FUSION FOR ENERGY

TECHNOLOGY OFFER

HELCZA – High Heat Flux Testing Facility for Fusion and Advanced Thermal Systems

Thanks to its collaboration with Fusion for Energy (F4E) in support of ITER development, the HELCZA (High Energy Load Czech Assembly) facility has developed strong capabilities in the testing and qualification of components exposed to high thermal loads. Located at the Research Centre Řež in the Czech Republic, HELCZA enables the validation of plasma-facing and high-heat-flux components under the extreme conditions representative of those expected in fusion reactors.

Capabilities and technologies

The HELCZA facility provides advanced experimental capabilities for high heat flux testing and component qualification, including:

- Electron beam system capable of reproducing extreme thermal loads of several MW/m², representative of fusion reactor conditions.
- Large vacuum chamber and test infrastructure designed for testing plasma-facing components and high-heat-flux assemblies.
- Integrated cooling and thermohydraulic systems to reproduce realistic operational conditions for actively cooled components.
- Advanced diagnostics and monitoring systems for temperature measurement, thermal response evaluation, and component integrity assessment.
- Capability to test a variety of fusion components such as first wall panels, divertor targets, RF antenna components, and other thermally loaded structures.

Advantages and Potential Applications

- Testing under fusion-relevant thermal loads, enabling validation before installation in reactor environments.
- Ability to test full-scale components and complex assemblies, not only small samples.
- High-precision diagnostics enabling detailed analysis of thermal behaviour and cooling performance.
- Valuable platform for the development and qualification of advanced materials, cooling technologies, and high-heat-flux components.
- Applicable to technologies used in fusion energy, aerospace thermal protection systems, advanced power systems, and high-performance industrial cooling solutions.

Collaboration opportunities

The HELCZA facility offers its high heat flux testing capabilities to research institutions, fusion developers, and industrial companies developing components exposed to high thermal loads. The facility is available for testing, validation, and performance optimisation of high-heat-flux components, supporting both fusion projects and other advanced engineering applications requiring reliable thermal qualification.

Fusion for Energy Technology Transfer Programme
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