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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

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Thermal vacuum test methods for spacecraft

航天器热真空试验方法

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Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009. This standard proposed by China Aerospace Science and Technology Corporation. This standard by the National Aerospace Technology and Standardization Technical Committee (SAC/TC425) centralized. This standard was drafted by Beijing Satellite Environmental Engineering Institute. The main drafters of this standard. Liu Chang, Chang Jing, Yang Xiaoning, Wei Chuanfeng, Liu Bo, Wei Xifeng, Peng Guangdong, Du Chunlin, in the new war, Tao Tao. Spacecraft thermal vacuum test method

1 Scope

China's national standard for thermal vacuum testing of spacecraft. It specifies the purpose of the test, the test conditions and requirements, the temperature control methods, the test equipment, the procedure, the interruption and handling of a test, the evaluation and the use of the data, and it applies to spacecraft at system level and below. Thermal vacuum is the test that catches what vibration testing does not. In orbit there is no air, so a spacecraft loses heat only by radiation and moves it internally only by conduction and by whatever heat pipes it carries; and it swings between sunlight and eclipse, so every surface cycles through a temperature range far wider than anything on the ground. The chamber reproduces both: it is pumped to high vacuum and its walls are cooled with liquid nitrogen to simulate deep space, while lamps or heaters impose the orbital heat loads. Most spacecraft failures found before launch are found here - a thermal design that does not hold, a component that fails cold, a joint that opens as it cycles.

This standard specifies the purpose of spacecraft thermal vacuum test test, test conditions, test requirements, temperature control methods, test equipment, test Procedure, Test Interruption and Processing, Experimental Evaluation and Data Utilization. This standard applies to spacecraft system-level thermal vacuum test.

2 Normative references

The following documents for the application of this document is essential. For dated

references, only the dated version applies to this article Pieces. For undated references, the latest edition (including all amendments) applies to this document.

GB/T 29085-2012 satellite anti-pollution technology requirements

3 Terms and definitions

The following terms and definitions apply to this document.

3.1 Thermal vacuum test thermalvacuumtest Ground simulation testing to verify or check the spacecraft's ability to withstand the space environment (vacuum, cold black and thermal radiation).

3.2 Temperature ramp rate Component temperature from the specified low (high) temperature (down) to the specified high (low) temperature rate of change of temperature.

3.3 Temperature stable temperaturestability For the preset temperature monitoring point reaches the specified temperature and the rate of temperature change is less than the specified value of the thermal state, can be considered temperature stability.

4 Test purposes

4.1 appraisal grade thermal vacuum test Verify the ability of the spacecraft to work under the specified test pressure and appraisal level thermal cycling stress conditions, test the spacecraft subsystems in Rail work under various modes of performance indicators meet the design requirements.

4.2 Quasi-class thermal vacuum test Verify that the performance indicators of various subsystems of the first spacecraft on orbit in various working modes meet the requirements and test pressure And quasi-certified thermal cycling Stress Exposure Potential quality defects that may be introduced due to components, materials, processes, and manufacturing.

4.3 Acceptance grade thermal vacuum test To verify whether the performance indexes of various subsystems of spacecraft on orbit in various working modes meet the requirements and test pressure and test Exposure to thermal cycling Stress exposure to potential quality defects that may be introduced due to components, materials, workmanship, and manufacturing.