

Title: Establishing Standardized Test Methods for Evaluating Space Suit Gloves

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The Artemis space suit glove environmental protection garment (EPG) will be the first line of protection used to protect the crewmember's hands from the environments encountered during extravehicular activity (EVA). As the Artemis missions will include more extreme environments, it is necessary to define tests to evaluate if gloves can meet new, challenging requirements.

The NASA Engineering and Safety Center (NESC) has funded an effort with the goal to help vendors to produce a space suit glove that is sufficiently durable to meet the needs of the Artemis missions. Three problems were identified in meeting that goal. First, there are no standardized tests defined to evaluate the durability of space suit gloves for the extreme lunar environments. Second, there is insufficient data on glove performance in a lunar environment from which to compare new designs. And third, current ISS glove TMG fabrics are unlikely to be sufficient to meet Lunar requirements.

Four tasks were established to answer different aspects of these three problems. Task 1 focused on the characterization of potential glove fabrics using ASTM standardized test methods when possible. When one did not exist, new standardized test procedures were devised. Task 2 focused on developing a procedure for characterizing the thermal performance of a glove assembly. Task 3 focused on devising a standard procedure for characterizing the dust/abrasion resistance of a space suit glove. Task 4 focused on devising a standard procedure for characterizing the cut resistance of a space suit glove while at cryogenic temperatures. The new procedures created in Tasks 2, 3 and 4 were then validated by testing the Phase VI glove to collect baseline data. This paper will summarize the approach used to establish standardized test methods for each task and will expound on the ASTM process to publish the new standards.