.
Design Approver	DA-Design Approver	Approves the DA Deliverables
	IO-Design Approver	
Design Review Manager	IO-Design Review Manager	This is primarily an IO role but can be supported/delegated to DA (to be commonly agreed between IO and DA Design Review Management Teams)
Design Review Chair	DA-Design Review Panel Chair	Shall respect independency and instructions to the Chair (e.g. Chit categorization) as detailed in this document
Design Review Secretary	DA-Design Review Secretary	
Design Review Panel Members	IO+DA Review Panel Members	DA Review Panel Members: DA technical experts (independent from the design developer team) as required. IO Review Panel Members as per relevant workflow
IO-CID Head	IO-CID Head	Or delegate
IO-CIC Program Manager	IO-CIC Program Manager	Or delegate
IO-SIRO	IO-SIRO	

Note 1: The DA-PA-TRO shall not be part of the Design Review Panel after PA

Note 2: The Sign-Off Authority to be applied for SDR management documents is detailed in Section 10.

2) Documents and tools used for document management:

- After PA signature, the IO documents (Design Plan and DPP) become respectively in the DA the Quality Plan and List of Deliverables.
- All output documents (see **Section 9&10**) shall be managed in IO-IDM (e.g. Close-Out Report)

3) Other requirements:

- **SDR meetings schedule:** The DA PA TRO shall provide inputs to the IO PA TRO for the identification of SDRs for the yearly ITER Design Review Plan [10].
- **Specific monitoring of selected SDRs:** The DA is not in charge of the organization of the preparation meeting (T0-24W meeting).

At T0-24W the IDP-List shall be prepared by the IO Design Coordinator from the agreed List of Deliverables which will serve as a basis for the titles of the document deliverables to be submitted by the DA for the SDR.

If a meeting is organized, the Design Developer and DA PA TRO shall be invited to the meeting and shall contribute to identify risks, issues, missing materials, seen from their perspective.

- **Interface/Design Integration Reviews:** The DA is not in charge of the organization of these meetings, but the Design Developer / DA PA TRO shall support the IO Design Coordinator (IO-PA-TRO) and SIRO during these meetings and provide requested inputs.
- **DCM:** The DCM shall provide evidence of compliance between the input technical requirements (RQs) documents and output design documents **for the same scope**. Input technical RQs for DA-Design Developer are identified in the relevant TRS listed Annex B (such SRD, sub-SRD, TRA and complementary ADs). If the SDR scope is lower than the input RQs scope (i.e. TRS), the DA-Design Developer shall in the same matrix first identify from the TRS the applicable requirements for the lower scope development (e.g. equipment level RQs) and then provide evidence of implementation in the design documents (e.g. equipment level design documents).

Note: For some DAs the DCM may have a different name or even a slightly different format, nevertheless their content is equivalent (ex: DCM in EUDA = VCD QUAL (Verification Control Document – Qualification and VCM in EUDA = VCD ACC (Verification Control Document Acceptance)).

- **Chits**

In case of chit raised during the design review which is not in line with PA Baseline (i.e. a requirement is missing from the PA baseline), the IO PA TRO shall inform in writing the corresponding IO Project Leader/Program Manager and the IO CIDH of the missing Requirements having caused the chit. The IO has then to formalise the

corresponding modification in accordance with the applicable change procedures within 30 days. In the meantime, the design review shall continue with the current PA baseline.

NOTE: By PA Requirements, it is understood the technical requirements included in the PA, whether in the Annex B or in the listed applicable documents, plus the approved modifications through the appropriate change process.

- **Design Approver**

- The DA-Design Approver shall be a reviewer of the **Close-Out Report** before PA signature when the scope is linked to a future PA for which the DA is in charge
- After PA signature the recommendation of the DA-Design Approver is mandatory before Closeout report Approval (as IO only acts as Design Acceptor in this situation).

- **Design Review scope**

Design Reviews shall be carried out at the minimum at the highest level of the scope of the PA to cover the whole system of the scope of the PA. There is an exception in the case that a PA covers several independent systems. In that case there will be a need for a Design Review per system.

NB: This means that the organisation of Design Reviews at lower level does not discharge from holding the design Reviews at the highest level covering the full scope of the PA. For example, if the scope of a Functional PA is a level 1 System, PDR and FDR reviews shall be also held at Level1, even if there were several PDRs and FDRs held at lower levels.

- **For F4E Design Reviews, the following maturity indicators shall have been reached:**

PDR:

- System to sub-systems propagation of requirements is at least 90% complete, the objective being 100%.
- Qualification, verification, and test plans have been at least defined, and approved at best. Special models have been defined and designed.
- Manufacturability, transfer, assembly, and qualification/start-up of the system have been addressed.

FDR:

- Design shall be 100% qualified (VCD QUAL demonstrates full compliance).
- System's acceptance shall have achieved the following maturity: 50% of the requirements have the Acceptance Plan defined in the VCD ACC).
- Manufacturability, transfer, assembly, and qualification/start-up of the system are defined and agreed with the stakeholders. In particular, manufacturability is confirmed and documented (at least one manufacturing route is demonstrated)."