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Requirements for structural stress analysis of space products

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Foreword

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

This standard uses the redrafting method to modify the ISO 16454.2007 "Aerospace System Structural Design Stress Analysis Requirements".

This standard is structurally modified compared to ISO 16454.2007. This standard and ISO 16454.2007 are listed in Appendix A.

Chapter and chapter comparison list.

The technical differences between this standard and ISO 16454.2007 and their reasons are as follows.

---About the normative reference documents, this standard has made technical adjustments to adapt to China's technical conditions, adjustments

The situation is reflected in Chapter 2, "Regulatory Citations", and the specific adjustments are as follows.

* Added normative reference GB/T 32303;

* Removed ISO 14622, ISO 14623, ISO 14454.2007 normative references;

--- Revised 4.2.2.2, replacing the thickness of the corresponding clause of ISO 16454.2007 with the size of the specification;

--- Revised Chapter 4, integrated the original standard and the reference standards ISO 14622, ISO 14623, clear the load

Requirements such as working conditions, design conditions and design safety factor.

This standard also made the following editorial changes.

--- Change the standard name to "Aerospace product structural stress analysis requirements";

---Classified the order of terms and definitions in ISO 16454.2007 by type;

--- Added informative Appendix A to provide a comparison of this standard with the structural changes of ISO 16454.2007.

This standard is proposed and managed by the National Aerospace Technology and its Application Standardization Technical Committee (SAC/TC425).

This standard was drafted. Beijing Aerospace Systems Engineering Research Institute, China Aerospace Standardization Institute.

Introduction

Since the beginning of the space age, structural integrity verification has been one of the main areas of activity for mechanics. Aerospace structural integrity

Once it fails, it is likely to cause the task to fail and endanger the life of the person, as well as the safety of the ground buildings and other property. Static strength is

One of the most important critical conditions in structural integrity analysis is usually the main criterion for aerospace structural weight assessment. Aerospace structure

Being too heavy can lead to tasks that are extremely expensive or impossible to achieve. If the safety factor of the aerospace structure design is insufficient, it may cause the structure.

Failures put high risks on personal safety, expensive equipment and other property. Therefore, it is necessary to formulate corresponding measures for static strength analysis.

The requirements provide efficient design and lightweight, reliable, low-risk structures for aerospace applications.

This standard specifies the technical requirements related to the critical conditions of static strength, excluding the critical conditions related to fatigue, creep and crack propagation.

However, the stress results calculated based on the requirements of this standard can be applied to the analysis of its critical conditions. Stress analysis model based on the requirements of this standard,

Methods and procedures can be used for displacement and deformation calculations, as well as load calculations for substructures and structural components.

Aerospace product structural stress analysis requirements

1 Scope

This standard specifies structural stress analysis and corresponding safety margin determination requirements for aerospace products, including basic data, analytical methods, and soft

Pieces, structural mathematical models, mathematical model checks, failure mode determination, hazard location analysis, safety margin determination, and reporting requirements.

This standard applies to the determination of stress/strain distribution and safety margin in the design of the main structure of launch vehicles and spacecraft, including liquid propulsion.

The tank, pressure vessel and solid engine housing do not include liquid propellant engines, solid engine nozzles and solid propellant itself.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only dated versions apply to this article.

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

GB/T 32303 Space structure fracture and damage control requirements

3 Terms and definitions

The following terms and definitions as defined in GB/T 32303 apply to this document.

3.1

Basic data basicdata

Input data required to perform stress analysis and determine safety margins.

3.2

Specification size gauges

Structural dimensions that have a significant effect on the stress level and/or safety margin, such as the thickness of the sheet, the width and thickness of the profile edge.

Degree, the height and thickness of the web.

3.3

A-reference value A-basisalowable

The confidence level is 95%, covering at least the mechanical strength value of the 99% parent value.

3.4

B-reference value B-basisalowable

The confidence level is 95%, covering at least the mechanical strength value of the 90% parent value.

3.5

Minimum allowable value minimumalowable

The minimum material mechanical properties guaranteed by the supplier.

3.6

Primary structure

The structural components that bear the primary load and determine the base frequency of the launch vehicle and spacecraft.

3.7

Semi-finished semi-finisheditem

For structural fabrication or assembly, there is no final product.