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Experimental and numerical study of thin fragments protection for radiographic detectors OLIVIER BOZIER, DENIS COUNILH, FABRICE GILLOT, LISE-MARIE ADOLF, PASCALE SILVIN, NICOLAS RAMBERT, CEA DAM DIF, DAVID HEBERT, ISABELLE BERTRON, CEA DAM CESTA — To perform a non-intrusive measurement on a pyrotechnic setup, we usually use radiography. But due to blast and fragments, the X-ray generator head and the detectors of the radiographic chain must be protected. Since the detector holds the data we want to collect, he cannot be sacrificed. The constitution of detector shielding is therefore an essential part of a radiographic chain. The choice of shielding should take into account two conflicting needs. On one hand, shielding must be sufficiently resistant to protect the detector from the blast and fragments generated. On the other hand, it should be thin enough in order to attenuate as little as possible the radiographic signal. We carried out an experimental campaign to test the performances of various shieldings. Cylindrical projectiles of various masses (from 20g to 40g) and aspect ratios (length to diameter ratio from 0.1 to 1) that are representative fragments, have been launched with a gas gun with different initial velocities (from 1500m/s up to 2000m/s). Multiple shielding configurations have been tested. They were assemblies of successive steel, aluminum and B4C plates. Combined with a numerical study, we optimize disposition and thicknesses of the plates which fulfils our requirements in terms of detector protection and radiographic measurement.

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