SLOVENSKI STANDARD
SIST EN 2624:2009

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Aeronavtika - Tlaļ no sunkovno preskuġanje komponent v hidravliļ nih sistemih

Aerospace series - Pressure impulse testing of hydraulic system components

Luft- und Raumfahrt - Druckimpulsprüfung von Komponenten in Hydraulik-Anlagen

Série aérospatiale - Essai d'impulsion de pression des composants de systèmes hydrauliques

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

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Foreword

This document (EN 2624:2007) has been prepared by the Aerospace and Defence Industries Association of Europe - Standardization (ASD-STAN).

After enquiries and votes carried out in accordance with the rules of this Association, this Standard has received the approval of the National Associations and the Official Services of the member countries of ASD, prior to its presentation to CEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 2008, and conflicting national standards shall be withdrawn at the latest by January 2008.

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1 Scope

This test method shall be used to verify the structural integrity of certain hydraulic components under pressure impulse-type loading.

For the purpose of pressure impulse testing the hydraulic system components shall be divided into passive and active components. This standard establishes the requirements and the procedures for impulse testing of passive hydraulic components only.

Unless otherwise specified in the detail specification or in existing component related standards, the following procedures shall be used.

Active hydraulic components shall be tested according to tailored test requirements as specified in detail specifications.

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 6772, *Aerospace — Fluid systems — Impulse testing of hydraulic hose, tubing and fitting assemblies.*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 Components

3.1.1
passive components
passive components are units under pressure whose impulse loading in service primarily results from pressure fluctuations in the hydraulic system

The number of cycles, the amplitudes and the wave shape of these impulses in general cannot be predicted or calculated with sufficient accuracy.

Passive components are, for example:

— "manifolds" and fluid distribution components except lines, fittings and hoses

— filter housings

3.1.2
active components
active components are units under pressure which have to sustain (active) pressure pulses resulting from their own function in addition to the normal (passive) system pressure fluctuations

The active portion of the impulse loading in general can be predicted or calculated or derived from the duty cycle of the component.

Active components are, for example:

— flight control actuators and control components

— landing gear and other utility hydraulics

— braking and nose wheel steering hydraulics

3.2
shape of impulse trace
when observed on an oscilloscope the impulse traces show as approximate pressure-time cycles

The dynamic cycle produced by the test machine shall be in conformance with the trace illustrated in Figure 1. It is mandatory that the pressure time curve be confined to the shaded area on Figure 1.

3.3
rate of rise
the rate of rise is defined as the slope of the pressure-time curve in the straight portion of the pressure increase portion

For purposes of definition, the rate of rise shall be determined between 10 % of the total rise above back pressure and 10 % of the total rise below peak pressure. Sweep rate of the oscilloscope shall be adjusted so that the slope of the pressure rise shall take advantage of the full size of the screen.

The trace and photos of the impulse cycle should be an accurate record of the impulse cycle and show a grid or other means to permit accurate checking.

4 Requirements

4.1 General

When this standard is referenced in a design specification as part of the requirements the following requirements shall be specified:

a) Nominal system pressure

b) Operating fluid and ambient temperature

c) Fluid

4.2 Rate of rise

The rate of pressure rise shall be less than 1 400 000 kPa/s (14 000 bars/s) unless otherwise specified in the detail specification.

4.3 Cycling rate

The cycling rate shall be between 1 cycle/s (large components) and 5 cycles/s (small components), with the actual cyclic rate to be defined in the component detail specification. At rates higher than 1 cycle/s the component shall be instrumented to verify that intended stresses are applied.

4.4 Temperature

The fluid and ambient temperature during testing shall be maintained at the nominal component operating temperature as specified in the detail specification.

4.5 Number of cycles

Unless otherwise specified in the detail specification, the following number of pressure impulse cycles shall be applied as a minimum separately to both the pressure and returns (when applicable), cavities of the component.

Avoid backflowing electro-hydraulic servo valves if present in the assembly under test.

High pressure	300 000 cycles	See Figure 1.
Low pressure	150 000 cycles	

4.6 Preparation of specimens

The preparation of test specimens shall be defined in the component detail specification.

4.7 Test equipment

The test equipment and circuit shall produce repeatable pressure pulses within the limits defined in 3.2.

4.8 Test fluid

The fluid used for the test shall be the service fluid of the component undergoing the test, unless otherwise specified in the component detail specification.

4.9 Performance after test

The component shall conform to the performance requirements specified in the detail specification after completion of the impulse testing.

5 Test procedure

5.1 General

This method of testing is intended to determine the ability of hydraulic system components to withstand hydraulic impulse for qualification testing.

5.2 Accuracy

Set up and maintain equipment accuracy so that all data are accurate within 2 % of actual.

5.3 Component set-up

Bleed entrapped air from the component and test circuit being pressurised. Allow all drains and low pressure ports that are not part of the pressure containing envelopes to drain freely and keep them at atmospheric pressure. Metal shot or loosely fitting metal pieces may be placed in the unit under test is desired to minimize fluid volume.

5.4 Impulse test

Conduct the impulse test as required in Clause 4 and the detail specification.

5.5 Component verification

After completion of the pressure impulse testing, the unit shall be tested to the performance limits specified in 4.9.

The unit shall then be disassembled and inspected for cracks or structural failure.