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EXPERIMENTAL INVESTIGATION OF ACTIVE THERMODYNAMIC VENT SYSTEM WITH
LIQUID NITROGEN

Abstract

Thermodynamic vent system(TVS) technology can effectively solve the problem of longterm storage of liquid cryogenic propellant without liquid-entrained vent. The research team built a thermodynamic vent technology ground test system based on liquid nitrogen medium. The double-layer vacuum tank can achieve 0.001Pa. The liquid nitrogen tank volume is 760L, the steady-state heat leakage of the test system is 137W, and the variable-leakage working condition test is realized by compensating the heater. The TVS test system is mainly composed of a small circulation pump, J-T valve and a sleeve heat exchanger. The circulation pump and throttling device are located in a vacuum interlayer. The vent mass flow rate in the design state is 87 kg/m²/s, the J-T refrigeration capacity is 560W, the heat transfer coefficient is 10661W/m²/K, and nearly 40 conditions tests have fully verifying the feasibility and correctness of the TVS design scheme.