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F4E Document

P-03.02 F4E_CAD_Manual

This document describes the procedures, processes and the expected CAD environment for suppliers carrying out CAD design work for mechanical and plant systems.

Approval Process			
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Change Log			
P-03.02 F4E_CAD_Manual (22BE49)			
Version	***Latest Status***	***Issue Date***	***Description of Change***
v1.0	Signed	07 May 2010	
v2.0	Signed	05 October 2010	New section on the schema of design collaboration and numbering system were added.
v3.0	In Work	07 October 2010	Updating version in IDM with document version
v4.0	In Work	07 October 2010	Updating IDM version with document version
v5.0	In Work	07 October 2010	Updating IDM version with document version
v6.0	In Work	07 October 2010	Updating IDM version to the document version
v7.0	Approved	07 October 2010	Modifications introduced in the sections related to scheme of collaboration and numbering system. The IDM revision is the same as the document revision
v8.0	Approved	10 June 2011	The section of the Executive Summary modified in this version are: 1.- Section 2.3.1 , 2.4.1 and 2.6.1 Properties and attributes definition 2.- Section 2.5 Standard parts CADENAS 3.- Section 3.1.4 Scheme of design collaboration. Synchronous approach 4.- Section 3.1.7. Drawing Title Block 5.- Section 3.2.1 CAD Data Workflow and life cycle in asynchronous mode 6.- Section 3.2.2 CAD Data Workflow and life cycle in synchronous mode The main reason of the changes are due to the new customization of the ITER CAD Supplier Package that make possible to use the logbook, the integration of some request done by the suppliers. and the new IO title block policy.
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F4E CAD MANUAL

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Areas and functions	
Version Responsible:	A. Moreno (CAD)
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Process Groupd and Context:	Projects Delivery, Engineering
Function(s) concerned:	During the contract implementation the F4E CAD Manual shall be used by: • The TPO for the follow-up of technical, management and quality of CAD requirements; • CADO member of the F4E DO; • CAD designers of F4E Suppliers and supply chain DO;

Purpose

The purpose of this document is to describe the best practices, procedures, processes and the expected CAD environment for suppliers carrying out CAD design work for mechanical and plant systems.

Scope and Applicability

The F4E CAD Manual defines methodologies and best practices for the production of CAD data, the different schemes of CAD design collaboration to collaborate with delocalized F4E suppliers and the processes to be applied for the CAD data management, the CAD data quality assurance and the CAD data quality control.

This document is applicable to all the F4E contracts which include CAD tasks.

This document shall be used by the members of the F4E DO and F4E suppliers DO.

The F4E CAD Manual is written in conjunction with the ITER IO CAD manual and some specific areas of the IO CAD Manual have been modified to suit F4E requirements. In case of conflicts between requirements expressed in the F4E CAD Manual and the IO CAD Manual the F4E CAD Manual shall prevail.

The terms of the Contract take precedence over the terms set out in this document and any other applicable one.

All terms and acronyms used in this document are described in the section 'Abbreviations and Definitions' for clarification purposes.

Table of Contents

Applicable and Reference Documents

This section is divided in 3 subsections and the scope of each one is described below:

Applicable Documents:

This subsection includes documents which are referred as applicable during the text and which contain detailed requirements that complement the current document requirements. The applicability level is defined in the text.

AD01. CAD Manual 04-2 CAD Data Structuring (ITER_D_34VSEC)

AD02. CAD Manual 04-3 Mechanical Design Methodologies (ITER_D_33XVW6)

AD03. CAD Manual 04-5 - Plant Design Processes (ITER_D_33PE8P)

AD04. CAD Manual 05 - Design Data Management (ITER_D_249WSM)

AD05. CAD Manual 07 - CAD Fact Sheet (ITER_D_249WUL)

AD06. CAD Manual 09 - Drawing Best Practices (ITER_D_24SNC9)

AD07. CAD Manual 10 - ISO Drawing Standards (ITER_D_24MZWV)

AD08. CAD Manual 14 - Diagram Guidelines (ITER_D_35CY6V)

Reference Documents:

This subsection includes documents referred during the text which complements or expands the information of this document.

RD01. CAD Manual 12-1 Multi-Discipline Design Guidelines (ITER_D_359GKJ)

RD02. CAD Manual 12-2 Piping Design Guidelines (ITER_D_33WL3N)

RD03. CAD Manual 12-3 HVAC Design Guidelines (ITER_D_3593F7)

RD04. CAD Manual 12-4 Cable Tray Design Guidelines (ITER_D_34FM2E)

RD05. CAD Manual 12-5 Civil Engineering Design Guidelines (ITER_D_33J8ZH)

RD06. Hyperlinks to CAD Manual - Training Docs - How To - Catalogs - What Is – avi (ITER_D_24N3GT)

Abbreviations and Definitions

Term	Definition	Abbr.
Three dimensional model	It is virtual representation of a three dimensional object created with the aid of a 3D modelling software	3D
Bill Of Models	It is an Excel file containing the list of 3D files to be exchanged in a CAD data exchange process	BOM
Computer Aided Design	It is the use of computers for the creation, modification, analysis or optimization of a design	CAD
CAD Officer	It is the responsible of CAD data management within F4E for a specific CAD task or contract	CADO
Computer Aided Three-dimensional Interactive Application Version 5	It is a CAD software from Dassault Systemes used for the management of 3D models	CATIA V5
Data Exchange Transfer	It is the process for the exchange of CAD data between IO, F4E and suppliers	DET
Design Office	Group inside an organization being responsible for the CAD design management	DO
Equipment and Systems	It refers to specific set of workbenches within CATIA V5 used for Plant Design	EnS
Fusion for Energy	The European Joint Undertaking for ITER and the development of Fusion Energy	F4E
AVEVA E3D	It is a CAD software from AVEVA for the management of CAD models, specifically used in plant design	E3D
Frame Title Block	IO CATIA function used to introduce the frame and title block in drawings.	FTB
ITER Organization	The international organization – F4E customer	IO
Piping and Instrumentation Diagram	It is a detailed diagram showing the piping and vessels in the process flow, together with the instrumentation and control devices.	P&ID
Process Flow Diagram	It is a diagram showing the flow of a plant process, displaying the main equipment and how they are connected	PFD
Remote Desktop Service	It is one component of Microsoft Windows that allow as user to take control of a remote computer or a virtual machine over a network connection	RDS
Single Line Diagram	The schematic one-line diagram represents the electrical power network, HV (High Voltage), LV (Low Voltage), VLV (Very Low Voltage), in general one-line diagram is carried out by level of voltage	SLD
See System Design	It is the integrated tool that all IO, DA and external contractors must use when creating a diagram	SSD
See Electrical Expert	Expert is an application which will be use in ITER context for detailed electrical design of cubicles (wiring diagrams, layout design)	SXP
Technical Project Officer	It is F4E staff (in a Project Team or Technical Support Team) responsible for the technical aspects of the Procurement and the subsequent Contract	TPO
Workstation	Computer dedicated to run CAD tools	WS

1 Introduction

The F4E CAD Manual is written in conjunction with the ITER IO CAD manual and some sections of the IO CAD manual have been modified to suit F4E requirements. In case of conflicts between requirements expressed in the F4E CAD Manual and the IO CAD Manual the F4E CAD Manual shall prevail.

The F4E CAD Manual defines methodologies and best practices for the production of CAD data, the different schemes of CAD design collaboration to collaborate with delocalized F4E suppliers and the processes to be applied for the CAD data management. The F4E CAD Manual is part of the F4E Quality Assurance documentation and it is written for the following contributors to the ITER Project:

i. The F4E DO Members
ii. The Institutes working with F4E
iii. The F4E Suppliers & Subcontractors

1.1 ITER Project CAD System

This section describes the different CAD tools currently used in the ITER Project. CAD software currently used in the ITER Project:

i. CAD System: CATIA V5 for the CAD design of Mechanical and Plant Systems. The CATIA V5 Equipment and Systems workbenches are used for Plant Systems CAD design.
ii. CAD database: ENOVIA VPM V5 is the reference database for storing the CAD data of the ITER project.
iii. Diagrams (PFD, P&IC, SLD …) CAD System: SEE System Design (SSD) is the authoring tool for the creation of diagrams.
iv. Detail Electrical Diagrams CAD System: SEE Electrical Expert (SXP) is using for the creation of detailed electrical diagrams.
v. Assembly and maintenance simulation system: DELMIA used to simulate assembly and maintenance processes.
vi. CAD Quality Checker: Q-Checker is used to check if the CAD data is compliant with the main CAD quality rules and methodologies.
vii. Isometric drawing: ISOGEN software is used for the production of isometric pipes drawings
viii. Mechanical design catalogues: CADENAS is the library for mechanical standards components to be used in the CAD design.

Other software used for specific applications which are not part of this CAD Manual but some guidance or support can be provided are:

i. 3D data tolerance: 3DCS specific software used for the analysis of 3D tolerances chains.
ii. Plant design: AVEVA E3D specific software for CAD design of plant design as alternative to CATIA V5 Equipment and System.
iii. Diagrams: AVEVA Diagrams authoring tool for the creation of diagrams as alternative to SSD.

The following sections of the CAD manual describes how the different software shall be used to manage the CAD data, how the CAD data shall be stored and how the CAD data shall be controlled to ensure is compliant with the design functional and CAD quality requirements.

2 Design Collaboration Scheme. CAD Data

This section describes the possible design collaboration schemes between ITER-IO, F4E and F4E Suppliers that can be set up when a F4E supplier has to implemented CAD design works.

The ENOVIA database is the reference CAD database for the ITER project, the design collaboration scheme describes the CAD infrastructure set up required to allow the supplier to use CAD data in the ENOVIA database and to store the CAD data produced.

The ENOVIA database is located in ITER Site (Cadarache) and the CAD data can be accessed by suppliers using one of the following schemes of design collaboration:

i. Synchronous scheme in this case the supplier is connected directly to the ENOVIA database.
ii. Asynchronous scheme in this case the data is extracted from ENOVIA and provided to the supplier to be modified file based, to store the data in ENOVA a reintegration process is required.
iii. Scheduled scheme is similar to the asynchronous scheme but there are several reintegration cycles of the data during the execution of the CAD task.
iv. Multi-CAD in this scheme the usage of another software different than CATIA is allowed under certain conditions and the CAD data shall be finally stored in ENOVIA in CATIA format.

The following section of the CAD Manual describes the requirements of each of the possible scheme of design collaboration.

2.1 Synchronous Scheme of Design Collaboration

This section describes the Synchronous mode of design collaboration. In the synchronous scheme the supplier develops their CAD design activities directly connected to the ENOVIA database. The supplier will receive modifications rights for a specific set of CAD data in ENOVIA.

There are different ways to connect the suppliers to the ENOVIA database, the type of connection is agreed between F4E and the supplier at the beginning of the design task. The possibilities are the followings:

i. The supplier designer is working physically in IO site
ii. The supplier's DO is connected to ENOVIA using the Teradici, solution. In that case the supplier's designers are working in the supplier's DO site.
iii. The supplier's DO is connected to ENOVIA through a RDS connection to a virtual workstation. In that case the supplier's designers are working in the supplier's DO site.

In sections 2.1.1, 2.1.2 and 2.1.3 more details are given about the Teradici and RDS connections to ENOVIA. Depending on how the technology evolves in the future other different ways of remote connections could be proposed.

Once the connection to the ENOVIA data base is set up using one of the technologies mentioned above the transfer of CAD data between IO, F4E and supplier is based in the transfer of ownership of the CAD data. The ownership in ENOVIA defines who has the rights to modify the CAD data. To keep traceability of the transfer of CAD data the DET process is used, a detailed description of the DET process is given in section 15 of this F4E CAD Manual. The figure 1 illustrate the flow of CAD data based in the transfer of ownership and controlled using the DET process.

The designers working in synchronous scheme of design collaboration shall follow a specific training and certification on ITER specific CATIA/ENOVIA methodologies. Once the designer has passed the certification he/she will be granted with specific ENOVIA role allowing modifying data in ENOVIA.

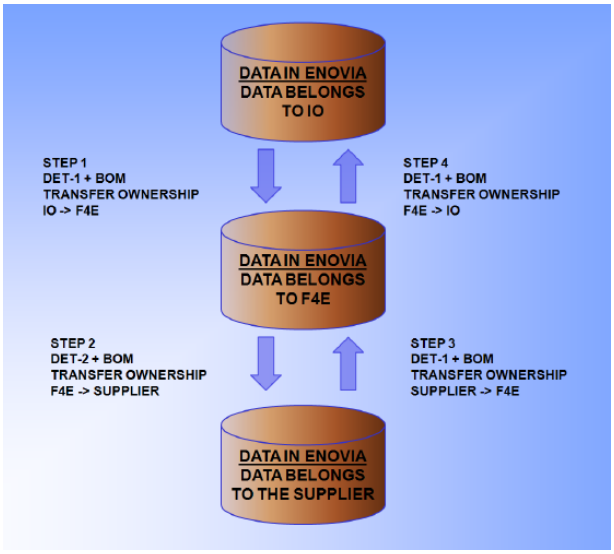


Figure 1 CAD Data Exchange process Synchronous Scheme

In each step of the process the data transferred is specified in the BOM (Bill of Models) which is an Excel file listing the entire CAD data transferred, the BOM is used as part of the DET process.

2.1.1 Connection in IO Site

If the supplier will be performing the CAD design tasks directly on IO site, the designer shall be equipped with a CAD workstation provided by the IO. In the contract it shall be specified if F4E or the supplier shall request the CAD workstation to IO and who shall pay the monthly fee for the usage of the CAD workstation to IO.

The supplier shall provide to F4E with a complete set of ENOVIA/CATIA licenses for each designer working in IO site. If the production of CAD data includes CATIA Equipment and System the Supplier shall provide the proper CATIA license.

2.1.2 Teradici Solution

This section describes the infrastructure to be set up for the usage of the Teradici solution in the synchronous scheme of design collaboration.

The direct connection with the IO ENOVIA Database is done using a Teradici Zero Client which is installed at F4E supplier premises. This device is connected through Internet to a CAD workstation which is belonging to the IO network in Cadarache having installed CATIA and ENOVIA. The designer in the supplier's site has to plug a keyboard, mouse and screen to control the CAD workstation located in ITER site. See image below to better understand how the connection is setup.

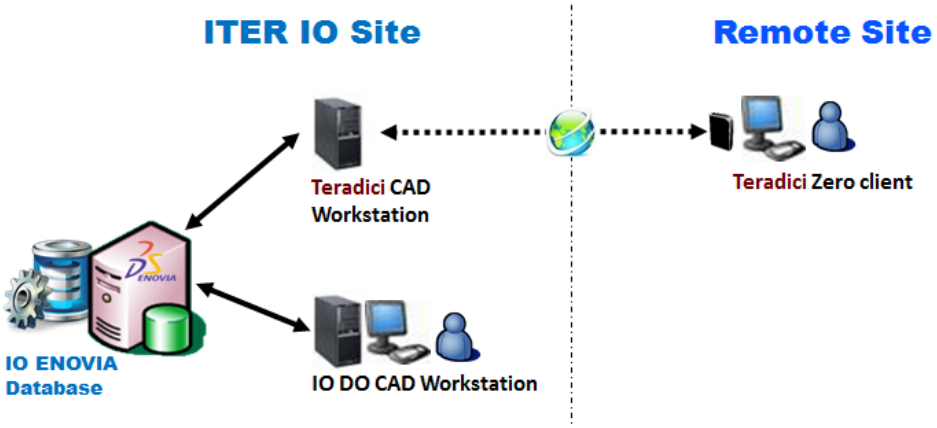


Figure 2 Teradici solution connections

The supplier working according to the synchronous scheme of CAD design collaboration shall use Teradici PcoIP technology solution (https://www.teradici.com) and fulfil the following requirements:

- Hardware requirements: USB Mouse & keyboard, Display, Network cable with RJ45 connector and Power Cord.
- Network requirements on Supplier side shall be: 4MB/s internet line per machine, Maximum latency is 150ms, TCP/UDP ports required for PcoIP technology (TCP: 4172, UDP: 4172), Public IP address for the Teradici Zero Client connection has to be communicated to ITER IO: Connection through ITER IO Firewall will then be granted. It is highly recommended the supplier use a separate Internet connection line for the Teradici to avoid affecting the performance of the solution due to the workload in the network traffic.
- The Supplier shall provide to F4E a complete set of ENOVIA + CATIA licenses which will reside at the IO in Cadarache per designer. If the production of CAD data includes CATIA Equipment & System the Supplier shall provide the proper CATIA license.

IO will provide the following resources in the setup of the connection:

i. Workstation including the Teradici host card, hosted at IO site in Cadarache,
ii. The operating system,
iii. Microsoft Office & Skype for Business,
iv. Antivirus software,
v. Screen recording software,
vi. CAD software installation, maintenance and support according to IO standards and settings(e.g. CATIA V5, ENOVIA V5 without license files),
vii. File transfer. File transfer from and to the hosted workstation will be done via a file transfer relay at IO site,
viii. No backup for user data on the workstation will be provided. Under request a folder per user could be provided in a specific serve with backup service,
ix. Restrictions:
    - User will not be able to browse websites on Internet (limited access to intranet e.g. IDM will be granted).
    - There will be no email capability on the hosted workstation.
    - Administrator privileges will not be granted.
    - For maintenance reasons all workstations may be rebooted and maintained once per day for up to 2 hours. The timing will be optimized to avoid working hours at the remote site (7:00 am – 7:00 pm local time at remote site).

2.1.3 RDS Connection

This section describes the infrastructure that enables the direct connection to ENOVIA using a RDS connection. For this connection the supplier on remote site requires a computer connected to internet, IO provides access to a Remote Desktop in a virtual workstation connected to the IO network and with CATIA and ENOVIA installed.

The access to the Remote Desktop is granted by the IO DO using two different credentials, the firewall account credentials and the ITER user account credential. F4E will request the two needed credentials and the setup of the connection. Each designer will be notified with the two credentials (user and password) and a specific How-To presentation explaining how to connect.

The quality on the Internet connection in the remote computer in terms of bandwidth and latency shall be checked before setting up the connection.

The Supplier shall provide to F4E a complete set of ENOVIA + CATIA licenses which will reside at the IO in Cadarache per designer. If the production of CAD data includes CATIA Equipment & System the Supplier shall provide the proper CATIA license.

2.2 Asynchronous Scheme of Design Collaboration

This section describes the different steps of the process of design collaboration in an asynchronous mode. The design work is based on CAD data in the ENOVIA database at the start of the work, these CAD data are transferred to a supplier that carries out the design work, and finally the CAD data are reintegrated back to ENOVIA.

The process collaboration process starts by IO DO identifying the CAD data to be used for a specific CAD task, the CAD data are classified in two types: contextual CAD data (defining the environment) and design CAD data (data to be modified by the supplier). The data collected by the IO DO is provided to F4E, the CAD data exchange process is controlled and identified using the DET process; the details of the process are given in the section 15 of this CAD manual. Each DET is including:

- DET form describing the purpose of the exchange and details of the actors and data exchanged.
- In the case of DET for design data a BOM Excel file is included listing the CAD files in the CAD data exchange process.
- A Zip file containing the CAD data package exchanged.

The DETs (contextual and design) received by F4E are checked and transferred to the suppliers to implement the modifications. Once the modifications have been performed by the supplier; the supplier will have to return the CAD data provided as design data and the BOM identifying the changes performed according the DET process detailed in section 15 of this CAD manual.

The data received from the supplier are checked by F4E, reintegrated in the ENOVIA database and provided to the IO.

The image below shows the different exchange of CAD data between IO, F4E and Supplier.

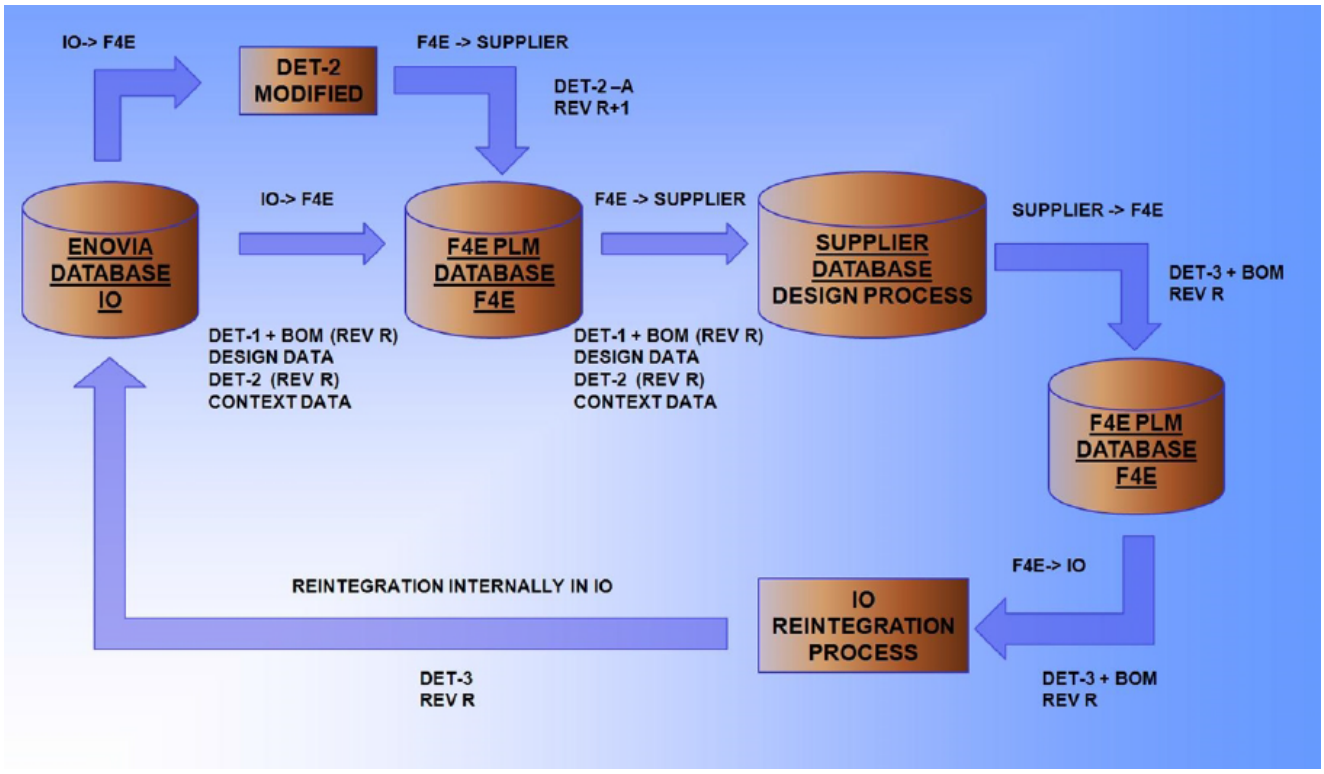


Figure 3 CAD Data Exchange process Asynchronous Scheme

The suppliers working in asynchronous can follow a specific training on ITER CAD methodologies, this training is not compulsory but highly recommended.

2.2.1 Infrastructure Requirements

This section explains the infrastructure needed on supplier side to work in an asynchronous scheme of design collaboration.

The CAD data are generated and modified using the CATIA release specified by the IO. The exact current ITER release is stated in the section 4.1 of this CAD Manual.

The supplier shall have in his site the number of CAD WS needed to perform the tasks, equipped with the CATIA license according to the task to be performed. In case of mechanical design task the CATIA license shall allow access to the CATIA mechanical workbenches, in case of plant design task the CATIA license shall allow access to the CATIA equipment and systems workbenches.

The language environment of CATIA V5 and the operating system must be English otherwise the behaviour of the software can be different from the IO DO installation.

The supplier shall install the most recent ITER CAD Supplier Package and if necessary the Equipment and Systems related extensions shall be downloaded and installed, the installation of this CAD package will provide the following:

i. Definition of the ITER CATSettings for mechanical and/or Equipment & Systems for plant design.
ii. Definition of the ITER drafting standard for ITER and/or ITER_Plant.
iii. Access to the ITER properties panel.
iv. Access to the FTB manager for drawing frame and title block.
v. Access to the ITER Equipment & Systems catalogues.
vi. Access to the ITER CATIA Material library.

The current ITER CAD Supplier Package can be downloaded from here:

ITER_D_Y2D4NB - 02 ITER CAD supplier package

The instructions on how to install it can be downloaded from here:

ITER_D_QQQLRG - 01_ITER_CAD_Supplier_Package_Readme_First_PDF

ITER_D_9GFQWP - 01_ITER_CAD_Supplier_Package_Readme_First_AVI

In case the supplier has to perform some CAD design task involving the usage of Equipment and Systems the following extension of the ITER CAD Supplier package shall be installed:

ITER_D_9G4CJB - 04 EnS Add-on Design Usage

The instructions on how to install the EnS Add-on extension can be found in the following document:

ITER_D_9GFD4P - 03 EnS Add-on Documentation

If the supplier has no access to the documents referred above they will be provided by the F4E DO.

The F4E DO will inform the supplier about changes in the CATIA release and ITER CAD Supplier Packages with time in advance to allow the supplier to prepare for the migration to the new CATIA release.

2.3 Schedule Scheme of Design Collaboration

This section describes the schedule scheme of design collaboration which is a variation of the asynchronous scheme of design collaboration. If in the asynchronous of design collaboration the cycle followed by the CAD data is from IO to F4E, from F4E to supplier, from supplier to F4E and finally the data is reintegrated back to the ENOVIA data base as shown in Figure 3, in the schedule scheme of design collaboration this cycle is followed with an agreed frequency.

It is important to remark that when the supplier has sent the CAD data back to F4E to reintegrate the CAD data in ENOVIA. The supplier shall stop working in the CAD data sent for reintegration and when the supplier will receive again the CAD data sent by F4E after the reintegration, the supplier shall replace the original CAD data for the new CAD data received and restart the work from there.

2.3.1 Infrastructure Requirements

The infrastructure required to setup the scheduled scheme of design collaboration is the same than for the asynchronous scheme of design collaboration and detailed in section 2.2.2 of this CAD Manual.

2.4 Usage of Multi-CAD by Suppliers

In the case of a design task involving a supplier not equipped with the ITER official CAD system, subject to prior agreement with F4E, the use of Multi-CAD may be permitted, providing that the supplier complies with the following F4E requirements:

i. The supplier shall exchange with F4E the 3D CAD data and 2D drawings relevant for the control of design and associated interfaces in the CATIA version indicated in the section 4.1 of this manual.
ii. The supplier shall be responsible for the consistency and accuracy of the geometry conversion from the originating CAD system to the CATIA V5 data sent to F4E.
iii. The supplier shall be responsible for ensuring the consistency and accuracy between the 3D CAD data and the 2D drawings generated from these 3D data.
iv. The supplier shall be responsible to ensure that the CAD data can be used for downstream applications like drawing generation without limitation. (Both native CATIA V5 and PDF files will be generated).
v. F4E will provide to the supplier the constraints linked to the quality checker tool.
vi. The supplier shall provide, when exporting data to F4E, the 3D CAD data structure, including associated ITER attributes and values, identical to those exported by F4E down to the Work-Package nodes (inclusion of converted models in a CATIA Product structure). The Work-Package nodes will be identified in the data exchange Bill of Material (BOM) provided by F4E when exporting the models to the supplier.
vii. The identification of models and drawings shall comply with the ITER CAD numbering system, to allow traceability and the history of objects modified or modelled.
viii. F4E will provide if needed specific checking procedures applied to Protection Important Components (PIC) and configuration DMU models.

The methodology to ensure the consistency between the CAD data created in the original software and the CAD data exchanged in CATIA format shall be agreed before starting the CAD design activities.

The exchange of CAD data will follow the same scheme than for asynchronous scheme of design collaboration, unless it has been agreed differently between IO, F4E and Suppliers.

3 Design Collaboration Scheme. Diagram Data

It is important to highlight the difference between 2D drawings and 2D schematic diagrams. The 2D drawings are made from the 3D mock-up. The 2D schematics are functional diagrams. A diagram is a conceptual view of one system without scale and dimensions.

To produce ITER schematic diagrams, several users need to be able to work in concurrent engineering design on the same or different type of document. It is challenging to design, maintain, and describe the ITER installation and processes; it requires the use of a unique database interconnected to different types/discipline of diagrams.

For plant functional design, system diagrams such as block diagrams, one line diagrams, Process Flow Diagrams etc. are commonly used. Diagrams are created from a predefined set of symbols, defined in the project, and respect a standard graphical representation.

In the ITER project the following types of diagrams are used to define the system at different level of detail for each discipline:

i. Process Flow Diagram
ii. Piping and Instrumentation Diagram
iii. One Line Diagram
iv. Cabling Diagram
v. Wiring Diagram

The authoring tools in the ITER project to create these diagrams are See System Design (SSD) and See Electrical Expert (SXP). The following sections describe the requirements for the usage of these tools in the ITER project.

3.1 Connection to SSD Application

SSD (IGE-XAO editor) is the integrated tool that IO, DA and suppliers shall use when creating diagrams. The tool is provided and maintained by the ITER IO. Different user profiles are recognized by the tool, granting for each profile different access rights: application administrators, designers and viewers.

The major software functions are:

i. To create schematic diagrams.
ii. To manage technical and other pieces of information dynamically associated with the schematics and save them in the database.
iii. To produce reports, extract data, create part lists or search for items, etc.
iv. To check design consistency (fluid flow direction, component orientation, etc.).
v. To identify and link interfaces with other systems/disciplines.

The diagrams are stored in a centralized SSD database.

The access to SSD is granted through web remote access, each user is provided with specific user and password to access SSD after having passed a compulsory SSD training and certification.

If the design requires the use of network elements, their representations (PFD and P&ID fluids diagrams), shall be executed through a remote connection to the IGE+XAO SEE System Design licenses and ITER IO database. If the Supplier has to create PFD and P&ID fluids and/or electrical circuits' diagrams, it is mandatory to use the remote connection to the IGE+XAO SEE System Design licenses and ITER IO database.

The following document explains how to connect to the SSD tool and main principles on how to use the tool:

ITER_D_R7SAGV - 1 - How to use SSD

3.2 See Electrical Expert Usage

SEE Electrical Expert is an application which is used in ITER context for detailed electrical design of cubicles (wiring diagrams, layout design). SEE Electrical Expert is the official ITER tool for the first design and future modification of the cubicles during ITER life. SEE Electrical Expert is mandatory to be use for any cubicle partially or entirely design for

ITER needs which include any specific wiring and choice of sub-components. Is not required to be defined with SEE Electrical Expert:

i. Any cubicle sold as an out-of- the-box complete and ready to use product, with a unique commercial reference, present in a public catalogue and proven to have already been use by several different customers (for example : a General purpose Medium voltage AC drive).

ii. Any cubicle sub components or basic unit equipment such as a signal acquisition module. These sub components shall nevertheless be represented on the macro equipment drawing to be performed with SEE Electrical Expert. These sub-components are most often recovered from the extensive built-in commercial catalogue provided with the software (More than 500.000 references in catalogue from ABB, Entrelec, Legrand, MURRelektronik, Moeller Electric, Rockwell Allen Bradley, Sarel, Schneider Electric, Siemens, Socomec and Wago…)

SEE Electrical Expert is off-the-shelf usable software which is IEC standard compliant.

The collaborators to the ITER project shall install the SEE Electrical Expert Software, purchase the needed licenses and train their designers. ITER-IO will provide a specific environment (set up) of SEE Electrical Expert allowing the respect of the ITER wiring diagram rules (numbering of wires and diagram layout standardization). In the section 4.4 of this manual See Electrical Expert environment are available.

4 Software Enablers

This section establishes the exact version of the different pieces of ITER official CAD software tools.

4.1 ITER CAD Official Version CATIA and ENOVIA

The current official software releases for CATIA and ENOVIA are Version 5 Release 2018 Service Pack 2 as indicated in the ITER CAD Manual 07 - CAD Fact Sheet.

ITER_D_249WUL - CAD Manual 07 - CAD Fact Sheet

The F4E supplier shall follow further changes of CATIA release. The changes will be announced officially to F4E suppliers by the F4E DO Head.

4.2 Auxiliary Tools

In the ITER project there are some auxiliary tools used to perform specific tasks:

i. Q-checker is specific software integrated in CATIA which allows the CAD designer to verify if the CAD data is compliant with the main CAD Manual rules.
ii. CADENAS is software needed to access the CATIA library for mechanical standard parts.

The exact versions of this auxiliary software, the requirements to use them and the instructions on how to use them are detailed in the following sections.

4.2.1 Q-Checker

The current version of Q-Checker is Version 5.6.3 possible evolution of the version will be communicated by the F4E DO head. The supplier shall follow the possible evolution of the Q-Checker version.

The supplier shall purchase the required Q-Checker license, it is recommended to buy shareable license as Q-Checker is not software the CAD designer supposed to use in a daily base.

If the CAD task is performed using the synchronous mode the Q-Checker license shall be provided to IO to be installed in the IO license server.

IO shall provide the Q-Checker profiles needed to perform the required test according to the CAD Manual.

If the CAD task is performed in asynchronous mode instructions shall be provided by F4E on how to install the IO Q-Checker profiles.

The current IO Q-Checker profiles are named IO_PROFILE_3.0.0 and it can be found as an attachment in the following link:

ITER_D_2SSUXZ - Q-Checker IO_PROFILE_3.0.0

The Q-Checker profile can evolve during the CAD task execution allowing a more automated checking of the CAD data, F4E DO will inform about any evolution in the IO Q-Checker profiles to be used.

The following document explains how to use Q-Checker:

ITER_D_3PESLN - How to use Q-Checker

4.2.2 CADENAS

The current CADENAS version is Version 10.0 Build 144072 possible evolution of the version will be communicated by the F4E DO head. The supplier shall follow the possible evolution of the CADENAS version.

If the CAD task is performed using the synchronous mode the CADENAS license shall be provided to IO to be installed in the IO license server.

The following documents explain how to use CADENAS in the synchronous scheme of design collaboration:

ITER_D_35ZJ6Y - How To - CADENAS

In the case of the asynchronous or schedule scheme of design collaboration specific process shall be followed to connect to CADENAS, the process is explained in the following document:

ITER_D_342DV4 - How To - CADENAS For File Based Users (RDSFX)

4.3 See System Design

The ITER IO will manage the maintenance and access to See System Design. Any evolution in the version used will be managed by the ITER IO. The ITER IO will inform on any evolution on the version software used including description of new functionalities.

4.4 See Electrical Expert

The current official software versions for See Electrical Expert in the ITER Project are V4R3 and V4 R2, possible evolution of the current version will be announced by the F4E DO head.

To properly configure See Electrical Expert for the usage in the ITER project one of the following environment shall be installed according to the software version:

ITER_D_XGQ9E6 - ITER Environment for See Electrical Expert - V4R2

ITER_D_2F9LY4 - ITER Environment for See Electrical Expert - V4R3

5 CAD Data Structuring

This section of the CAD Manual describes the CAD data structuring processes and methodologies common for mechanical and plant design and for CAD tasks performed using the synchronous, asynchronous or scheduled scheme of design collaboration.

This section defines rules for the following topics when creating or modifying CAD data in the ITER project:

i. Naming and writing conventions.
ii. Forbidden colors.
iii. Forbidden functions.
iv. General rules for modelling.
v. Assembly definition rules.
vi. Sketcher.
vii. Standard parts.
viii. General rules for drawings.
ix. Properties and attributes.
x. Geometrical representation.
xi. Design quality.
xii. Logbook.
xiii. Design work when working file based (asynchronous mode).

The following table contains an overview of the rules:

Categories: M = Mandatory (Shall comply) R = Recommended (Should comply)						
Topic	**Rule No.**	**Rule Description**	**Category**	**Q-Checker Rule**	**EV5/FB**	**IO CAD Manual Section**
General	**RDS01**	Consult the complementary CAD Design Handbooks (3URXHL) for PBS specificities.	M		EV5/FB	**4.2.5**
Writing and naming conventions	**RDS02**	The language used by ITER is English.	M		EV5/FB	**4.2.6.1**
	RDS03	The part name used should clearly and concisely describe the part.	M		EV5/FB	**4.2.6.1**
	RDS04	Part names are limited to 35 characters.	M	IO_PART_02, IO_Pro_401	EV5/FB	**4.2.6.1**
	RDS05	The first preference for the naming of objects in CATIA and ENOVIA is to use the full names – full words and no abbreviations. GRAVITY SUPPORT instead of GS.	M		EV5/FB	**4.2.6.1**
	RDS06	The second preference for the naming of objects in CATIA and ENOVIA is to use a combination of full words and abbreviations.	M		EV5/FB	**4.2.6.1**
	RDS07	Only abbreviations included in the ITER abbreviations list are permitted.	M		EV5/FB	**4.2.6.1**
	RDS08	All part design bodies and open bodies must have speaking names. FLANGE instead of Body.21.	M		EV5/FB	**4.2.6.1**

Categories: M = Mandatory (Shall comply) R = Recommended (Should comply)						
Topic	**Rule No.**	**Rule Description**	**Category**	**Q-Checker Rule**	**EV5/FB**	**IO CAD Manual Section**
	RDS09	Important geometrical elements, features and sets should have speaking names.	M		EV5/FB	**4.2.6.1**
	RDS10	Published element names shall start with 3D, 2D or letters. Length shall be between 4 and 60 characters. Letters, underscore, space, parenthesis, number, dot, minus, + or = symbols are allowed.	M	IO_PUB_1	EV5/FB	**4.2.6.1**
	RDS11	Forbidden publication name: "Plane.X", etc. Publication names generated by EnS modules of CATIA are kept unchanged.	M	IO_PUB_1	EV5/FB	**4.2.6.1**
Writing and naming conventions	**RDS12**	The following characters ONLY are permitted to be used: Upper A to Z, a – z. Numbers 0 to 9, Dot ., Equal =, Minus sign –, Plus sign +, Underscore _, Blank. It is not permitted to use national accented characters or characters other than the Roman alphabet. (E.g. Cyrillic, Kanji, Hangul etc.) Except for supplier manufacturing drawings in specific cases.	M	IO_PART_02,03, IO_Pro_401	EV5/FB	**4.2.6.2**
Forbidden functions	**RDS13**	Do not use forbidden colors (Red, orange, khaki green)	M	IO_COL		**4.2.7**
	RDS14	Inside a Work package (WP) the following functions are forbidden in ASSEMBLY DESIGN: ASSEMBLY FEATURES (except for STEEL STRUCTURE DESIGN and REUSE PATTERN) SYMMETRY, COMPONENTS/NEW COMPONENT (except for CGR files) WELD DESIGN Workbench.	M		EV5/FB	**4.2.8**
	RDS15	For structure exposed assemblies all kind of applications and assembly features are forbidden.	M	IO_Pro_404	EV5	**4.2.8**
General modelling rules	**RDS16**	CATPart, CATProduct, and CATDrawing must be updated.	M	IO_Pro_403	EV5/FB	**Table 4.2-2**
	RDS17	No broken links inside assemblies, to skeleton or from drawing views to 3D.	M	IO_Pro_405	EV5/FB	**Table 4.2-2**

Categories: M = Mandatory (Shall comply) R = Recommended (Should comply)						
Topic	**Rule No.**	**Rule Description**	**Category**	**Q-Checker Rule**	**EV5/FB**	**IO CAD Manual Section**
	RDS18	No context/import links (except Secondary Structure, Flexibles in Conduit design and Electrical Harness).	M		EV5/FB	**Table 4.2-2**
	RDS19	For a 3D EV5 document, the maximum file size should be 80Mb.	R	IO_MAX_Maximum Document File Size	EV5/FB	**4.2.9**
	RDS20	Publication name shall match published element name.	M	IO_PUB_2	EV5/FB	**Table 4.2-2**
	RDS21	Publication must be synchronized and resolved.	M	IO_PUB_4	EV5/FB	**Table 4.2-2**
	RDS22	Publications shall follow naming & writing conventions.	M	IO_PUB_1	EV5/FB	**4.2.6**
	RDS23	Part version & document revision only 3 characters: dash or letter.	M	IO_REV	EV5/FB	
	RDS24	Elements shall follow naming & writing conventions.	M	IO_PART_003	EV5/FB	**4.2.6.2**
General modelling rules	**RDS25**	If an alternative design in parallel to the reference design, a variant (slightly different part), or a part based on a parametric part from the ITER catalogue have to be made, the specific methodology described in ITER_D_33CPWB - How To Create New Part Filebase Using Existing Ones Extracted From ENOVIA shall be used.	M		FB	**4.2.20**
Sketcher	**RDS26**	Sketch should be fully constrained for normal part.	R		EV5/FB	**4.2.11**
	RDS27	For skeleton part sketch shall be fully constrained.	M	IO_SKE_201	EV5/FB	**4.2.11**
	RDS28	No contour directly (implicit) linked to sketch origin, use constraints instead.	R		EV5/FB	**4.2.11**
	RDS29	Minimize the number of entities inside a sketch.	M			**4.2.11**
	RDS30	Sketches must be created without superposition & discontinuity (use Sketch analysis).	M		EV5/FB	**4.2.11**
	RDS31	Do not apply colours on contour inside a sketch, if needed, apply colours on 3D.	M		EV5/FB	**4.2.11**
	RDS32	No empty sketch should remain in the CATPart.	M	IO_PART_008	EV5/FB	**Table 4.2-2**
CATIA Specification tree	**RDS33**	Do not use Hybrid Bodies for better management & sharing the same working standard.	R	IO_PART_014	EV5/FB	**Table 4.2-2**

Categories: M = Mandatory (Shall comply) R = Recommended (Should comply)						
Topic	**Rule No.**	**Rule Description**	**Category**	**Q-Checker Rule**	**EV5/FB**	**IO CAD Manual Section**
	RDS34	All Bodies  have to be in Show.	M	IO_PART_005_ter	EV5/FB	**Table 4.2-2**
	RDS35	All Solid Features have to be in Show.	M	IO_PART_005_ter	EV5/FB	**Table 4.2-2**
	RDS36	All Sketches under Solid Feature shall be hidden.	M	IO_PART_005_ter	EV5/FB	**Table 4.2-2**
	RDS37	A maximum of 50 bodies inside a CATPart is recommended.	R	IO_PART_005_ter	EV5/FB	**Table 4.2-2**
	RDS38	The current active object has to be the Part Body before promotion.	M	IO_PART_004	EV5/FB	**Table 4.2-2**
	RDS39	No empty Body.	M	IO_PART_009	EV5/FB	**Table 4.2-2**
	RDS40	No unused elements remaining.	M	IO_PART_010	EV5/FB	**Table 4.2-2**
CATIA Specification tree	**RDS41**	No inactive or disconnected features or operations in specifications tree for 3D modelling.	M	IO_PART_007	EV5/FB	**Table 4.2-2**
	RDS42	No inactive features or operations in specifications tree for skeleton.	R	IO_Ske_203	EV5/FB	
	RDS43	No children on Dress-up features (no geometry base on Filleted, Drafted or Chamfered faces and edges).	R	IO_PART_006	EV5/FB	**Table 4.2-2**
	RDS44	Surface only allowed in Geometrical Set.	M	IO_PART_012	EV5/FB	**Table 4.2-2**
Assemblies management	**RDS45**	No unresolved assembly constraints.	M	IO_CST	EV5/FB	**Table 4.2-2**
	RDS46	Use the File+Desk function to check assembly links.	R		EV5/FB	**Table 4.2-2**
	RDS47	Structure the assemblies from global to detail.	R		EV5/FB	**4.2.10.1**
	RDS48	Part positioning from detail to global.	R		EV5/FB	**4.2.10.2**
	RDS49	Each part or assembly has to be ISO constrained with 0 degree of freedom **OR** the minimum of constraints has to be “Fix”.	M		EV5/FB	**4.2.10.3**
	RDS50	Mechanical standard parts shall be placed with CADENAS application.	M		EV5/FB	**4.2.12**
Drawings	**RDS51**	DRW name shall follow naming convention.	M	IO_DRW_607	EV5/FB	**4.2.6**
	RDS52	Check title block is well filled & updated: attributes, sheet scale.	M	IO_DRW_612	EV5/FB	**4.2.13.8**
	RDS53	Do not isolate views.	M	IO_DRW_605	EV5/FB	
	RDS54	Do not lock views.	M	IO_DRW_606	EV5/FB	
	RDS55	Do not create or use fake dimensions.	M	IO_DRW_608	EV5/FB	**4.2.13.12**
	RDS56	MODIFICATION_SHEET must exist.	M	IO_DRW_611	EV5/FB	**4.2.13.7**
	RDS57	Sheet format must be respected.	M	IO_DRW_610	EV5/FB	**4.2.13.6**

Categories: M = Mandatory (Shall comply) R = Recommended (Should comply)						
Topic	**Rule No.**	**Rule Description**	**Category**	**Q-Checker Rule**	**EV5/FB**	**IO CAD Manual Section**
	RDS58	Sheet name shall follow naming convention	M	IO_DRW_601	EV5/FB	**4.2.13.7**
	RDS59	Keep the best associativity between DRW & 3D with "Overload properties" or “Scene” function.	M		EV5/FB	
	RDS60	Generate as few manual 2D entities with interactive drafting (line etc.) as possible.	R		EV5/FB	
	RDS61	The Drawing must be linked to the correct 3D document, 1 CATProduct or 1 CATPart (Edit/link).	M		EV5/FB	**4.2.13.9**
Drawings	**RDS62**	View name must Start with letter It should use letters, number, +, -, =, parenthesis, bracket, dot, underscore & space.	M	IO_DRW_602	EV5/FB	
	RDS63	Only one modification sheet allowed.	M	IO_DRW_603	EV5/FB	**4.2.13.7**
	RDS64	Views without link are allowed for modification sheet or comment.		IO_DRW_604	EV5/FB	**4.2.13.10**
	RDS65	Views must be updated.	M		EV5/FB	
	RDS66	10 drawing sheets maximum (max size: 60Mb).	R	IO_MAX_Maximum CATDRW File Size	EV5/FB	
Properties / Attributes	**RDS67**	Fill all relevant properties/attributes.	M	IO_PRO_2	EV5/FB	**4.2.14**
	RDS68	In CATIA use only the ITER properties panel to fill the properties/attributes.	M		EV5/FB	**4.2.14**
	RDS69	Description of modification must be filled.	M		EV5/FB	**4.2.14**
	RDS70	Link to “Description Document”.	M		EV5/FB	**4.2.14**
	RDS71	Link to “Bill of Material”.	M		EV5/FB	**4.2.14**
Quality	**RDS72**	The default representation of design data is non-isolated elements with full feature history.	M	IO_PART_15	EV5/FB	**4.2.15**
	RDS73	Isolated solid or CGR representation can be used for special purpose like IP-protection, simplification and simulation result.	M		EV5/FB	**4.2.15.2**
	RDS74	Perform regularly light check.	M	IO_PART_005_bis	EV5/FB	**4.2.16**
	RDS75	Perform clash analysis.	M		EV5/FB	**4.2.16.1**
	RDS76	Use check list and/or Q-Checker.	M		EV5/FB	**4.2.16.3**
	RDS77	The CATDUA V5 utility must be performed without errors.	M	IO_DUA_CATDUAV5	EV5/FB	**4.2.16.5**
	RDS78	The CATIA Part number and the filename of new CV5 files must be identical.	M		FB	**4.2.20**

Categories: M = Mandatory (Shall comply) R = Recommended (Should comply)						
Topic	**Rule No.**	**Rule Description**	**Category**	**Q-Checker Rule**	**EV5/FB**	**IO CAD Manual Section**
	RDS79	If the CATIA Part number and the filename of **new** CV5 files are changed all kind of CV5 links must be maintained.	M		FB	**4.2.20**
	RDS80	For the same component (for example a standard part) on different location and usage (instances) only one reference including CATIA unique identifier shall be used.	M		FB	**4.2.20**
	RDS81	If standard parts are received from the IO and an additional instance is needed the same part must be used.	M		FB	**4.2.20**
Quality	**RDS82**	Concerning plant design using Equipment and systems workbenches, data delivered shall only use catalogue items and settings from the Equipment and systems supplier package.	M		FB	**4.2.20**
	RDS83	In case of missing Equipment and systems standard items, supplier will have to make a catalogue request ticket to get in contact with ITER catalogue team.	M		FB	**4.2.20**
	RDS84	All the data file-based should be located in the same folder, check this data management before sending.	M		FB	**4.2.20**
Design work performed by Suppliers using CV5 for File based work	**RDS85**	Use always the relevant (normally the most recent) set of data received from ITER.	M		FB	**4.2.20**
	RDS86	The filename and the CV5 part number of a document CATPart, CATProduct, CATDrawing **received from the IO must not be modified.**	M		FB	**4.2.20**
	RDS87	If you have sent new data to ITER, do not continue to work on this set of data in parallel. You have to wait for a new dataset from ITER containing ITER ID etc. Further changes have to be made with this new set of data received from ITER.	M		FB	**4.2.20**

Categories: M = Mandatory (Shall comply) R = Recommended (Should comply)						
Topic	**Rule No.**	**Rule Description**	**Category**	**Q-Checker Rule**	**EV5/FB**	**IO CAD Manual Section**
	RDS88	*Only the following links are allowed between CAD documents:* - CATProduct & CATpart - CATProduct & CATProduct - CCP links & CATPart to SKE and symmetrical part - CATDrawing & CATPart/CATProduct *ITER IO needs to synchronize links between:* - CATIA documents and Catalogues - CATIA documents and material libraries.	M		FB	**4.2.20**
	RDS89	For drawings, The ITER tool FTB manager has to be used to generate for each sheet a drawing frame and an ITER title block with default values. The proper values will be filled in after saving the drawings in Enovia. For new drawings the CV5 properties shall be modified using the ITER properties panel. For manufacturing drawings the supplier title block can be used.	M		FB	**4.2.22**

A detailed description of the different rules can be found in the following IO CAD Manual document:

ITER_D_34VSEC - CAD Manual 04-2 CAD Data Structuring

6 Mechanical Design Methodologies

This section describes modelling techniques to be applied when designing mechanical components. The main topics defined in this section are related to:

i. Modelling temperature.
ii. Choice of modelling methodology: Multi-Body versus Multi-Part.
iii. Axis System and Origin.
iv. Skeletons.
v. Positioning of Work-packages.
vi. Flexible positioning for different configurations.
vii. Definition of welded parts.

The following table contains an overview of the main rules:

Categories: M = Mandatory (Shall comply) R = Recommended (Should comply)						
Topic	**Rule No.**	**Rule Description**	**Category**	**Q-Checker Rule**	**EV5/FB**	**IO CAD Manual Section**
General Rules	**RCM01**	Consult the complementary CAD Design Handbooks (3URXHL) for PBS specificities.	M		EV5/FB	**4.3.5**
	RCM02	The RT for all modelling at ITER is 20°C (293K).	M		EV5/FB	**4.3.6**
	RCM03	Multi body is the recommended methodology for conceptual design, multi part for manufacturing design.	R		EV5/FB	**4.3.7**
	RCS01	Sketch has to be fully constrained.	M	IO_Ske_201	EV5/FB	**4.2**
	RCM04	Environment or context data must not been copied inside the CATPart of a specific component.	M		EV5/FB	**4.3.7.3**
	RCM05	The CATPart must only contain the geometry of the component itself and the necessary minimum of auxiliary geometry.	M		EV5/FB	**4.3.7.3**
	RCM06	The auxiliary geometry - for example interface geometry - can be linked to another part if this other part is a skeleton.	M		EV5/FB	**4.3.7.3**
Axis system and origin	**RCM07**	Mechanical components which are rotated around the z-axis of the Tokamak shall be designed according to XZ methodology.	M		EV5/FB	**4.3.8**
	RCM08	Other mechanical components can have specific local axis system.	M		EV5/FB	**4.3.8**
	RCM09	Standard parts have a local origin.	M		EV5/FB	**4.3.8**
	REA07	Each part or assembly has to be ISO constrained with 0 degree of freedom **OR** the minimum of constraints has to be “Fix”.	M		EV5/FB	**4.2**
Skeletons	**RCM10**	Skeleton methodology shall be used for interface management between mechanical systems and between mechanical and plant systems.	M		EV5/FB	**4.3.9**

Categories: M = Mandatory (Shall comply) R = Recommended (Should comply)						
Topic	**Rule No.**	**Rule Description**	**Category**	**Q-Checker Rule**	**EV5/FB**	**IO CAD Manual Section**
	RCM11	CSKE methodology can be used if it is considered as useful for a specific component.	R		EV5/FB	**4.3.9**
	RCM12	After transfer of design data from IO to DA, already existing CAD data based on skeleton methodology shall not be isolated without agreement of the IO DECO.	M		EV5/FB	**4.3.9**
	RCM13	Links between CATPart are only allowed if the reference geometry is inside a SKE part, or between the symmetrical part and the original part.	M		EV5/FB	**4.3.9**
	RCM14	Only CCP (CATIA Copy Paste) type of link shall be used.	M		EV5/FB	**4.3.9**
	RCP09	No inactive features or operations in specifications tree for Skeleton.	R	IO_Ske_203	EV5/FB	**4.2**
	RCM15	All elements in a skeleton used for links must be published on the part level.	M		EV5/FB	**4.3.9**
	RCM16	Publication name must match published element name.	M	IO_PUB_2	EV5/FB	**4.3.9**
	RCM17	Do not use more than 100 publications per skeleton.	R		EV5/FB	**4.3.9**
	RCM18	Publication must be synchronized and resolved (check inside SKE & driven Parts, WP CATProducts).	M	IO_PUB_4	EV5/FB	**4.3.9**
	RCM19	The first level of skeleton is the RSKE which is controlled by IO and driven by physics.	M		EV5/FB	**4.3.9.1**
	RCM20	Lower level of CSKE is controlled by IO designers or DA/supplier designers. CSKE are driven by the 1st level Skeletons.	M		EV5/FB	**4.3.9.1**
	RCM21	If possible limit the hierarchy to 3 (RSKE-CSKE-COMP).	R		EV5/FB	**4.3.9.1**
	RCM22	To allow proper configuration management, the impact of changes of skeleton shall be limited to a minimum.	M		EV5/FB	**4.3.9.1**
	RCM23	Geometry should be used directly from the source skeleton.	M		EV5/FB	**4.3.9.1**
	RCM24	Republication of geometry in lower level skeleton originally defined in higher level skeleton should be avoided.	R		EV5/FB	**4.3.9.1**
	RCM25	Horizontal links, for example between RSKE of different PBS shall not be made.	M		EV5/FB	**4.3.9.1**
	RCM26	Do not make circular references / links between skeletons.	M		EV5/FB	**4.3.9.1**

Categories: M = Mandatory (Shall comply) R = Recommended (Should comply)						
Topic	**Rule No.**	**Rule Description**	**Category**	**Q-Checker Rule**	**EV5/FB**	**IO CAD Manual Section**
Skeletons	**RCM27**	For the RSKE-CSKE and the driven component the same modeling approach (XZ or common origin) shall be used. Repositioning of skeleton driven geometry in driven CATParts should be avoided.	R		EV5/FB	**4.3.9.2**
	RCM28	A RSKE contains only wireframe geometry – point, line, sketch…or parameters.	M		EV5/FB	**4.3.9.2**
	RCM29	A CSKE can be built with parameters, wireframe or solid geometry according to the needs.	R		EV5/FB	**4.3.9.2**
	RCM30	Respect writing convention for publications.	M	IO_PUB_1	EV5/FB	**4.3.9.3**
	RCM31	Interfaces between different mechanical PBS are covered by RSKE.	M		EV5/FB	**4.3.9.4**
	RCM32	Interfaces inside a mechanical system can be covered by CSKE.	M		EV5/FB	**4.3.9.4**
	RCM33	Interfaces between mechanical and plant component are handled by an ISKE on the mechanical and interface parts from catalogue.	M		EV5/FB	**4.3.9.4**
	RCM34	The PSKE is used to position at least the main components of the product structure with assembly constraints.	R		EV5/FB	**4.3.9.5**
	RCM35	The PSKE contains only elements like planes and lines to be used for assembly constraints.	M		EV5/FB	**4.3.9.5**
	RCM36	The elements inside a Work package used for positioning of the WP in the next higher structure exposed assembly must be published on the WP level.	M		EV5	**4.3.10**
	RCM37	The flexible PSKE can be used to handle different configurations in position for remote handling and assembly studies.	R		EV5/FB	**4.3.11**

A detailed description of the different rules can be found in the following IO CAD Manual document:

ITER_D_33XVW6 - CAD Manual 04-3 Mechanical Design Methodologies

According to the rules defined above, before starting the manufacturing design the CAD data shall follow the Multi-Part modelling methodology where each elementary part or assembly shall be represented in the CAD data by a CATPart or a CATProduct respectively. Before starting the manufacturing design the Supplier shall ensure that the CAD data is modified from Multibody models to Multipart.

7 Plant Design Process

This section describes modelling techniques to be applied by designers when performing plant design. The main topics defined in this section are related to:

i. Working in asynchronous scheme of design collaboration with plant design.
ii. Global ENOVIA structure.
iii. Plant design overview.
iv. Plant design detailed definition.
v. Links management in plant design.
vi. CAD Quality.
vii. Isometric drawings management.

The following table contains an overview of the main rules:

Categories: M = Mandatory (Shall comply) R = Recommended (Should comply)						
Topic	**Rule No.**	**Rule Description**	**Category**	**Q-Checker Rule**	**EV5/FB**	**IO CAD Manual Section**
General	**RP001**	Consult the complementary CAD Design Handbooks (3URXHL) for PBS specificities.	**M**		EV5/FB	**4.5.5**
	RP002	Follow the "Working ENOVIA based/File-based" rules according to your case.	**M**		EV5/FB	**4.5.6**
	RP003	Do not work File-based (FB) when an ENOVIA connection is available (IO or DA replication site).	**M**		EV5	**4.5.6.1**
	RP004	When no ENOVIA connection has been implemented (Meaning designers are working FB) make sure the CAD Supplier Package, the CAD EnS supplier Package and the IDSequenceNumber have been set up correctly.	**M**		FB	**4.5.6.2**
	RP005	Follow the Global ENOVIA structure, each system has to work in its own PBS, in the right SE and inside the correct WP.	**M**		EV5	**4.5.7**
	RP006	Follow the PRC origin definition.	**M**		EV5/FB	**4.5.7.1**
	RP007	Apply the Coordinate systems and positioning definition.	**M**		EV5/FB	**4.5.7.5**
	RP008	Native CV5 data format for the CM.	**M**		EV5	**4.5.6.3**
	RP009	Run the CATDUA on your data.	**M**		EV5/FB	**4.5.11.4**
	RP010	Do not forget to perform a 3D CAD quality check before promoting to draft.	**M**		EV5/FB	**4.5.11.4**
Positioning	**RP011**	The steel structure parts have their local origin at the intersection of the first (from south/west corner) structural column axis with the upper face of the floor slab of the building	**M**		EV5/FB	**4.5.7.1.3**
	RP012	The steel frame of a building has its origin at the centre of the first beam at the south west corner of the building on the upper floor slab.	**M**		EV5/FB	**4.5.7.1.3**
	RP013	SE and WP origins have to remain coincident with the PRC origin.	**M**	IO_PRO_407	EV5/FB	**4.5.7.5**

Categories: M = Mandatory (Shall comply) R = Recommended (Should comply)						
Topic	**Rule No.**	**Rule Description**	**Category**	**Q-Checker Rule**	**EV5/FB**	**IO CAD Manual Section**
	RP014	In the System PRC, as data is gathered from several PRC, the position of this data has to be carefully positioned according to the SITE_MASTER_SKELETON position.	**M**		EV5/FB	**4.5.7.5**
	RP015	Pay attention to the positioning of interfaces, as their WP are instantiated in different PRC their position have to be taken into account.	**R**		EV5/FB	**4.5.7.6.2.4**
Design	RP016	Unless specified otherwise, always use the "PRJ_ITR_EV5" PRM when connected to ENOVIA for EnS design and choose your discipline among: - Piping. - HVAC. - Electrical.	**M**		EV5	**4.5.8.6.4**
	RP017	For the usage of a specific catalog part like an isolating valve for vacuum, use the "PRJ_ITR_VAC_EV5" PRM.	**M**		EV5	**4.5.8.6.5**
	RP018	For tubing (meaning small pipes and instrumentation), use the "Piping Design" workbench and the "PRJ_TUBING_EV5" PRM.	**M**		EV5	**4.5.8.6.5**
	RP019	For contractors and sub-contractors working file-based and if CAD and CAD EnS supplier package have been installed, use the "PRJ_ITR_FB".	**M**		FB	**4.5.8.6.5**
	RP020	Use the appropriate methodologies for your system.	**M**		EV5/FB	**4.5.8.1**
	RP021	Use the appropriate workbenches for your system.	**M**		EV5/FB	**4.5.8.2**
	RP022	Follow the appropriate splitting rule.	**R**		EV5/FB	**4.5.7.9**
	RP023	Use the 2D-3D checker tool for comparison between SSD and CATIA.	**R**		EV5/FB	**4.5.8.5**
	RP024	In EnS master-slave connections based on connectors shall be used. Exceptions: - Equipment, that has to be constrained. - Secondary structure (CCP links preferred, CIP links authorized inside WP). - Flexibles made in "Conduit design" workbench (CIP links inside WP). - Harness design.	**M**		EV5/FB	**4.5.10.3**
	RP025	In EnS cross doc connections based on connectors shall be used. Exceptions: - Equipment, that has to be constrained. - Secondary structure (CCP links preferred, CIP links authorized inside WP). - Flexibles made in "Conduit design" workbench (CIP links inside WP). - Harness design.	**M**		EV5/FB	**4.5.10.6**
	RP026	Check the network connectivity using the Analyse: Network functionality.	**R**		EV5/FB	**4.5.10.5**
	RP027	Check the cross doc connection alignment status using the Analyse: Cross Doc Connection functionality.	**M**		EV5/FB	**4.5.10.6**

Categories: M = Mandatory (Shall comply) R = Recommended (Should comply)						
Topic	**Rule No.**	**Rule Description**	**Category**	**Q-Checker Rule**	**EV5/FB**	**IO CAD Manual Section**
	RP028	**WP instantiation is forbidden** in order to be able to give a unique functional reference to each component inside.	**M**		EV5/FB	**4.5.7.3**
Design	RP029	Select the corresponding LineID for your routing.	**R**		EV5/FB	**4.5.9.8.1**
	RP030	**Usage of Logical sets are forbidden**.	**M**		EV5/FB	**4.5.7.4**
	RP031	To allocate or reserve space for future routing or equipment use the “System Space Reservation” workbench.	**R**		EV5/FB	**4.5.9.6**
	RP032	After inserting a space reservation item, rename it to give it a meaningful name.	**M**		EV5/FB	**4.5.9.6**
Primary and Secondary structure	RP033	Primary structure for auxiliary buildings (all except Tokamak Complex, Hot Cell and Radwaste buildings) should be designed using the “Structure Detail Object Design” workbench.	**M**		EV5/FB	**4.5.9.4**
	RP034	Secondary structures are made using the SR1 “Structure Design” workbench.	**R**		EV5/FB	**4.5.9.5**
	RP035	Creation of Walkway & Platform secondary structure is made using the “HVAC” workbench.	**R**		EV5/FB	**4.5.9.5**
	RP036	To use secondary structure you have to feed the system with minimum inputs, only wireframe, meaning you have to create a dedicated skeleton to handle the secondary structure.	**M**		EV5/FB	**4.5.9.5**
Primary and Secondary structure	RP037	The dedicated skeleton must drive only secondary structure geometry and no other geometry.	**M**		EV5/FB	**4.5.9.5**
	RP038	The dedicated skeleton has to remain in the same WP as the secondary structure it is driving. In this case contextual links are allowed.	**M**		EV5/FB	**4.5.9.5**
	RP039	Do not create contextual links at SE level.	**M**		EV5/FB	**4.5.9.5**
	RP040	Secondary structures are parametric catalog parts.	**R**		EV5/FB	**4.5.9.5**
Equipment	RP041	The “Equipment Arrangement” workbench has to be used for Equipment insertion.	**M**		EV5/FB	**4.5.8.2**
	RP042	Use the “System Space Reservation” workbench to allocate or reserve space for equipment not existing in the catalog.	**M**		EV5/FB	**4.5.9.6**
Piping	RP043	Piping equipment has to be inserted from the catalog using the “Equipment Arrangement” workbench choosing the “Piping Discipline”.	**M**		EV5/FB	**4.5.8.2**
	RP044	The “Piping Design” workbench has to be used for pipe routing.	**M**		EV5/FB	**4.5.8.2**
Piping	RP045	Pipes are the last component to be placed on a run after tees, elbows, valves etc. Insulations are placed on Bendable pipes. Use the insulation management function if you want to see the insulation on the ISOMETRIC drawing.	**R**		EV5/FB	**4.5.9.8.2**

Categories: M = Mandatory (Shall comply) R = Recommended (Should comply)						
Topic	**Rule No.**	**Rule Description**	**Category**	**Q-Checker Rule**	**EV5/FB**	**IO CAD Manual Section**
	RP046	Supports are placed using the "Hanger Design" workbench.	**M**		EV5/FB	**4.5.7.6.2.3**
	RP047	Standard Copy/Paste is not allowed for runs and in-line parts. Use the dedicated EnS tool: "Copy/Paste 3D System".	**M**	IO_PRO_406	EV5/FB	**4.5.10.8**
HVAC	RP048	HVAC equipment has to be inserted from the catalog using the "Equipment Arrangement" workbench and choosing the HVAC discipline.	**M**		EV5/FB	**4.5.8.2**
	RP049	The "HVAC Design" workbench has to be used for HVAC routing.	**M**		EV5/FB	**4.5.8.2**
	RP035	Creation of Walkway & Platform secondary structures are made using the "HVAC" workbench.	**R**		EV5/FB	**4.5.9.5**
	RP050	HVAC Design is used for the trenches network.	**M**		EV5/FB	**4.5.9.9**
	RP051	HVAC Design is used for the bridges design.	**M**		EV5/FB	**4.5.9.10**
Electrical	RP052	Electrical equipment has to be inserted from the catalog using the "Equipment Arrangement" workbench choosing the Electrical discipline.	**M**		EV5/FB	**4.5.8.2**
	RP053	Overhead cables have to be created using the "Conduit Design" workbench.	**M**		EV5/FB	**4.5.8.2**
	RP054	Bus bars are designed using "System Routing" workbench where you will find a dedicated bus bar type (topline catalog stored file-based).	**M**		EV5/FB	**4.5.9.8.4.1**
	RP055	Cable trays are designed using "Raceway Design" Workbench.	**M**		EV5/FB	**4.5.9.8.4.2**
	RP056	Space reservation for maintenance has to be created using "System Space Reservation" workbench.	**M**		EV5/FB	**4.5.9.8.4.2**
Catalog usage	RP057	For details of how to use catalogs see: User Guide for Plant Design 3D catalogs (2NBUCZ).	**R**		EV5/FB	**4.5.9.7**
	RP058	You will find the catalog documentation here: PLANT Catalog Documentation (283AMM).	**R**		EV5/FB	**4.5.9.7**
	RP059	Do not create a file-based catalog.	**M**		EV5/FB	**4.5.8.6.7** **4.5.9.7.1**
	RP060	Do not use your own catalog.	**M**		EV5/FB	**4.5.8.6.7** **4.5.9.7.1**
	RP061	If you need a new Catalog part, make a 3D catalog ticket request. 3D Catalog Request Tickets (2FA2WP).	**R**		EV5/FB	**4.5.9.7.1**
Catalog usage	RP062	Standard catalog parts (door, plate with dimension, etc.) belong to the "Standard part" organisation. You are not allowed to modify them; you can only modify the Item Instance frame in the ITER properties panel to fill the functional reference.	**M**		EV5/FB	**4.5.9.7.2**
	RP063	Parametric catalog parts belong to your system and you get the ownership of this part, so you can modify it as needed. Use as much as possible the "Edit part" parameters.	**M**		EV5/FB	**4.5.9.7.3**

Categories: M = Mandatory (Shall comply) R = Recommended (Should comply)						
Topic	**Rule No.**	**Rule Description**	**Category**	**Q-Checker Rule**	**EV5/FB**	**IO CAD Manual Section**
	RP064	For contractors and subcontractors working file-based, you have to request and install the CAD supplier and the CAD EnS supplier packages to be able to use the ITER catalog.	**M**		FB	**4.5.6.2**
Openings, doors, supports and plates	**RP065**	The "Hanger Design" workbench has to be used to insert openings, supports, doors, plates, and penetrations.	**M**		EV5/FB	**4.5.8.2**
	RP066	Parametric parts (opening, plate with no dimension in the naming, etc.), once inserted, can be modified.	**R**		EV5/FB	**4.5.9.7.3**
	RP067	For openings follow the opening request process: CIVIL ENGINERING (42HW3A).	**M**		EV5/FB	**4.5.9.11.1**
	RP068	If wall penetration doesn't exist in the catalog, use the preliminary penetration to get localisation on the isometric drawing. The part is placed directly on the run.	**R**		EV5/FB	**4.5.9.11.2**
	RP069	Plates must be placed aligned with the concrete	**M**		EV5/FB	**4.5.9.11.3**
	RP070	Hangers have to be placed "On Object" selecting the run at the support location.	**R**		EV5/FB	**4.5.9.11.4**
	RP071	Hangers after their insertion have to be connected to a plate using the "Attach Support …" function.	**M**		EV5/FB	**4.5.9.11.4**
	RP072	In each door there is a publication named "Frame" that you have to use to create openings in the building. The publication has to be copied and pasted using the "paste special" and "Break link" command. No contextual link allowed.	**M**		EV5/FB	**4.5.9.11.5**
ITER attributes	**RP073**	Complete the item instance attributes which correspond to the Functional Reference.	**R**		EV5/FB	**4.5.8.4**
	RP074	Complete the ITER attributes according to the maturity of the design.	**M**		EV5/FB	**4.5.8.6.3**

A detailed description of the different rules can be found in the following IO CAD Manual document:

ITER_D_33PE8P - CAD Manual 04-5 Plant Design Processes

The designers working in synchronous scheme of design collaboration and performing plant design tasks shall follow a training and certification on specific Equipment and System ITER CAD methodologies. For designer working in asynchronous scheme of design collaboration the training is highly recommended but not compulsory.

8 Design Work Performed Out of ENOVIA

This section defines the specific CAD rules for the designer performing mechanical or plant design tasks in asynchronous or scheduled scheme of design collaboration.

All specific requirements defined in previous sections of this CAD Manual for the setup of the asynchronous and scheduled scheme of design collaboration shall be followed.

Summarizing the main rules and specific setup requirements are:

i. All the rules in previous sections shall be applied is they are applicable.
ii. ITER naming and writing conventions shall be used as defined in section 5 of this CAD Manual
iii. For the setup of the CAD infrastructure the following actions shall be performed:
    - The official CATIA release shall be installed.
    - The language environment for CATIA shall be set to English.
    - The ITER CAD supplier package shall be installed, including the Add-on for EnS in case of plant design.
iv. The filename and the CATIA V5 part number of a document CATPart, CATProduct or CATDrawing received from the IO must not be modified except for the cases described in the point below.
v. If an alternative design in parallel to the reference design, a variant (slightly different part), new part or a part based on a parametric part from the ITER catalogue have to be made a specific methodology described in the document below shall be used:

    ITER_D_33CPWB - How To Create New Part Filebase Using Existing Ones Extracted From ENOVIA

vi. The CATIA Partnumber and the filename of new CATIA V5 files must be identical.
vii. If the CATIA Partnumber and the filename of new CATIA V5 files are changed all kind of CATIA V5 links must be maintained.
viii. Forbidden functions shall not be used. In section 5 of this CAD Manual the list of forbidden functions can be found.
ix. For the same component (for example a standard part) on different location and usage (instances) only one reference including CATIA UUID shall be used.
x. If standard parts are received from the IO and an additional instance is needed the same part must be used.
xi. Concerning plant design using Equipment and systems workbenches, data delivered shall only use catalogue items and settings from the Equipment and systems supplier package.
xii. In case of missing Equipment and systems standard items, supplier will have to make a catalogue request ticket to get in contact with ITER catalogue team. 3D Catalog Request tickets depending on context, new items wished will be produced by supplier or IO but will in any case be published by IO through revision of the Equipment and systems supplier package.
xiii. For the modification of CATIA properties the ITER properties panel shall be used.
xiv. Modification of CATIA properties with CATIA standard function is not allowed.
xv. The following tasks must be carried out before saving the CATIA data:
    a. Unnecessary elements should be deleted especially environment data which is copied for temporary usage.
    b. Auxiliary geometry like wireframe, sketches, surfaces planes etc. must be hidden
    c. The last feature in a part design body or the whole body must be the “Defined In Work Object”
    d. The CATDUA utility must be applied with clean option.
    e. All the data file-based should be located in the same folder, check this data management before sending.
    f. The following links between CATIA documents or CATIA documents and other documents are allowed:
        i. Links between CATProduct and other CATProduct (subassemblies) or CATPart.
        ii. CCP links and links to parameters between CATPart - skeleton parts and driven parts, symmetrical parts.
        iii. Links between CATDrawing views and CATPart or CATProduct.
        iv. Links between CATIA documents and Catalogues synchronized with ITER IO.

v. Links between CATIA documents and material libraries synchronized with IO.

g. The following links between CATIA documents or CATIA documents and other documents are not allowed and must be isolated:
   i. Links between CATDrawing documents.
   ii. Links between CATPart without skeleton approach or non-symmetrical parts.
   iii. Links between CATIA documents and design table, local material libraries, local catalogues, knowledge ware rules etc.

h. Use always the relevant (normally the most recent) set of data received from ITER.

i. In schedule scheme of design collaboration if you have send new data to ITER, do not continue to work on this set of data in parallel. You have to wait for a new dataset from ITER containing ITER ID etc. Further changes have to be made with this new set of data received from ITER..

For the creation of new CATIA V5 CAD data files the standard functionality in CATIA shall be used.

The Work Package should be the default type of assembly created by the supplier. Using the ITER properties panel the value of the Assembly type attribute must be set to WP.

New Structure Exposed assemblies should be used only after contacting the F4E DECO because it should be an exception to make a new structure exposed assembly on the supplier side.

For the creation of drawings, the ITER tool FTB manager has to be used to generate for each sheet a drawing frame and an ITER title block with default values. The proper values will be filled in after saving the drawings in ENOVIA. For new drawings the CV5 properties shall be modified using the ITER properties panel.

The supplier shall use his own title block from the FTB manager. F4E shall take care to include supplier's title block in the FTB manager. The format of the title block shall be agreed between F4E and supplier.

The following How-To explains the steps to be followed to include a new title block in the FTB manager:

ITER_D_HQV46Z - How to prepare a Titleblock to implement in FTB Manager

9 Design Data Management

This section specifies the processes and rule for CAD data and lifecycle management in ENOVIA. The main topics described in this section are:

i. Data structuring in ENOVIA.
ii. New Data creation.
iii. ENOVIA attributes.
iv. Lifecycle of CAD data in ENOVIA.
v. Visibility management.
vi. Change management.
vii. Variant creation.
viii. Alternative creation.
ix. People and organization management.

The following table contain an overview of the main rules:

Categories: M = Mandatory (Shall comply) R = Recommended (Should comply)						
Topic	**Rule No.** 	**Rule Description**	**Category**	**Q-Checker Rule**	**EV5/FB**	**IO CAD Manual Section**
General	**RE01**	ENOVIA is the official CAD database for the ITER project. All parts, assemblies and drawings designed with CATIA shall be stored under ENOVIA.	M		EV5	**5.7**
	RE02	Fill in all relevant properties/attributes.	M	IO_PRO_2	EV5/FB	**5.6**
	RE03	In CATIA use only the ITER properties panel to fill-in the properties/attributes.	M		EV5/FB	**5.6**
	RE04	ENOVIA description instance attribute shall be filled-in as a minimum with the PBS values.	M		EV5	**5.8.2**
	RE05	Consult the complementary CAD Design Handbooks (3URXHL) for PBS specificities.	M		EV5/FB	**5.5**
Data Structuring	**RE06**	The tree structure of the PRC shall contain CAD data according to the purpose of the PRC.	M		EV5	**5.6.1**
	RE07	Only CATIA/ENOVIA support is allowed to create new PRC.	M		EV5	**5.6.1**
	RE08	1st Level of SE under the PRC is structured by PBS. For each PBS we define max 5 SE for CONFIG. CONTEXT, DM and AM.	M		EV5	**5.6.2**
	RE09	The selective load capability of SE assemblies in ENOVIA leads to SE assemblies in the higher levels of the product structure and Work Packages or part detail at the leaf level.	M		EV5	**5.6.2**
	RE10	Specific data like skeleton shall be located under dedicated nodes.	M		EV5	**5.6.2**
	RE11	Respect the characteristics of SE and WP to make the right choice for new assemblies.	M		EV5	**5.6.3**

Categories: M = Mandatory (Shall comply) R = Recommended (Should comply)						
Topic	**Rule No.**	**Rule Description**	**Category**	**Q-Checker Rule**	**EV5/FB**	**IO CAD Manual Section**
	RE12	Several ENOVIA instances of the same ENOVIA part reference are used for mechanical design systems to accelerate change management.	M		EV5	**5.6.3**
	RE13	The requirement of unique identification of plant equipment and civil engineering components like plates leads to the fact that all WP up to the leaf instance are unique references.	M		EV5	**5.6.3**
Drawings	**RE14**	A single part drawing shall be linked to the CATPart. A sub-assembly drawing shall be linked to the sub-assembly CATProduct.	M		EV5/FB	**5.6.4**
	RE15	A drawing revision shall always be linked to the ENOVIA part version, which represents the CATPart or CATProduct revision linked to the views.	M		EV5	**5.6.4**
	RE16	For convenience parts/CATParts/sub-assemblies can be instantiated in a PP/PA or system PRC as leaf instance to see the drawing in the tree. Shall be handled congruent in one PBS and described in CAD handbook.	M		EV5	**5.6.4**
	RE17	No detail drawings in the DMU PRC. Multi PBS (except PBS22) drawings shall be in assembly drawings branch of DMU PRC. Global drawings of one PBS can be in PBS branch of the DMU PRC.	M		EV5	**5.6.4**
	RE18	SE part shall not be used as a drawing collector because of change management.	M		EV5	**5.6.4**
Lifecycle & Change Management	**RE19**	The lifecycle of ENOVIA objects is defined by the combination of Maturity value, Version/Revision and Status value.	M		EV5	**5.9**
	RE20	For a SE assembly we manage part versions.	M		EV5	**5.9.2**
	RE21	For Work package and part detail (CATParts) we manage part version and document revision synchronously.	M		EV5	**5.9.2**
	RE22	No versioning mechanism is applied on ENOVIA instances.	M		EV5	**5.9.2**
	RE23	The current valid revision of linked documents shall always be synchronized with the current valid revision of the impacting CAD document(s).	M		EV5	**5.9.2**
	RE24	For part versions with associated 3D document revisions the status values of part version and document revision has to be identical.	M		EV5	**5.9.3**
	RE25	The visible contextual data (interfaces) from other PBS have a status Draft or higher.	M		EV5	**5.9.3**

Categories: M = Mandatory (Shall comply) R = Recommended (Should comply)						
Topic	**Rule No.**	**Rule Description**	**Category**	**Q-Checker Rule**	**EV5/FB**	**IO CAD Manual Section**
	RE26	ENOVIA instances are always 'In Work'.	M		EV5	**5.9.3**
	RE27	To modify parts and documents in status draft or higher, a new version must be created.	M		EV5	**5.9.3**
	RE28	The change type shall be set to Minor or Major before promotion.	M		EV5	**5.11**
Visibility	**RE29**	Leaf instances, their content and documents at status 'In Work' or 'Void' are invisible to users of other organizations.	M		EV5	**5.10.1**
	RE30	To allow designers of the same PBS, access to the 'In Work' data and other PBS designers to GV data, 2 leaf instances of the same reference but different versions can be managed in the same branch or sub branch of the tree structure. This approach: i. Is not allowed for CONTEXT and CONFIG branches. ii. Is allowed in DM and AM branch but is not mandatory. iii. Shall be described in CAD handbook of the system.	M		EV5	**5.10.2**
	RE31	The visibility and access to sensitive CAD data classified as "ITER RESTRICTED" is managed in addition to the visibility management.	M		EV5	**5.10.3**
	RE32	All drawings classified as 'ITER RESTRICTED' shall be clearly marked as such on each drawing sheet.	M		EV5	**5.10.3**
Variant / Alternative	**RE33**	Variants of mechanical design parts shall be preferably managed with skeleton methodology.	R		EV5	**5.12**
	RE34	An Alternative is only used for defining a new concept of design, which can evolve in parallel to the original design.	M		EV5	**5.13**
	RE35	Alternatives are new independent references.	M		EV5	**5.13**
	RE36	Alternatives shall have the representation attribute value AM or AMDRW.	M		EV5	**5.13**
	RE37	Alternatives shall be in a separated AM branch of the tree structure, not mixed with DM or CM.	M		EV5	**5.13**
	RE38	If an alternative for at least one part inside a work package is needed, we make an alternative for all work packages up to the leaf instance.	M		EV5	**5.13**
	RE39	Alternatives are identified with the Option attribute. The value shall be speaking like the DWO number.	M		EV5	**5.13**

Categories: M = Mandatory (Shall comply) R = Recommended (Should comply)						
Topic	**Rule No.**	**Rule Description**	**Category**	**Q-Checker Rule**	**EV5/FB**	**IO CAD Manual Section**
	RE40	Only one part among reference and alternatives can have the preferred attribute value Y (YES), all others must have N (NO).	M		EV5	**5.13**
	RE41	If the decision is taken to replace the current "reference" design by the alternative, the former alternative shall replace the "reference" in the specific branch.	M		EV5	**5.13**
P&O	**RE42**	The structure of the data is organized in PBS-Levels. This corresponds to the organizations of the P&O.	M		EV5	**5.14.1**
	RE43	A user with a role in a specific organization cannot change data of another organization.	M		EV5	**5.14.1**
	RE44	A user with a role in a specific project cannot change data of another project.	M		EV5	**5.14.2**
	RE45	The level of privileges (rights) within the context of organization and project are handled by different roles.	M		EV5	**5.14.3**
	RE46	The prerequisite to get a specific role with modification rights is the attendance and successful certification according to the defined procedures.	M		EV5	**5.14.3**
	RE47	Role requests shall be made following the defined procedure.	M		EV5	**5.14.3**
	RE48	The lock concept in ENOVIA is an additional security mechanism to protect data from modification.	M		EV5	**5.14.4**
	RE49	The users shall lock only the minimum of data needed to allow the modification to be performed. The data shall be unlocked as soon as possible.	M		EV5	**5.14.4**
	RE50	The visibility and access to sensitive CAD data classified as 'ITER RESTRICTED' is managed by the attribute 'RESTRICTED' and related specific organization.	M		EV5	**5.14.5**

A detailed description of the different rules can be found in the following IO CAD Manual document:

ITER_D_249WSM - CAD Manual 05 - Design Data Management

In the case of F4E supplier performing CAD design tasks in ENOVIA it is compulsory to apply the F4E CAD data promotion procedure which it is explained in detail in the following F4E document:

F4E_D_25LFP9 - SOP-03.01 CAD Data Promotion

A specific How-to document has been developed to explain the suppliers how to apply the procedure and how to produce the different documents and reports.

F4E_D_25RPEX - How to 'Supplier CAD Data Promotion Procedure

10 Drawing Best Practices

This section describes the creation of drawings for ITER project. The rules defined shall be applied whatever the CAD tool used and same practices shall be applied at any site contributing to ITER drawings. ITER drawing practices are according ISO Standards Handbook 12 “Technical Drawings”, in case of inconsistency between this document and any ISO standard the definition in the ISO standard shall be applied.

The main topics describes in this section are:

i. Standard drawing sheets.
ii. Drawing projection.
iii. ITER Title Block.
iv. ITER Title Block for Isometric drawings.
v. Title Block and banner management for suppliers, Das and IO.
vi. Type of drawings.
vii. Drawing presentation.
viii. Manufacturing details.
ix. Preferred sizes.
x. Character height.
xi. Drawing notes.
xii. Modification to drawings.
xiii. CAD-related standards.
xiv. Restricted drawings.
xv. Construction drawings.

The following table contain an overview of the main rules:

	Rule N°	Rule Description	Cat. M(Mandatory)	Q-Checker Rule	FB/ EV5	IO CAD Manual Section
	RED02	The first sheet (Sheet.1) or MODIFICATION_ SHEET) shall always be the ‘Modification sheet’.	M		F/E	**9.2**
	RED03	The second sheet (Sheet.2) is the first of the drawing sheets.	M		F/E	**9.2**
	RED06	For each revision of a drawing sheet the information about the modification shall be entered on the modification sheet.	M		F/E	**9.2.1**
	RED07	If the modification sheet becomes full, then the current entries are removed and an entry is made stating that the earlier history is shown on the previous revision of the Drawing. There shall be only 1 modification sheet per Drawing.	M		F/E	**9.2.1**
	RED12	For supplier manufacturing drawings first angle projection can be used. Clear normalized indication in the supplier title block is required.	M		F/E	**9.3.1**
	RED14	The drawing number is unique across the whole ITER project and is also independent of the PBS levels	M		E	**9.4**
	RED15	The drawing “DESCRIPTION’ field must start with the main assembly name e.g., “BL” for Blanket, “CS” for Central solenoid, “DIV” for Divertor, etc …	M		E	**9.4**
	RED18	For each kind of these listed drawings (from a to d) be sure to choose the right location depending on technical needs (Enovia V5, SMDD, etc…)	M		F/E	**9.6**

	Rule N°	Rule Description	Cat. M(Mandatory)	Q-Checker Rule	FB/ EV5	IO CAD Manual Section
	RED22	Drawings produced by the Suppliers/Manufacturers may be bi-lingual. The primary language is English and the secondary language is that of the supplier/manufacturer.	M		F/E	**9.7.1**
	RED30	All dimensioning shall conform to ISO 129: "Engineering Drawing – Dimensioning". See also ISO Standards Handbook 12.	M		F/E	**9.8**
	RED31	All models shall have dimensions that are true. Text editing of dimension values is not allowed.	M		F/E	**9.8**
	RED34	The drawing notes should be as clear and concise, to convey the relevant information. The notes must be sequentially numbered.	M		F/E	**9.13**
	RED36	All drawings classified as 'ITER RESTRICTED' shall be clearly marked as such on each drawing sheet.	M		F/E	**9.17**

A detailed description of the different rules can be found in the following IO CAD Manual document:

ITER_D_24SNC9 - CAD Manual 09 - Drawing Best Practices

10.1 Supplier Title Block and Banner

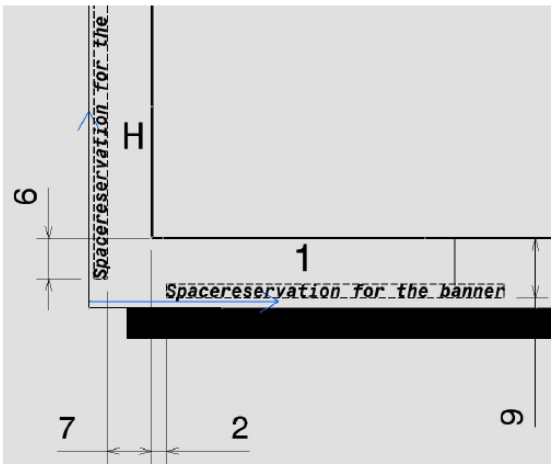
For drawing produced by suppliers the format of the title block shall be agreed between F4E and Suppliers, in case a supplier shall create or reintegrate drawings in ENOVIA a specific title block for the supplier shall be included in the FTB Manager tool. F4E shall be responsible to include the supplier title block in the FTB Manager. The following document describes the process to include a title block in the FTB Manager.

ITER_D_HQV46Z - How to prepare a Titleblock to implement in FTB Manager

F4E shall provide instructions to the supplier on how to use and fill in the title block from FTB Manager.

For drawings produced by supplier but not stored in ENOVIA (detailed manufacturing drawings), these drawings shall include the supplier title block, the content of this title block shall be verified with F4E and it won't be included in the FTB manager unless it is requested by the supplier. The supplier title block shall contain the F4E contract number as specific requirement, standard title block fields like description, scale, projection standard, approval workflow,… shall be included as well. These drawings may be stored in SMDD and the drawing frame and title block shall be compliant with the requirement to the placement of SMDD banners.

The following spaces in the left and bottom hand side borders of the drawing frame shall be left blank if the drawings shall be stored in SMDD:



10.2 Bill of Materials in Drawings

To include Bill of Materials in drawings IO has developed a CATIA macro with different profiles to help in the production of the Bill of Materials, the following How-To explains how to access and use the macro:

ITER_D_XB8F7G - CATIA BOM Macro enhancements

The usage of this macro is not compulsory and the Bill of Materials can be produced manually or with any other tool by the designer. The minimum content of the Bill of Material shall be according ISO Standards Handbook 12 or template agreed between F4E and supplier.

11 ISO Drawing Standards

This section lists the currently available ISO standards associated to technical drawings and diagrams. It is applicable for all designers and engineering involved in the production of drawings and/or diagrams.

All these standards are defined according the IO CAD Manual section 10:

ITER_D_24MZWV - CAD Manual 10 - ISO Drawing Standards

11.1 Technical Drawings

ISO 128 Technical drawings - General principles of presentation.

ISO 129 Technical drawings - Indication of dimensions and tolerances.

ISO 2553	Welded, brazed and soldered joints - Symbolic representation on drawings.
ISO 3098	Technical product documentation- Lettering.
ISO 4063	Welding, and allied processes - Nomenclature of processes and reference numbers.
ISO 5455	Technical drawings - Scales.
ISO 5456	Technical drawings - Projection methods.
ISO 5457	Technical drawings - Sizes and layouts of drawing sheets.
ISO 6412	Technical drawings - Simplified presentation of pipelines.
ISO 6413	Technical drawings - Representation of splines and serrations.
ISO 6433	Technical drawings - Item references.
ISO 7083	Technical drawings - Symbols for geometric tolerancing.
ISO 7200	Technical product documentation - Data fields in title blocks and document headers.
ISO 7573	Technical product documentation - Parts lists.
ISO 10209	Technical product documentation - Vocabulary.

11.2 Mechanical Engineering Drawings

ISO 1101	Geometric tolerancing, generalities (GPS) - Geometrical tolerancing -Tolerances of form, orientation, location and run-out.
ISO 1302	Geometrical Product Specification (GPS) - Indication of surface texture in technical product documentation.
ISO 1660	Technical drawings - Dimensioning and tolerancing of profiles.
ISO 2162	Technical drawings - Springs.
ISO 26909	Springs – Vocabulary.
ISO 2203	Technical drawings - Conventional representation of gears.
ISO 2692	Geometrical product specifications (GPS) - Geometrical tolerancing - Maximum material requirement (MMR), least material requirement (LMR) and reciprocity requirement (RPR).
ISO 2768	General tolerances.
ISO 3040	Geometrical product specifications (GPS) - Dimensioning and tolerancing - Cones.
ISO 5458	Geometrical tolerancing - Positional tolerancing.
ISO 5459	Geometrical product specifications (GPS) - Geometrical tolerancing - Datums and datum-systems.
ISO/TR 5460	Technical drawings - Geometrical tolerancing - Tolerancing of form,orientation, location and run-out. Verification principles and methods.Guidelines.
ISO 5845	Technical drawings - Simplified representation of the assembly of parts with fasteners.

ISO 6410 Technical drawings - Screw threads and threaded parts.

ISO 6411 Technical drawings - Simplified representation of centre holes.

ISO 7083 Technical drawings - Symbols for geometrical tolerancing - Proportions and dimensions.

ISO 8015 Geometric product specifications (GPS) - Fundamentals - Concepts, principles and rules.

ISO 8826 Technical drawings - Rolling bearings.

ISO 9222 Technical drawings - Seals for dynamic application.

ISO 10135 Geometrical product specifications (GPS) - Drawing indications for moulded parts in technical product documentation (TPD).

ISO 10578 Technical drawings - Tolerancing of orientation and location – Projected tolerance zone.

ISO 10579 Geometrical product specifications (GPS). Dimensioning and tolerancing - Non-rigid parts.

ISO 13715 Technical drawings - Edges of undefined shape - Vocabulary and indications.

11.3 Construction Drawings

ISO 2594 Building drawings - Projection methods.

ISO 3766 Construction drawings - Simplified representation of concrete reinforcement.

ISO 4157 Construction drawings - Designation systems.

ISO 4172 Technical drawings - Construction drawings - Drawings for the assembly of prefabricated structures.

ISO 5261 Technical drawings - Simplified representation of bars and profile sections.

ISO 6284 Construction drawings - Indication of limit deviations.

ISO 7437 Technical drawings - Construction drawings - General rules for execution of production drawings for prefabricated structural components.

ISO 7518 Technical drawings - Construction drawings - Simplified representation of demolition and rebuilding.

ISO 8048 Technical drawings - Construction drawings - Representation of views, sections and cuts.

ISO 8560 Technical drawings - Construction drawings - Representation of modular sizes, lines and grids.

ISO 9431 Construction drawings - Spaces for drawing and for text, and title blocks on drawing sheets.

ISO 11091 Construction drawings - Landscape drawing practice.

ISO 80000 Quantities and units.

11.4 Other Standards Related to Technical Drawings

ISO 6414 Technical drawings for glassware.

11.5 Graphical Symbols for Use on Diagrams

ISO 1219 Fluid power systems and components - Graphic symbols and circuit diagrams.

ISO 3511 Process management control functions and instrumentation – Symbolic representation.

ISO 3952 Kinematic diagrams - Graphical symbols.

ISO 10628 Flow diagrams for process plants - General rules.

12 Plant Design Guidelines

The purpose of this section is to provide general basic design rules for the preliminary layout design. It is intended as guidance only and it will not replace the standard to be used to design the facility. This section is a compilation of the state of the art guideline rules for the layout design in different plant design disciplines.

Here below you can find the hyperlinks to IO CAD manual sections providing guideline rules for the plant design in different disciplines:

ITER_D_359GKJ - CAD Manual 12-1 Multi-Discipline Design Guidelines

ITER_D_33WL3N - CAD Manual 12-2 Piping Design

ITER_D_3593F7 - CAD Manual 12-3 HVAC Design Guidelines

ITER_D_34FM2E - CAD Manual 12-4 Cable Tray Design Guidelines

ITER_D_33J8ZH - CAD Manual 12-5 Civil Engineering Design

13 SMDD

SMDD is an ITER IO database for the archiving of all Diagrams and Drawing in PDF format. SMDD manages all PDF format diagrams and drawings derived from the following sources:

i. Multi-CAD drawings.
ii. ENOVIA/CATIA drawings.
iii. CATIA drawings produced out of ENOVIA.
iv. NON-CAD drawings.
v. SSD diagrams.
vi. SXP diagrams.

The drawings and diagrams produced in ENOVIA and SSD will be automatically pushed to SMDD in PDF format. For other drawings and diagrams produced out of ENOVIA or SSD the designer shall upload them in SMDD using the upload capabilities of the SMDD database.

The following documents explain the procedures to use SMDD:

ITER_D_KFMK2B - Procedure for the Management of Diagrams and Drawings in pdf Format Using the SMDD Application

ITER_D_LYEH46 - Working Instruction for Usage of SMDD

The following document describes How-To use SMDD:

ITER_D_JKT5KN - How to use the SMDD Application (System for the Management of Diagrams and Drawings)

Users requiring interface with SMDD shall receive training on SMDD functionalities for the management of drawings and diagrams.

14 Diagrams Guidelines

This section defines the rules to be applied by the designers creating diagrams in the ITER project, and guidelines will be provided to define best practices to ensure the quality of diagrams throughout the project.

The designer producing diagrams in SSD shall follow a compulsory training and he/she shall pass a certification before being granted with write access to the SSD database.

For the production of diagrams the ISO Standards shall be followed and the rules defined during the training provided to the designer. The training material used during the training can be found here:

SEE System Design Presentations

Additional material on how to perform specific actions in SSD can be found here:

SEE System Design

14.1 Diagrams Quick Reference Guide

This section defines best practices on how to create diagrams for the ITER project and it doesn't replace ISO standards or rules provided during the compulsory training for designers.

The following table provides an overview of the rules contained in this section.

Rule No.	Rule Description	Category M(Mandatory) R(Recommended)	IO CAD Manual Section
	General Rules for PFD:		
RD001	Include process piping, major and minor (TTT code is P).	M	14.7.1.2.1
RD002	Include major equipment symbols, named and declared according to the ITER Numbering System.	M	14.7.1.2.1
RD003	Include different line "weights" for minor & major process lines.	M	14.7.1.2.1
RD004	Include major bypass and recirculation lines.	M	14.7.1.2.1
RD005	Include valves that affect the process/operation of the system.	M	14.7.1.2.1
RD006	Include interconnection with other systems (PBS).	M	14.7.1.2.1
RD007	Include system operational values at normal and limit conditions (flow, temperature and pressure).	M	14.7.1.2.1
RD008	Include composition of fluids. A chemical flow sheet may be added.	M	14.7.1.2.1
RD009	Include components location.	M	14.7.1.2.1
RD010	Include flow direction, symbolized by an arrow.	M	14.7.1.2.1
RD011	Include "Diamond" symbols to identify each line. A chart representing the list of values for each line with different scenario, if needed.	M	14.7.1.2.1
RD012	Include only suitable functional information.	R	14.7.1.2.1
RD013	The organization of the PFD diagram should take into account a space reservation for each function. This permits to easily add a more detailed representation later.	R	14.7.1.2.1
RD014	Represent the flow from left to right whenever possible.	R	14.7.1.2.1
RD015	Include major reductions.	R	14.7.1.2.1
RD016	Do not include accessories.	M	14.7.1.2.2

Rule No.	Rule Description	Category M(Mandatory) R(Recommended)	IO CAD Manual Section
RD017	Do not include secondary pipes that do not directly impact the system process.	M	14.7.1.2.2
RD018	Do not include minor bypass lines.	M	14.7.1.2.2
RD019	Do not include isolation and shutoff valves.	M	14.7.1.2.2
RD020	Do not include maintenance vents and drains.	M	14.7.1.2.2
RD021	Do not include pipe size, attributes.	R	14.7.1.2.2
RD022	Do not include seismic class information.	M	14.7.1.2.2
RD023	Do not include instrumentation.	M	14.7.1.2.2
RD024	Do not include pipe fittings, connections, flanges or welding.	M	14.7.1.2.2
RD025	Scaling or geographically positioning components is not required.	R	14.7.1.2.2
RD026	Do not include penetrations between rooms.	M	14.7.1.2.2
	General Rules for P&ID:		
RD041	Include all mechanical equipment, named and declared according to the ITER Numbering System.	M	14.7.1.3.1
RD042	Include all valves and their identifications.	M	14.7.1.3.1
RD043	Include all piping, which shall be defined and declared with corresponding attributes. Piping Lines are declared inside P&ID and are initialized on PBS Level 3 and TTT is “PI”.	M	14.7.1.3.1
RD044	Include vents, drains, special fittings, sampling lines, reducers, increasers, etc.	M	14.7.1.3.1
RD045	Include permanent start-up and flush lines.	M	14.7.1.3.1
RD046	Include flow directions.	M	14.7.1.3.1
RD047	Include interfaces.	R	14.7.1.3.1
RD048	Include instrumentation and designations.	M	14.7.1.3.1
RD049	Show detail functioning.	M	14.7.1.3.1
RD050	Include symbol of penetrations.	M	14.7.1.3.1
RD051	Include locations, OPR.	M	14.7.1.3.1
RD052	Include all reductions.	M	14.7.1.3.1
RD053	Include accessories of connection only if significant.	R	14.7.1.3.1
RD054	Include valve actuators.	M	14.7.1.3.1
RD055	Represent flow from left to right whenever possible.	R	14.7.1.3.1
RD056	Include signal link to controller, converter or other function but it shall remain graphical.	R	14.7.1.3.1
RD057	Do not include instrument root valves.	M	14.7.1.3.2
RD058	Do not include control relays.	M	14.7.1.3.2

Rule No.	Rule Description	Category M(Mandatory) R(Recommended)	IO CAD Manual Section
RD059	Do not include minor manual switches.	M	14.7.1.3.2
RD060	Do not include equipment rating or capacity.	M	14.7.1.3.2
RD061	Do not include attributes through text boxes.	M	14.7.1.3.2
RD062	Do not include equipment not visible or not accessible from the operator point of view.	M	14.7.1.3.2
RD063	Do not include pressure temperature and flow data.	M	14.7.1.3.2
RD064	Do not declare elbow, tees and similar standard minor fittings.	M	14.7.1.3.2
RD065	Do not include scenarios; only one system solution is represented at P&ID level.	M	14.7.1.3.2
RD066	Do not include extensive explanatory notes.	R	14.7.1.3.2
RD067	Do not include control loop representation.	M	14.7.1.3.2
	General Rules for One Line Diagrams:		
RD081	System is designed from top to bottom of the page.	R	14.7.2.2
RD082	Show only main equipment of the electrical installation.	M	14.7.2.2
RD083	Show only logical links, Do not represent cables.	M	14.7.2.2
RD084	Show the power supply and voltage conversion for Main transformers.	M	14.7.2.2
RD085	Components shall be named and declared according to the ITER numbering system.	M	14.7.2.2
RD086	Shall contain: Container (boards) relevant.	M	14.7.2.2
RD087	Shall contain: Relevant content (circuit breaker, transformer, etc.).	M	14.7.2.2
RD088	Shall contain: Relevant power functional links.	M	14.7.2.2
	General Rules for Cabling Diagrams:		
RD101	Equipment shared between cabling and one line diagram is represented.	M	14.7.2.3
RD102	Follow the order from supplier to client, from left to right.	R	14.7.2.3
RD103	Components and cables to be created in the database.	M	14.7.2.3
RD104	Shall contain: Cables.	M	14.7.2.3
RD105	Shall contain: Junction Boxes.	M	14.7.2.3
RD106	Shall contain: All equipment power supply clients.	M	14.7.2.3
	General Rules for Routing Diagrams:		
RD121	Only one segregation (group/type of cable on a diagram).	M	14.7.2.6
RD122	Route is functional, do not represent physical layout.	M	14.7.2.6
RD123	Route segments are created in the database.	M	14.7.2.6

A detailed description of the different rules can be found in the following IO CAD Manual document:
ITER_D_35CY6V - CAD Manual 14 - Diagram Guidelines

15 CAD Data Exchange Process

The exchange of CAD data between IO, F4E and suppliers is managed using the DET procedure, a detailed explanation on the DET procedure can be found in the following document:

F4E_D_25AL73 - SOP-01.37 Data Exchange Transfer

Each CAD data exchange is identified with a sequential number. The exchange process is controlled using a DET form which contains the identification of the exchange, identification of the actors, the purpose of the exchange, identification of the data exchanged and location of the data to be used.

A template of the DET form can be found here:

F4E_D_257G84 - Data Exchange Task (DET) Template - SmarTeam Implementation

F4E archives in SmarTeam all the CAD data exchanges between IO, F4E and suppliers for traceability reasons. The workflow and the archiving of the DET according to the F4E_D_25AL73 - SOP-01.37 Data Exchange Transfer is performed in F4E SmarTeam database.

In the case of design data DET the CAD data included in the exchange is listed in a BOM Excel file. The Excel file defines with different colour code the CAD data not modifiable. Rows in the Excel file marked in red colour can't be modified by the final receiver of the DET.

15.1 DET Reintegration in Asynchronous Mode

In the case of asynchronous or scheduled scheme of design collaboration when the CAD data are sent back to ENOVIA for reintegration a BOM shall be included in the DET process by the supplier identifying the changes performed in the CAD data. The BOM shall be based in the BOM received in the original design data DET and the supplier shall identify with a color code the modifications performed. The following image shows a BOM of the CAD data exported for modification out of ENOVIA.

Part Version

Name	Version	Current	Assem	Organization	Project	Owner
SKATEBOARD#WP#L67QCY	---	Draft	WP	EXPORTED	EUDAPRJ	EXPORT_EU_TO_AMW
TRUCK#WP#L67Q9A	---	Draft	WP	EXPORTED	EUDAPRJ	EXPORT_EU_TO_AMW
TRUCK#L67Q5C	---	Draft	PD	EXPORTED	EUDAPRJ	EXPORT_EU_TO_AMW
WHEEL#L67Q7B	---	Draft	PD	EXPORTED	EUDAPRJ	EXPORT_EU_TO_AMW
MAIN_BOARD#L67QAZ	---	Draft	PD	EXPORTED	EUDAPRJ	EXPORT_EU_TO_AMW

CCP Links (Documents)

Linked parts: TRUCK#L67Q6T						
TRUCK_SKE#L67PZW	---	Draft	PD	EXPORTED	EUDAPRJ	EXPORT_EU_TO_AMW
Linked parts: MAIN_BOARD#L67QBH						
MAIN_BOARD_SKE#L67Q3D	---	Draft	PD	ITERORG	ITERPRJ	BEZOLB

The following image shows the BOM after the modification by the supplier identifying the changes performed:

Part Version

Name	Version	Current	Asser	Organization	Project	Owner
SKATEBOARD#WP#L67QCY	---	Draft	WP	EXPORTED	EUDAPRJ	EXPORT_EU_TO_AMW
TRUCK#WP#L67Q9A	---	Draft	WP	EXPORTED	EUDAPRJ	EXPORT_EU_TO_AMW
TRUCK#L67Q5C	---	Draft	PD	EXPORTED	EUDAPRJ	EXPORT_EU_TO_AMW
WHEEL#L67Q7B	---	Draft	PD	EXPORTED	EUDAPRJ	EXPORT_EU_TO_AMW
WHEEL_100MM						
MAIN_BOARD#L67QAZ	---	Draft	PD	EXPORTED	EUDAPRJ	EXPORT_EU_TO_AMW
BUMPER						

CCP Links (Documents)

Linked parts: TRUCK#L67Q6T						
TRUCK_SKE#L67PZW	---	Draft	PD	EXPORTED	EUDAPRJ	EXPORT_EU_TO_AMW
Linked parts: MAIN_BOARD#L67QBH						
MAIN_BOARD_SKE#L67Q3D	---	Draft	PD	ITERORG	ITERPRJ	BEZOLB

The color code to be followed is:

Legend:		
IO => EXT	Not to be modified by partner	
	Specific rules to be applied	*See comments*
EXT => IO	Minor change	*3D external geometries and / or interfaces not modified*
	Major changes	*3D external geometries and / or interfaces modified*
	Added	*Objects added*
	Deleted	*Objects deleted*

The BOM shall accurately describe all the changes to ensure that during the reintegration process in ENOVIA all the changes are imported. Objects in the BOM without color will remain unchanged in ENOVIA.

How to perform the reintegration of the CAD data in ENOVIA is detailed in the following document:

ITER_D_Q6HVV2 - How to use the CATIA reconciliation

16 ITER Training Aids

The IO DO has developed training aids aimed at assisting a new, in-experienced or experienced user with various guides and instructions in understanding and using the various tools and methodologies used by in the ITER project.

The following different types of training aids are available:

i. **How-to.** These graphic aids use a PowerPoint presentation to explain the topic in a step by step fashion using text and screenshots. These presentations can be printed for easy reference whilst performing the operations on a computer.
ii. **What-is**. These documents explain in simple terms various topics.
iii. **Video**. These video aids use an avi movie with a worked example. They allow the user to follow a process or methodology in real-time or in a stop-replay fashion. They also have an audio track, explaining the various steps involved in the process.
iv. **Whitepaper**. These documents explain processes and topics not suitable for a "How to". This document has all the IDM hyperlinks used for training ITER_D_24N3GT - Hyperlinks to CAD Manual - Training Docs - How To - Catalogs - What Is - avi

16.1 ITER CATIA Material Library

A CATIA ITER Material Library has been defined by ITER to apply materials to the CAD models. The material library is accessible using the CATIA "Apply Material" command both in synchronous and asynchronous scheme of design collaboration. In the asynchronous scheme the ITER Material Library is part of the ITER CAD Supplier Package. Any update of the ITER Material Library will be communicated by the F4E DO Head and it can be downloaded from here:

ITER_D_28EH8C - ITRCatalog.CATMaterial

The materials included in the CATIA ITER Material Library are taken from all materials approved for ITER construction. New materials can be included in the CATIA ITER Material Library; the request shall be done through IO CAD ticket system.

The following How-To explains the content of the CATIA ITER Material Library, how to request new materials to be included in the library and how to apply materials to the CAD models.

ITER_D_T2H9CS - Presentation of ITER material library for CATIA

The properties included in the CATIA ITER Material Library for each material are only the name of the material and the density. The purpose of using the Library would be to evaluate the weight of the components.

The designers shall apply material to the different parts and products according the above How-To by the Final Design maturity phase.

16.2 CAD data protection in ENOVIA

In ENOVIA and SSD it is possible to restrict the access of CAD data to a reduced list of people, in order to protect the access to the data to all contributors in the ITER project. This restriction could be needed due to Intellectual Property Rights or CAD data subjected to Export Control.

IO DO shall issue a CAD Data Protection Notice form defining the data to protect and the access rights to be provided for the different actors. Once the CAD Data Protection Notice is approved the access to the CAD data can be granted. F4E and IO shall agree and approve the content of the CAD Data Protection Notice.

The documents below shows How-To protect data in CATIA/ENOVIA once the CAD Data Protection Notice has been approved and the roles have been granted to the different actors.

ITER_D_QAWQ5K - How_to_protect_restricted_data_in_Enovia
When a designer creates new data to be protected he/she shall follow the How-To above.
The diagrams data in SSD are protected following the same process, but the actions to restrict the access are managed by the SSD administrators.