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C2Or4D-02: Investigation of chill-down process of cryogenic tank

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When cryogenic liquids or propellants are transferred from a storage tank to another empty atmospheric storage tank, a chill-down process occurs in the empty tank. The wall temperature of the empty tank is relatively high compared to the cryogenic liquids; thus, evaporation of the cryogenic fluid and a temperature reduction process occur during the filling of the empty tank.
The tank had a diameter of 2.5 m and a height of 4.7 m. Several thermometers were installed evenly along the height of the tank walls and inside the tank. The wall temperature, ullage, and fluid temperature were measured during the filling process of the empty cryogenic tank, and these results were compared with the simulation results. The wall temperatures along the tank height were simulated and analyzed based on the experimental results. Differences in the chill-down process between the empty tank and pipe flow are also discussed in this paper.

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