

REPORT NO.

ITR-IEBH-101 v1.0

TITLE

ITER Engineering Basis Handbook

Vol. 1: Genesis, Design and Evolution

Chapter 1 - Foreword

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January 12th, 2026

This work has been carried out within the framework of the EUROfusion Consortium, funded by the European Union via the Euratom Research and Training Programme (Grant Agreement No 101052200 – EUROfusion). Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Commission. Neither the European Union nor the European Commission can be held responsible for them.



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www.iter.org

About the ITER Engineering Basis Handbook

This handbook consists of two volumes which describe the ITER design from its inception up to the design, construction and assembly in 2025.

The handbook is not designed to be read as a continuous sequence of chapters. Instead, it is composed of focused, self-contained sections that address specific topics. Each chapter can be read and understood independently, allowing readers to engage with the material most relevant to their needs without requiring familiarity with preceding chapters. As a result, the reader will find certain overlapping content in chapters.

It is to be noted that at the time of writing, the design for some systems is still on-going. Therefore, the reader should consider that whilst there is significant value of this important point-in-time study, an update would be required as the Project progresses.

A broad Project overview is given in the first volume, to provide the reader with background information necessary to understand the context in the subsequent more-detailed chapters of the second volume, dedicated to the individual systems composing ITER.

For the overall table of contents of the Handbook and to access each one of the chapters, please refer to <https://www.iter.org/scientists/iter-technical-reports>

Authors and Contributors of this Chapter

This Foreword is authored by Laban COBLENTZ, Head of the ITER Organization Communication Division.

Chapter 1

FOREWORD

The ITER Engineering Basis Handbook stands as both a compilation of the ITER design principles and a testament to the enduring spirit of international collaboration and scientific ambition that defines the Project. ITER represents a bold step forward in the quest to harness fusion power—a pursuit that has evolved from the conceptual design in the late twentieth century into a global, multidisciplinary endeavour, with construction and manufacturing well advanced, and machine assembly fully underway.

Throughout the intervening decades, scientists and engineers from around the world have joined forces, overcoming formidable scientific and technical obstacles to design and construct the largest fusion device ever built. The project's unique scale and complexity have required unprecedented cooperation among nations, industries, and research institutes, under the leadership of the ITER Organization and a truly global partnership.

This Handbook encapsulates the core of that effort. It is the product of the collective expertise and dedication of more than eighty authors, supported by editorial and coordination teams. Their commitment to sharing knowledge and lessons learned ensures that the Handbook will serve not only as a technical reference but also as a living record of ITER's ongoing evolution. The contributors, with the support of the ITER Organization and EUROfusion, have made it possible to capture the rationale behind design choices, the challenges faced, and the solutions developed throughout the project's history.

The objective of the ITER Engineering Basis Handbook is clear: to document the engineering design of ITER, safeguard its legacy, and prevent the loss of invaluable knowledge. It is intended for scientists, engineers, students, and decision-makers engaged in fusion research and large-scale



engineering projects. By consolidating lessons learned and technical insights, the Handbook provides a transparent, authoritative resource for current and future generations, supporting informed decision-making and fostering innovation across the fusion community.

As ITER progresses—from conception, through design and construction, to eventual operation—the Handbook will continue to evolve. It is a “live” document, reflecting the ongoing advancements and discoveries that shape the project. Future updates will capture new milestones, technical refinements, and operational experiences, ensuring that the Handbook remains a vital tool for all stakeholders and a lasting contribution to the field of fusion energy.

In the spirit of collaboration and knowledge-sharing that defines ITER, this Handbook is offered as a resource and inspiration to all who seek to advance the frontiers of fusion science and engineering.