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C2Or2B-02: Testing of SHIIVER MLI Coupons for Heat Load Predictions

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The Structural Heat Intercept, Insulation, and Vibration Evaluation Rig (SHIIVER) is designed to demonstrate the performance benefits of installing multilayer insulation (MLI) and structural vapor cooling onto a large hydrogen tank as a part of an upper stage. The intent of the 4 meter sub-scale demonstration is to design the MLI in a manner that its performance can be scaled to a full sized application. In order to predict the performance of the blankets as well as aid in the design, several features needed to be tested. Four different coupons were tested and evaluated for thermal performance relating to the number of layers, the seams, and the attachment mechanisms. The attachment mechanisms were further tested for structural strength at nominal application temperatures. From the testing, the number of layers were determined to be 30, and heat load penalties were determined for the seams and attachments. The attachment mechanisms passed all load testing with a margin of greater than 40%.

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