SLOVENSKI STANDARD
SIST EN 3275:2004

01-maj-2004

Aerospace series - Pipe coupling 8°30' up to 28 000 kPa - Dynamic beam seal - Metric series - Technical specification

Aerospace series - Pipe coupling 8°30' up to 28 000 kPa - Dynamic beam seal - Metric series - Technical specification

Luft- und Raumfahrt - Rohrverschraubung 8°30' bis 28 000 kPa - Dichtlippe - Metrische Reihe - Technische Lieferbedingungen

Série aérospatiale - Systeme de raccordement 8°30' jusqu'a 28 000 kPa - Joint a levre - Série métrique - Spécification technique

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49.080	Letalski in vesoljski hidravliļ ni sistemi in deli	Aerospace fluid systems and components

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EUROPEAN STANDARD

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English version

Aerospace series - Pipe coupling 8°30' up to 28 000 kPa - Dynamic beam seal - Metric series - Technical specification

Série aérospatiale - Système de raccordement 8°30' jusqu'à 28 000 kPa - Joint à lèvre - Série métrique - Spécification technique

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This European Standard was approved by CEN on 11 January 2001.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

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

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Contents

Foreword

This document (EN 3275:2002) has been prepared by the European Association of Aerospace Manufacturers (AECMA).

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 AECMA, 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of an identical text or by endorsement, at the latest by October 2002, and conflicting national standards shall be withdrawn at the latest by October 2002.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard; Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

1 Scope

This standard specifies the required characteristics, inspection and test methods, quality assurance and procurement requirements for metric series 8°30' dynamic beam seal pipe couplings, for temperature ranges type II and III according to ISO 6771 and nominal pressure up to 28 000 kPa.

2 Normative references

This European Standard incorporates by dated or undated reference provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies (including amendments).

ISO 468, *Surface roughness — Parameters, their values and general rules for specifying requirements.*

ISO 2685, *Aircraft — Environmental test procedure for airborne equipment — Resistance to fire in designated fire zones.*

ISO 2859-1, *Sampling procedures for inspection by attributes — Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot-inspection.*

ISO 6771, *Aerospace — Fluid systems and components — Pressure and temperature classifications.*

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

ISO 7137, *Aircraft — Environmental conditions and test procedures for airborne equipment.*

ISO 7257, *Aircraft — Hydraulic tubing joints and fittings — Rotary flexure test.*

ISO 8625-1, *Aerospace — Fluid systems — Vocabulary — Part 1: General terms and definitions relating to pressure.*

ISO 9538, *Aerospace — Hydraulic tubing joints and fittings — Planar flexure test.*

EN 2813, *Aerospace series — Aluminium alloy AL-P6061-T6 — Drawn tube for pressure applications - 0,6 mm ≤ a ≤ 12,5 mm.*[1])

EN 3042, *Aerospace series — Quality assurance — EN aerospace products — Qualification procedure.*

EN 3120, *Aerospace series — Titanium alloy TI-P64003 — Cold worked and stress relieved — Seamless tube for pressure systems — 4 mm ≤ D ≤ 51 mm -690 MPa ≤ R_m ≤ 1 030 MPa.*[1])

EN 10204, *Metallic products — Types of inspection documents.*

TR 2674, *Aerospace series — Design and construction of pipelines for fluids in liquid or gaseous condition — Rigid lines, installation.*[2])

MIL-H-5606, *Hydraulic fluid, Petroleum Base, Aircraft, Missile and Ordnance.*[3])

MIL-H-8446, *Hydraulic fluid, Nonpetroleum Base, Aircraft.*[3])

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[1]) Published as AECMA Prestandard at the date of publication of this standard

[2]) Published as AECMA Technical Report at the date of publication of this standard

[3]) Published by: Department of Defense (DoD), the Pentagon, Washington, D.C. 20301.

3 Symbols

A	Elongation, in percent
D_0	Actual outside diameter of pipe, in millimetres
D_1	Actual inside diameter of pipe, in millimetres
DN	Nominal outside diameter of pipe
P	Working pressure, in megapascals
R_m	Tensile strength, in megapascals
$R_{p0,2}$	0,2 % proof stress, in megapascals
σ_x	Axial stress due to pressure, in megapascals

4 Terms and definitions

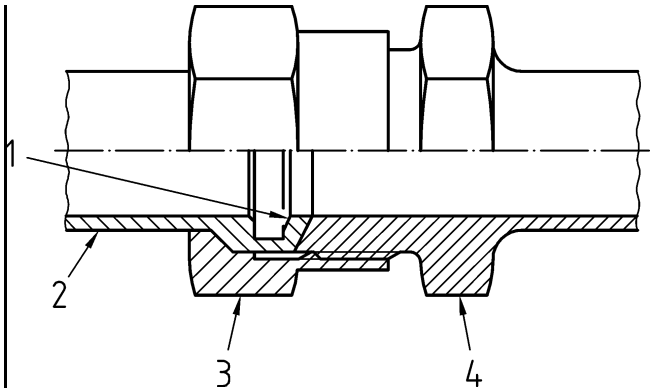
For the purposes of this standard, the following terms and definitions apply:

4.1 Pressure

Nominal pressure, proof pressure, impulse pressure, burst pressure according to ISO 8625-1.

4.2 Coupling

4.2.1
Coupling assembly
assembled and torque-tightened nut, ferrule and pipe mating with e.g. unions, tees or elbows (See figure 1)



Key
1 Dynamic beam seal
2 Ferrule
3 Nut
4 Union end

Figure 1 — Example of coupling assembly

4.2.2
Straight coupling
union connecting pipe to pipe

4.2.3
Forged parts; shaped parts
couplings machined out of individual forging blanks. For crosses, tees and elbows machined out of bar or plate stock the term "shaped" may be used

4.3 Surface defects

4.3.1
Surface irregularity
nonconformity with general surface appearance, possible defect

4.3.2
Crack
clean (crystalline) fracture passing through or across the grain boundaries that possibly follows inclusions of foreign elements. Cracks are normally caused by overstressing the metal during forging or other forming operations, or during heat treatment. Where parts are subject to significant reheating, cracks are usually discoloured by scale

4.3.3
Fold
doubling over of metal, which can occur during the forging operation. Folds can occur at or near the intersection of diameter changes and are especially prevalent with non-circular necks, shoulders and heads

4.3.4
Lap
fold-like machining defect

4.3.5
Seam
(1) usually a surface opening or crack resulting from a defect obtained during casting or forging

(2) extraneous material, stringer in the material, which is not homogeneous with base metal

4.3.6
Pit
void or hole in the surface as caused, for example, by corrosion

4.4 Quality assurance

4.4.1
Production batch
a definite quantity of some commodity or service produced at one time under conditions that are presumed uniform

4.4.2
Delivery batch
batch consisting of couplings with the same identity block which may come from different production batches.

4.4.3
Acceptable quality level (AQL)
when a continuing series of lots is considered, a quality level which for the purposes of sampling inspection is the limit of a satisfactory process average

4.4.4
Qualification
testing required to demonstrate successful performance of the coupling assembly in simulated service (overload, destructive and fatigue tests)

4.4.5
Major defect
a defect other than critical, that is likely to result in a failure or to reduce materially the usability of the considered product for its intended purpose

4.4.6
Minor defect
a defect that is not likely to reduce materially the usability of the considered product for its intended purpose, or that is a departure from established specification having little bearing on the effective use or operation of this product

5 Requirements, inspection and test methods

See table 1 and table 2.

5.1 Test conditions and preparation of specimens for qualification

Tests fluids. Unless otherwise specified, tests shall be carried out using e.g. a petroleum base hydraulic fluid to MIL-H-5606 for coupling assemblies of type II temperature range and a silicate ester base hydraulic fluid to MIL-H-8446 for those of type III temperature range. Water may be used, whenever practical, for proof, burst, stress corrosion and re-use capability testing. For other than hydraulic system applications, it is preferable to use system fluid for leakage (gaseous pressure) and proof testing. When specified in the test method, the test fluid is used as a lubricant.

Specimen preparation. Shaped parts shall be machined with the grain flow of the bar or plate in the direction of the fluid. Specimens shall be assembled as illustrated in table 2. Installations on the pipe end shall be in accordance with TR 2674. Prior to testing, all couplings shall be assembled using the maximum specified torque. Except, when specified in table 2, the coupling shall be assembled using the minimum installation torque for at least half of the specimens, and maximum torques for the remainder.

Pipe assembly. The method of joining the pipe to the coupling end (brazing, welding, mechanical attachment, etc.) shall not be detrimental to the properties, strength or geometry of the pipe and the coupling end. The joint shall be in accordance with the design instructions and shall be inspected by direct measurement, X-ray or other non-destructive methods.

Table 1 — Requirements, inspection and test methods

Clause	Characteristic	Requirement	Inspection and test method	Q[a]	A[a]
5.2[b]	Materials	Conformity with the product standards	Chemical analysis or certificate of compliance to EN 10204 issued by the semi-finished product manufacturer.	X 100 %	X 100 %
5.3[b]	Dimensions Fluid passages	Conformity with the product standards Conformity with the product standards	Suitable measuring instruments A ball with a diameter 0,5 mm less than the minimum diameter specified for the passage shall pass through the coupling.	X 100 % X 100 %	X 50 % X 20 %
5.4[b]	Product identification	Marking according to product standards and definition documents including batch identification of Annex A. It shall be legible and shall not adversely affect the material or the functioning of the products.	Visual examination	X 100 %	X 100 %
5.5[b]	Surface roughness	Conformity with the product standards Interpreted in accordance with ISO 468.	Suitable measuring instruments or visual-tactile samples	X 100 %	X 100 %
5.6[b]	Surface treatment	Conformity with the product standards	Visual examination The thread shall be tested using a gauge with a tolerance class of 4h6h.	X 100 %	X 100 %
5.7[b]	Surface defects	Parts shall be free from surface defects indicated in 4.3 liable to have an adverse affect on their characteristics and endurance.	Visual inspection using suitable methods	X 100 %	X 100 %
	Threads	Threads may be cut, rolled or ground, except titanium alloys which shall be cut or rolled. The external threads of couplings should be rolled and, if machined, shall have an arithmetical mean deviation, R_a, of the profile of 3,2 µm or smoother in accordance with ISO 468.	Visual examination	X 100 %	X 100 %
		The grain flow in rolled threads shall be continuous and follow the general thread contour with the maximum density at the thread root.	Thread flanks in rolled threads shall be examined by micro-examination. Specimens shall be taken from the finished part by sectioning on a longitudinal plane across the threaded area. The specimens shall be polished and etched to reveal the surface defects.	X 10 %	X 5 %

Table 1 (continued)

<table>
<tr><th>Clause</th><th>Characteristic</th><th>Requirement</th><th>Inspection and test method</th><th>Q[a]</th><th>A[a]</th></tr>
<tr><td>5.7 (con-tinued)</td><td></td><td>Laps, cracks, surface irregularities and seams (see 4.3) are not acceptable on any part of the pressure thread flank, in the thread root or on the non-pressure thread flank. Laps and seams, depths of which are within the limits of table, are acceptable on the crest and the non-pressure thread flank above the pitch diameter.
<table>
<tr><th>DN</th><th>Depth mm</th></tr>
<tr><td>05</td><td>0,15</td></tr>
<tr><td>06</td><td>0,18</td></tr>
<tr><td>08</td><td>0,18</td></tr>
<tr><td>10</td><td>0,2</td></tr>
<tr><td>12</td><td>0,23</td></tr>
<tr><td>14 to 32</td><td>0,25</td></tr>
</table></td><td></td><td></td><td></td></tr>
<tr><td>5.8</td><td>Proof pressure</td><td>The coupling assembly shall withstand a pressure equal to twice the nominal pressure of the fluid system for 5 min at ambient temperature without leakage and shall not show any evidence of permanent deformation or other mal-function when using the specified torque values.</td><td>The coupling assembly shall be connected to a pressure source with one end free to move. Rate of pressure increase shall be (150 000 ± 37 500)kPa/min.</td><td>X</td><td></td></tr>
<tr><td>5.9</td><td>Gaseous pressure</td><td>The coupling assembly shall withstand a gaseous pressure equal to the nominal pressure for 5 min, at ambient temperature. There shall be no visible formation of bubbles after 1 min at pressure or other malfunction that would affect assembly or disassembly when using the torque values specified.</td><td>The coupling assembly shall be solvent cleaned and air dried prior to testing. It shall be assembled and tightened to the minimum torques specified in table 3. It shall then be pressurized with nitrogen to the nominal pressure. This pressure shall be maintained for 5 min while the specimens are immersed in water or suitable oil (see figure 2).</td><td>X</td><td></td></tr>
</table>

Table 1 (continued)

Clause	Characteristic	Requirement	Inspection and test method	Q[a]	A[a]
5.10	Hydraulic impulse resistance	The coupling assembly shall withstand 200 000 impulse pressure cycles without leakage.	The coupling assembly shall be impulse tested at the temperatures and in the sequence specified in ISO 6772.	X	
5.11	Minimum burst pressure	The coupling assembly shall withstand a pressure equal to four times the nominal pressure of the fluid system for 5 min, when tested at ambient temperature. There shall be no leakage or burst. Pipe expansion is permissible. The coupling assemblies need not meet any disassembly or assemblies requirements after this test.	The coupling assembly shall be connected to a pressure source with one end free to move. Rate of pressure increase shall be (150 000 ± 37 500) kPa/min.	X	
5.12	Flexure fatigue resistance	Coupling assembly welded to pipes shall achieve a target minimum flexure fatigue stress of 130 MPa for 10^7 cycles. For other methods of joining the coupling to the pipe the minimum flexure fatigue levels for each DN size shall be as shown in table 4a or 4b.	In accordance with either ISO 7257 or ISO 9538. The bending stress shall be determined prior to the application of internal pressure. In order to obtain the true bending stress, it is always necessary to measure the strain dynamically at the flexure test frequency. The tolerance for the specified bending stress shall be from 0% to 10%. NOTE If it is desired to express the stress in terms of combined pressure and bending stress, the axial pressure stress is calculated by the formula:	X	