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Acceptance plan and performance measurement methodology for the ITER cryoline system

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The cryoline (CL) system of ITER consists of a complex network of vacuum insulated multi and single process lines distributed over three different areas with a total length of about 5 km. With the imminent award of the manufacturing contract for a prototype, the CL project will soon enter into the construction phase. Acceptance tests after on-site installation are critical for the validation of the design, fabrication, quality control procedures and to demonstrate that the CL system will fulfill the expected thermo-mechanical requirements. The acceptance itself will be performed in two phases, namely provisional and final. The strategy for each phase is based on the availability of the final connection of the CLs to their interfacing equipment and will be refined during the execution of the project. The thermal performance of the CL system will be measured during the final acceptance tests using the ITER cryoplant and cryodistribution (CD) infrastructure. The method proposed is based on temperature measurements of a small calibrated cryogenic helium flow through the lines. The cryoplant will be set to establish constant pressure and temperature whereas dedicated heater and valves in the CD will be used to generate the stable mass flow rate. Fluid inserted well-type temperature sensors may be foreseen to minimize the external influences for best accuracy.

In this proceeding we will briefly introduce the ITER CL system and describe in detail the acceptance tests planned. A methodology for heat in-leak measurements using the available infrastructure while maintaining a small stable flow will also be discussed.

Primary author: BADGUJAR, SATISH (ITER Organization)

Co-authors: Mr FORGEAS, Adrien (ITER Organization); Mr SARKAR, Biswanath (ITER-India, Institute for Plasma Research); Mr FAUVE, Eric (ITER Organization); Mr CHANG, Hyun-Sik (ITER Organization); Mr BONNETON, Michel (ITER Organization); Mr CHALIFOUR, Michel (ITER Organization); NAVION, Nicolas (ITER Organization); Mr SHAH, Nitin (ITER-India, Institute for Plasma Research)

Presenters: Mr SARKAR, Biswanath (ITER-India, Institute for Plasma Research); Mr SHAH, Nitin (ITER-India, Institute for Plasma Research); BADGUJAR, SATISH (ITER Organization)

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