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Space systems — Fracture and damage control

Systèmes spatiaux — Maîtrise des fissurations et des dommages

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Contents

Page

Foreword

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This document was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 14, *Space systems and operations*.

This second edition cancels and replaces the first edition (ISO 21347:2005), which has been technically revised.

The main changes are as follows:

— updates of the normative references and their citations in the text; organization of requirements in structural-related ISO document to avoid duplication;

— updates of the terms and definitions to harmonize with the other structural-related ISO documents;

— update of approaches to classify non-fracture-critical items (non-FCI);

— addition of supplemental information in Annex A.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

To prevent premature structural failure due to the propagation of cracks or crack-like defects during a structure's service life, a fracture control policy is being imposed on space systems. These systems include civil and military space vehicles, launch systems, and their related ground support equipment. For crewed space flight systems, most procurement agencies have considered fracture control a human-safety-related requirement. For example, the National Aeronautics and Space Administration (NASA) and the European Space Agency (ESA) have required fracture control for all payloads using the NASA Space Shuttle (Shuttle) and all equipment items installed on the International Space Station (ISS). These systems have established specific fracture control requirements. These requirements have been implemented on all the payloads and equipment items using the Shuttle and ISS.

Recently, many procurement agencies and range safety authorities have imposed fracture control requirements on critical hardware items such as main propellant tanks of expendable launch vehicles (ELVs) and high-pressure gas bottles used in uncrewed spacecraft in order to prevent loss of either life or launch site facilities, or both. Mechanical damage control is also being required by many range safety authorities on impact-damage-prone composite-overwrapped pressure vessels (COPVs). This document specifies uniform fracture and mechanical damage control requirements for non-Shuttle and non-ISS hardware. It can be applied to safety and mission critical structures and other hardware items.