INTERNATIONAL STANDARD

ISO 7257

Second edition
2016-06-01

Aircraft — Hydraulic tubing joints and fittings — Rotary flexure test

Aéronautique — Joints et raccords pour tubes hydrauliques — Essai de flexion rotative

Reference number
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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 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).

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For an explanation on 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.

The committee responsible for this document is 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 7257:1983), which has been technically revised to add imperial unit equivalents, three DN sizes, and for additional clarifications.

Introduction

This International Standard describes a flexure fatigue test procedure which allows evaluation of various tube fitting designs or material combinations. This evaluation is performed by fatigue testing the tube joints over a spectrum of bending stresses and then plotting the cycles to failure. Other test methods may be used as long as they develop the same data as the rotary flexure test.

Aircraft — Hydraulic tubing joints and fittings — Rotary flexure test

1 Scope

This International Standard specifies a flexure test procedure to determine and classify the fatigue strengths of reconnectable or permanent hydraulic tube joints.

The procedure is intended for conducting flexure tests of fittings and joints with high-strength hydraulic tubes of various alloys such as corrosion resistant steel, Nimonic™[1)], titanium and aluminium alloy hydraulic tube for use on commercial and military aircraft.

A mean stress is applied by holding system pressure in the specimens and then flexing in a rotary bending test machine.

2 Requirements

2.1 Flexure test device

The test device should be capable of testing in-line or bulkhead union test specimens and other configurations such as elbows and tees.

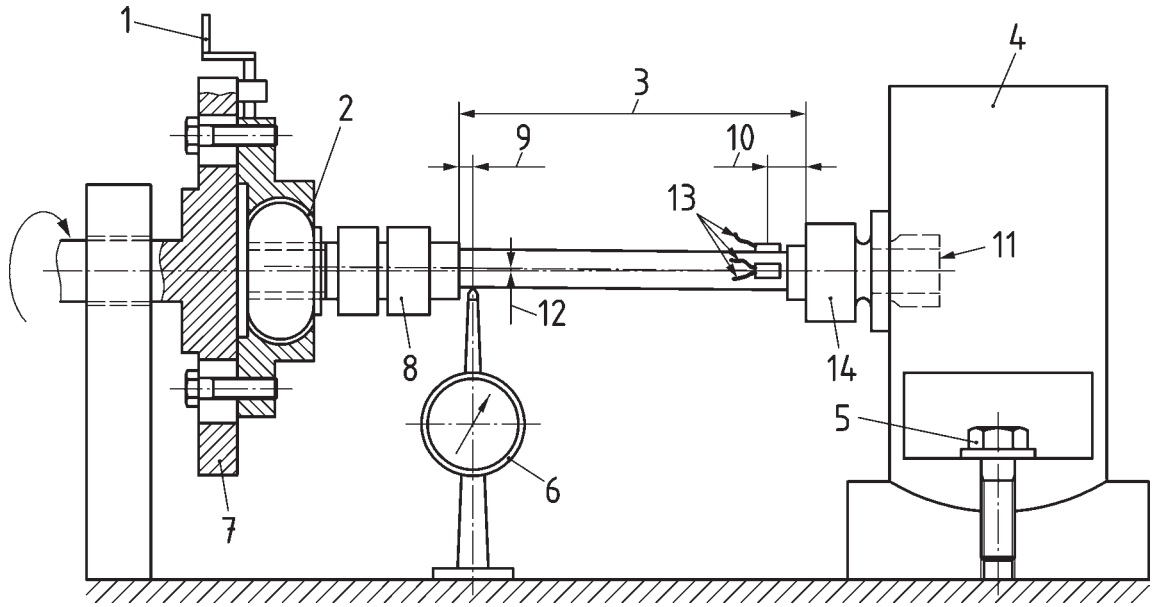
The rotary flexure test device should be similar to that shown in Figure 1. Each rotary flexure test device should be capable of testing one specimen, but several specimens may be mounted on one plate.

The device should be capable of constantly maintaining the required operating pressure during the test. The test fluid shall be water or system fluid (working fluid) unless otherwise specified by the responsible authorities. A typical pressurization and automatic shutdown system is shown in Figure 2. The shut-down should be automatic in the event of failure or pressure drop. The device should be capable of testing at controlled constant temperature, if specified by the procuring agency. The tailstock of the test device should be designed to permit alignment during initial installation and specimen mounting, and to serve as a pressure manifold. The rotating headstock should have a low-friction, self-aligning bearing and should be designed to permit total deflections of up to 25 mm/1 inch, and a constant rotational frequency within the range of 1 500 min^{-1} to 3 600 min^{-1}. The base should be of rigid construction.

2.2 Flexure test specimen

The test specimen should be consisting of an adapter fitting (headstock end), a section of straight tubing, and a test fitting at the tailstock end. Typical test specimens are shown in Figure 3. The tubing shall be of a size and wall thickness as specified by the user or procuring agency.

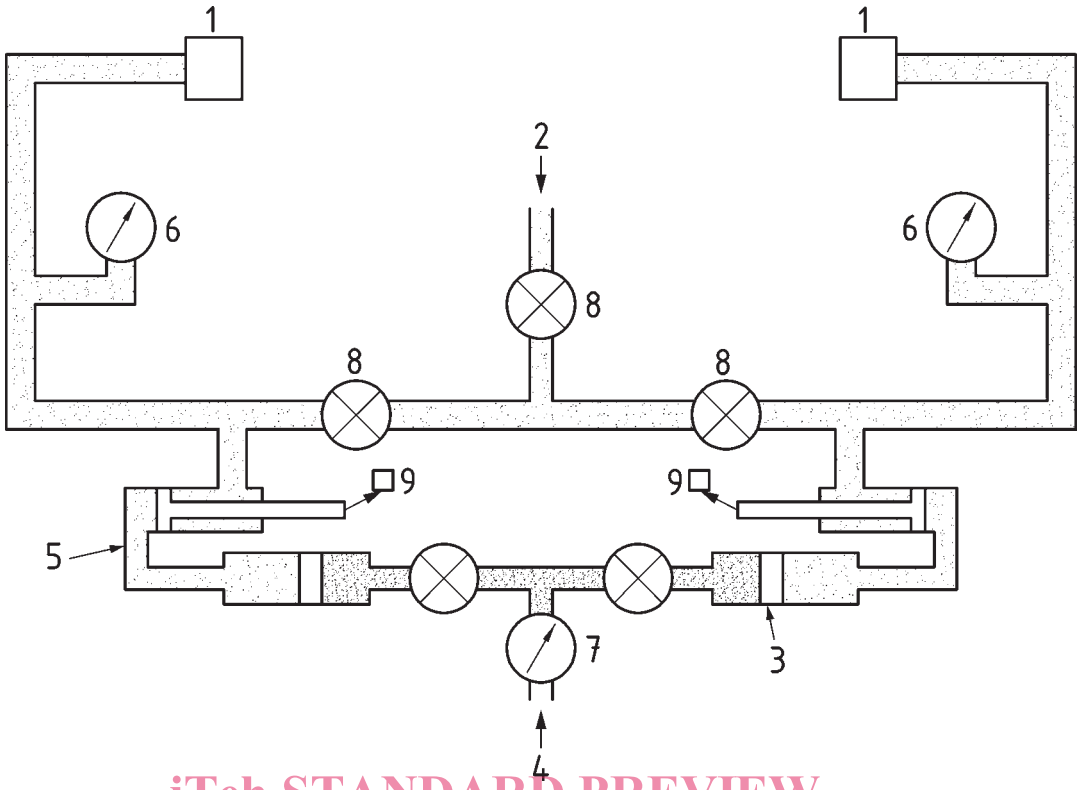
1) Nimonic™ is the trademark of a product supplied by Special Metals Corporation. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of the product named. Equivalent products can be used if they can be shown to lead to the same results.



Key

1	adjustment for deflection	8	adapter fitting
2	self-aligning bearing (without torsion on test joint)	9	10 mm/0,400 inch max
3	test length, *L*	10	(5 ± 1) mm/(0,200 ± 0,040) inch
4	tailstock	11	hydraulic pressure
5	tailstock alignment bolt	12	deflection, *D*
6	dial indicator, alternate for strain gauge (horizontal and vertical adjustment)	13	strain gauges
7	headstock	14	test joint (specimen separable joint)

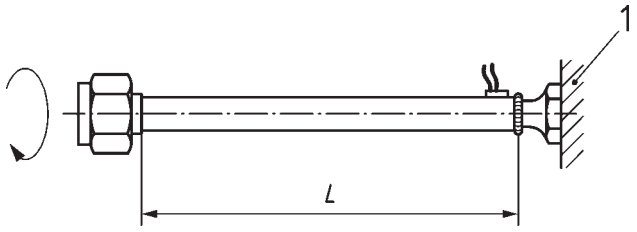
Figure 1 — Typical rotary flexure test schematic



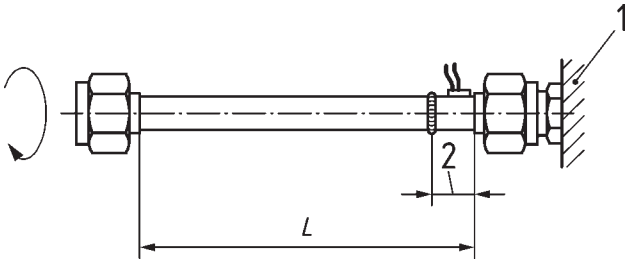
Key

1 tailstock
2 hydraulic pressure
3 accumulator to suit pressure
4 nitrogen pressure
5 actuator 2:1 ratio
6 laboratory test gauge, approximatively 35 000 kPa
7 laboratory test gauge, approximatively 14 000 kPa
8 needle valve
9 microswitch (to stop motor and cycle counter)

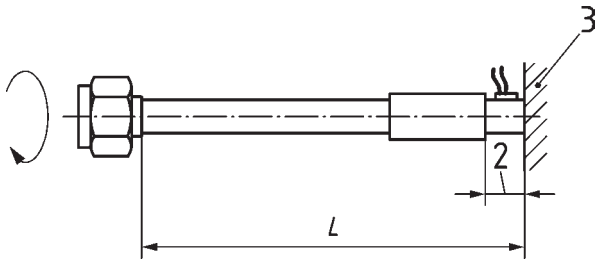
Figure 2 — Typical rotary flexure test hydraulic schematic



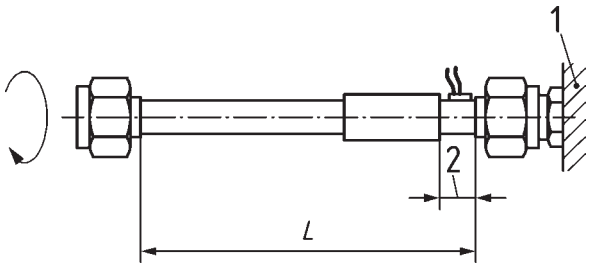
a) Permanent bulkhead union



b) Buttweld

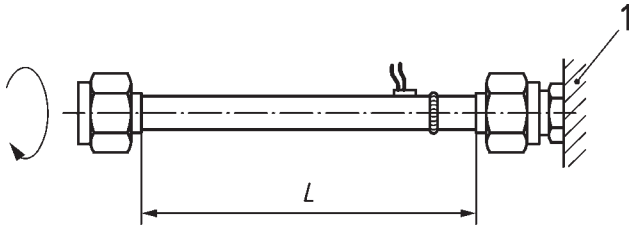


c) Permanent joint

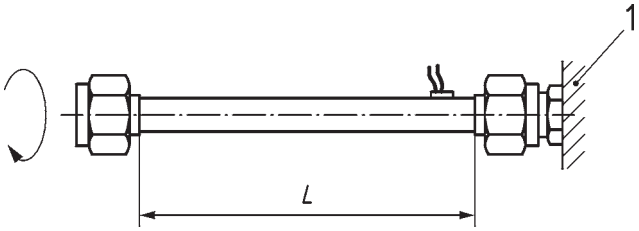


d) Permanent joint

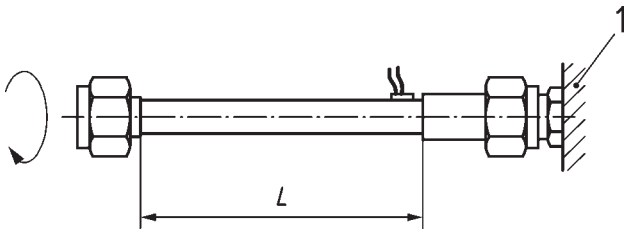
e) Permanent joint



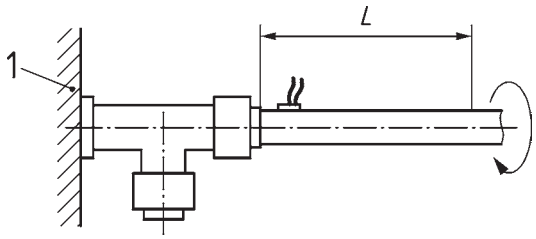
f) Reconnectable, butt welded joint



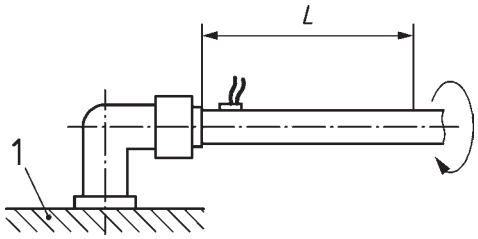
g) Reconnectable, internal swaged joint



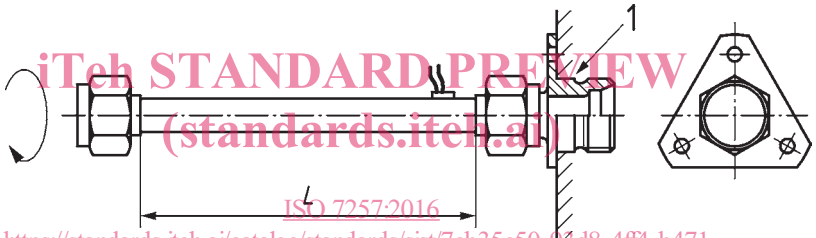
h) Reconnectable, external swaged joint



i) Reconnectable or permanent tee piece



j) Reconnectable or permanent elbow



k) Reconnectable union, flanged bulkhead

Key

1 boss
2 12 mm/0,500 inch max.
3 clamp

Figure 3 — Alternate specimen mounting for permanent joints