

## Structure Design of Vacuum Vessel with Large Openings for Spacecraft Thermal Vacuum Test

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**Abstract :** Space environment simulator is a facility used to conduct thermal test for spacecraft, and vacuum vessel is the main body of it. According to the requirements for thermal tests of the spacecraft and its solar array panels, the primary vessel and the side vessels are designed to be a combinative structure connected with aperture, which ratio reaches 0.7. Since the vacuum vessel suffers 0.1MPa external pressure during the process of thermal test, in order to ensure the simulator's reliability and safety, it's necessary to calculate the vacuum vessel's intensity and stability. Based on the impact of large openings to vacuum vessel structure, this paper explored the reinforce design and analytical way of vacuum vessel with large openings, using a large space environment simulator's vacuum vessel design as an example. Tests showed that the reinforce structure is effective to fulfill the requirements of external pressure and the gravity. This ensured the reliability of the space environment simulator, providing a guarantee for developing the spacecraft.

**Keywords :** vacuum vessel, large opening, space environment simulator, structure design

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