

Preparation for the Procurement of the ITER Assembly Toolings

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1. Introduction

Of the nine components allocated to Korea for the construction of the ITER (International Thermonuclear Experimental Reactor) [1], the preparation status for the procurement of assembly toolings are described herein.

The design concepts for the assembly tools have been developed for a majority assembly tools. A detail design for the urgent sector sub-assembly tools will be carried for the next one year. This task is done in accordance with the ITA (ITER Transitional Arrangements) Agreement signed between ITER IT (International Team) and Korea. A long-term schedule and cost estimation for these assembly tools will be prepared for this period as well.

2. The Work Scope

The ITER tokamak is assembled from 9 sub-assembly sectors, each with a toroidal angle of 40° , and comprising a sector of vacuum vessel (VV), two toroidal field coils, the associated VV thermal shield. The components are delivered to the site individually, and sub-assembled into sectors using purpose-built jigs and fixtures in the assembly hall. Prior to installing the sectors in the tokamak pit, the tokamak gravity supports, lower cryostat sections, and the components which cannot be installed following final assembly of the sectors, are installed, or placed in the pit. Then sub-assembled nine- 40° sectors are transferred to the pit and installed sequentially. Following installation of the final sector, a detailed dimensional survey is carried out. The cryostat and ex-vessel components are finally installed after the VV is closed toroidally through welding.

Among the eleven categories of ITER assembly toolings, the tools for the following 9 assembly operation have been allocated to Korea; sector sub-assembly, sector assembly, cryostat assembly, cryostat thermal shield assembly, poloidal field coil assembly, port and piping assembly, central solenoid assembly, correction coil & feeder assembly, in-vessel component assembly.

The task is divided into two groups; one is the detail design group, the other is conceptual design one.

The work scope of detail design covers the development of detailed design concepts, validated via appropriate structural and functional analyses,

preparation of detail drawings, and the preparation of draft specifications for the development of detailed engineering designs for the major assembly tools. The tools to be studied in detail are as follows:

- i) vacuum vessel support, and sector lifting tools;
- ii) upending tool;
- iii) sub-assembly tool;
- iv) toroidal field coil support and bracing tools.

For each tool, the task will comprise the following items of work:

- i) review of the design concepts, development of alternative concepts if advantageous;
- ii) detailed structural analyses to validate the design concepts, including dynamic analyses as required;
- iii) elaboration of tentative operating for the tools, sufficient to clearly explain the function of the tools;
- iv) elaboration of the main components of the tool.
- v) preparation of drawings sufficient to describe the tools.
- vi) preparation of draft specification on the design ed tools;
- vii) development of tentative operating procedure for the tool;
- viii) planning for the subsequent detailed engineering, and manufacturing phases.

In addition, the conceptual design will be reviewed and refined for all the other tools which are not included in the detail design group. Finally, cost estimation and planning will be done for the all assembly tools allocated to Korea.

3. Conclusion

The detail design of the above-selected tools and conceptual design for all the other tools will be carried out for the next one year in accordance with the agreement between ITER IT and Korea as a one member of ITER negotiation country. And, cost estimation and planning will be done for the all assembly tools allocated to Korea.

REFERENCES

- [1] ITER Final Design Report, 2001.