

RADIATION TRANSMISSION MEASUREMENTS FOR DEMRON FABRIC

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Summary

Radiation testing on Demron fabric samples was performed by the US Department of Energy at Lawrence Livermore National Laboratory. Conclusions from those tests and calculations include:

- 1) Demron is effective as a radiation shield, comparable to lead in terms of g/cm^2 and tantalum according to the mass attenuation coefficient, against gamma, x-ray and beta emissions. For example, for 100 keV photon radiation, the mass attenuation coefficient is about $3.8 \text{ cm}^2/\text{g}$, which means that the transmission will be down to the $1/e$ point for a thickness of $1/3.8 = 0.26 \text{ g}/\text{cm}^2$. For Demron, with a density of $3.14 \text{ g}/\text{cm}^3$, the thickness would be 0.8 mm corresponding to 2 layers for the present sample. For lead with a density of $11.3 \text{ g}/\text{cm}^3$, the thickness would be 0.2 mm.
- 2) Demron's physical characteristics as a flexible, malleable fabric make it much easier to work with and handle than lead.
- 3) Demron feels cool to the touch.
- 4) Unlike lead, according to Radiation Shield Technologies, Demron is non-toxic, contains no dermal or inhalation risks to the user, and requires no special or restrictive conditions for disposal.
- 5) At the current sample thickness (0.38 mm), Demron provides a factor 3 protection against beta and a factor of 10 against low energy gamma emissions.
- 6) The mass attenuation coefficients can be used to determine the thickness of Demron fabric required to successfully shield against higher energy/intensity gamma radiation.

While the exact composition and construction of the Demron fabric is proprietary, it can be concluded that for radiation shielding purposes, Demron shields similar to lead by weight, yet poses none of lead's environmental or biological dangers.