

Control of Radon-Induced Contamination in the DEAP-3600 Acrylic Vessel

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DEAP-3600 is a 3600kg single-phase liquid-argon dark matter detector under construction at SNOLAB. The argon is held in an acrylic vessel which is optically transparent at the shifted wavelength of 420 nm; an effective neutron shield; and physically strong.

Because the acrylic (Poly Methyl MethAcrylate) is in contact with the liquid argon it can be a source of alpha-induced backgrounds. To achieve a background rate of less than 0.01 events in the 1000-kg fiducial volume per year of exposure the allowed limit of Pb-210 in the bulk acrylic is 10^{-20} g/g. We discuss how pure acrylic was procured and manufactured into a complete vessel paying particular attention to exposure to radon during all processes. In particular field work at RPT Asia (the supplier of the acrylic panels) and ThaiMMA (supplier of the monomer Methyl MethAcrylate) in Thailand is described. The increased diffusion of radon during annealing the acrylic at 85C as well as techniques to mitigate against this are described.

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