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C2Or2B-05: Thermal insulation system design and cryogenic test for a new independent type B LNG mock up tank

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The thermal insulation performance of the thermal insulation system is crucial for the design and operation of the cargo containment system (CCS) for LNG carriers. The boil off rate (BOR) of the carrier is the main evaluation criterion. In this paper, the geometrical arrangement of the new thermal insulation system applied to a new independent type B LNG mock up tank were proposed, designed and constructed. In order to quantitatively evaluate the insulation performance, a simplified heat transfer model was established and both theoretical method and finite element method were used to calculate the BOR and temperature distribution of the new type B LNG mock up system. In what following, a cryogenic test set-up was built and experimental measurements of the temperature distribution and BOR based on the liquid nitrogen was carried out for the mock up tank. By comparing the result of theoretical method, finite element method and the cryogenic test, it was found that the new thermal insulation system of independent type B LNG mock up tank could efficiently prevent the environment heat load for the LNG vaporization and could provide guidance for the actual design and construction of new independent type B CCS.

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