IDM UID
3L775F
VERSION CREATED ON / VERSION / STATUS
21 Mar 2024 / 2.0 / Approved
EXTERNAL REFERENCE / VERSION

MQP Level 3

Working Instruction for Interface Management

The purpose of this working instruction is to provide additional instructions and requirements for any IO staff involved in the implementation of the concepts and tools introduced in the Design Interface Control Procedure.

Please apply the deviation request(s) available as referencing document(s).

Approval Process			
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Document Security: Non-public - Unclassified *RO: Khomutnikov Aleksei*			
Read Access	**GG: MAC Members and Experts, AD: ITER, AD: External Collaborators, AD: External Management Advisory Board, AD: OBS - Quality Management Division (QMD), AD: DA, AD: Auditors, AD: ITER Management Assessor, project administrator, RO, LG: [DOC] Baseline Managers, GG: MAC Members Only, AD: IO_Director-Ge...**		

Change Log			
Working Instruction for Interface Management (3L775F)			
Version	***Latest Status***	***Issue Date***	***Description of Change***
v0.0	In Work	28 Jun 2020	
v1.0	Approved	29 Jun 2020	First issue as per MQP doc request https://user.iter.org/?uid=Y5JVG5
v2.0	Approved	21 Mar 2024	As per MQP request A4XVNN the changes are: - removal of all instructions related to implementation in PLM 3DX (MATRIX) - introduction of the references to dedicated Interface Sheets templates - addition of requirements (or clarification) on the Interface Requirements part - removal of the requirement to use DOORS to manage Interface Requirements (thus removal of all references to DOORS tool)

Table of Contents

1 Purpose

The purpose of this Level 3 Working Instruction is to provide additional instructions and requirements for any IO staff involved in the implementation of the concepts and tools introduced in the Design Interface Control Procedure [2].

This document is a MQP Level 3 procedure and complements the MQP level 2 Design Interface Control Procedure [2] (part of the Design Control Process).

This procedure is a part of the Design Control Process and complies with the requirements stated in Chapter 3.3.4 Design Control of the parent document Quality Assurance Program [1].

2 Scope

This document differentiates the responsibilities of the Systems Integration Responsible Officer (SIRO) versus the Technical Responsible Officer (TRO) as it pertains to Interface Management (the duties and responsibilities of SIRO are defined in [10]). In addition, this document provides instructions for Interface Configuration Control, Interface Design Control and one to multiple interfaces.

This document is applicable to IO staff performing Interface Management activities during the Design Development of all ITER PBS systems.

3 Definitions and Acronyms

3.1 Definitions

The definition of all the terms related to Interface Management/Control can be found in [2]

3.2 Acronyms

DA	Domestic Agency
DPP	Document Production Plan
EWP	Engineering Work Package
FDR	Final Design Review
GBS	Geographical Breakdown Structure
ICD	Interface Control Documents
ICM	Interface Compliance Matrix
IDD	Interface Definition Document
IFP	Interface Point
IR	Interface Requirement
IS	Interface Sheet
PA	Procurement Arrangement
PBS	Plant Breakdown System
PFI	Physical and Functional Integration
PCR	Project Change Request
PLM	Project Lifecycle Management
RO	Responsible Officer
SDR	System Design Review

SIRO	System Integration Responsible Officer
SRD	System Requirement Documents
TRO	Technical Responsible Officer
UID	Unique Identifier

4 References Documents

[1] ITER_D_22K4QX - ITER Quality Assurance Program (QAP)
[2] ITER_D_28VNJG - Design Interface Control Procedure
[3] ITER_D_2832CF - Design Review Procedure
[4] ITER_D_YQ7U33 - Working Instruction for Implementation and Management of a Document Production Plan (DPP) in PLM
[5] ITER_D_33RGW2 - Standard Template for Interface Sheet
[6] ITER_D_3N88A7 - Standard Template for Interface Control Document
[7] ITER_D_6JAG8T - Template for FDR-ICM (Interface Compliance Matrix for the scope of a FDR)
[8] ITER_D_6JA2M4 - Template for IS-ICM (Interface Compliance Matrix for a single Interface Sheet)
[9] ITER_D_SNE6G8 - Staged Approach Configuration - PBS Level 3
[10] ITER_D_2M9BHD - GIN 024 - Duties and Responsibilities of the ITER Organization System Integration Responsible Officer (SIRO)
[11] IS/ICD templates (873CA5)
[12] ITER_D_44BLNX - Requirements Management Process (RQMP)

5 Basic Principles for the Production of the Interface Documentation

The overall Interface Management Process is presented in [2] and the main steps are represented on the Figure 5-1:

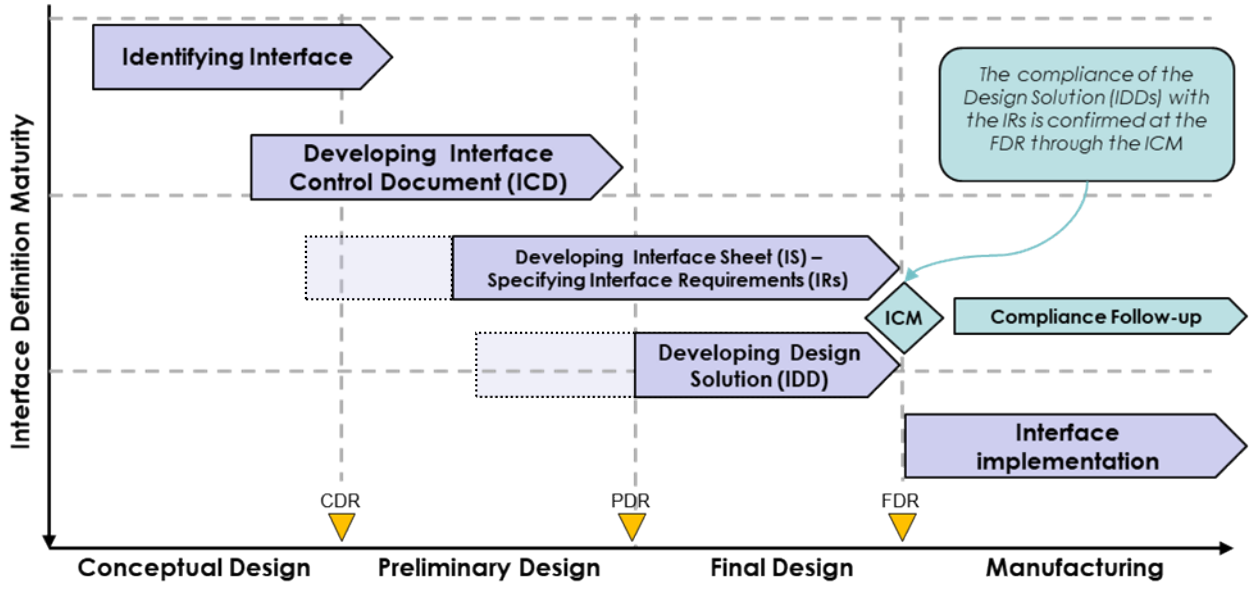


Figure 5-1: Main steps of the Interface Management Process

5.1 Interface Control Document (ICD)

At the start of each design phase of a system under the System Integration Responsible Officer (SIRO) responsibility, the SIRO will (with the support of the PBS RO):

- Review and check the completeness of the interface identification in the different ICDs of the system;
  - Verify the listed interfaces are up-to-date
  - Identify any missing interfaces;
    - By exploring the two interfacing systems architectures (identifying potential Interface Requirements (IR) associated to the sub-systems or components that must be recorded in existing or new IS)
    - By considering, if available, the functional analysis (for potential missing functional interfaces)
  - The scope of the already identified Interface Sheets (IS) shall be checked and assessed in order to identify the potential need to split the IS into several documents (see Figure 5-3), or merge several IS into one if relevant.
- If a need for a new IS is identified;
  - Contact the PBS RO of the interfacing system to confirm the need
  - If the need has been confirmed, the corresponding ICD needs to be updated:
    - Add a row in the table of chapter 5 of the corresponding ICD, as shown in template [6] (see Figure 5-2, the rules for numbering and naming the IS are provided in Appendix A)
    - Describe in the table;
      - What are the affected systems (PBS nodes and PAs) on both side of the interface
      - What are the information/data expected (with which level of accuracy)
      - Which PBS will provide the requested information/data
      - When the information/data is needed (associated to Design Phases) and why the data is needed (for which usage)
    - Assign in IDM the author/co-authors, reviewers and approver as per the roles and responsibilities defined in [2]
    - Create the new IS (see chapter 5.2).

5 List of the Interface Sheets (IS) related to the present ICD

Forecast IS are listed in this chapter, including the detailed expected data that shall stand in the IS.

IS references		PBS XX	PBS YY	Interface points	Interface steps	Provider	IS Version [4]			
IS number* Document UID* [1]	Tile* Subtitle	• Affected subsystems • Affected PA * [2]	• Affected subsystems • Affected PA * [2]	Detailed expected data* [3]	Successive steps to complete the IF point [6]		1.0[5]	2.0[5]	3.0[5]	4.0[5]
IS-XX-YY-001 IDM_D XXXXXX vX.X										

Figure 5-2: ICD Template extract

Definition of the Interface Sheets architecture

The main objectives when defining the architecture of the ISs of an ICD (and thus the scope of each IS) should be to:

- Ensure the proper propagation of the IRs into the design
- Allow an easy tracking of the compliance of the design with the IRs
- Ease the Configuration Management of the ISs

In order to achieve these main objectives, several principles should be considered:

1. The contractual breakdown of the two systems: the number of involved PAs in a given IS shall be limited to the minimum. This should allow a better identification of the applicable ISs to each PAs. When several PAs are involved in one IS, the applicability of the IRs to each PA shall be clearly indicated (in the IS).
2. As much as possible the scope of the ISs should be aligned and consistent with the scope that can be practically verified through the Design Reviews. This eases the control of the compliance through the identification of the Interface Definition Documents (IDD) in the Interface Compliance Matrix (ICM), and this avoids putting under Configuration Control the full IS when only few IRs are verified at a given Final Design Review (FDR).

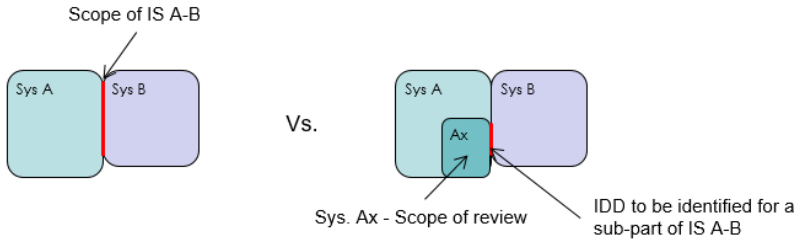


Figure 5-3: Scope of IS Vs. Scope of Review

In the example of Figure 5-3, at the beginning of the Design Phase for the sub-system "Ax", the interface identification is reviewed by the SIRO (with the support of the PBS ROs). It is identified that the IS "A-B" shall be split into (at least) 2 ISs, one addressing specifically the IR between "Ax" and B (and the IS "A-B" shall be updated accordingly to avoid overlap).

The specific case of "One to Multiple" Interfaces is treated in chapter 8.

5.2 Interface Sheet (IS)

At the start of the design phase of a given system, the SIRO of the concerned system shall initiate the drafting (or update) of the ISs, with the support of the two interfacing PBS ROs and the SIRO of the interfacing system, as foreseen in the ICD and in accordance with the DPP. These IS shall be based on the applicable template [5] and the review/approval in IDM managed as per SOA.

Note: In addition to the Standard Template for Interface Sheet [5] that provides overall guidance for a "generic" IS, several IS templates are available in the IDM folder IS/ICD templates (873CA5) [11] for some specific interface topics (such as for instance for PBS 65 Liquid and Gas Distribution, PBS 44 Cabling, PBS 48.01 Functional interface,…).

The SIRO, with the support of the PBS ROs will:

- Identify and list the Interfacing Systems/Components (in the chapter "Interface Identification" of the template [5]):

  - When the maturity of the interfacing systems is low only the PBS Level 1/2/3 can be indicated
  - When reaching the appropriate maturity (mainly from Final Design up to the release of Engineering Work packages [EWP]), the interfacing components should be identified with their Functional References, defining the Interface Points (IFPs)
  - For fluid IFPs, a numbering scheme is provided in Appendix B in order to facilitate the coherency checking
  - The PIC classification of the interfacing components must be indicated as well as their Geographical Breakdown Structure (GBS)
- Specify the IRs at each IFPs in the chapter "Interface Requirement" of the systems IS, as found in the template [5]:
  - the IR shall be clearly defined following **SMART criteria** outlined in Appendix C
  - the IR shall be referenced with a **Unique Identifier** (for instance composed of the IS name, "i" for IR, and a unique object number for the related IS, e.g. "*1652-004i169*" for a IR in IS "*16-52-004*")
  - An IS lists Complementary Applicable Documents (ADc) containing additional requirements to be satisfied by the interfacing components during its implementation into the design and construction solutions. **Each of these ADc shall be made applicable by a dedicated IR**.
  - If a referenced document is used to specify (or support the specification) of an IR, this document must be referenced **with its current applicable version**
  - The parent requirements (e.g. from the Input Applicable Documents such as SRD) should only be provided for information
  - The applicability of each IR on the Interfacing Systems/Components shall be specified for the different phases of the applicable Staged Approach (as per [9]) (i.e. if the interfacing component is to be built and operational for the specified Staged Approach operational phase, and thus installed during one of the preceding Assembly phases)
  - The division of responsibilities shall be clear between the two interfacing systems
  - In the case where the interface involves a PIC System or Components, this shall be clearly stated in the IR (even if the IR itself is not considered as defined requirements or safety requirements)
  - The origin of the interface technical data shall be provided (reference document, engineering judgment…)

Particular attention must be given to the level of details and accuracy of each IR in order to avoid unnecessary change (in particular through the PCR process when applicable) of the IS. The IR must allow the maximum flexibility on the design of the two interfacing systems, while ensuring their compatibility and interoperability.

Note: In some cases, the Interface Requirements might be specified in the CMM (for instance for plant systems cable declarations to PBS 44 where coordinates are extracted from the 3D model). In such cases, the CMM shall be referenced with UID and version, and the Design Integration RO (DIRO) shall be involved in the review of the IS.

Once the design documentation of a system/sub-system or component is Handed Over to Construction in an EWP, the related IR are then considered as fully implemented and the interfacing component shall adapt to this design solution.

5.3 Interface Compliance Matrix (ICM)

A complete ICM is required at each Final Design Review (see ICM template [7] and [8]).

The SIRO prepares the initial ICM after the FDR Interface Review (see chapter 7). For this, the SIRO:

- Identifies the applicable ISs for the scope of work submitted to the review
- Prepare the initial ICM, that presents:
    - The IRs of the selected ISs with their mandatory attributes (i.e. IR UID, statement, key requirement, definition status – see Appendix C)
    - The IS in which the IR is baselined (ITER IDM reference and applicable version)
    - Any documented evidences already available to justify the implementation into the design of the IR:
        - IDD type (the doc type of the design document implementing the IR (e.g. drawings, BoM, calculation note, etc))
        - IDD reference (ITER IDM reference and applicable version)
        - IDD paragraph (if applicable)
    - The current IR implementation status:
        - "Implemented": the IR is fully implemented into the design of the concerned system
        - "Partially implemented": the IR is partially implemented in the design at this stage (interfaces details to be refined into manufacturing drawings)
        - "Not yet implemented": the IR is not yet taken into account in the design at this stage
        - "Implementation issues": the IR is not implemented in its current state and either the IR should be updated (in agreement with the interfacing system) or the design solution modified

The SIRO then determines, for each IR listed in the ICM, its applicability to the scope of work of the review ("Yes"/"No").

The SIRO presents the initial ICM to the PBS RO of the relevant system in the frame of the Interface Review prior to the FDR (see chapter 7).

The PBS RO (co-author of the ICM) completes then the ICM (for the IR applicable) with new/modified documented evidences of the IR implementation and updated implementation status.

In case the design is developed by a DA through a PA, the IO PBS RO shall interact with the DA TRO in order to collect the necessary information.

The SIRO co-signs the ICM, launches the review in IDM, as per SOA, and the approved version of the ICM is submitted in the FDR documentation package.

For systems that passed the FDR and are preparing for the MRR, in case no ICM formally records the compliance of the Design with the IR, the ICM shall be drafted and approved before MRR (as a recovery measure).

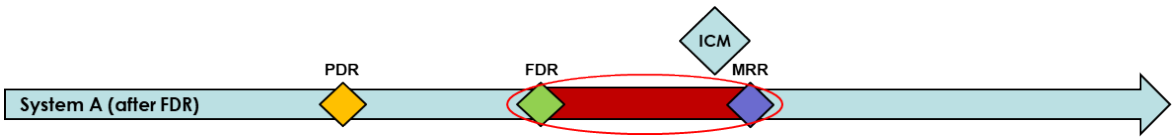


Figure 5-4: Recovery measure for systems between FDR and MRR

For systems already under manufacturing interfacing with systems still under development, the compliance and compatibility of both design solutions will be checked during the upcoming System Design Review (SDR) of the system under development. At this stage, the system under development shall adapt to the design solution of the system already under manufacturing.

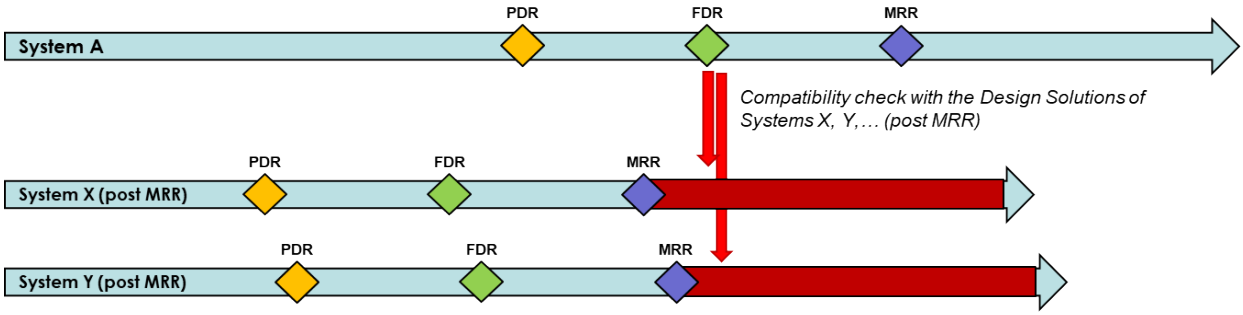


Figure 5-5: Case of interfaces with systems already under manufacturing

6 Interface Configuration Control

The main principles of the configuration management of Interface Documents are given in [2]. At PDR and FDR, relevant ISs and ICD are submitted by the IO PBS RO in the SDR Input Data Package. Once the SDR is closed, the relevant ISs are then considered as Applicable for the next stage and for the two concerned systems. ISs become "Configuration Management (CM) relevant" documents at FDR, after their consolidation with the Design definition (when the compliance between IDDs and the IRs is confirmed through the ICM). ICDs are not "CM relevant" documents.

7 Interface Design Control

According to the Design Review Procedure [3], during the preparation phase of the SDR, the Design Coordinator (see definition in [3]) shall contact the Physical and Function Integration Division (or the Design Integrator, see definition in [3]) to organize a Review of Interfaces. This should be done at least six weeks, at a minimum, before the SDR meeting.

This Review of Interface is initiated by the SIRO throughout the Design process by regular exchanges with the PBS RO (interface meetings) and ultimately by drafting the initial version of the ICM. The ICM is then submitted in the Input package of the FDR.

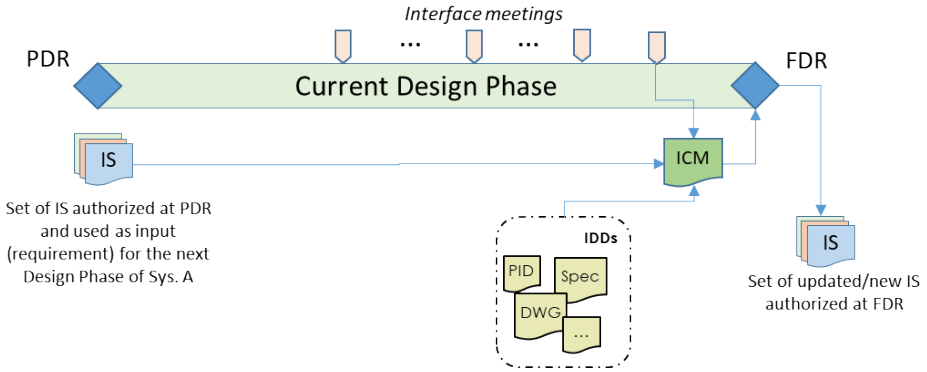


Figure 7-1: Review of Interfaces and IS steps

8 Management of "One to Multiple" Interfaces

The "One to Multiple" Interfaces are interfaces involving one system on one side, the Service Provider, and several other systems on the other side, the Clients. For these particular interfaces between a Service Provider and the Clients, the standard bilateral IS scheme will be adapted and supplemented with additional tools and documents.

The management of these "One to Multiple" Interfaces is led and guided by the SIRO in charge of the "Service Provider" side (or by a dedicated Transversal Function RO, acting as SIRO for this interface).

The process for "One to Multiple" Interfaces consists of the following main steps/activities:

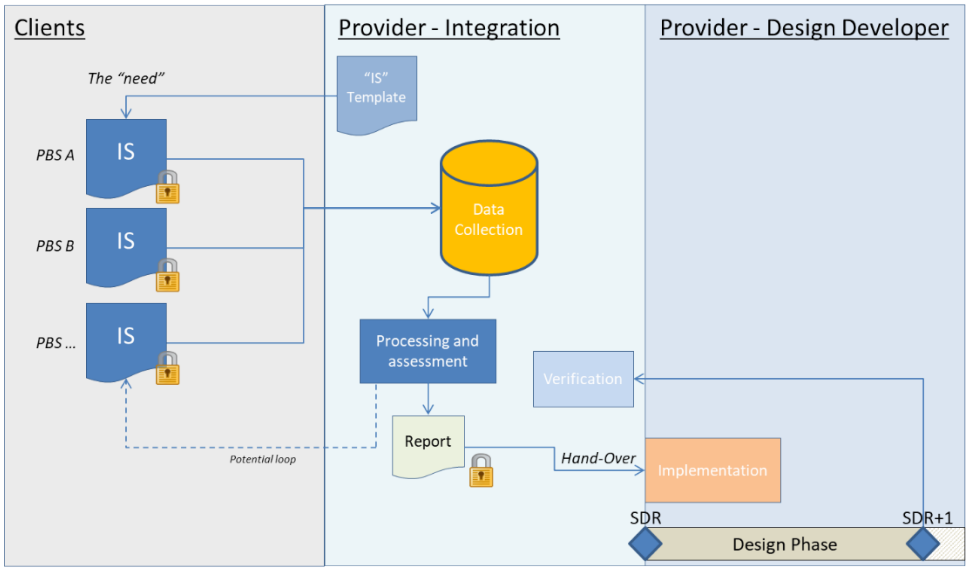


Figure 8-1: Management of Transverse Interfaces

1. The SIRO defines the expected content of the IS (type of data, format,…) and provides it to the identified Clients in a specific ICD, which act as a Design Plan for the activity.

   Note: In some cases, the need from the clients can be found in the clients design documents. In such cases, these design documents can act as the "IS" if deemed relevant and adequate by the SIRO of the Service Provider. This shall be clearly identified in the ICD (or Design Plan).

2. The SIRO defines a schedule (date to receive the expected IS recording the Clients' needs), suitable with the remaining activities of the process
3. The Clients issue the IS recording their needs (including margin according to the current design maturity) according to the defined schedule
4. The SIRO reviews the ISs from all the Clients and once approved, load into the Data Collection Table or Database and baselined.
5. The SIRO processes the data (for instance grouping the needs per area, adding margins,…) and issue a report recording the input data needed for the design of the "Provider" System
6. The report is Handed-over to the Design Developer for the design execution of the "Service Provider" system
7. The design of the "Service Provider" system is verified (compliance with the input report) by the SIRO in the frame of the related SDR

The SIRO is responsible for:

- Drafting the ICD (or Design Plan) between the Service Provider and all the Clients
- Providing the Clients with the expected content of the IS (in the ICD)
- Managing the schedule (request the IS at a given date, suitable with the remaining activities of the process)
- Reviewing the IS from all the Clients
- Managing/supporting the writing of the associated Data Collection Table/Database
- Processing the data and issue the final report to the Design Developer of the system
- Verifying that the design of the Provider System is compliant with the inputs (the report) and thus with the clients' needs
- Managing the configuration of the ISs (the needs from the clients), the Data Collection Table/Database and the final report

It should be noted that the IS (the needs from the clients) and the Data Collection Table/Database shall not be made applicable to the Design Developer of the Provider System. The only applicable document to the Design Developer shall be the input Report. However, in specific cases (if there is no processing of the data collected), a specific report might not be necessary and the Data Collection Table/Database can be directly transferred to the Design Developer. In that case, the Data Collection Table/Database shall be baselined and managed under configuration once handed-over to the Design Developer.

9 Link with other Processes

9.1 Interactions with Configuration Identification and status accounting process

The Interface control process is linked to all MQP project realization processes (see Management and Quality Programme (MQP) map).

For the management and control of the interface document this procedure is linked to the configuration management process in its entirety and in particular with the following QAP Level-2 sub-processes:

- Configuration identification
- Configuration Control
- Configuration Status Accounting, Verification and Audit

Appendix A: ICD/IS Numbering and Naming Rules

1. Rules for Numbering and Naming

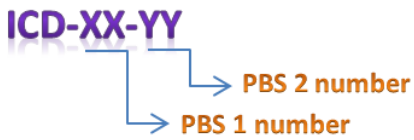
1) The numbering of ICD, IS must be unique.
2) Guideline for numbering and naming of the ICD/IS/IDS is provided below to ease understanding of the content of the scope of the document.
3) The PBS or subsystems' name and number used for ICD, IS numbering and naming shall always be the up-to-date ones. Moreover, the ICD/IS number and name quoted anywhere in interface documents shall follow the same rule.

2. Scheme of Numbering and Naming

A. ICD NUMBERING:

Format: ICD-PBS1-PBS2

- ICD between **two different PBS and subsystems**



Example: *ICD-11-22*

For PBS **subsystems (from Level 2 to any lower level):**
Any level 2 and lower level subsystems' official code number could be added after the PBS number with the hyphen '.' (a dot).
ICD-XX.aa-YY.cc
or
ICD-XX-YY.cc
or
ICD-XX.aa-YY
or
ICD-XX.aa-YY.cc.mm.nn

If there are **more than one subsystems at the same level** shall be indicated in the ICD number, they should be put in a pair of brackets, and in the brackets the subsystems' number should be separated by the hyphen '**,**' (Comma).
ICD-XX.(aa, ab, ac) -YY

Example: *ICD-26.CH-31 or ICD-26.(PH, CV, DR, DY)-31*

If the lower level PBS involved in the ICD number are **a continual serial number (01, 02, 03 … 0*)** without interrupt, the ICD number can be given as:
ICD-XX.(01~0*)-YY

Example: ICD-62.(61~65)-31
The pair of brackets could be ignored if not cause confusion.

- For ICD within the same level-one PBS: **ICD-PBS1-PBS1**
ICD-XX.aa-XX.ab
or
ICD-XX-XX

- If there will be two or more ICDs for the same pair of 'PBS1' and 'PBS2', a 3 digits number shall be given and added after the PBS number, i.e.:

ICD-PBS1-PBS2-nnn

In this case, the map of all ICDs numbers and their scope shall be reported at Chapter 2 Scope of each ICD.

B. ICD NAMING:

Interface Control Document for PBS1 name (PBS1 number) and PBS2 name (PBS2 number)

Or **Interface Control Document for interface within PBS1 name (PBS1 number)**

Example:
Interface Control Document for Magnet system (PBS 11) and Machine Assembly and Tooling (PBS 22)
or
Interface Control Document for interface between Chilled Water System (PBS 26.CH) and Drying System (PBS 26.DY)

C. IS NUMBERING:

Format: IS-PBS1-PBS2-*** (where *** is an incremental serial number, and this number could also be used to categorize some IS into different groups in one ICD)

- IS between two different Level one PBS

Example: *IS-11-22-001*

- For PBS subsystems (from Level 2 to any lower level):
  Any level 2 and lower level subsystems' official number could be added after the PBS number with the hyphen '.' (Dot).
  IS-XX.aa-YY.cc-***
  or
  IS-XX-YY.cc-***
  or
  IS-XX.aa-YY-***
  or
  IS-XX.aa-YY.cc.mm.nn-***
  If there are **more than one subsystems at the same level** shall be indicated in the IS number, they should be put in a pair of brackets, and in the brackets the subsystems' number should be separated by the hyphen '**,**' (Comma)
  IS-XX.(aa, ab, ac) –YY-***

  Example: *IS-18.PI-62.21-001, IS-26.CH-31-001 or IS-26.CH-31-002*

- For Interface within the same PBS:
  IS-XX.aa-XX.ab-***
  or
  IS-XX-XX-***

  Example: *IS-18.GI-18.DM-001*

D. IS NAMING:

The name of the IS shall refer to the PBS involved
Interface Sheet between PBS XX and YY

Appendix B: Numbering Rules and Scheme for Fluid Interface Points

1. Naming convention – General Method

The IFP naming across SG5 is made up of three parts:

1. Prefix: A reference to IS Title
2. The radical: "-IFP-"
3. The unique number: A 4-digit number to ensure unicity of labelling.

The rules applying to the each of these parts is described below

1.1. Forming the prefix

All IS titles should follow the naming guideline from this WI (see Appendix A):

This part of the IS title is the starting point to form the Prefix. The following rules are then applied:

- Remove "IS-"
- Remove any punctuation in the PBS
- Replace the hyphens "-" by underscores "_"

Therefore, the Prefix is:

$$PBS\ A\_PBS\ B\_\ ICD\ number$$

Where PBS A < PBS B.

E.g: IS title: **IS-18.DM-32.DT-001** Interspace gas from DMS to DS
Remove: "IS-"
18.DM-32.DT-001
Remove any punctuation in the PBS
18DM-32DT-001
Replace the hyphens with underscores
18DM_32DT_001

1.2. Radical

The radical is always the same:

$$-IFP-$$

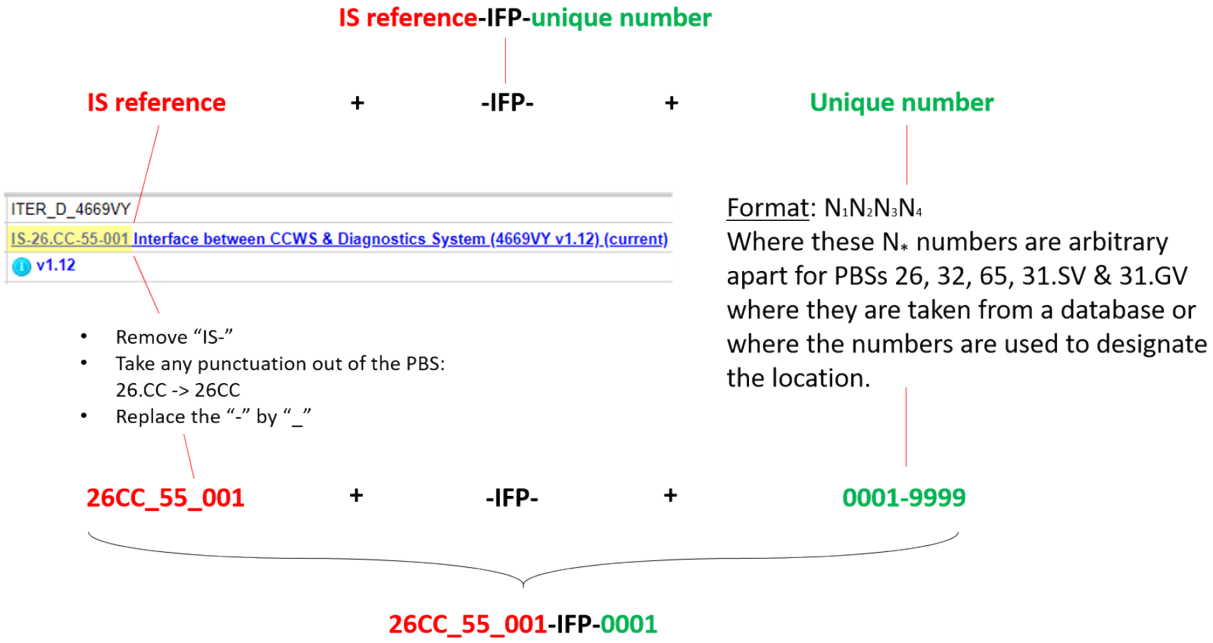
1.3. The Unique Number

The unique number is a four-digit number starting from 0001 for each IS. The unique number is incremented for each IFP.

$$N_1N_2N_3N_4$$

1.4. Summary

The method is summarised in the following figure:



2. Naming exceptions

There are several cases of exceptions in the naming. These exceptions are either due to inconsistencies in the IS title, or were made in an attempt to link the numbering to an existing referential of the PBS or to maintain an existing convention between two PBSs.

2.1. For IS with inconsistencies in the title

1. The ICD number is not indicated

The number of the IS specified in the ICD does not appear in the title and must be found from the ICD document itself.

Eg: 3PF28W Title: *Interface Sheet between the Fuelling and Wall Conditioning (**PBS 18**) and the Chilled Water System (**26.CH**)*

18_26CH_001 – IFP – $N_1N_2N_3N_4$

2. Multiple ICD numbers are referenced in the IS title

It sometimes happens that one document covers the scope of several IS according to the scopes defined in the ICD. The IS can then carry several IS numbers. If this is the case, then only the first IS number is retained.

Eg: 3QHATH Title: *Interface Sheet (IS) IS-26-CC-31-**001 and 002 and 003***

$$26CC\_31\_\mathbf{001} - IFP - N_1N_2N_3N_4$$

2.2. For IFPs with PBS 65

For IS with PBS 65, the unique number is taken from the valve number for each interface point in column J of the Data Collection Table (34A96Z) (DCT). The numbering on the valves for PBS 65 is also a 4-digit counter from 0001 to 9999, which is reinitiated for each service gas (Helium - He, Compressed Air - CA, Nitrogen - NG, Demineralised Water - DW, and others.). There can be duplicated values if the service fluid is not indicated. Therefore, exceptionally, the PBS 65 in the Prefix is indicated to level 3 to avoid duplicate IFP labelling.

Eg:

$$26\_6511CA - IFP - 0284$$

PBS Level 3 — Valve number from DCT

2.3. For IFPs with PBS 31.GV

For PBS 31.GV, the unique number is taken from the CGVS Client List (AVY8ST) while the prefix and radical follow the standard procedure.

The numbering,

$$N_1N_2N_3N_4$$

Is used to refer to the pump set (Column B) and Client # (Column K) of the CGVS Client List where

- $N_1N_2N_3$ are the first 3 digits of the pump set number and
- N_4 is the client #.

E.g: For row ID #3: the CGVS pump set it **31GV00-PVG-1010** and the client number is 3.

Therefore the number of the IFP number would be

1013

2.4. For IS covering several PBS in their scope

Certain IS notably with PBS 62 and 26 (TCWS) cover several sub-systems. When this is the case, the PBS is detailed to level 2 where possible. Sometimes, notably for the TCWS, the PBS level 2 cannot be inferred because the same piping is used by 26.PH and 26.DR, in this case, the PBS is kept at level 1.

Eg:

PBS 62: **IS-26.CH-62.(11, 14, 74)-002** Interface between PBS 62-11/62-14/62-74 Tokamak Complex and PBS 26-CH Chilled Water system

$$26CH\_6211\_002 - IFP - N_1N_2N_3N_4$$
$$26CH\_6214\_002 - IFP - N_1N_2N_3N_4$$
$$26CH\_6274\_002 - IFP - N_1N_2N_3N_4$$

PBS Level 2

Counter reset for 6211, 6214 and 6274

PBS 26: **IS-15.IV-26-001** Interface Sheet between Primary Heat Transfer PBS 26.PH/CV/DR/DY and In-Vessel Coils PBS 15.IV

$$15IV\_26PH\_001 - IFP - N_1N_2N_3N_4$$
$$15IV\_26CV\_001 - IFP - N_1N_2N_3N_4$$
$$15IV\_26DR\_001 - IFP - N_1N_2N_3N_4$$
$$15IV\_26DY\_001 - IFP - N_1N_2N_3N_4$$

PBS Level 2

Counter reset for each PBS level 2

2.5. For IS between PBS 23 and PBS 32

The IS between PBS 23 and PBS 32 describe and number the IFPs. In order to avoid PBS 32 re-numbering the IFPs and to make to the most of existing efforts to tag IFPs, the existing numbers in the IS are re-used in the SG5 naming convention.

For PBS 23.03 and 32.DT(Q5PRWP)

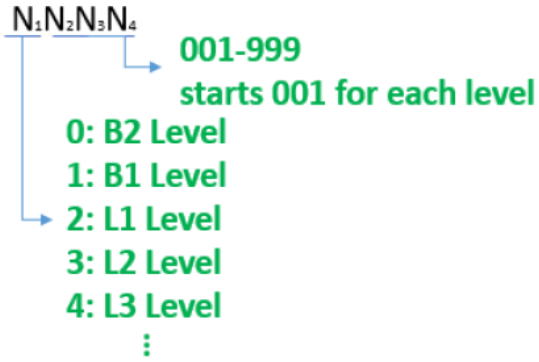
- Since the IP functional reference numbers of PBS 23 in IS and in Diagrams are written interchangeably, it is suggested to exchange the names of IP1 and IP3.
- PBS 23: In case of RSD and RTD, a numbering system associated with port cells is proposed to distinguish them by location

No.	Components (PBS 23.03) [16]		Components(PBS 32.DT.80) [15]	
	Name	Functional reference Number	Name	Functional reference Number
IP1-23-32-001	Cask Docking System *Cabling and piping network*	2303CD-RTD-1abc (a = level, bc = port cell / cargo lift shaft)	11-Level-Port Cell *Cask connection*	32.DT.80-PI-abc1 (a = level, bc = PC) cargo lift 0470
IP2*-23-32-001	Cask and Plug Remote Handling System	23.03	Tokamak Complex Detritiation System	32.DT.80-PI-abc2 (a = level, bc = port cell)
IP3-23-32-001	Cask Rescue System *Cabling and piping network*	2303CR-RSD-1a00 (a = level)	11-Level-Port Cell *Cask rescue near PC*	32.DT.80-PI-abc3 (a = level, bc = port cell)
IP4-23-32-001	Cask Maintenance System *Fliters and valves maintenance*	2303CM-RSD-nnnn	11-Level-Port Cell *Cask connection*	32.DT.80-PI-abc1 (a = level, bc = PC) cargo lift shaft 4990

IP group	IFP name	PBS 23 Ref. #	PBS 32 Ref. #
IP 1 (before IP 3)	23_32_001-IFP-abcx a: Level (B2=1,B1=2, L1=3,L2=4,L3=5) bc: Port Cell x: IP group	2303CR-RSD-abc1	32.DT.80-PI-abc1
IP 3 (before IP 1)		2303CD-RTD-abc3	32.DT.80-PI-abc3
IP 4		2303CM-RSD-abc4	32.DT.80-PI-abc3

2.6. For IS with PBS 31.SV, 31.TN, 26

For the PBS mentioned above, the unique number's first digit is an indicator of the level where the IFP is located:

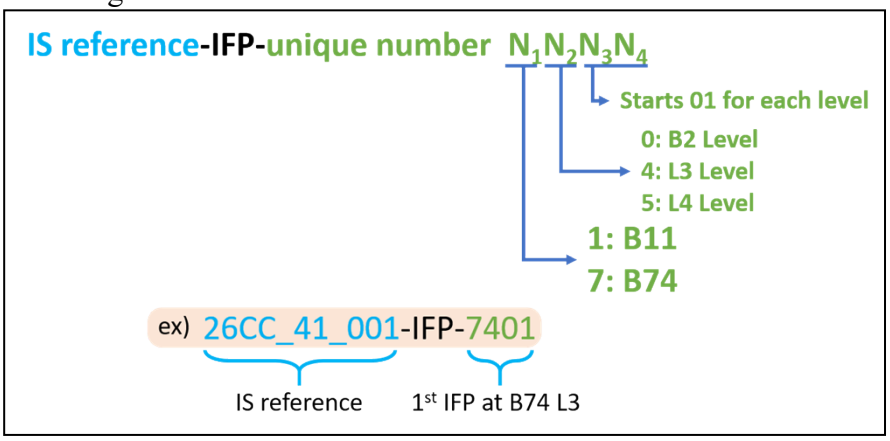


This numbering has been agreed for the Tokamak Building (Bldg 11) and remains TBD for other buildings.

2.7. For IS between PBS 26.CC and PBS 41

For IFPs between 26.CC and 41 located in both B11 and B74 are not the general case of 2.6 described above.

- The first digit is an indicator of the building where the IFP is located
- The second digit is an indicator of the level where the IFP is located



Appendix C: Requirements for the definition of SMART Interface Requirements

SMART requirements

The IR shall be a **SMART** requirement. That means, a IR shall be:

- **S**pecific (i.e. unique, singular, unambiguous, complete and standalone);
- **M**easurable (i.e. verified by measurable parameters with tolerances or margins);
- **A**chievable (i.e. technically achievable at affordable cost within acceptable schedule);
- **R**elevant (i.e. s expressing a technical criteria to be satisfied, applicable to the assigned design elements, consistent with other requirements, constraints and conditions);
- **T**raceable (i.e. assigned a unique identifier, clear links with associated requirements and design elements).

Particular attention must be given to the following SMART criteria:

- A IR shall only specify a technical requirement to be satisfied by the concerned PBS elements at the specified Interface Point.
    - A IR shall only specify a function, performance, characteristic or quality to be met by the design element. It shall not specify a process, activity, or responsibility requirement.
    - For example "PBSxx element zz shall be designed, manufactured and installed so to withstand the mechanical reaction forces from the PBSyy element ww, that are specified in document [dd]" and not "PBSyy *(or IO/DA)* shall run the procedure A to define the mechanical reaction forces onto PBSxx".
- A IR may regroup several interface requirements as long as they relate to the same engineering topic and their compliance demonstration will be justified by the same IDDs.
- A IR shall always be expressed in line with the following grammatical rules:
    - Use the modal auxiliary "shall";
    - The subject of the IR statement shall be the design element that must comply with the IR (e.g. "The system shall set the start flag to Y" and not "The start flag shall be set to Y");
    - Do not use conjunctions (*and*, *or*, *but*….) or limiting phrases (*unless*, *except*…) – in order to avoid multiple and/or conflicting needs in the same IR that would compromise its interpretation and/or its compliance demonstration;
    - Do not use interpretable wordings such as numerous, achievable, degraded, efficient, effective, flexible, optimum, often, easy, to the maximum (or minimum) extent, as much (little/far…) as possible, scalable, versatile, shall be capable of, robust, light-weight, small, big, portable, etc. Also avoid words ending in "ly" (such as easily, usually, normally, generally, typically, approximately, user-friendly, extremely) or ending in "ize" (such as maximize / minimize), etc.

Key Interface Requirements (KIR)

An IR is identified as a Key Requirement if, as per the definition in [12], it is "*deemed critical to demonstrate the achievement of ITER safety, plasma and/or engineering performances/testing".*

Attention

Compliance Management for IR shall be limited to ISs related to PBS elements identified as ITER Configuration Items as per CMIP *(or that are a CI parts contributing in achieving the requirements resulting in the PBS element identification as a CI). This is to focus effort on:*

- *Verifying and validating, during related Project Gate Reviews, the definition and compliance demonstration for IRs that are deemed critical to achieve ITER Project success (see below for definition);*
- *Maintaining the traceability of the definition and compliance demonstration of these Key IRs.*

However this graded approach does not relief the Responsible Officers of the concerned PBSs (IO/DA, including their suppliers) to guarantee that the delivered products (design, manufactured and installed components) comply with all their IRs*. For IRs not Key IRs, the ROs must ensure that the necessary documented evidences are available to comply with applicable legislations, codes/standards, project management/procurement documentation,*