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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

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Design requirements for residual propellant venting of spacecraft

航天器剩余推进剂排放设计要求

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for Standardization Work Part

1.Structure and Drafting Rules of Standardization Documents" Drafting. Please note that some of the contents of this document may involve patents. The issuing agency of this document is not responsible for identifying patents. This document was proposed and managed by the National Aerospace Technology and Application Standardization Technical Committee (SAC/TC425). This document was drafted by: Beijing Institute of Control Engineering. The main drafters of this document. Song Tao, Liang Junqiang, Ding Fenglin, Sun Shuisheng, Yin Wenjuan, Geng Yongbing, Li Ze, Gao Jun, Lin Zhen, Li Wen, Zhang Lan. Design requirements for residual propellant emissions of spacecraft

1 Scope

China's national design requirements for venting the residual propellant of a spacecraft. It specifies the general design requirements and the detailed design requirements. Venting is a passivation measure and it addresses one of the largest sources of orbital debris. A spacecraft or upper stage that reaches the end of its life with propellant still in its tanks is a pressure vessel containing reactive chemicals, exposed to thermal cycling and to micrometeoroid impact for decades. A significant fraction of the catalogued debris in orbit came from exactly that: stages that exploded years after their mission, each producing hundreds of fragments in the orbit they occupied. Venting the residual propellant and pressurant at end of life removes the stored energy and the possibility. Designing for it means providing a vent path that will still work after years of dormancy, and doing so without producing a thrust that changes the orbit unpredictably.

This document specifies the general design requirements, details, Detailed design requirements and other content. This document is applicable to the active and passive emission design of propellant and high-pressure gas of spacecraft. Of other working fluids on the spacecraft The emission design can be implemented by reference.

2 Normative references

The contents of the following documents constitute the indispensable clauses of this document through normative references in the text. Among them, the dated reference documents, only The version corresponding to this date is applicable to this document; for undated references, the latest version (including all amendments) is applicable to this document.

GB/T 34513-2017 Space Debris Mitigation Requirements

3 Terms and definitions

The following terms and definitions defined in GB/T 34513-2017 apply to this document.

3.1 Activeventing Propellant and high-pressure gas emissions implemented by sending instructions on the ground.

3.2 Passiveventing The propellant discharge device on the spacecraft discharges propellant and high-pressure gas autonomously under certain preset conditions.

4 General design requirements

4.1 Design basis The design basis generally includes.

a) The content of Chapter 6 in GB/T 34513-2017;

b) Spacecraft development mission requirements;

c) Promote the development task requirements of the subsystem;

d) Promote the reliability, safety and environmental conditions of the sub-system.

4.2 Design criteria The design criteria are as follows:

a) The remaining propellant discharge design should meet the technical requirements specified in

6.2 of GB/T 34513-2017;

b) The design of the remaining propellant emission should start from the spacecraft program stage and run through the development process to the effect after the spacecraft in orbit is emptied. According to different mission tracks, carry out targeted design based on the evaluation of results;

c) The design of residual propellant emissions should comprehensively consider the engineering feasibility, economic effectiveness and technological advancement of the spacecraft system;