SLOVENSKI STANDARD
SIST EN 3747:2009

01-marec-2009

Nadomeģļ a:
SIST EN 3747:2004

Aeronavtika - O-obroļ ki, iz fluorosilikonske gume (FVMQ) - Tehniļ na specifikacija

Aerospace series - O-rings, in fluorosilicone rubber (FVMQ) - Technical specification

Luft- und Raumfahrt - O-Ringe aus Fluorsilikon-Elastomer (FVMQ) - Technische Lieferbedingungen

Ta slovenski standard je istoveten z: EN 3747:2007

ICS:

49.025.40 Guma in polimerni materiali Rubber and plastics

SIST EN 3747:2009 **en,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 3747

June 2007

ICS 49.025.40

Supersedes EN 3747:2003

English Version

Aerospace series - O-rings, in fluorosilicone rubber (FVMQ) - Technical specification

This European Standard was approved by CEN on 11 September 2003.

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 CEN Management Centre 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 CEN Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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

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

Contents

Page

Foreword

This document (EN 3747:2007) 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 December 2007, and conflicting national standards shall be withdrawn at the latest by December 2007.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 3747:2003.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This standard specifies the characteristics, qualification and acceptance requirements for O-rings in fluorosilicone rubber (FVMQ) to EN 3825, EN 3826 and EN 3827, for aerospace applications.

It is applicable whenever referenced.

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 48, *Rubber, vulcanized or thermoplastic — Determination of hardness (hardness between 10 IRHD and 100 IRHD).*

ISO 188, *Rubber, vulcanized or thermoplastic — Accelerated ageing and heat resistance tests.*

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

EN 3376, *Aerospace series — Limits of surface imperfections of elastomeric toroidal sealing rings (o-rings).* [1)]

EN 3825, *Aerospace series — Fluorosilicone rubber (FVMQ) — Hardness 60 IRHD.*[1)]

EN 3826, *Aerospace series — Fluorosilicone rubber (FVMQ) — Hardness 70 IRHD.* [1)]

EN 3827, *Aerospace series — Fluorosilicone rubber (FVMQ) — Hardness 80 IRHD.* [1)]

EN 9133, *Aerospace series — Quality management systems — Qualifiation procedure for aerospace standard parts.*

ASTM D 1414-94, *Standard test methods for rubber O-rings.* [2)]

3 Terms and definitions

For the purposes of this standard the following terms and 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

---

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

2) Published by: American Society for Testing and Materials (ASTM), 1916 Race street, Philadelphia, PA 19103, USA.

3.2
inspection lot
quantity of O-rings from a single production batch with the same part number which completely defines them

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 9133

Before any particular compound can be used to manufacture O-rings to this technical specification it shall have received qualification approval by satisfying the qualification authority that it will meet all the requirements of EN 3825, EN 3826 and EN 3827.

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.

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 Responsability

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 [a]	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**	60^{+5}_{-4} IRHD | 70^{+5}_{-4} IRHD | 80^{+5}_{-4} IRHD	ISO 48 – Microtest	Q	See 4.1.
				A	Table 3, Column B
5.4	**Density**	Permissible deviation from compound qualification value ± 0,03 Mg/m^3	ISO 2781	Q	See 4.1.
				A	Table 3, Column A
5.5	**Compression set**	After 24 h at 150 °C 25 % max.	ASTM D 1414	Q	See 4.1.
				A	Table 3, Column B
5.6	**Resistance to heat ageing**	After 70 h at 200 °C Change in hardness 5 IRHD to 10 IRHD Change in weight 2 % max.	ISO 188	Q	See 4.1.
5.7	**Resistance to liquids**				
5.7.1		After 70 h at 23 °C in liquid B	ISO 1817		
		Change in hardness – 20 IRHD to 0 IRHD		Q	3
		Change in volume 0 % to 25 %		Q	3
5.7.2		After 70 h at 150 °C in liquid 101	ISO 1817		
		Change in hardness – 5 IRHD to 12 IRHD		Q	3
		Change in volume 0 % to 12 %		Q	3
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 %

[a] Q: Qualification, A: Acceptance.

Table 2 — Sampling plans for visual inspections and dimensional characteristics

Batch size	Sample size	Acceptance number (Ac) and limiting quality (LQ_{10}) in accordance with the acceptance quality limit (AQL) AQL 0,065 %	
		Ac	LQ_{10} %
≤ 50	100 %	–	–
51 to 90	013	↓	↓
91 to 150	020	↓	↓
151 to 280	032	↓	↓
281 to 500	050	↓	↓
501 to 1 200	080	↓	↓
1 201 to 3 200	125	↓	↓
3 201 to 10 000	200	0	1,140
10 001 to 35 000	315	↑	↑
35 001 to 150 000	500	↓	↓
150 001 to 500 000	800	1	0,485

↑ Use sampling plan above.

↓ Use sampling plan below.

The data given in this Table are based on single sampling plans for a normal inspection, as specified in ISO 2859-1, Tables 2-A and 6-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 limit.

Table 3 — Sampling plans for the inspection of physical characteristics

Batch size	Sample size		Acceptance number
	Non-destructive tests A	Destructive tests B	(Ac)
≤ 500	08	3	0
501 to 3 200	13	5	0
3 201 to 35 000	20	5	0
≥ 35 001	32	8	0