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Ultrafine particle generation by high-velocity impact of metal projectiles GIANLUCA IANNITTI, Techdyn Engineering, LUCA STABILE, PAOLO VIGO, ANDREW RUGGIERO, ALDO RUSSI, GIORGIO BUONANNO, University of Cassino and Southern Lazio — In the present work, size distributions and total concentrations of ultrafine particles generated during high velocity impacts of metals are shown in order to estimate the possible exposure of survival personnel to ultrafine metallic particles in the event of kinetic energy penetrator impact. Taylor cylinder impact tests were designed and performed using a light gas-gun facility investigating both high purity copper and aluminum cylinders impacting against a steel anvil in impact chamber. Moreover, in order to deepen the possible particle formation mechanisms, ballistic impact tests without metal-on-metal sliding contacts were also performed. In particular, symmetrical Taylor impacts of copper cylinders tests (rod-on-rod tests) were designed. High-resolution time measurements of particle distributions and total concentrations were performed through Fast Mobility Particle Sizer spectrometer and Condensation Particle Counters. Particle number emission factors were also evaluated. High particle generation in the ultrafine range were detected in classic Taylor cylinder impact tests: particle number distributions with a mode of 10 nm were detected. Moreover, number emission factors comparable to the ones typical of combustion phenomena were recognized.

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