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Aerospace series — Hydraulic tubing joints and fittings — Planar flexure test

Série aérospatiale — Joints et raccords des tuyauteries hydrauliques — Essai de flexion plane

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ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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 documents 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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 10, *Aerospace fluid systems and components*.

This second edition cancels and replaces the first edition (ISO 9538:1996), of which it constitutes a minor revision.

The changes are as follows:

— the publication dates of ISO 7257 and ISO 7169 in the introduction were removed in order to reflect the most updated versions of those documents.

Introduction

This document describes a planar flexure test procedure for hydraulic tubing joints and fittings.

The test procedure can be applied as an alternative to the rotary test procedure specified in ISO 7257.

The qualification test procedures for tube fittings are specified in ISO 7169.

Other test methods can be used as long as they develop the same results as the procedure specified in this document.

Aerospace series — Hydraulic tubing joints and fittings — Planar flexure test

1 Scope

This document specifies a flexure test procedure for reconnectable and permanent hydraulic tube joints.

This procedure is intended for conducting flexure tests on fittings with high-strength hydraulic tubes made of corrosion-resisting steel, titanium and aluminium for use on commercial and military aircraft.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

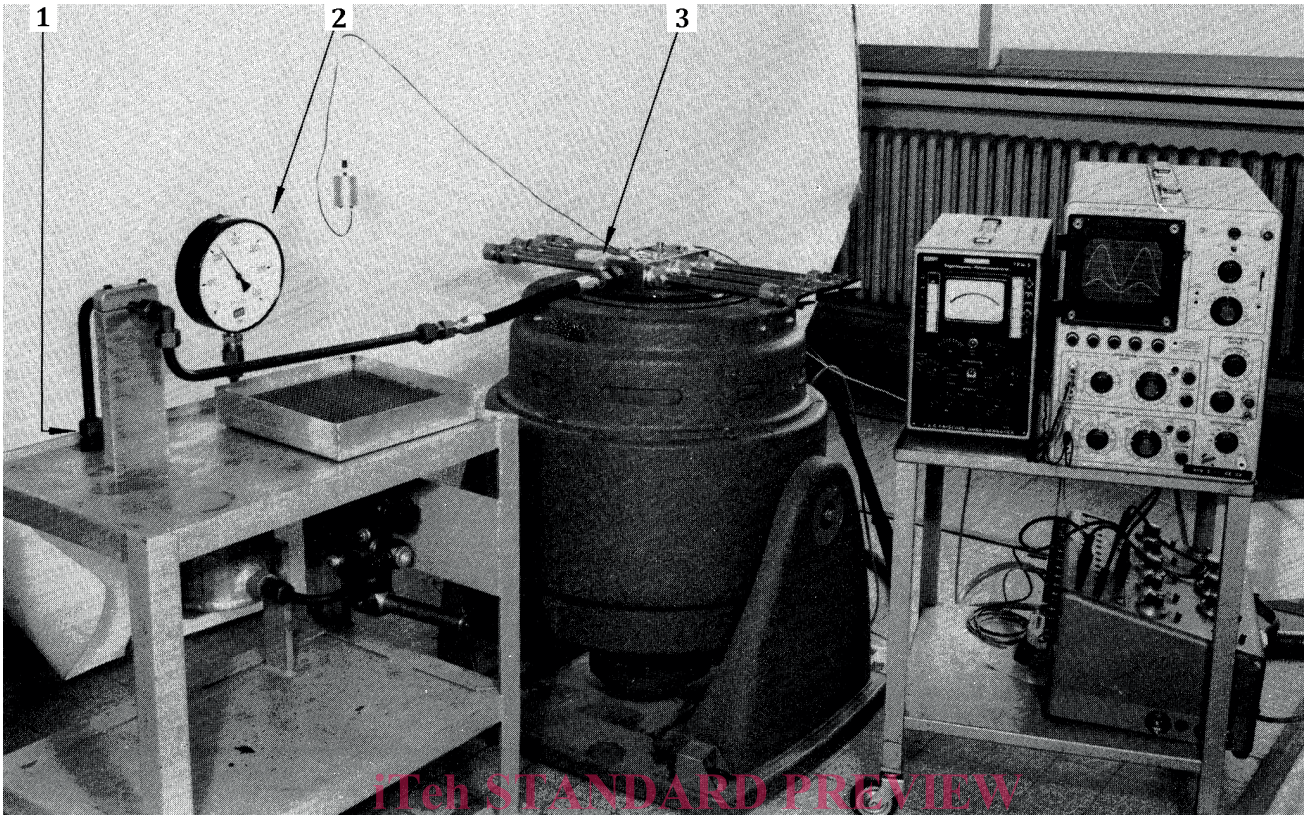
ISO and IEC maintain terminological databases for use in standardization at the following addresses:

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

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

4 Device for flexure test

The test device should be similar to that shown in Figure 1. It shall consist of a vibrator, a manifold to receive at least six test specimens, and a hydraulic supply unit capable of constantly maintaining the static operating pressure during testing, including monitors inducing the shutdown of the system in the event of pressure drop.



Key

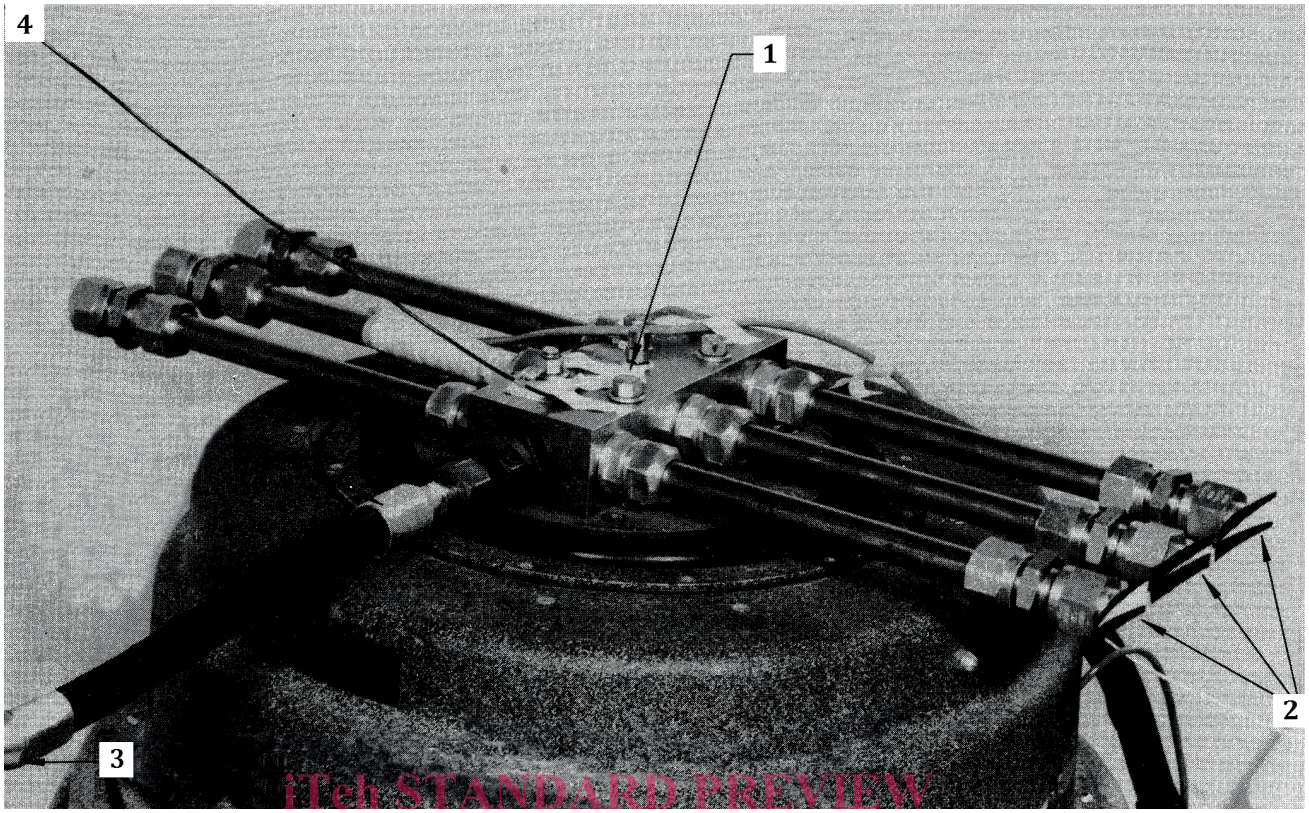
1 pressure supply
2 pressure gauge
3 test specimen

Figure 1 — Set-up of test drive

Three test specimens are attached to two opposite ends of the manifold, which is rigidly mounted on the vibrator. A hose assembly establishes the connection with the hydraulic supply unit.

The vibrator shall allow for vibration frequencies up to 300 Hz.

Details of the set-up are shown in Figure 2.



Key

1 stress cycle in the tube during vibration
2 angle gauges for optical amplitude control
3 pressure generation and monitoring in the test specimen
4 acceleration cycle of vibrator

Figure 2 — Details of set-up

5 Flexure test specimens

The test specimens shall consist of the tube fitting to be tested (for example straight union), the test tube and the fitting to seal the tube.

6 Stress determination

The maximum permissible flexure fatigue stress of the test tubing is determined for the combined stress level.

The combined stress, σ_f, is composed of the tensile stress, σ_p, resulting from the internal pressure and the wall thickness of the tube, and the bending stress, σ_b.

Strain gauges shall be used to demonstrate the bending stress, and the deflection can be checked during testing by means of angle gauges.

A typical stress cycle is illustrated in Figure 3.

The bending stress, σ_b, is determined by the maximum permissible flexure fatigue stress of the test tube and shall be specified for each application.