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The TRADE Target Design and Development

P.Agostini, A.Aiello, P.Turroni, , F.Pisacane, S.Monti
ENEA Rome (Italy)

S.Buono, L.Maciocco
AAA (France)

S.Maloy
Los Alamos National Laboratories (USA)

Y.Lejeail
CEA Cadarache (France)

M.Salvatores
CEA Cadarache (France) and ANL (USA).

Abstract

The TRIGA Accelerator Driven Experiment (TRADE) project is a common international initiative aiming to validate the coupling of an accelerator to a reactor; specifically an external proton accelerator will be coupled to the existing TRIGA reactor of ENEACasaccia Centre. In the TRADE experiment, the target will substitute the central fuel element of the reactor, whose core will be made sub-critical by removal of some elements [1]. Due to the modest power of the reactor, a solid target has been chosen, whose spallation heat will be removed by water cooling. Some preliminary target concepts were designed under the geometrical constraint of the central fuel space. Due to the geometrical constraint, a conical cavity was envisaged as the most promising solution. Apart from the material choice, three different solutions were considered: thin walls, thick walls and thick walls with cladding. The cooling water will flow in natural or forced convection, depending on the final power and safety authority requirements. The final choice of material will be based on a weighted comparison of different criteria and basically: neutron yield and final activation, thermal conductivity, mechanical properties, corrosion, machineability, needed R&D. The various geometrical solutions as well as the most promising target materials are herein presented and discussed.