

SLOVENSKI STANDARD

SIST EN 4688:2021

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Nadomešča:
SIST EN 4688:2012

Aeronavtika - Barve in laki - Dvokomponentni temeljni premaz, korozijsko obstojen, kromiran, ki se suši pri sobni temperaturi - Visoka korozijska odpornost, za vojaško uporabo

Aerospace series - Paints and varnishes - Corrosion resistant chromated two-components room temperature curing epoxy primer - High corrosion resistance for military application

iTeh STANDARD PREVIEW

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Luft- und Raumfahrt - Beschichtungsstoffe - Zweikomponenten-Epoxid-Grundierung, chromathaltig, korrosionsbeständig, raumtemperaturhärtend - Hohe Korrosionsbeständigkeit für militärische Anwendung

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Série aérospatiale - Peintures et vernis - Peinture primaire époxy anticorrosion chromatée à deux composants polymérisant à température ambiante - Haute résistance à la corrosion pour applications militaires

Ta slovenski standard je istoveten z: EN 4688:2021

ICS:

49.040	Prevleke in z njimi povezani postopki, ki se uporabljajo v letalski in vesoljski industriji	Coatings and related processes used in aerospace industry
87.040	Barve in laki	Paints and varnishes
95.020	Vojaštvo na splošno	Military in general

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EUROPEAN STANDARD

EN 4688

NORME EUROPÉENNE

EUROPÄISCHE NORM

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ICS 49.040

Supersedes EN 4688:2012

English Version

**Aerospace series - Paints and varnishes - Corrosion
resistant chromated two-components room temperature
curing epoxy primer - High corrosion resistance for
military application**

Série aérospatiale - Peintures et vernis - Peinture
primaire époxy anticorrosion chromatée à deux
composants polymérisant à température ambiante -
Haute résistance à la corrosion pour applications
militaires

Luft- und Raumfahrt - Beschichtungsstoffe -
Zweikomponenten Grundierung, chromathaltig,
korrosionsschützend, raumtemperaturhärtend - Hoher
Korrosionsschutz für militärische Anwendung

This European Standard was approved by CEN on 2 November 2020.

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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 CEN-CENELEC 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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European foreword

This document (EN 4688:2021) 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 document 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 document shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 2021, and conflicting national standards shall be withdrawn at the latest by July 2021.

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

This document supersedes EN 4688:2012.

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

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EN 4688:2021 (E)**1 Scope**

This document defines the requirements for a two-components, high corrosion inhibiting epoxy primer.

The coating applies to suitably prepared metallic substrates, chromic acid anodised, or conversion coated aluminium alloys and other suitably prepared substrates.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

EN 2101, *Aerospace series — Chromic acid anodizing of aluminium and wrought aluminium alloys*

EN 2334, *Aerospace series — Chromic-sulphuric acid pickle of aluminium and aluminium alloys*

EN 2437, *Aerospace series — Chromate conversion coatings (yellow) for aluminium and aluminium alloys*

EN 3665, *Aerospace series — Test methods for paints and varnishes — Filiform corrosion resistance test on aluminium alloys*

EN 3837, *Aerospace series — Paints and varnishes — Nature and method for surface preparation of test pieces in aluminium alloys*

EN 3840, *Aerospace series — Paints and varnishes — Technical specification*

EN 3847, *Aerospace series — Paints and varnishes — Determination of sedimentation rating*

EN 4160, *Aerospace series — Paints and varnishes — Determination of the effect of thermal exposure*

EN 4689, *Aerospace series — Paints and varnishes — Two-components room temperature curing polyurethane finish — High flexibility and chemical agent resistance for military application*

EN 4704, *Aerospace series — Tartaric-Sulphuric-Acid anodizing of aluminium and aluminium wrought alloys for corrosion protection and paint pre-treatment (TSA)*

EN ISO 1513, *Paints and varnishes — Examination and preparation of test samples*

EN ISO 1518-1, *Paints and varnishes — Determination of scratch resistance — Part 1: Constant-loading method*

EN ISO 1519, *Paints and varnishes — Bend test (cylindrical mandrel)*

EN ISO 1520, *Paints and varnishes — Cupping test*

EN ISO 1524, *Paints, varnishes and printing inks — Determination of fineness of grind*

EN ISO 2409, *Paints and varnishes — Cross-cut test*

EN ISO 2431, *Paints and varnishes — Determination of flow time by use of flow cups*

EN ISO 2811-1, *Paints and varnishes — Determination of density — Part 1: Pycnometer method*

EN ISO 2811-2, *Paints and varnishes — Determination of density — Part 2: Immersed body (plummet) method*

EN ISO 2811-3, *Paints and varnishes — Determination of density — Part 3: Oscillation method*

EN ISO 2811-4, *Paints and varnishes — Determination of density — Part 4: Pressure cup method*

EN ISO 2812-1, *Paints and varnishes — Determination of resistance to liquids — Part 1: Immersion in liquids other than water*

EN ISO 2812-2, *Paints and varnishes — Determination of resistance to liquids — Part 2: Water immersion method*

EN ISO 2813, *Paints and varnishes - Determination of gloss value at 20°, 60° and 85°*

EN ISO 3251, *Paints, varnishes and plastics — Determination of non-volatile-matter content*

EN ISO 3675, *Crude petroleum and liquid petroleum products — Laboratory determination of density — Hydrometer method*

EN ISO 3679, *Determination of flash no-flash and flash point — Rapid equilibrium closed cup method*

EN ISO 4628-2, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 2: Assessment of degree of blistering*

EN ISO 4628-8, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 8: Assessment of degree of delamination and corrosion around a scribe or other artificial defect*

EN ISO 4628-10, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 10: Assessment of degree of filiform corrosion*

EN ISO 6270-1, *Paints and varnishes — Determination of resistance to humidity — Part 1: Condensation (single-sided exposure)*

EN ISO 9117-1, *Paints and varnishes — Drying tests — Part 1: Determination of through-dry state and through-dry time*

EN ISO 9117-3, *Paints and varnishes — Drying tests — Part 3: Surface-drying test using ballotini*

EN ISO 9117-6, *Paints and varnishes — Drying tests — Part 6: Print-free test*

EN ISO 9227, *Corrosion tests in artificial atmospheres — Salt spray tests*

EN ISO 9514, *Paints and varnishes; Determination of the pot life of multicomponent coating systems — Preparation and conditioning of samples and guidelines for testing*

EN ISO 11664*, *Colorimetry*

EN ISO 11890-1, *Paints and varnishes — Determination of volatile organic compound (VOC) content — Part 1: Difference method*

ISO 3270, *Paints and varnishes and their raw materials — Temperatures and humidities for conditioning and testing*

MIL-PRF-5606H, *Performance specification: Hydraulic fluid, petroleum base; aircraft, missile, and ordnance. (NATO H-515)*¹⁾

MIL-PRF-6081D, *Performance specification: Lubricating oil, jet engine. (NATO O-133)*¹⁾

* And all its parts quoted in this document.

¹⁾ Published by: DoD National (US) MIL. Department of Defense <http://www.defenselink.mil/>.

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MIL-PRF-23699F, *Performance specification: Lubricating oil, aircraft turbine engine, synthetic base, NATO code number O-156* ¹⁾

MIL-DTL-83133G, *Detail specification: Turbine fuel, aviation, kerosene type, JP-8 (NATO F-34), NATO F-35, and JP-8+100 (NATO F-37)* ¹⁾

AMS 1526B, *Cleaner for aircraft exterior surfaces water-miscible, pressure-spraying type* ²⁾

AMS 1527B, *Cleaner for aircraft exterior surfaces water-miscible, foam-on, pressure-spraying* ²⁾

AMS 1533A, *Cleaner for exterior aircraft surfaces gel-type, solvent-base* ²⁾

ASTM B117, *Standard Practice for Operating Salt Spray (Fog) Apparatus*

DEF STAN 68-10 Issue 5, *Corrosion Preventive, Water Displacing NATO Code: C-634 Joint Service Designation: PX-24*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 3840 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <http://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

4 Surface pretreatments

In accordance with EN 3837, the surface pretreatments applicable to aluminium alloy test panels are the following:

EN 3837 — Procedure A: Sulfochromic pickling in accordance with EN 2334

EN 3837 — Procedure B: Chromic acid anodizing in accordance with EN 2101

EN 3837 — Procedure C: Chromate conversion coating in accordance with EN 2437

EN 3837 — Procedure D: Tartaric-Sulphuric-Acid anodizing in accordance with EN 4704

5 Classification

The primer is classified according to the following types:

TYPE I: Standard solvent content (VOC < 680 g/l)

TYPE II: Low volatile organic content (VOC < 350 g/l)

TYPE III: Waterborne (VOC < 250 g/l)

²⁾ Published by: SAE International (US) Society of Automotive Engineers <http://www.sae.org/>.

6 Batch release and qualification testing

6.1 General

The general requirements for qualification and batch release testing shall be in accordance with (i.a.w.) EN 3840 and the applicable appendix for the specific material.

6.2 Qualification tests

For product qualification, all tests defined in this document, in Table 2 to Table 7, shall be performed. A minimum of 3 (three) batches shall be tested for qualification purposes.

6.3 Batch acceptance testing

The Manufacturer shall give evidence on the Test Report or the Certificate of Conformance that all the tests marked with the symbol * in this specification have been performed for batch acceptance tests.

6.4 Purchaser batch release testing

The Purchaser may perform any of the tests of this specification deemed necessary to ensure continuing uniform quality in material shipments.

Table 1 — General requirements

Material description	Primer, corrosion inhibiting, for aerospace applications
Formulation	Base Curing agent Thinner – if appropriate
Preparation	These components shall be mixed in simple proportions, by volume or weight, in accordance with the manufacturers' instructions.
Technical specification	EN 3840
Marking	See EN 3840.
Storage stability	See EN 3840.
Application and use	Dry film thickness of $(25 \pm 5) \mu\text{m}$.
Drying conditions	$(23 \pm 2) ^\circ\text{C}/(50 \pm 5)\% \text{RH}$ for 7 (seven) days before testing, or after air drying for 4 (four) to 6 (six) hours before the application of the topcoat EN 4689. ISO 3270 for 7 (seven) days before testing.
Quality assurance	See EN 3840.
Designation	Primer corrosion inhibiting.
Packaging	See EN 3840.
Health and safety	see EN 3840.

Table 2 — Physical and chemical characteristics — Delivery conditions (1 of 3)

Tests according to EN 3840	Test	Test criteria	Test requirements		
— *	Condition	Test method	EN ISO 1513 (as received in the original container)		
		Requirement	Shall be free from contaminants and show no skinning, gelling, hard settlement, or other defect		
1 *	Non-volatile matter	Test method	EN ISO 3251		
		Requirement	% m/m	Base + 2 % Reference value ^{a,b}	Curing agent ± 2 % Reference value ^{a,b}
49	Volatile organic content (VOC) (Type II and III only)	Test method	EN ISO 11890-1		
		Test condition	Base + Curing agent + Thinner		
		Requirement	g/l	< Reference value ^b	
7	Flash point	Test method	EN ISO 3679		
		Requirement	°C	Base > Reference value ^b	Curing agent > Reference value ^b
8 *	Flow time	Test method	EN ISO 2431		
		Test condition	Base + Curing agent + Thinner		
		Requirement	± 10 % Reference value ^{a,b}		
5	Sedimentation rating	Test method	EN 3847		
		Test condition	Base + Curing agent + Thinner		
		Requirement	ml/4 h	≤ 30	
* See Subclause 6.3.					
^a The deviation is that compared to the reference value.					
^b The reference value is that established during qualification.					

Table 2 — Physical and chemical characteristics — Delivery conditions (2 of 3)

Tests according to EN 3840	Test	Test criteria	Test requirements				
3* 4*	Density	Test method	EN ISO 2811-1 to EN ISO 2811-4 or EN ISO 3675				
		Test condition	(23 ± 2) °C/(50 ± 5) % RH				
		Requirement	g/cm ³	Base ± 0,03 g/cm ³ ref value	Curing agent ± 0,03 g/cm ³ ref value	Thinner ± 0,03 g/cm ³ ref value	
10	Fineness of grind	Test method	EN ISO 1524				
		Requirement	µm	Base c	Curing agent	Thinner —	
—*	Application, properties and finish	Test method	None				
		Panel	EN 3837-A ₁ or EN 3837-A ₂ (2024-T3 unclad or 2024-T3 clad)				
		Pretreatment	EN 3837 – Procedure A or B or C or D				
		Coating	Coating to this document				
		Test condition	(23 ± 2) °C/(50 ± 5) % RH				
		Requirements	The paint film applied shall result in an opaque even finish free from runs, sags, wrinkling, pinholing or other defects				
20*	Pot life	Test method	EN ISO 9514				
		Test condition	Base + Curing agent + Thinner				
		Requirement	h	> Reference value ^b			
21*	Drying time at the surface	Test method	EN ISO 9117-3				
		Panel	EN 3837-A ₁ or EN 3837-A ₂ (2024-T3 unclad or 2024-T3 clad)				
		Pretreatment	EN 3837 – Procedure A or B or C or D				
		Coating	Coating to this document				
		Requirement	h	Reference value ^{a,b}			
		Test condition	(23 ± 2) °C/(50 ± 5) % RH				
<p>* See Subclause 6.3.</p> <p>a The deviation is that compared to the reference value.</p> <p>b The reference value is that established during qualification.</p> <p>c To be agreed between manufacturer and customer.</p>							