DRAFT INTERNATIONAL STANDARD

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Aircraft — Hydraulic tubing joints and fittings — Rotary flexure test

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

ICS: 49.080

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 7257 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 7257:1983). The second edition adds imperial unit equivalents, additional clarifications and three DN sizes.

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. This test procedure is intended for comparative evaluation of fatigue characteristics only, the qualification test procedure for tube fittings being specified in ISO 7169. 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 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, 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 Normative references

The following referenced documents are indispensable for the application 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 2964, *Aerospace — Tubing — Outside diameters and thicknesses — Metric dimensions*

ISO 7169, *Aerospace — Separable tube fittings for fluid systems, for 24 degree cones, for pressures up to 3 000 psi or 21 000 kPa — Procurement specification, inch/metric*

3 Requirements

3.1 Flexure test device

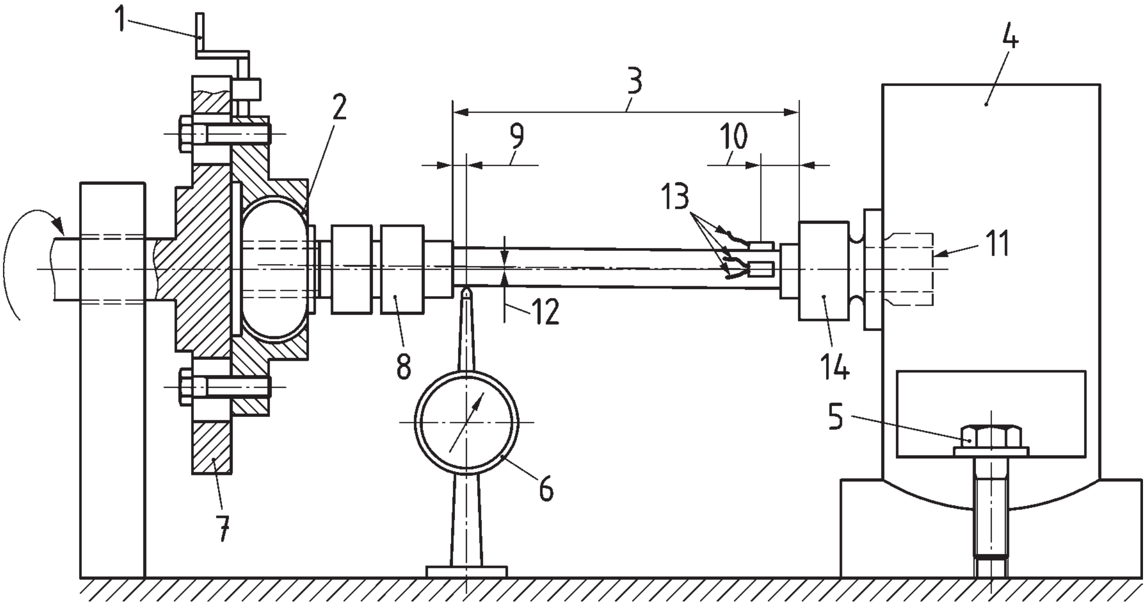
The test device should be capable of testing in-line or bulkhead union test specimens and other configurations such as elbows and tees.

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 to 3 600 min–1. The base should be of rigid construction.

3.2 Flexure test specimen

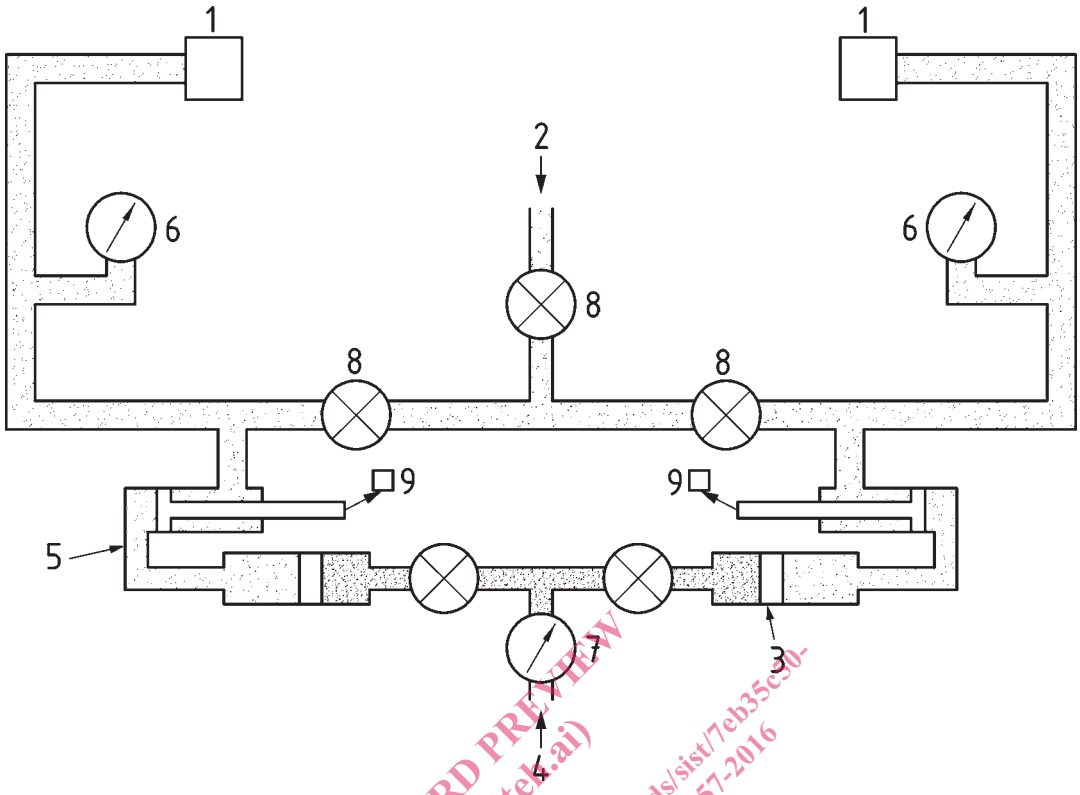
The test specimen should be consist of an adapter fitting (headstock end), a section of straight tubing, and a test fitting at the tailstock end. Typical test specimens are shown in Figure 3. The tubing shall be of a size and wall thickness as specified by the user or procuring agency.



Key

1 Adjustment for deflection
2 Self-aligning bearing (without torsion on test joint)
3 Test length, *L*
4 Tailstock
5 Tailstock alignment bolt
6 Dial indicator, alternate for strain gauge (horizontal and vertical adjustment)
7 Headstock
8 Adapter fitting
9 10 mm/0,400 inch max
10 (5 ± 1) mm/(0,200 ± 0,040) inch
11 Hydraulic pressure
12 Deflection *D*
13 Strain gauges
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