

# Thermal Hydraulic Design of the Active Part of the MEGAPIE Target

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## Abstract

Thermal hydraulic analyses and design of the active part of the MEGAPIE target have been performed using the CFX 4.3 code in the present work. Three types of geometric configurations, i.e. with a flat guide tube, with a slanted guide tube and with an injection bypass are investigated with the main emphasis on the coolability of the beam window and the heat removal from the active part of the target. In the target with a flat guide tube flow stagnation occurs in the region near the window center. This leads to an excessive hot spot on the window surface. To improve the coolability of the window, two methods are proposed. By the first method the lower end of the inner cylinder is cut with an inclined cross section. In this way, the axial-symmetry of the flow is destroyed and the flow stagnation zone near the window center is reduced. However, the improvement of heat transfer is insufficient to keep the window temperature below the design value. The second method is to introduce a bypass injection to remove the flow stagnation zone from the window center region. The CFX results show that with a bypass injection, the beam window can be sufficiently cooled down and the heat deposited in the target can be safely removed from the active part of the target. More optimization studies are required for designing a target with a bypass injection to obtain an optimum thermal-hydraulic performance.