

DIN EN 4860

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Entwurf**Luft- und Raumfahrt –
Umweltprüfung –****Abrasiver Verschleiß von Bedruckungen, Beschriftungen, Oberflächen und
Materialien verursacht durch die Reibung der Fingerkuppe oder der Hand;
Englische Fassung prEN 4860:2020**

Aerospace series –

Environmental testing –

Test Xb: Abrasion of markings, letterings, surfaces and materials caused by rubbing fingertips and hands;

English version prEN 4860:2020

Série aérospatiale –

Essais d'environnement –

Essai Xb: Abrasion de marques, lettres, surfaces et matériaux par cause de frottement de doigts et de mains;

Version anglaise prEN 4860:2020

Anwendungswarnvermerk

Dieser Norm-Entwurf mit Erscheinungsdatum 2020-07-03 wird der Öffentlichkeit zur Prüfung und Stellungnahme vorgelegt.

Weil die beabsichtigte Norm von der vorliegenden Fassung abweichen kann, ist die Anwendung dieses Entwurfs besonders zu vereinbaren.

Stellungnahmen werden erbeten

- vorzugsweise online im Norm-Entwurfs-Portal von DIN unter www.din.de/go/entwuerfe bzw. für Norm-Entwürfe der DKE auch im Norm-Entwurfs-Portal der DKE unter www.entwuerfe.normenbibliothek.de, sofern dort wiedergegeben;
- oder als Datei per E-Mail an nl@din.de möglichst in Form einer Tabelle. Die Vorlage dieser Tabelle kann im Internet unter www.din.de/go/stellungnahmen-norm-entwuerfe oder für Stellungnahmen zu Norm-Entwürfen der DKE unter www.dke.de/stellungnahme abgerufen werden;
- oder in Papierform an den DIN-Normenausschuss Luft- und Raumfahrt (NL), 10772 Berlin oder Saatwinkler Damm 42/43, 13627 Berlin.

Die Empfänger dieses Norm-Entwurfs werden gebeten, mit ihren Kommentaren jegliche relevanten Patentrechte, die sie kennen, mitzuteilen und unterstützende Dokumentationen zur Verfügung zu stellen.

Gesamtumfang 22 Seiten

DIN-Normenausschuss Luft- und Raumfahrt (NL)

Nationales Vorwort

Der Verband der Europäischen Luft-, Raumfahrt- und Verteidigungsindustrie – Normung (ASD-STAN) ist vom Europäischen Komitee für Normung (CEN) für zuständig erklärt worden, Europäische Normen (EN) für das Gebiet der Luft- und Raumfahrt auszuarbeiten. Durch die Vereinbarung vom 3. Oktober 1986 wurde ASD Assoziierte Organisation (ASB) des CEN.

Das vorliegende Dokument (prEN 4860:2020) wurde von ASD-STAN, Fachbereich Werkstoffe, unter Mitwirkung deutscher Experten des DIN-Normenausschusses Luft- und Raumfahrt (NL) erarbeitet.

Das zuständige deutsche Normungsgremium ist der Arbeitsausschuss NA 131-09-07 AA „Testverfahren“ im DIN-Normenausschuss Luft- und Raumfahrt (NL).

Der vorliegende Norm-Entwurf enthält zur technischen Kommentierung einen Europäischen Norm-Entwurf (prEN) ausschließlich in Englischer Fassung aus der CEN-Umfrage.

Ein zweiter Norm-Entwurf wird nur die Deutsche Fassung der veröffentlichten ASD-STAN prEN enthalten. Es wird darauf hingewiesen, dass auf Grund der Verfahrensweise zur Normenerstellung bei ASD-STAN der zweite Norm-Entwurf ausschließlich der redaktionellen Prüfung der deutschen Sprachfassung dienen wird.

Entsprechend Beschluss 57/9 des Technischen Ausschusses des Beirats des DIN-Normenausschusses Luft- und Raumfahrt (NL) sind die europäischen Luft- und Raumfahrt-Normungsergebnisse zweisprachig, in Deutsch und Englisch, in das Deutsche Normenwerk zu überführen. Aus diesem Grund wird die Norm beide Sprachfassungen enthalten.

Aktuelle Informationen zu diesem Dokument können über die Internetseiten von DIN (www.din.de) durch eine Suche nach der Dokumentennummer aufgerufen werden.

**Aerospace series - Environmental testing - Test Xb:
Abrasion of markings, letterings, surfaces and materials
caused by rubbing fingertips and hands**

Série aérospatiale - Essais d'environnement - Essai Xb :
Abrasion de marques, lettres, surfaces et matériaux par
cause de frottement de doigts et de mains

Luft- und Raumfahrt - Umweltprüfung - Abrasiver
Verschleiß von Bedruckungen, Beschriftungen,
Oberflächen und Materialien verursacht durch die
Reibung der Fingerkuppe oder der Hand

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee ASD-STAN.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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European foreword

This document (prEN 4860:2020) 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 document is currently submitted to the CEN Enquiry.

1 Scope

This document provides a series of standard testing methods to determine the resistance of markings, letterings, surfaces and materials on flat or curved surfaces against abrasion as may occur for example by manually operating actuators, buttons, materials and surfaces in aerospace. The method is also suitable to test the resistance against fluids, pastes, particles and other materials and also in combination.

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 60068-1:2014, *Environmental testing - Part 1: General and guidance*

3 Terms and definitions

No terms and definitions are listed in this document.

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 General description

Marking and lettering on the product surface is a communication feature between the product and human beings. This communication feature often affects its usability and diminishes the value of the product. Therefore, testing of the abrasion resistance to the environmental load on the surface generated by human physical contact is of great importance.

5 Description of the test apparatus, test piston, test fabric and test media

5.1 General description

A suitable test apparatus shall comprise all the parts and generate the motion which are described in the drawing in Annex A.

A dynamic pneumatic drive shall move the test piston via a connecting rod towards the surface under test and then over it. The tip of the test piston due to its viscoelasticity is deformed in such a way as to fit the surface under test. This is to simulate the motion of human fingertip including its hand and arm muscles. This motion shall be repeated cyclically. A viscoelastic test piston shall be used to simulate the characteristics of the human fingertip, ball of a thumb and hand. The material property, hardness, the shape and the surface topography of the test piston shall be chosen in such a way that the pressure and friction executed by a human finger or by the ball of a thumb are simulated. To obtain reproducible conditions for impact and friction, a piece of fabric is placed between the piston and the surface under test (either as a cover of the piston or as a curtain, hanging between piston and surface). The test fabric shall be chosen according to the real simulation condition. Depending on the relevant specification, this fabric may either be dry (dry test) or wetted with a specified test liquid by means of an automatic feedthrough if the test is intended to cover the influence of fluid contamination as may occur in normal use (wet test).

The test specimen shall be positioned on a solid, rigid frame being able to hold a range of samples with various dimensions and geometries and withstand all forces specified in this document. For non-rigid test specimens, additional sample support shall be used.

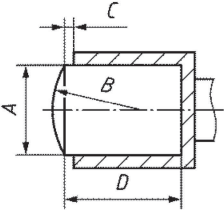
5.2 Motion of the test piston

A single cycle of the test piston shall comprise: movement of the piston towards the test specimen at an angle of $45^\circ \pm 5^\circ$ to the surface of the specimen and at a velocity of $60 \text{ mm/s} \pm 5 \text{ mm/s}$. After the test piston impacts the surface of the specimen, it shall move parallel over the surface of the specimen for a specified distance (referred to as the rubbing path). During this portion of the movement the test piston shall apply a specified force and the longitudinal axis of the test piston shall remain normal to the test specimen. The test piston shall then retract and separate from the surface of the specimen and return to its start position. This motion shall be repeated cyclically as many times as prescribed by the relevant specification and the duration of the cycle set so that the “piston pressing on the surface” and “piston lifted times” are approximately equal. The period of each pressing unidirectional movement cycle is set based upon the force applied by the test piston and the rubbing path. The length of the rubbing movement shall be set to that specified in the relevant specification, which shall be between 4 mm and 40 mm. The applied force shall be set to that specified in the relevant specification and shall be between 1 N and 20 N. The test specimen shall be firmly mounted on an adjustable, solid and rigid frame.

5.3 Test piston

The size and the type of the test piston shall be selected from Table 1 according to the shape and dimension of the test specimen and the kind of lettering. The test piston shall consist of viscoelastic material which shall be chemically inert against the test liquids and shall be characterized by a Shore-A-hardness of 48 ± 5 , measured on the flat side of the viscoelastic material.

Table 1 — Information about size of the test piston

	Size	Dimensions			
		mm			
		A $\pm 0,1$	B $\pm 0,1$	C $\pm 0,1$	D $\pm 0,15$
	1	10	20	1	32
	2	20	20	3	35
	3	30	20	2	32

If necessary other dimensions for the test piston more suited to the test specimen may be chosen. They shall then be prescribed by the relevant specification. The load-displacement charts shall be documented by the manufacturer and provided upon request.

The test piston shall be replaced regularly to obtain the reproducible test results. The normal lifetime of the test piston is no more than 1 (one) year or 2 000 000 test cycles, whichever occurs first. It could wear out before reaching the maximum lifetime depending on the usage (e.g. test media, forces) which can drastically change this behaviour. Wear signs include divergent hardness, loss of the contour of the contact surface, damages on the surface, and discoloration and gloss change of the viscoelastic test piston material. If one of the latter occurs, the test piston shall be replaced.

5.4 Test fabric

Between the test specimen and the test piston there shall be an easily replaceable piece of fabric which also can be a cover for the test piston.

EN ISO 12947-1:1998, Table 1 gives an example of specifications of the test fabric.

Abrasion side, machine direction and cross direction of the fabric shall be specified. Additionally, they shall be marked. The movement direction of the test piston shall be parallel to the machine direction of the fabric to maintain reproducibility. To ensure this, a guide for the fabric is recommended. The fabric