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

**GB/T 32303-2015**

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**Requirements for structure fracture and damage control of  
space systems**

航天结构断裂与损伤控制要求

**(English Translation)**

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### Foreword

This standard is drafted in accordance with the rules given in GB/T 1.1-2009.

This standard uses the re-drafting method to modify ISO 21347.:2005 "Space System Fracture and Damage Control".

This standard is structurally adjusted in comparison with ISO 21347.:2005, which is listed in Appendix A and ISO 21347.:2005 Chapter number comparison list.

There is a technical difference between this standard and ISO 21347.:2005, and the terms involved in these differences have passed through the margin Set the vertical single line (|) were marked, the standard and ISO 21347.:2005 technical differences are as follows.

- "5.4.7" determination of damage tolerance "with" 12.5mm "instead of" 12.7mm ". As China's aerospace engineering development Has been using "12.5mm" to carry out damage tolerance test, and does not affect the conclusion of the test, and therefore make this change;
  - Chapter 6 of this standard increases the qualification requirements for personnel engaged in nondestructive testing;
  - In Appendix B of this standard, tables A.2 and A.2.2.4 in Annex A of ISO 21347.:2005 are deleted and Regulation of detection, non-routine detection of the expression. As China's non-destructive testing standards are generally measured by the level of measurement accuracy values were given, no There are points for "regular detection" and "unconventional detection", and the recommended accuracy values for several conventional detection methods given in Table A.2 are missing Lack of correspondence, so delete this content.
- This standard has also made the following editorial changes.
- the standard name to "space structure fracture and damage control requirements";
  - This standard has removed ISO 21347.:2005 normative reference document ISO 14623.:2003, for ease of use, will be cited ISO 14623.:2003 part of the content in the form of text added to the standard Chapter 6;

--- This standard removed ISO 21347.:2005 2.13 "fracture-limitedlifeitem" and 2.28 "pressurizedhard-ware "terms and definitions, since the two terms and definitions do not appear in the text;

This standard has been defined in ISO 21347.:2005 2.14 "Fracture Mechanics" because "fracture mechanics" as a mechanics Support, has a clear meaning, there is no need to explain as a term and definition;

- this standard has increased 2.13 "broken key parts", 2.23 "mechanical damage key parts" and 2.29 "test test" three terms and definitions;

--- This standard revises the precedence of symbols and abbreviations in Chapter 3 of ISO 21347.:2005;

This standard removes five entries such as "Gr/Ep", "ISS", "POD", "PTC", "T" in ISO 21347.:2005, Because these deleted symbols and abbreviations are no longer present in this standard;

--- This standard has increased 5.4 "composite material pressure vessel mechanical damage control requirements", and with the composite pressure vessel related machinery Damage control requirements are placed in this article for a unified statement.

This standard is proposed by China Aerospace Science and Technology Corporation.

This standard is nationalized by the National Aeronautical Technology and Its Application Standardization Technical Committee (SAC/TC425).

The drafting of this standard. Beijing Aerospace Systems Engineering Research Institute, China Aerospace Standardization Institute.

## Introduction

This standard is based on the contents of ISO 21347.:2005 and has been modified locally.

The purpose of implementing fault control in space systems is to prevent the structure from being lost early in the life of the crack due to crack or crack effect. These systems include civil or military spacecraft, and associated ground support equipment. For manned space systems, large Most purchasers use rupture control as a mandatory requirement to ensure astronaut safety. For example, NASA and NASA (ESA) requires that all payloads emitted by the space shuttle and equipment installed on the International Space Station must be subjected to rupture control and Developed a special fracture control requirements.

In order to avoid the loss of personal injury or ground launch facilities caused by space launch, breakage control requirements began in a one-time launch vehicle (ELV) of the main engine tank, unmanned aerospace high pressure cylinders and other key structures on the implementation of mechanical damage control requirements apply to the same Shock damage is more sensitive to composite pressure vessels (COPV). ISO 21347.:2005

for the International Space Station, the space shuttle and its A space system other than payload provides a uniform fracture and damage control requirements that apply to mission safety and reliability Key structure.

Space structure fracture and damage control requirements

## 1 Scope

This standard specifies the minimum requirements for control and mechanical damage control of general aerospace structures, including launch vehicles, spacecraft, etc.

Reusable carriers can be implemented with reference to this standard.

This standard is intended to regulate the application of fault control technology and mechanical damage control technology in aerospace structures to enable the aerospace system to work and with the process to achieve a high level of reliability and security, to ensure the success of space missions. This standard applies to fracture as the main failure mode of the metal, nonmetallic or composite structure, and may be subject to mechanical damage and consequently a decrease in load carrying capacity, or even premature failure Composite structure. This standard does not apply to the handling of known defects.

## 2 Terms and definitions

The following terms and definitions apply to this document.

Burst burst strength after blasting burststrengthafterimpact; BAI the actual pressure of the pressure vessel after the impact of the burst.

Catastrophic danger catastrophichazard Have the potential to cause death, cause life-threatening or permanent personal injury or occupational disease, so that the manned spacecraft is lost Functional modules that cause significant damage to terrestrial launch equipment, or a situation or situation that poses a potential risk to the environment for long-term damage.

Composite material A material made up of two or more different macroscopic or morphological materials.

**Note:** In general, the composite material between the various components of the material has a clear interface, can be physically identified. Here the composite material is not included A structure in which a plurality of portions are bonded, such as a metal honeycomb sandwich structure.

Composite pressure vessel composite-overwrappedpressurevessel; COPV A pressure vessel consisting of a liner and a fiber reinforced composite shell.

**Note:** Lining is divided into metal lining and non-metallic lined and other types, used to hold the liquid and prevent the leakage of liquid; fiber reinforced composite material wrapped in the lining of the appearance the local or all of the face forms a composite shell that is typically used to withstand

internal and external loads.

#### Critical defect

Has a specific shape and size and in a specific load and the role of the environment will be unstable expansion of the defects.

Major danger criticalhazard Have a temporary or non-lethal personal injury, temporary occupational disease, the launch vehicle or the spacecraft module or ground the situation or situation of causing serious damage to the equipment, causing damage to public or private property, or causing a potential risk of short-term damage to the environment.

#### Damage margin

Material or structure due to resistance to defects, cracks or other damage failure or destruction of the ability.