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CCS V06



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

GB/T 44000-2024

**Space environment - General requirements of ground
simulation test facility for space environmental effect of
materials**

空间环境 材料空间环境效应地面模拟试验装置通用要求

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Foreword

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1 Scope

GB/T 44000-2024 specifies the ground facilities used to find out what space does to materials before they are sent there. A spacecraft's exterior is attacked continuously and irreversibly: ultraviolet and particle radiation break polymer chains, atomic oxygen in low Earth orbit erodes surfaces, thermal cycling through eclipse fatigues joints, and vacuum drives volatile species out of materials to condense on optics and radiators elsewhere on the vehicle. None of it can be inspected or repaired in orbit, and the mission may last fifteen years. Ground simulation is the only way to know, and it is a demanding thing to build: several environments must be combined rather than applied one at a time, because their effects are not additive, and the acceleration factors that make a fifteen-year test fit into months are the main source of doubt. This document specifies the general requirements for such facilities, covering the laboratory environment, the vacuum system, the test control system and the test measurement arrangements. Under ICS 49.020 and CCS V06, it is written for space materials laboratories, spacecraft primes, and the mission assurance functions that accept their data.

This document specifies the general requirements for ground-based simulation devices for space environmental effects of materials, including the laboratory environment, vacuum system, test control system, test measurement system, safety and other general requirements, as well as the implementation of ground simulation tests on the space environment effects of different materials. Special requirements involved include simulation sources, test monitoring systems, performance test systems, safety and protection, etc: This document applies to vacuum, charged particles, space ultraviolet, space atomic oxygen, space plasma, space debris and micrometeoroids: Environment and generated vacuum outgassing, thermal cycling, particle radiation effects, ultraviolet radiation, atomic oxygen ablation, surface charge and discharge, internal (deep) charge and discharge. Development and application of ground simulation devices for effects such as electricity and hypervelocity impact:

2 Normative references

The contents of the following documents constitute the essential clauses of this document through normative references in this document: For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to This document:

GB/T 32452-2015 Spacecraft space environment terminology

GB/T 34517-2017 Vacuum outgassing evaluation method for non-metallic materials used in spacecraft

3 Terms and definitions

The terms and definitions defined in GB/T 32452-2015 and GB/T 34517-2017 and the following apply to this document: 3:

1 Recovery effect recovery effect The material will produce performance degradation under the simulated environmental test conditions: After the simulated environmental effect is stopped and exposed to atmospheric conditions, the performance will be completely or partially The phenomenon of partial reply: 3:

2 In-situ measurement The test is carried out on the sample under vacuum conditions:

4 General requirements

1 Laboratory Environment Unless otherwise specified, the laboratory environment requirements are as follows:

- a) Temperature: 15°C~35°C;
- b) Relative humidity: 20%~80%;
- c) Pressure: local atmospheric pressure: