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Title: Analysis of Risks to Oxygen Systems from Particulate and Fiber Contaminants and Derivation of Cleanliness Requirements

Abstract:

It has been well documented in the literature that contamination within oxygen systems can create significant fire hazards. Cleanliness limits for nonvolatile residues, ranging from 10 to 500 mg/m^2, have been established for various industries and types of oxygen systems to reduce the risk of ignition of flammable organic films. Particulate cleanliness limits used for oxygen systems, however, vary considerably, notably within the aerospace industry. Maximum allowed particle size, quantity limits, and allocations for fibers or metallic particles are all variables seen in aerospace cleanliness limits. Particles are known to have the potential to ignite within oxygen systems and must be limited to prevent fires. Particulate contamination may also pose risks to the performance of oxygen systems that are unrelated to ignition hazards. An extensive literature search was performed to better understand the relative importance of particle ignition mechanisms versus other deleterious effects of particles on oxygen systems and to identify rationale for derivation of particulate cleanliness limits for specific systems. The identified risks of different types and sizes of particles and fibers were analyzed. This paper summarizes the risks identified and rationale that may be used to derive particulate cleanliness limits for specific oxygen systems.