International Standard

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Space systems — Measured parameters at firing bench and flight tests of liquid rocket engines

Systèmes spatiaux — Paramètres mesurés au banc d'allumage et essais de vol des moteurs à propergol liquide

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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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 16694:2015), which has been technically revised.

The main changes are as follows:

— Clauses 4 and 5 are amended;

— the list of measured parameters is expanded;

— in Tables 1 and 3, the parameter “…pressure pulsation…” is split into two parameters: “…vibration amplitude…” and “…vibration frequency…”; the parameter “vibro-overloads…” is split into “vibration acceleration amplitude…” and “vibration acceleration frequency…”;

— certain parameters are moved from the category “mandatory parameters” to the category “optional”;

— superscripts and subscripts of parameter "Letter symbols" are corrected.

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.

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Introduction

The document provides users, designers, and manufacturers of liquid rocket engines with requirements and guidance for parameters, measured during firing bench and flight tests. Parameters to be measured are used for reliability analysis and quality control of liquid rocket engines.

The parameters listed in the document characterize performance of liquid rocket engines and they are used to evaluate the technical condition of engines (operable, inoperable), their conformity with the specified requirements and whether engines are available to be delivered to a user and put into operation. ISO 15865 is used to assess conformity of liquid rocket engines to the specified requirements.

Uniform requirements for the parameters, measured during firing bench and flight tests of liquid rocket engines, ensure the following:

— quality and reliability of developed and operated liquid rocket engines;

— comparison of liquid rocket engine test results;

— end product safety and environmental protection.

The engine developer may identify an additional list of measured parameters for specific items, taking into account their design features.

This document makes it possible to develop uniform criteria for performance evaluation and comparison of liquid rocket engines, created by different countries, based on firing bench and flight tests results.

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Space systems — Measured parameters at firing bench and flight tests of liquid rocket engines

1 Scope

This document specifies requirements for the list of parameters, measured during firing bench and flight tests. The requirements of the document apply to all the types of expendable liquid rocket engines supplied to the user:

a) operating on all types of propellant (including cryogenic);

b) with afterburning (with gradual burning) and without afterburning (without gradual burning);

c) low-thrust engines: one component (monopropellant) and two-component (bipropellant);

d) with a single firing or multiple firings.

The document doesn't specify firing bench test preparation and testing procedure, methods of test results processing and analysis, or requirements to measurement accuracy.

The document specifies mandatory and optional parameters.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 15864, *Space systems — General test methods for spacecraft, subsystems and units*

ISO 24917, *Space systems — General test requirements for launch vehicles*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Abbreviated terms

AVR	apparent velocity regulator
BTP	booster turbo pump
CFC	component-flow controller
CPT	certification periodic test
DD	design documentation

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