

## Top Level Project Scope Document

### ITER Plant Breakdown Structure (PBS)

This document is a part of the ITER configuration baseline documentation.

Its scope is to define the ITER Plant Breakdown Structure (PBS), the roles and responsibilities for managing the PBS, and to describe the PBS status.

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Change Log			
ITER Plant Breakdown Structure (PBS) (28WB2P)			
Version	Latest Status	Issue Date	Description of Change
v1.0	In Work	12 Oct 2007	
v1.1	In Work	17 Oct 2007	
v1.2	In Work	17 Oct 2007	
v1.3	Signed	24 Oct 2007	
v1.4	In Work	12 Dec 2007	
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v1.6	Approved	06 May 2008	
v1.7	In Work	11 Sep 2009	Improved the PBS to cover external services and interfaces: Deleted PBS-42 (incorporated into relevant PBS 51,52,53,54) Added PBS-44 Cable Tray Infrastructure Added PBS-47 Plasma Control Updated and rename PBS 64 Radiological Protection Renamed PBS-67 to Hot Cell and Radwaste Facilities Added PBS-69 Access Control & Security System Added PBS-70 Site Outside Platform Added PBS-98 External Services
v1.8	Signed	02 Oct 2009	Improved the PBS to cover external services and interfaces: Deleted PBS-42 (incorporated into relevant PBS 51,52,53,54) Added PBS-44 Cable Tray Infrastructure Added PBS-47 Plasma Control Added PBS-58 Port Plug Test Facility Updated and rename PBS 64 Radiological Protection Renamed PBS-67 to Hot Cell and Radwaste Facilities Added PBS-69 Access Control & Security System Added PBS-70 Site Outside Platform Added PBS-98 External Services  if(typeof editorarray == 'object') {  editorarray.push('ctl00_MasterPlaceHolder_DocumentView1_ctl01_ctl11_v er_description') } }
v1.9	Approved	15 Oct 2009	Changed reference to new WBS document
v2.0	Approved	25 Feb 2011	Deleted PBS 67 per MPCR 26. Improved PBS Structure for the following purposes: -Simplified PBS level (down to level 4) to control components effectively. -Every component shall be named with the ITER Numbering System and shall be represented on a diagram. All ITER components are represented at PBS Level 4. -The unique function of the PBS is to structure materials (physical components). Tasks/ activities and locations shall be dealt with by the WBS and GBS respectively (not by the PBS).

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## 1 Purpose

- 1.1 This procedure describes the ITER Plant Breakdown Structure (PBS) and the roles and responsibilities for managing the PBS throughout the life cycle of the ITER Project.
- 1.2 The PBS enables to identify the rooting of all ITER systems, subsystems, assemblies/loops and subsequently of their components.
- 1.3 The PBS also enables to support engineering data structure and configuration management [2] by generating and assigning to each ITER item a unique reference to be used as a root for identifying and numbering items or activities associated with the item.

## 2 Scope

- 2.1 This procedure shall apply to the ITER Plant and all its systems (at all levels).
- 2.2 The PBS has been set at the beginning of the ITER Project and shall be maintained in compliance with this procedure during the lifetime of the ITER Project.
- 2.3 The PBS is linked to other major breakdown structures developed for the management of the ITER Project, that is, the Work Breakdown Structure, the Geographical Breakdown Structure and the Functional Breakdown Structure. The relationship between PBS and the other structures is described in Attachment 1.

## 3 Definitions

- 3.1 **Plant Breakdown Structure (PBS):** The PBS is the hierarchical breakdown of the ITER Plant into distinct ITER elements. The PBS identifies the links between parent/child elements, so that there is only one rooting between a parent element and one of its child element (and vice versa).
- 3.2 **PBS Level:** The PBS has five levels (Level 0 to 4), each level representing a specific hierarchical step in the breakdown of ITER Plant, and thus regrouping all the ITER items for that hierarchical step.
- 3.3 **Item:** An all-inclusive term used in place of any of the following: appurtenance, assembly, component, equipment, material, module, part, structure, subassembly, subsystem, system.
- 3.4 **PBS links:** The relationship between a parent ITER element and one of its child elements (and vice versa). It is represented as an interconnecting line between nodes of the PBS tree.
- 3.5 **Tree:** The graphical form of the PBS as a tree structure, including nodes and branches.
- 3.6 **Node:** An intersecting point in the tree structure, representing a specific ITER item.
- 3.7 **Branch:** The structure of the tree from a given parent node to all its child nodes.
- 3.8 **ITER Plant:** “ITER Plant” refers to the whole ITER installation, including the ITER site and its infrastructure and all buildings and equipment on that site. ITER Plant is the starting point of the PBS (i.e. ITER item at PBS Level 0).

- 3.9 **ITER system:** A primary constituent element of ITER Plant. All ITER systems are represented at PBS Level 1.
- 3.10 **ITER sub-system:** A primary constituent element of an ITER system. All ITER sub-systems are represented at PBS Level 2.
- 3.11 **ITER assembly/loop:** A primary constituent element of an ITER sub-system. All ITER assembly/loop are represented at PBS Level 3.
- 3.12 **ITER component:** A constituent item of an ITER assembly/loop that is linked to its parent assembly/loop via its PBS number. A component is a major piece of equipment, such as a pump or a tank, to which is assigned a Function Category Designator as described in the reference [4]. All ITER components are represented at PBS Level 4.
- 3.13 **Acronyms:**
  - CIEH: Head of Office for Centralized Integration and Engineering
  - DA: Domestic Agency
  - DG: Director General
  - DIPH: Head of Department for ITER Project
  - DIRH: Head of Directorate
  - IO: ITER Organization
  - OH: Head of Office
  - PBS: Plant Breakdown Structure
  - RO: Responsible Officer
  - SRD: System Requirements Document
  - WBS: Work Breakdown Structure

## 4 Roles and Responsibilities

- 4.1 The DG shall have overall responsibility for the definition of the ITER PBS.
- 4.2 The CIEH is responsible for the centralized management of all proposals for modifying the PBS.
  - 4.2.1 The CIEH shall check that the PBS is developed for all ITER items and that a common structure is used for all systems (at all PBS level).
  - 4.2.2 The CIEH shall review any proposal for modifying the existing PBS and pre-assess its potential impact on the ITER Project. If this potential impact is significant, the CIEH shall require that the proposed modification is fully assessed as a Project Change Requests (PCR) in accordance with Project Change Procedure [3].
  - 4.2.3 The CIEH shall ensure that any proposals for modifying the PBS and their outcome are recorded into a centralized database.
- 4.3 Any modifications to the existing PBS shall be undertaken as described below.
  - 4.3.1 The RO of a PBS Level 1 system is responsible for defining the PBS branch for that system – that is, identifying the PBS nodes that are connected down from it (that is, PBS Level 2 and 3). He/she shall keep this PBS branch in agreement with the evolution of the associated system design. This includes any changes (deletion or addition of PBS nodes, or changes of scope of PBS nodes).

- 4.3.2 The RO shall define the PBS identification number and name of each new PBS node he/she proposes to add as described in Section 5. Any request for modification to the PBS shall be in accordance with Project Change Procedure.
- 4.3.3 The revision of the PBS structure is approved according to the level of the PBS affected.
- Revision at PBS level 1 shall be approved by the Head of Department for ITER Project (DIPH). This approval authority may be delegated to the CIEH.
  - Revision at PBS level 2 and 3 shall be approved by the CIEH or his/her delegate.
- 4.4 All components shall be identified and updated at PBS level 4 by the system Responsible Officer.

## 5 PBS Level and Identification

- 5.1 The PBS is the hierarchical breakdown of ITER Plant into ITER elements following five levels as shown in Table 1 below. The current PBS shall be shown in the PBS Structure [1].
- 5.2 Each node of the PBS tree is named according to the ITER element it represents - as defined. For example: the top level node is ITER Plant, one of the Level 1 nodes is the Vacuum Vessel.

PBS Level	ITER element	PBS level ID
0	ITER Plant	<i>None</i>
1	System	2-digit number, 'XX'
2	Sub-systems	ID of parent PBS Level 1 + "." + 2 alphanumeric digits, 'XX.YY'
3	Assembly/loop	ID of parent PBS Level 2 + "." + 2 alphanumeric digits, 'XX.YY.ZZ'
4	Components	Per ITER Numbering System for Parts/Components

Table 1 – ITER PBS Level and numbering

- 5.3 Table 1 also shows the system for deriving the PBS identification number (ID) of each ITER element (or node), in agreement with the ITER Numbering System for Parts/Components [4].
- 5.3.1 ITER Plant being the root node has no numbering – it is the Level 0.
- 5.3.2 The ID of an ITER system (PBS Level 1) is represented by a unique 2-digit number, such as 11 for magnets or 26 for cooling water systems.
- 5.3.3 The ID of an ITER sub-system or assembly/loop (PBS Level 2 or 3) comprises the ID of its parent ITER element, plus 2 alphanumeric characters to represent the system or sub-system. These 2 characters shall be unique in the PBS branch for a given parent element, but can be re-used in another, independent branch. The IDs of each PBS level are separated by a full stop. For example:

- In-Vessel Coils = 15.IV
- CS Assembly Tools = 22.CS
- Third Correction Coil = 11.BC.C3
- Equatorial Cryostat Thermal Shield = 27.02.ES

- 5.3.4 The ID (Unique Identification Number) of an ITER component (PBS Level 4) shall be assigned according to the ITER Numbering System for Parts/Components [4].
- 5.4 The PBS is linked to other major breakdown structures developed for the management of the ITER Project, that is, the Work Breakdown Structure (WBS), the Geographical Breakdown Structure (GBS) and the Functional Breakdown Structure (FBS). The relationship between PBS and these other structures is described in Attachment 1.
- 5.5 The PBS is represented in a graphical form as a tree structure, with PBS nodes and branches. The current PBS at Level 1 is shown in the Attachment 2.
- 5.6 All components shall be identified on the diagrams (e.g., Process Flow Diagram, Piping and Instrumentation Diagram, Loop Diagram, etc.) with a unique identification number according to Section 5.3.4.

## 6 References

- [1] PBS Structure (ITER\_D\_2FBMWF)
- [2] ITER IO Configuration Management Plan (ITER\_D\_27LHHE)
- [3] Project Change Procedure (ITER\_D\_22F4E5)
- [4] ITER Numbering System for Parts/Components (ITER\_D\_28QDBS)
- [5] ITER Systems Engineering Management Plan (ITER\_D\_2F68EX)

## 7 Attachments

Attachment 1 – Relation of PBS with other breakdown structures

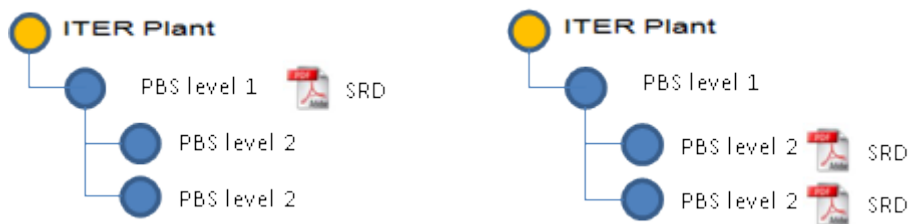
Attachment 2 – Figure - 1, ITER Plant Breakdown Structure Level 1

## Attachment 1 - Relations of PBS with other Breakdown Structures

The Plant Breakdown Structure (PBS) is a subset of the WBS that includes an exhaustive, hierarchical tree structure of deliverable items and services that make up the ITER plant. In addition PBS should be utilized only for the ITER items with independent interfaces among Geographical Breakdown Structures, Functional Breakdown Structures, and so forth.

### PBS-SRD

In principle, PBS Level 1 and 2 should be characterized by the fact that their requirements are formally recorded in a SRD as shown in the below.



### PBS-WBS

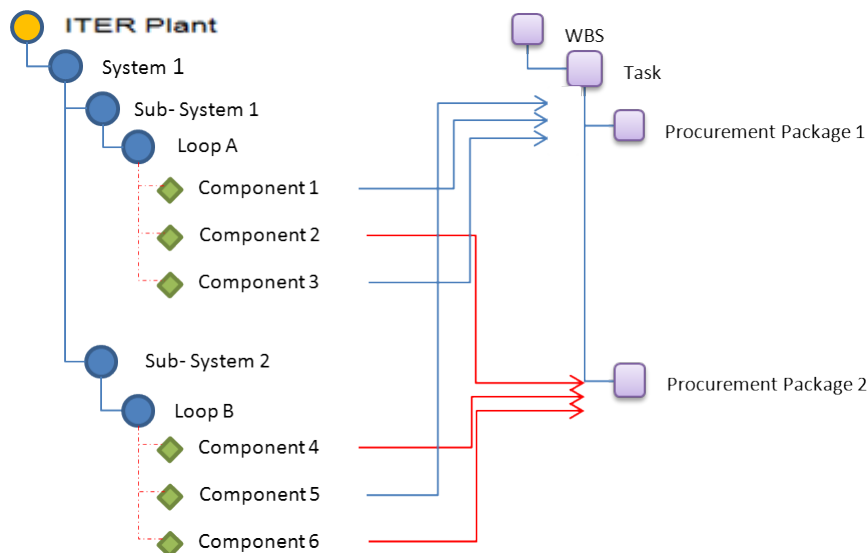
The PBS and its graphical representation are used to verify the status of the plant configuration. It is important to note that the PBS does not define the activities (tasks or work packages) required to actually realise the elements of the plant. These are defined in the ITER Work Breakdown Structure (2NC9T7). The two structures, the PBS and the WBS, have a similar organisation and nomenclature up to PBS first level.

This is because the scope of the ITER Project is the design, implementation, and operation up to the final decommissioning of a single plant, and quite naturally, the organisation of the work descends from the structure of the product to be created.

The first level of the PBS (corresponding to the breakdown of the plant into its systems) uses the same numbering convention as used for level 3 of the WBS, which identifies all activities related to the implementation and operation of these systems.

WBS, work breakdown structure, is aimed to organise the work for the design and construction phase (at least), and does not overlap PBS, but is the result of a systematic definition of the work and engineering data to be produced across the engineering processes, and PBS structure.

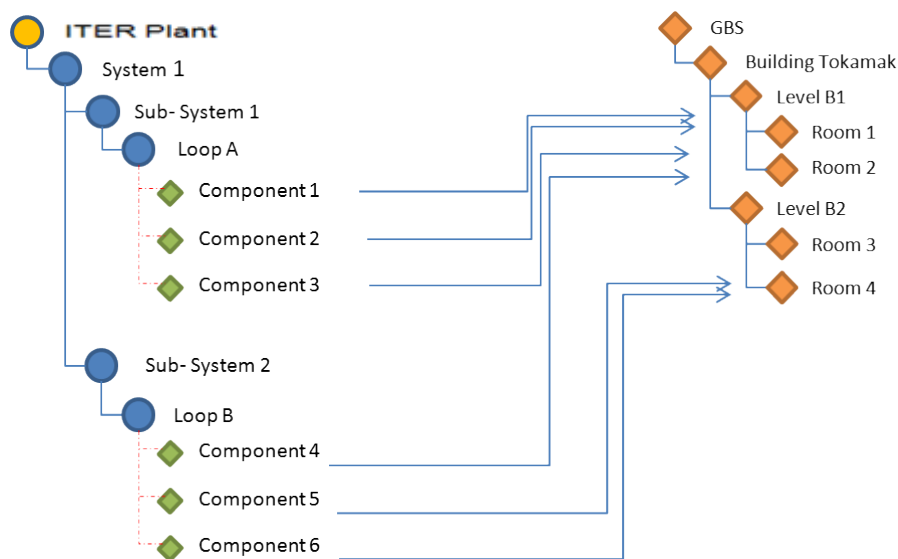




### PBS-GBS

The Geographical Breakdown Structure (GBS) defines the physical location of the components of ITER plant into buildings, levels and rooms.

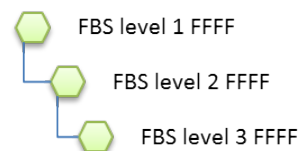
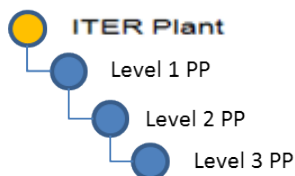
Components are identified on the PBS. When a physical location is required it shall be assigned in the relevant nodes of GBS.



### PBS-FBS

The Functional Breakdown Structure (FBS) is the ITER system for the operation [[ITER Functional Breakdown Structure](#) (ITER\_D\_43RRBR)]. The FBS will be used by CODAC for I&C variable naming and functional descriptions of the plant control systems.

The relation between the both structures is that the signal name which is based on the component name corresponds to the process variable name, as shown below:



Component Name    PPPPP-TTT-NNNN

Signal Name		Process Variable Name
PPPPPP-TTT-NNNN:AAAA[RRRR]-SSS	↔	FFFF-FFFF-FFFF: VV....VV

Details are described in the documents Signal and plant system I&C Variable Naming Convention (ITER\_D\_2UT8SH).

## Integrated Systems

ITER Overall products are broken down, in a logical way, into a set of “Integrated Systems”. The Integrated System Structure is to be used for the plant integration in order to maintain a functional consistency, a skill and discipline consistency inside each Integrated System, and to minimize interfaces between Integrated Systems. According to ITER Systems Engineering Management Plan [5] the ITER plant consists of several integrated systems which include the first level of the PBS.

## Attachment 2 - Top level and Plant Breakdown Structure level 1

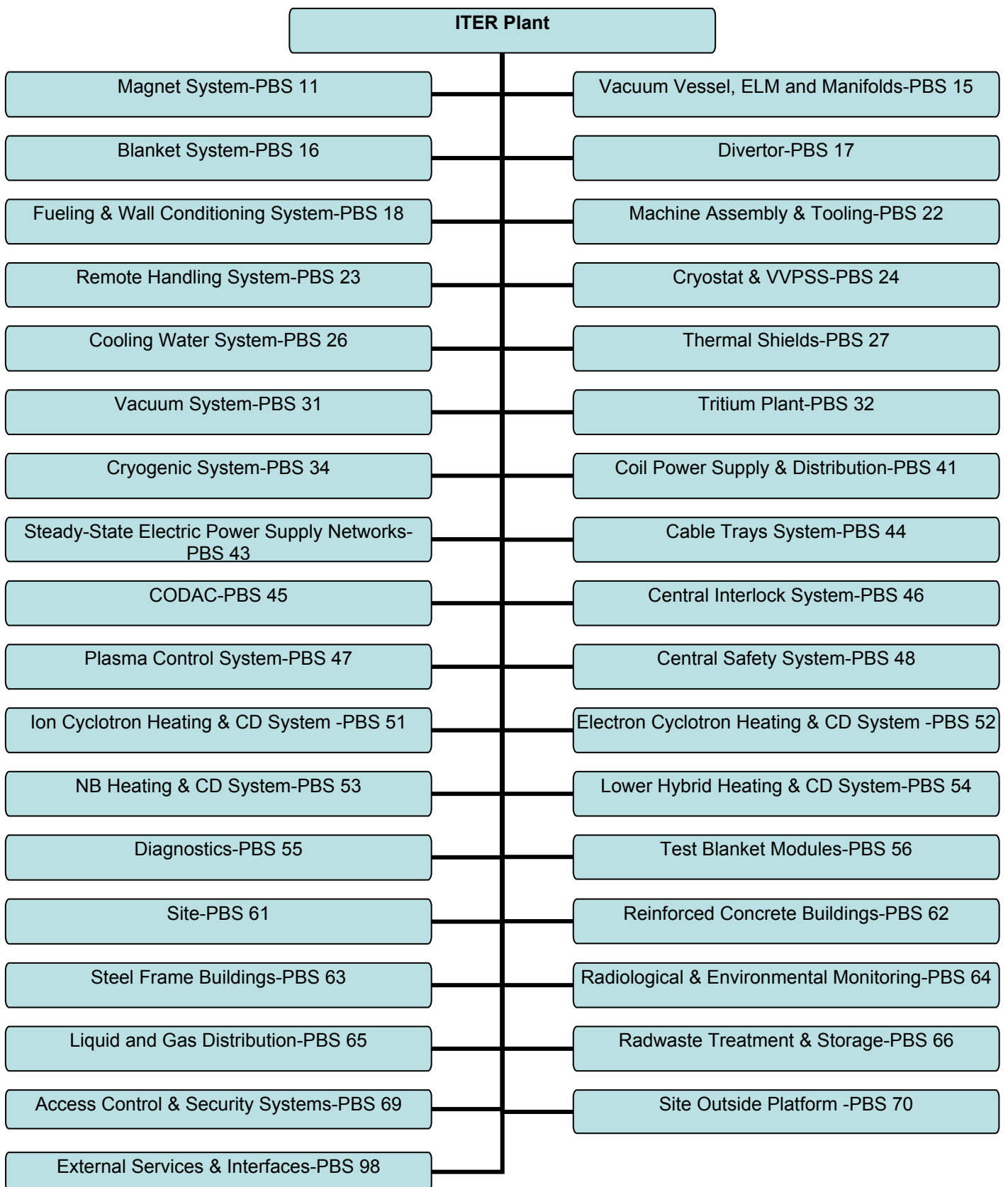


Figure – 1