IDM UID
35UVAQ
VERSION CREATED ON / VERSION / STATUS
04 Apr 2012 / 4.0 / APPROVED
EXTERNAL REFERENCE

Baseline Report (not under Configuration Control)

ITER Standard Component Register

This document gathers all components to be standardized, according to the standardisation activities managed by the RAMI & Standardisation IO-DA Board or
performed by other plant system teams as part of their design work. Each of those components is presented with summarized information complemented by technical specifications given in Annexes.
Although this document provides sufficiently detailed requirements for the procurement of standardized components, it also provides references to the ...

Approval Process			
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Approver	**Haange R.**	**01-May-2012:approved**	**IO/DG/DIP**
Document Security: level 1 (IO unclassified) *RO: Chiocchio Stefano*			
Read Access	**LG: IO Cryogenic Section All, LG: external cryogenic collaborator, LG: RAMI & Standardisation Board, LG: DA Configuration Managers, LG: External cryogenic expert, LG: Cryoplant writers, GG: DA Heads plus one, GG: Operations, GG: DAs Configuration Managers, GG: DA Heads, Co-ordinators and Management, AD: ITER, AD: DA, project administrator, RO, GG: MAC Members and Experts, GG: STAC Members & Experts, GG: Council Preparatory Working Group (CPWG), AD: External Collaborators**		

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Change Log				
Title (Uid)	***Version***	***Latest Status***	***Issue Date***	***Description of Change***
ITER Standard Component Register (35UVAQ_v4_0)	v4.0	Approved	04 Apr 2012	Quench valves taken out of the document as per N. Mitchell's request. Last sentence of section 1 "Purpose" modified as follows: An added benefit would be the reduction of purchase costs due to the procurement of larger numbers of common components replaced by: An added benefit could be the reduction of purchase costs due to the procurement of larger numbers of common components. However this reduction of purchase cost is not the main driver of the effort, as it consists primarily in the reduction of operation & maintenance costs in the Operation Budget. First sentence of section 2 "Scope" added to clarify the role and the authority of the Standardisation activities managed by the RAMI & Standardisation Board : The standardisation activity managed by the Board is limited to the definition of technical specifications and shall not address commercial or contract-related matters regarding specific suppliers as the Domestic Agencies retain the right to select their own suppliers.
ITER Standard Component Register (35UVAQ_v3_0)	v3.0	Signed	06 Mar 2012	This new version adresses formatting issues with the previous release and clarifies the standardisation process. Purpose & scope are explicitly stated and the standardisation process is updated. The content for LV/MV motors, Cryogenic valves and I&C Cubicles, previously approved by CEP/EED, CEP/PED and CHD/CSD, is not modified. Comments made by TKM/MAG on the cryogenic valves for magnet feeders seem to relate to another linked document (2VV4PL). For specific answers to previous comments, please refer to the metadata of previous versions.
ITER Standard Component Register (35UVAQ_v2_0)	v2.0	Signed	21 Feb 2012	This version complies with the ITER document template, typos have been corrected and more importantly the comments of the reviewers have been taken into account. For specific answers to each comment, please refer to the metadata of v1.0.
ITER Standard Component Register (35UVAQ_v1_0)	v1.0	Signed	05 Jul 2011	First version uploaded in relation with PCR-371 "Standardisation of components".
ITER Standard Component Register (35UVAQ_v0_0)	v0.0	In Work	17 Aug 2010	

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Table of Contents

1 Purpose

ITER, being a complex international project for which components will be procured in kind by several partners (Domestics Agencies) and in fund by ITER Organization, requires that a strong emphasis is placed on standardisation. In order to implement this standardisation of components, the RAMI & Standardisation Board[1] has been put in charge of defining a list of components to standardize, a standardisation process and a work plan.

The ultimate objective of the standardisation approach promoted by the RAMI & Standardisation Board is in a large majority of cases to define technical specifications for the components that are used in significant numbers by different plant systems, so that those plant systems can share interchangeable components, thus reducing the spares inventory as well as the requirements for training, tools and skills for operation and maintenance. An added benefit could be the reduction of purchase costs due to the procurement of larger numbers of common components. However this reduction of purchase cost is not the main driver of the effort, as it consists primarily in the reduction of operation & maintenance costs in the Operation Budget.

2 Scope

The standardisation activity managed by the Board is limited to the definition of technical specifications and shall not address commercial or contract-related matters regarding specific suppliers as the Domestic Agencies retain the right to select their own suppliers.

This Register gathers all components to be standardized, according to the standardisation activities managed by the RAMI & Standardisation IO-DA Board or performed by other plant system teams as part of their design work. Each of these components is presented with summarized information complemented by technical specifications given in Annexes.

Although this document provides sufficiently detailed requirements for the procurement of standardized components, it also provides references to the other documents explaining this standardisation (such as the studies and reports from the standardisation working groups, and the various handbooks prepared by the plant system teams and IPTs).

This Register shall be updated regularly to include the new standard components resulting from expert working group studies and approved by the IO-DAs RAMI & Standardisation Board.

3 Definitions

COTS	Commercial Off-The-Shelf
DA	Domestic Agency
IPT	Integrated Product Team
IO	ITER Organization
RAMI	Reliability, Availability, Maintainability, Inspectability

4 Use of this document

This document aims at providing a quick reference for plant system architects looking for standard components to use in their design. All the results from the standardisation studies, either as technical specifications or specific models, shall be listed herein. Designers of a plant system at the Preliminary Design Review stage shall compare their requirements and the

[1] ITER_D_2MDCUP - ITER RAMI & Standardisation Board Terms Of Reference

contents of this Register in order to assess opportunity to use previously defined standard components.

If a similar component is already defined in the Register, then it shall be used in order to avoid, as much as possible, any unnecessary diversity of components. If no compatible components are present in the Register, then another component shall be selected or defined. If there is a practical possibility that this new component could satisfy the requirements of different plants systems, then this component shall be added to the Register as a new standard component, via a specific PCR.

5 Standardisation Process

The standardisation process defined by the Board and approved by the IO-DA is reproduced in the figure 1 below for convenience.

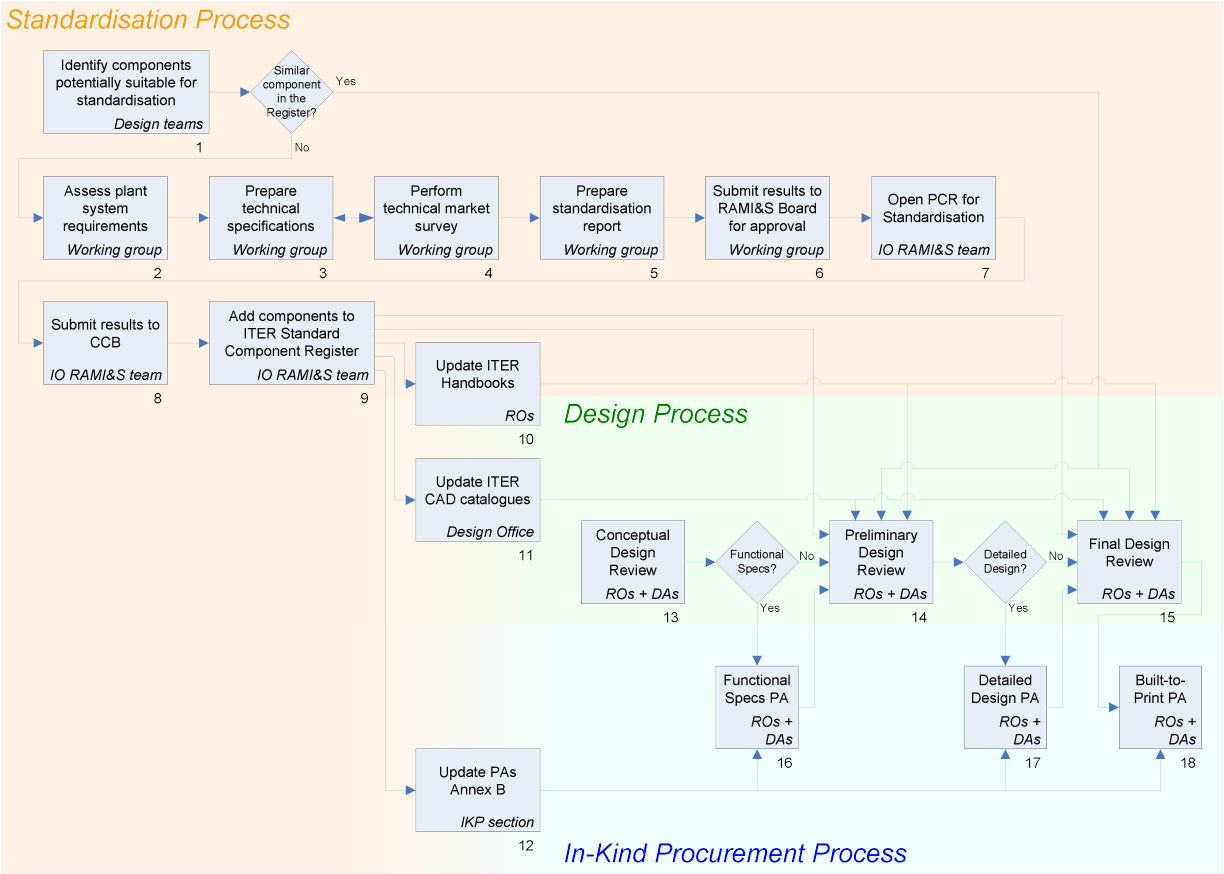

Figure 1: The standardisation process (in orange) and its interactions with the technical design of the plant systems (in green) and the Procurement Arrangements (in blue).

6 Organization

The RAMI & Standardisation Board gathers representatives from all DAs and is chaired by IO. According to the standardisation process, the Board defined a list of components to standardize and assigned Standardisation Working Groups to each of them. Those Standardisation Working Groups are usually chaired by an IO staff member of the Plant System teams most concerned with the considered components, and gather representatives from the other plant systems concerned (typically client systems) as well as representatives of the DAs involved in the procurement of the plant systems Procurement Packages.

7 Standard Components

Components defined as standard for the project are defined by their technical specifications and examples of suitable models from specific manufacturers are provided. The study that resulted in this specifications was performed either by one of the standardisation working groups managed by the RAMI & Standardisation Board, or by another entity such as an IPT, or a Plant System team as part of their design task.

7.1 Mechanical Components

7.1.1 Cryogenic valves and warm valves

The following technical specifications relates to cryogenic valves that must be integrated in the various cold boxes of the cryoplant, cryodistribution systems, cold valve boxes and coil termination boxes of cryogenic users.

The scope of cryogenic valves includes the control valves of the warm compressor stations of the cryoplant and the warm valves which are located on the cold valve boxes for the high temperature regeneration of the cryopumps.

The cryogenic valves (including warm valves) for ITER cryogenic systems shall comply with the technical specifications summarized in Annex 1 of the present document and detailed in section 5.1 of the Technical specification of the ITER cryogenic valves including warm valves (ITER_D_2VV4PL), which describes the required thermal and mechanical characteristics, the mechanical interfaces, the actuator and the positioner, as well as the reliability and maintainability requirements. In addition to the technical specifications, the satellite document ITER_D_3QP82D - Cryogenic Valves Technical Market Survey Report provides a list of recommended manufacturers among the companies proposed by IO and DAs, which are fully compliant with the requirements.

7.2 Electrical Components

7.2.1 LV & MV Electrical motors

Low Voltage and Medium Voltage Motors shall comply with the technical specifications summarized in Annex 2 of the present document and provided in section 4.7 of the Electrical Design Handbook Guide A (ITER_D_2EB9VT), which lists the applicable Codes and Standards, defines the ratings and details the requirements for:

- design and construction (enclosures, insulation, bearings, terminal leads, connectors and boxes),
- starting, acceleration and operation,
- vibration and over-speed,
- sound levels,
- accessories (lifting devices, space heaters, temperature detectors, current transformers, accessory terminal boxes, earthing
- cleaning and painting,
- packaging and storage,
- nameplate,
- drawing and documentation,
- tests and inspection (routine, performance and field tests),
- qualification requirements.

7.3 Instrumentation

7.3.1 I&C Cubicles

This document defines the cubicle components to be used by the different plant system I&C suppliers across all the domestic agencies and their subcontractors. It shall be used for every floor standing and wall mounted I&C cubicle included in the scope of the plant system I&C.

I&C cubicles are of two types:

- Signal Conditioning Cubicles (SCCs): SCCs house the I/O interface dedicated to signal conditioning. An SCC may include remote I/O, but there is no intelligence for controls in SCCs.
- Local Control Cubicles (LCCs): LCCs house the plant system I&C controllers. An LCC may house signal conditioning to improve integration of I&C equipment.

7.3.1.1 Multi-purpose floor-standing cubicles

The main targets are LCCs and SCCs in industrial standard environments.

For conventional and interlock controls, the cubicles shall have the following dimensions: height 47 U / 2200mm, width 800mm, depth 800mm.

Their general features shall be as follows:

- Structure: top and bottom frame, vertical uprights.
- Degree of protection IP55 according to IEC 60529.
- Resistance to mechanical impact: IK10 according to IEC 62262 (IK08 for the transparent doors).

The standard configuration shall comply with the technical description summarized in Annex 3 of the present document and detailed in section 3.1 of the I&C Cubicle Catalogue (ITER_D_35LXVZ) which describes the requirements for the doors, removable roof, side panels, and other components and accessories such as fan, supports, sensors, monitoring system and paint (also refer to section 4.3.1.5 of the present document).

7.3.1.2 Multi-purpose wall mounted cubicles with electromagnetic protection.

Main target is SCCs in harsh environment.

For conventional and interlock controls and EMI protection, the cubicles shall have the following dimensions: height 21U / 1000mm, width 800 mm, depth 300mm.

Their general features shall be as follows:

- Single-piece metal enclosures made from special sheets of ALUZINC 150.
- The presence of 55% of aluminium on the surface of the sheet metal ensures good reflection of electromagnetic waves.
- Protection degree: IP 55, according to IEC 60529.
- Resistance to external mechanical impacts: IK 10 according to IEC 62262.

The standard configuration shall comply with the technical description summarized in Annex 3 of the present document and detailed in section 3.2 of the I&C Cubicle Catalogue (ITER_D_35LXVZ) which describes the requirements for the single piece body, water- and dust-tight door, earthing and other components and accessories such as fan, supports, sensors, monitoring system and paint (also refer to section 4.3.1.5 of the present document).

7.3.1.3 Cubicles allocated to safety controls

Safety-specific, details still TBD, to be completed at a later stage.

7.3.1.4 I&C cubicle monitoring

Whatever the cubicle type, use and form factor; each I&C cubicle of ITER shall be monitored for door(s) status, master switch, current measured on cubicle earth and temperature inside the cabinet, as summarized in Annex 3 of the present document and detailed in section 4 of the I&C Cubicle Catalogue (ITER_D_35LXVZ) which describes the functional specifications, signals, interface and configuration of the cubicle monitoring system.

7.3.1.5 I&C cubicle accessories

Accessories for the floor standing cubicles shall comply with Annex 3 of the present document which summarizes the detailed information provided in section 5.1 of the I&C Cubicle Catalogue (ITER_D_35LXVZ) which describes eyebolts, plinths, cable-guide cross-rails for framework, steel-wired cable trays, metal guides, plastic document pockets, sheet-edge protection strips, partial 19” fixed racks.

19” accessories shall comply with Annex 3 of the present document which summarizes the detailed information provided in section 5.2 of the I&C Cubicle Catalogue (ITER_D_35LXVZ) which describes earthing strips, fixings for 19” rack, 1U fixed and telescopic perforated 19” trays, 2U fixed 19” trays, fixed 19” slides, 2U partial fixed 19” slides, current distribution accessories, 19” front plate for modular circuit-breakers, 19” DIN rail, 1U 19” front panels with metal guides, 1U 19” front panels with cable gland and brush gasket, plain 19” front panels and 1U 19” front panels with digital thermostat.

ANNEX 1: Cryogenic Valves

The thermal and mechanical characteristics of the cryogenic valves used in ITER cryogenics system shall comply with section 5.1.1 of the Technical specification of the ITER cryogenic valves including warm valves (ITER_D_2VV4PL):

Fluid	Helium / Nitrogen (gas or liquid)
Nominal valve size	from DN 6 to DN 200
Pressure class	PN25 (2.5 MPa) for LHe plants and cryodistribution
	From PN50 (5.0 MPa) to PN 100 (10.0 MPa) for LN2 plants
Service temperature	4 K to 300 K for the LHe plant and Magnet cryodistribution
	4 K to 470 K for the cryopumps cold valve boxes
Body	Stainless steel (AISI 316L or AISI 304L)
Static O-ring	Viton®
Seat/Seal	Vespel, PTFE, PCTFE, PEEK (For ionizing environment, recommendation will be given by the manufacturer)
Flow characteristic	Equal percent, linear, Kv (m^3/h) [1]
Rangeability	To be defined by the manufacturer for each nominal valve size
Stem	To be defined by the manufacturer
Heat leak	To be defined by the manufacturer for each nominal valve size, temperature level, and for the both possible cases: with and without 80 K thermal anchor.

The mechanical interfaces of the cryogenic valves used in ITER cryogenics system shall comply with section 5.1.2 of the Technical specification of the ITER cryogenic valves including warm valves (ITER_D_2VV4PL):

To vacuum enclosure	The valves bodies will be either welded on the various cold boxes or bolted using flanges and O rings.
To the process lines	The valves bodies will be welded on the piping
	Flanges will be accepted only for the warm valves
Cryogenic length	To be proposed by the manufacturer
Leak tightness	$< 10^{-9}$ Pa.m^3/s (from body to vacuum)
	$< 10^{-5}$ Pa.m^3/s (from body to atmosphere); Bellow seal shall be used for sub atmospheric circuits ($<10^{-9}$ Pa.m^3/s from body to atmospheric pressure)
	$< 10^{-4}$ Pa.m^3/s across the seat (Room temperature, up stream / design pressure, down stream / vacuum pressure)
Maximum available stress	To be defined by the manufacturer for each nominal valve size
Maximum available displacement	To be defined by the manufacturer for each nominal valve size and cryogenic length

The actuator for the cryogenic valves used in ITER cryogenics system shall comply with section 5.1.3 of the Technical specification of the ITER cryogenic valves including warm valves (ITER_D_2VV4PL):

Actuator	Pneumatic (air supply 7 bar g, oil and water free) Solenoid for on/off valves (220/240 Vac or 24 Vdc) Normally close / normally open Option: valve damper
I/A tubing	**Tube** polyamides **(Rilsan®** or equivalent**)** or Stainless Steel (recommended)

The positioners for the cryogenic valves used in ITER cryogenics system shall comply with section 5.1.4 of the Technical specification of the ITER cryogenic valves including warm valves (ITER_D_2VV4PL):

Positioner mounting	The positioner mounting shall refer to the Namur guidelines or IEC 60534-6-1 standard in order to make it possible to interchange the positioner of different manufacturer.
Positioner	Electro pneumatic
	Remote control (Hart protocol, Netbus, other fieldbuses…)
	Two options: 1) The positioner is side mounted on the cryogenic valve. 2) The positioner is father of the cryogenic valve. Motherboards with microcontroller and input circuit could be centralized in a dedicated cubicle (not supplied) while pneumatic unit including piezoelectric valves will be side mounted on the cryogenic valve.
Position	Position duplication (4-20 mA)
	End switches (positive and negative open/close indication)
Stroke time	To be defined by the manufacturer for each nominal valve size

The reliability and availability requirements for the cryogenic valves used in ITER cryogenics system shall comply with section 5.1.5 of the Technical specification of the ITER cryogenic valves including warm valves (ITER_D_2VV4PL):

Reliability	Control valves shall be integrated into the ITER cryogenic system for 20 years. It is expected they shall be operated for 10,000 stroke cycles at least and 20 thermal cycles without replacing any of its components. After the 10,000 stroke cycles the lifetime of the valve should be extended by the same amount of cycles by only exchanging easily dismountable parts of the valve while welded in situ on the cold box.
	MTBF shall be provided by the manufacturer
	A special requirement is relating to some cryogenic valves of the cryopumps system that have to withstand 500 thermal cycles per year due to the high temperature regeneration mode (<470 K).
Maintainability	It is expected that manufacturer will provide technical documentation and spare parts during 10 years at least.

ANNEX 2: LV & MV Motors

Codes and standards

For construction and installation, the LV and MV electrical motors shall respect the quality level required according to standards RCC-E, and IEC 60034, 60072, 60079, 60085, 60709 and 60780, in accordance with section 4.7.1 of the EDH Guide A (ITER_D_2EB9VT).

Ratings

Ratings shall comply with section 4.7.2 of the EDH Guide A (ITER_D_2EB9VT), which describes the information to be displayed on each Motor Data Sheet, and details the power supply requirements for the 3 classes of motors: >200 kW, ≤200 kW and <0.5 kW.

Enclosures

Design and construction of the enclosures shall comply with section 4.7.3.1 of the EDH Guide A (ITER_D_2EB9VT), depending whether the concerned motors are MV motors, LV motors covered by IEC 60034-5 or motors used in hazardous areas covered by IEC 60079. The physical characteristics of motors shall comply with IEC 60072 as much as practical and applicable.

Insulation

Design and construction of the insulation shall comply with section 4.7.3.2 of the EDH Guide A (ITER_D_2EB9VT), according to which the motors shall have moisture resistant fully encapsulated windings as described in IEC 60034-1. Insulation shall be Class F with highest design cooling medium temperature limited to class B in accordance with IEC 60085. For voltage and frequency variations, paragraph 7.3 of IEC 60034-1 shall apply.

For MV motors, the stator insulation shall be VPI (vacuum pressure impregnated) after the stator has been wound, wedged, connected and the bracing system installed. For MV motors, the strand insulation and turn insulation shall be designed to withstand excessive switching surges caused by open-close operation of vacuum contactor. The stator winding insulation shall be designed to withstand an electrical impulse voltage within the envelope defined in IEC 60034-15.

Bearings

Design and construction of the bearings shall comply with section 4.7.3.3 of the EDH Guide A (ITER_D_2EB9VT), regarding antifriction bearing, their lubrication and their sleeves and housing and the accessibility to the inner parts of the motor. L-10 life of the bearings shall be not less than 100,000 hours according to ISO 281 and AFBMA.

Terminal Leads, Connectors and Boxes

Design and construction of the terminal leads, connectors and boxes shall comply with section 4.7.3.4 of the EDH Guide A (ITER_D_2EB9VT), to ensure a degree of protection at least IP 54 in accordance with IEC 60034-5. Details of terminal boxes, their connections and their insulation and earthing are given for MV and LV motors.

Starting and Acceleration Characteristics

Starting and acceleration characteristics shall comply with section 4.7.4.1 of the EDH Guide A (ITER_D_2EB9VT), which describes the requirements for SIC and non-SIC components, and depending to their rated output P: $P < 5$ kW, 5 kW $\leq P < 37$ kW, $P \geq 37$ kW, $P > 70$kW. Motors shall meet duty cycle S1 in accordance with IEC 60034-1.

Operation

Operation of the LV & MV motors shall comply with section 4.7.4.2 of the EDH Guide A (ITER_D_2EB9VT), with frequency/voltage variation range according to IEC 60034-1, capability to sustain 130% overvoltage and to deliver nominal torque at 80% voltage (75% for SIC motors) during 10 seconds, and a pull-out torque of 160% (continuous load) or 200% (intermittent load).

Vibration and Over-speed

Vibration and over-speed shall be compliant with section 4.7.5 of the EDH Guide A (ITER_D_2EB9VT), i.e. the amplitude of vibration under all load conditions shall be limited to the values listed in IEC 60034-14, unless a lower value is required by the driven equipment. Motors shall be capable of over-speed operation, under emergency conditions, in accordance with the IEC 60034-1.

Sound Level

In compliance with section 4.7.6 of the EDH Guide A (ITER_D_2EB9VT), LV & MV motor sound level including maximum sound level and method of measurement shall be in accordance with the method described in IEC 60034-9. When requested, the Supplier shall demonstrate acceptable sound level in accordance with IEC 60034-9.

Lifting Devices

To facilitate installation or removal, motors shall have suitable lifting devices which shall be shown on the Supplier's drawings, in accordance to section 4.7.7.1 of the EDH Guide A (ITER_D_2EB9VT).

Space Heaters

Space heaters shall be provided when necessary as described in section 4.7.7.2 of the EDH Guide A (ITER_D_2EB9VT), i.e: for all motors rated 7.5 kW or larger, and motors rated 2 kW or larger installed outdoor or in damp environment. Power supply shall be 230 VAC, 1 phase or 400 VAC, 3 phases. Heaters shall be placed inside the motor frame, readily accessible and clearly indicated as SIC or non-SIC.

Temperature Detectors

Temperature detectors shall be provided when necessary as described in section 4.7.7.3 of the EDH Guide A (ITER_D_2EB9VT), which describes the sensors required for all MV motors and for specified LV motors.

Current Transformers

Current transformers shall be compliant with section 4.7.7.4 of the EDH Guide A (ITER_D_2EB9VT), which focuses on the requirements for motors located inside the Tokamak building or larger than 1,000 kW.

Accessory Terminal Boxes

Accessory terminal boxes shall comply with section 4.7.7.5 of the EDH Guide A (ITER_D_2EB9VT), i.e.: separate air-insulated accessory terminal boxes for space heaters, temperature detectors, thermocouples, vibration detectors and current transformers, designed and fabricated to meet a degree of protection of at least IP 54 in accordance with IEC 60034-5.

Leads of accessory items normally operating at voltages of 50 volts (rms) or less shall be separated from other accessory leads by a suitable barrier or be terminated in a separate accessory terminal box. All boxes for SIC motors shall be provided with isolation means such

as barriers or physical isolations between the wiring and/or components classified as SIC and the ones not classified as SIC in accordance with IEC 60709 and RCC-E.

Earthing

Earthing of the LV & MV motors shall comply with section 4.7.7.6 of the EDH Guide A (ITER_D_2EB9VT), which refers to EDH Part 5: Earthing and Lightning Protection (4B7ZDG).

Cleaning and Painting

Cleaning and painting of the LV & MV motors shall comply with section 4.7.8 of the EDH Guide A (ITER_D_2EB9VT), and shall suitable for use under the ITER site environmental condition.

Packaging and Storage

Packaging and storage of the LV & MV motors shall comply with section 4.7.9 of the EDH Guide A (ITER_D_2EB9VT), in order to protect the motors for shipment and outdoor storage, specifically avoiding exposure of windings and connections, terminals, bearings, and bare metal surfaces.

Nameplate

The nameplate on the LV & MV motors shall comply with section 4.7.10 of the EDH Guide A (ITER_D_2EB9VT), and display the data required by IEC 60034-1, plus other specific requirements.

Drawing and Documentation Requirements

Drawings and documentation for the LV & MV motors shall be provided in compliance with section 4.7.11 of the EDH Guide A (ITER_D_2EB9VT), which describes the generic requirements for all motors along with the specific requirements for MV and LV motors (SIC or non-SIC) regarding various curves, drawings and documents, list of spares, procedures and report, operation and instruction manuals, and others as applicable.

Test and Inspection

Routine tests, performance tests and field tests shall be made in accordance with applicable codes and standards, and written documentation and/or certified test reports shall be submitted in accordance with the packaged mechanical submittal schedule, as described in section 4.7.12 of the EDH Guide A (ITER_D_2EB9VT),.

Qualification Requirements

Qualification of SIC LV & MV motors along with their driven devices, shall be performed in compliance with RCC-E and IEC 60780 as described in section 4.7.13 of the EDH Guide A (ITER_D_2EB9VT), i.e. in a manner that assures their operability when subjected to ITER-equivalent conditions, including temperature, humidity, pressure, radiation, stray magnetic field and EMI (Electro-Magnetic Interference), during normal operation and accident conditions, as well as ambient conditions imposed by potential hazards external to the system (i.e. design base earthquake, etc.) and equipment aging (i.e. radiation, thermal & cyclic) throughout the equipment lifetime.

ANNEX 3: I&C Cubicles

Multi-purpose floor standing cubicles

The main targets are LCCs and SCCs in industrial standard environments.

For conventional and interlock controls, the cubicles shall have the following dimensions: height 47 U / 2200mm, width 800mm, depth 800mm.

Their general features shall be as follows:

- Structure: top and bottom frame, vertical uprights.
- Degree of protection IP55 according to IEC 60529.
- Resistance to mechanical impact: IK10 according to IEC 62262 (IK08 for the transparent doors).

The standard configuration shall comply with the technical description given in section 3.1 of the I&C Cubicle Catalogue (ITER_D_35XVZ):

- Front Securit® glazed door with 180° hinges (right) and locking system by key N°405,
- Rear plain door with 180° hinges (right) and locking system by key N°405,
- 1 Removable roof mounted with 2 cable gland plate type FL21 (one with 25 cables entries Ø5 to Ø26 and one with 7 cables entries Ø8 to Ø 60) on lateral one at the left side and other one at the right side,
- 1 pair of 2 standard side panels screwed on with captive screws,
- 1 standard fan 473m3/h mounted on the bottom of the rear door,
- 1 outlet grille mounted on the top of the rear door,
- 4 19” uprights front and rear chassis,
- 2 vertical trim strips on the front 19” upright,
- Cable tray mounted at left,
- 1 cable gland plate 3 parts mounted on the bottom of rack,
- 1 plinth 100mm joint,
- 1 set of 4 feet adjustable joint,
- 1 set of 4 lifting eyes (not mounted),
- 1 earthing braid for claddings joint,
- 2 earthing strips,
- 1 able support on the lateral framework,
- 1 front plate and 1 DIN rail (mounted on the 19’’ uprights),
- 1 digital thermostat 1U,
- Contact door at the front and rear door (mounted),
- 1 Monitoring and sensors joint (not wired) inside the enclosure,
- Painted with epoxy-polyester resin, Afnor.2550 (blue) for decontamination,
- Document support inside the front door.

Multi-purpose wall mounted cubicles with electromagnetic protection.

Main target is SCCs in harsh environment.

For conventional and interlock controls and EMI protection, the cubicles shall have the following dimensions: height 21U / 1000mm, width 800 mm, depth 300mm.

Their general features shall be as follows:

- Single-piece metal enclosures made from special sheets of ALUZINC 150.

- The presence of 55% of aluminium on the surface of the sheet metal ensures good reflection of electromagnetic waves.
- Protection degree: IP 55, according to IEC 60529.
- Resistance to external mechanical impacts: IK 10 according to IEC 62262.

The standard configuration shall comply with the technical description given in section 3.2 of the I&C Cubicle Catalogue (ITER_D_35XVZ):

Body:

- Single-piece body, folded and welded,
- 6 holes to the cubicles equipped with EMC gland: 3 PG21 and 3 PG13,
- holes on the top to mount the lifting eyes,
- Equipped with 19" fixed chassis 21U mounted at 80mm of the door.

Door:

- The special body-door gasket (IP + EMC) shall provide, in addition to water and dust tightness, electric continuity between the door and the body of the enclosure,
- 2 locks with key N°405 and earth continuity helps improve the general shielding,
- An earthing braid added to the enclosure between the body and the door guarantees a good earth connection and, consequently, good electromagnetic compatibility,
- Holes to mount the lamps from the monitoring system,
- EMC gland not mounted: 6 glands EMC (3xPG21 + 3xPG13),
- 2 earthing strips,
- Wall fixing lugs,
- 1 EMC fan 130m3/h mounted on the bottom lateral side (left) and 1 outlet grill mounted on the top of lateral side (right),
- 1 set of 4 lifting eyes (not mounted),
- 1 front plate and 1 DIN rail (mounted on the 19'' uprights),
- 1 digital thermostat 1U,
- 1 door contact (mounted),
- 1 Monitoring and sensors joint (no wired) inside the enclosure,
- Painted on the outside with epoxy-polyester resin, Afnor.2550 (blue) for decontamination,
- Document support inside the front door.

Cubicles allocated to safety controls

Safety-specific, details still TBD, to be completed at a later stage.

I&C cubicle monitoring

Functional specifications

Whatever the cubicle type, use and form factor; each I&C cubicle of ITER shall be monitored as described in section 4.1 of the I&C Cubicle Catalogue (ITER_D_35XVZ).

The monitoring system shall be a standard component for ITER; its hardware configuration may depend on the cubicle form factor for door monitoring only (one or two switches).

The monitoring system shall include a control function of the cubicle cooling system through an on/off command defined by high and low thresholds on the temperature measurement. This control function shall be implemented by a thermostat for air cooling, but may be more complex in the case of an air conditioning system.

The monitoring system shall include two beacons mounted on the cubicle front door: a green one to flag the status of the cubicle powering; a red one to flag the HH earth current, HH temperature and also the door opened. They shall be labelled POWER and FAULT.

The monitoring system shall include two local digital indicators of the cubicle temperature and earth current.

Signals delivered by the monitoring system

The monitoring system shall be interfaced to the plant system I&C or the central I&C depending on which I&C system it belongs to.

The signals used for this interface shall be compliant with section 4.2 of the I&C Cubicle Catalogue (ITER_D_35XVZ). They shall be made available on a single terminal block to be connected to the plant system I&C or to the central I&C.

Interface with plant system I&C or central I&C

The configuration used to interface the cubicles with the plant system I&C or central I&C shall be selected among the 5 configurations described in section 4.3 of the I&C Cubicle Catalogue (ITER_D_35XVZ):

Signal conditioning cubicle (SCC),

Signal conditioning cubicle (SCC) plus remote I/O chassis,

Combined SCC and LCC,

LCC configuration,

I&C cubicle without any I&C controller.

Configuration of the monitoring system

The initial configuration at delivery of the cubicle monitoring system shall comply with section 4.4 of the I&C Cubicle Catalogue (ITER_D_35XVZ):

Ready-to-use system, all sensors, beacons and digital indicators shall be mounted and cabled,

Temperature control shall be cabled and adjusted, temperature and earth current thresholds shall be set, and all shall be easily accessible even after complete integration of future I&C components,

The monitoring system shall be supplied by 220 VAC provided by the electrical distribution of the I&C cubicle (not included in the scope of these specifications),

A dedicated and separate terminal block shall be provided for the monitoring system power supply in addition to the terminal block dedicated to monitoring signals,

All wiring drawings and technical document related to the monitoring system for final cabling and maintenance shall be provided.

I&C cubicle accessories

Eyebolts

The lifting eyebolts for floor-standing cubicles shall comply with section 5.1.1 of the I&C Cubicle Catalogue (ITER_D_35XVZ) which describes the type, position on the cubicle, dimension, material used and maximum load.

Plinths

The plinths for floor-standing cubicles shall comply with section 5.1.2 of the I&C Cubicle Catalogue (ITER_D_35XVZ) which describes the structure, material, finish, degree of protection, resistance to impacts and maximum load.

Cable-guide cross-rails for framework

The cable-guide cross-rails for framework used for the floor-standing cubicles shall comply with section 5.1.3 of the I&C Cubicle Catalogue (ITER_D_35XVZ) which describes the structure, material and composition.

Steel wired cable trays

The steel wired cable trays for the floor-standing cubicles shall comply with section 5.1.4 of the I&C Cubicle Catalogue (ITER_D_35XVZ) which describes the dimensions, material, and fixation.

Metal guides

The metal guides for the floor-standing cubicles shall comply with section 5.1.5 of the I&C Cubicle Catalogue (ITER_D_35XVZ) which describes the dimensions, mounting elements, installation and number of items to be delivered.

Plastic document pockets

The plastic document pockets for the floor-standing cubicles shall comply with section 5.1.6 of the I&C Cubicle Catalogue (ITER_D_35XVZ) which describes the dimensions, fixation, material and number of items to be delivered.

Sheet-edge protection strips

The sheet-edge protection strips for the floor-standing cubicles shall comply with section 5.1.7 of the I&C Cubicle Catalogue (ITER_D_35XVZ) which describes the dimensions and material.

Partial 19" fixed racks

The partial 19" fixed racks for the floor-standing cubicles shall comply with section I&C Cubicle Catalogue (ITER_D_35XVZ) which describes the dimensions, fixation, material, maximum load and number of items to be delivered.

19" earthing strips (Y)

The 19" earthing strips (Y) shall comply with section 5.2.1 of the I&C Cubicle Catalogue (ITER_D_35XVZ) which describes the 2 models envisioned and their material, dimensions, and fixation.

Fixing for 19" racks

The fixing for 19" racks shall comply with section 5.2.2 of the I&C Cubicle Catalogue (ITER_D_35XVZ) which describes the number of screws, nuts and plastic washes required.

Fixed perforated 19" trays, 1 U

The fixing for fixed perforated 19" trays shall comply with section 5.2.3 of the I&C Cubicle Catalogue (ITER_D_35XVZ) which describes the dimensions, fixation, material, paint and acceptable load required.

Telescopic perforated 19" trays, 1 U

The telescopic perforated 19" trays shall comply with section 5.2.4 of the I&C Cubicle Catalogue (ITER_D_35XVZ) which describes the dimensions, fixation, material, paint and acceptable load required.

2 U fixed 19" trays

The 2 U fixed 19" trays shall comply with section 5.2.5 of the I&C Cubicle Catalogue (ITER_D_35XVZ) which describes the dimensions, fixation, material, paint and acceptable load required.

Fixed 19" slides

The fixed 19" slides shall comply with section 5.2.6 of the I&C Cubicle Catalogue (ITER_D_35XVZ) which describes the dimensions, fixation, material, paint, acceptable load and number of items required.

2 U partial fixed 19" slides

The 2 U partial fixed 19" slides shall comply with section 5.2.7 of the I&C Cubicle Catalogue (ITER_D_35XVZ) which describes the dimensions, fixation, material, paint and acceptable load required.

Current distribution accessories

The current distribution accessories shall comply with section 5.2.8 of the I&C Cubicle Catalogue (ITER_D_35XVZ) which describes the sockets, standards, fixation, material and protection required.

19" front plate for modular circuit-breakers

The 19" front plate for modular circuit-breakers shall comply with section 5.2.9 of the I&C Cubicle Catalogue (ITER_D_35XVZ) which describes the dimensions, fixation, material and paint required.

19" DIN rail

The 19" DIN rail shall comply with section 5.2.10 of the I&C Cubicle Catalogue (ITER_D_35XVZ).

1 U 19" front panels with metal guides

The 19" front panels with metal guides shall comply with section 5.2.11 of the I&C Cubicle Catalogue (ITER_D_35XVZ) which describes the fixation, material, paint and number of guides required.

1 U 19" front panels with cable gland and brush gasket

The 19" front panels with cable gland and brush gasket shall comply with section 5.2.12 of the I&C Cubicle Catalogue (ITER_D_35XVZ) which describes the fixation, material, paint and dimension required.

19" plain front panel

The 19" plain front panels shall comply with section 5.2.13 of the I&C Cubicle Catalogue (ITER_D_35XVZ) which describes the fixation, dimensions, material and paint required.

1 U 19" front panel with digital thermostat

The 19" front panels with digital thermostat shall comply with section 5.2.14 of the I&C Cubicle Catalogue (ITER_D_35XVZ) which describes the fixation, material, paint and thermostat specifications required.