



SLOVENSKI STANDARD
SIST EN 3050:2001
01-januar-2001

Aerospace series - O-rings, in fluorocarbon rubber (FKM), low compression set - Technical specification

Aerospace series - O-rings, in fluorocarbon rubber (FKM), low compression set - Technical specification

Luft- und Raumfahrt - O-Ringe, aus Fluorcarbon-Elastomer (FKM), mit niedrigem Druckverformungsrest - Technische Lieferbedingungen

Série aérospatiale - Joints toriques, en élastomère fluorocarbone (FKM), a faible déformation rémanente après compression - Spécification technique

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ICS:

49.080 Štejni sistemi in komponente za letalske sisteme za prenos tekočin in plinov
 Aerospace fluid systems and components

SIST EN 3050:2001

en

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EUROPEAN STANDARD

EN 3050

NORME EUROPÉENNE

EUROPÄISCHE NORM

May 1998

ICS 49.080

Descriptors: aircraft industry, O-ring seal, rubber, fluorinated rubber, compression set, hardness, characteristic, specification, quality assurance, acceptance testing, packing

English version

Aerospace series - O-rings, in fluorocarbon rubber (FKM), low compression set - Technical specification

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This European Standard was approved by CEN on 23 February 1998.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Foreword

This European Standard has been prepared by the European Association of Aerospace Manufacturers (AECMA).

After inquiries 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 November 1998, and conflicting national standards shall be withdrawn at the latest by November 1998.

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, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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Annex A (normative)



1 Scope

This standard specifies the characteristics, qualification and acceptance requirements for o-rings in low compression set fluorocarbon rubber (FKM) to EN 2798.

It is applicable whenever referenced.

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.

ISO 48	Rubber, vulcanized or thermoplastic - Determination of hardness (hardness between 10 IRHD and 100 IRHD)
ISO 188	Rubber, vulcanized - Accelerated ageing or heat-resistance tests
ISO 1629	Rubber and latices - Nomenclature
ISO 1749	Aircraft - Elastomeric sealing rings - Packaging and identification
ISO 1817	Rubber, vulcanized - Determination of the effect of liquids
ISO 2781	Rubber, vulcanized - Determination of density
ISO 2859-1	Sampling procedures and tables for inspection by attributes - Part 1: Sampling plans indexed by acceptable quality level (AQL) for lot-by-lot inspection
EN 2798	Aerospace series - Fluorocarbon rubber (FPM) - Low compression set - Hardness 80 IRHD ^{1) 2)}
EN 3042	Aerospace series - Quality assurance - EN aerospace products - Qualification procedure
EN 3376	Aerospace series - Limits of surface imperfections of elastomeric toroidal sealing rings (o-rings) ¹⁾
ASTM D1414-94	Standard Test Methods for Rubber O-Rings ³⁾

3 Definitions

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

3.1 Production batch

Quantity of o-rings manufactured from the same batch of rubber compound having the same section diameter vulcanized in the same oven load

3.2 Inspection lot

Quantity of o-rings from a single production batch with the same part number which completely defines them

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

2) FPM, previous designation replaced by FKM, in conformity with ISO 1629

3) Publiée par : American Society for Testing and Materials (ASTM), 1916 Race street, Philadelphia, PA 19103, États-Unis

3.3 Rubber compound

A homogeneous mixture of all constituents for a rubber

3.4 Batch of rubber compound

Quantity of rubber compound of definite composition which is identifiable, traceable and manufactured in a single production operation

4 Quality assurance

4.1 Qualification

EN 3042

Qualification, inspections and tests (requirements and methods) are specified in table 1. They shall be carried out on:

- 30 o-rings section diameter $d_2 = 1,8$ mm and inside diameter $d_1 = 14,0$ mm;
- 30 o-rings section diameter $d_2 = 3,55$ mm and inside diameter $d_1 = 26,5$ mm.

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4.2 Acceptance

4.2.1 Conditions

From every batch of rubber compound, samples from the first inspection lot of o-rings shall be tested for compliance with the requirements of table 1.

Characteristics:

- dimensions and tolerances;
- hardness;
- density;
- compression set (24 h);
- surface condition;
- packaging.

From all other inspection lots of o-rings from the same production batch, samples of o-rings shall be tested for compliance with the requirements of table 1.

Characteristics:

- dimensions and tolerances;
- compression set (24 h);
- surface condition;
- packaging.

4.2.2 Responsibility

Acceptance inspections and tests shall be carried out by the manufacturer, or under his responsibility.

4.2.3 Inspection and test report

A test report showing numerical values obtained shall be provided together with test results for the batch of rubber compound used.

5 Requirements

See table 1.

Table 1: Technical requirements and test methods

Clause	Characteristic	Requirement	Inspection and test method	Q/A ¹⁾	Sample size
5.1	Material	In accordance with the product standard or definition document plus approval of the qualifying authority	Certificate of compliance issued by the manufacturer of rubber compound	Q	
				A	
5.2	Dimensions and tolerances	In accordance with the product standard or definition document	Standard gauging	Q	See 4.1.
				A	Table 2
5.3	Hardness	80 + 5 - 4 IRHD	ISO 48 - Microtest	Q	See 4.1.
				A	Table 3, Column B
5.4	Density	EN 2798	ISO 2781	Q	See 4.1.
				A	Table 3, Column A
5.5	Compression set				
5.5.1		After 24 h at 200 °C 25 % max.	ASTM D1414	Q	See 4.1.
				A	Table 3, Column B
5.5.2		After 336 h at 200 °C 55 % max.	ASTM D1414	Q	See 4.1.
				A	
5.6	Resistance to heat ageing	After 70 h at 250 °C Change in hardness 0 IRHD to + 5 IRHD	ISO 188	Q	See 4.1.
				A	
5.7	Resistance to liquids				
5.7.1		After 70 h at 23 °C in liquid B Change in hardness 0 IRHD to - 5 IRHD Change in volume 0 % to + 5 %	ISO 1817	Q	3, see 4.1.
				Q	3, see 4.1.
5.7.2		After 70 h at 200 °C in liquid 101 Change in hardness - 15 IRHD to 0 IRHD Change in volume 0 % to + 15 %	ISO 1817	Q	3, see 4.1.
				Q	3, see 4.1.
5.8	Surface condition	Conform to acceptance document	EN 3376	Q	See 4.1.
				A	100 %
5.9	Packaging	See annex A.	Visual examination	A	100 %

1) Q = Qualification, A = Acceptance

Table 2: Sampling plans for visual inspections and dimensional characteristics

Production batch size	Sample size	Acceptance number (Ac) and limiting quality ((LQ) in accordance with the acceptable quality level (AQL) AQL 0,065 %	
		Ac	LQ ₁₀ %
≤ 50	100 %	–	–
51 to 90	13	↓	↓
91 to 150	20	↓	↓
151 to 280	32	↓	↓
281 to 500	50	↓	↓
501 to 1 200	80	↓	↓
1 201 to 3 200	125	↓	↓
3 201 to 10 000	200	0	1,2
10 001 to 35 000	315	↑	↑
35 001 to 150 000	500	↓	↓
150 001 to 500 000	800	1	0,5

↑ Use sampling plan above.
↓ Use sampling plan below.

NOTE: <https://standards.iteh.ai/catalog/standards/sist/71c8a80b-1800-4cf6-9e0a-f14c3208db79/sist-en-3050-2001>

The data given in this table are based on single sampling plans for a normal inspection, as specified in ISO 2859-1 (tables II-A and VI-A).

Other sampling plans specified in ISO 2859-1 may be used (double or multiple sampling), but these shall be chosen in such a way as to ensure an equivalent quality level.

Table 3: Sampling plans for the inspection of physical characteristics

Production batch size	Sample size		Acceptance number (Ac)
	Non-destructive tests A	Destructive tests B	
≤ 500	8	3	0
501 to 3 200	13	5	0
3 201 to 35 000	20	5	0
≥ 35 001	32	8	0

Annex A (normative)

A.1 Packaging

Packaging shall conform to the recommendations of ISO 1749 with the following additional requirements, except for identification.

A.1.1 General

O-rings shall be packed individually. The individual packages may be combined in collective packages in the form of strips or collective packages with perforations. These packages shall be water vapour-, ozone-, oil- and greaseproof and shall protect the product against compressive stresses.

A.1.2 Material of the individual package

The following package materials may be used for the individual packages:

- opaque polyethylene coated kraft paper;
- laminate consisting of aluminium, paper and polyethylene;
- opaque polyethylene film.

The use of polyvinyl chloride film (PVC film) is not permissible.

Transparent or translucent materials shall not be used.

A.1.3 Dimensions of the individual packages

Depending on the size of the o-ring to be packed the following outside dimensions shall be applied for individual packages:

55 mm × 55 mm ¹⁾	205 mm × 205 mm ¹⁾
75 mm × 75 mm	255 mm × 255 mm ¹⁾
100 mm × 100 mm ¹⁾	300 mm × 300 mm
150 mm × 150 mm ¹⁾	400 mm × 400 mm

The individual packages shall not be any larger than necessary.

O-rings up to 205 mm internal diameter shall be packed flat (no loops or distortion).

¹⁾ Sizes in accordance with ISO 1749