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P4.077 Venturi flowmeters for the control of the ITER magnets

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Within the framework of the ITER project, CEA/SBT is in charge of the design, manufacturing and delivery of 277 Venturi tube flowmeters for the control of the superconducting magnets. Six types of flowmeters were developed for either the control of the supercritical helium flow in the magnets at cryogenic temperature (4.5 K) or the operation of the current leads at room temperature. The last flowmeters were delivered to the ITER organisation this year, after four years of work.
The values of the Reynolds number in these measuring devices are unusual and outside the range of the standard NF EN ISO 5167-4 regarding the design of Venturi flowmeters. The flowmeters installed at room temperature are used under laminar and turbulent flow regimes, while those installed at cryogenic temperature are used under turbulent flow regime with high Reynolds numbers.
In this context, an experimental determination of the flowmeter coefficient was required. As a result of the large number of flowmeters, a manufacturing strategy was developed in order to obtain a reproducible behaviour from one type of flowmeter to another. The test benches used for the characterisation of the flowmeters as well as the experimental results that validated this strategy are presented.

The views and opinions expressed herein do not necessarily reflect those of the ITER Organisation.

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