

“Testing of Alternative Materials for Advanced Suit Bladders” by Grant Bue, Evelyne Orndoff, Janice Makinen, and Henry Tang

Several candidate advanced pressure bladder membrane materials have been developed for NASA Johnson Space Center by DSM Biomedical for selective permeability of carbon dioxide and water vapor. These materials were elastane and two other formulations of thermoplastic polyether polyurethane. Each material was tested in two thicknesses for permeability to carbon dioxide, oxygen and water vapor. Although oxygen leaks through the suit bladder would amount to only about 60 cc/hr in a full size suit, significant amounts of carbon dioxide would not be rejected by the system to justify its use. While the ratio of carbon dioxide to oxygen permeability is about 48 to 1, this is offset by the small partial pressure of carbon dioxide in acceptable breathing atmospheres of the suit. Humidity management remains a possible use of the membranes depending on the degree to which the water permeability is inhibited by cations in the sweat. Tests are underway to explore cation fouling from sweat.