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**Aeronavtika - Nekovinski materiali - Strukturni adhezivni sistemi - Sistemi za lepljenje struktur - Tehnična specifikacija**

Aerospace series - Non-metallic materials - Structural adhesive systems - Paste adhesive - Technical specification

Luft- und Raumfahrt - Nichtmetallische Werkstoffe - Strukturelle Klebstoffsysteme - Klebstoffpasten - Technische Lieferbedingungen

Série aérospatiale - Matériaux non-métalliques - Systèmes d'adhésifs structuraux - Adhésif en pâte - Spécification technique

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**Ta slovenski standard je istoveten z: EN 4106:2013**

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**ICS:**

49.025.50      Lepila

Adhesives

**SIST EN 4106:2014**

**en**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 4106**

January 2013

ICS 49.025.50

English Version

**Aerospace series - Non-metallic materials - Structural adhesive  
systems - Paste adhesive - Technical specification**

Série aérospatiale - Matériaux non-métalliques - Systèmes  
d'adhésifs structuraux - Adhésif en pâte - Spécification  
technique

Luft- und Raumfahrt - Nichtmetallische Werkstoffe -  
Strukturelle Klebstoffsysteme - Klebstoffpasten -  
Technische Lieferbedingungen

This European Standard was approved by CEN on 10 November 2012.

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-CENELEC 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-CENELEC Management Centre has the same status as the official versions.

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

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COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

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## Foreword

This document (EN 4106:2013) 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 July 2013, and conflicting national standards shall be withdrawn at the latest by July 2013.

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.

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

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## Introduction

This standard is part of the series of EN non-metallic materials standards for aerospace applications. The general organisation of this series is described in EN 4385. This document is a level 3 document as defined in EN 4385. It has been prepared in accordance with EN 4387.

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## 1 Scope

This European Standard defines the requirements for manufacture, qualification, inspection and testing of products in structural adhesive systems where the adhesive is supplied in the form of a paste, either a one-part or two-part system, for aerospace applications. The adhesive may be used in conjunction with a primer whose requirements are also included in this European Standard. It is applicable whenever referenced on a material standard.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 542, *Adhesives — Determination of density*

EN 924, *Adhesives — Solvent-borne and solvent-free adhesives — Determination of flashpoint*

EN 2243-1, *Aerospace series — Non-metallic materials — Structural adhesives — Test methods — Part 1: Single lap shear*

EN 2243-2, *Aerospace series — Non-metallic materials — Structural adhesives — Test method — Part 2: Peel metal-metal*

EN 2243-6, *Aerospace series — Non-metallic materials — Structural adhesives — Test method — Part 6: Determination of shear stress and shear strain*

EN 2379, *Aerospace series — Fluids for assessment of non-metallic materials* <sup>1)</sup>

EN 2757, *Aerospace series — Structural adhesives system — Test method — Determination of the drying and ignition residues of primers*

EN 2781, *Aerospace series — Non-metallic materials — Structural adhesives — Test methods — Determination of the primer thickness*

EN 4385, *Aerospace series — Non-metallic materials — General organisation of standardisation — Links between types of standards* <sup>1)</sup>

EN 4387, *Aerospace series — Non-metallic materials — Rules for drafting and presentation of technical specifications* <sup>1)</sup>

EN 6040, *Aerospace series — Non-metallic materials — Test method — Analysis of thermoset systems by High Performance Liquid Chromatography (HPLC)* <sup>1)</sup>

EN 6041, *Aerospace series — Non-metallic materials — Test method — Analysis of non-metallic materials (uncured) by Differential Scanning Calorimetry (DSC)* <sup>1)</sup>

EN 6042, *Aerospace series — Organic compounds — Test method — Analysis by infrared spectroscopy* <sup>1)</sup>

EN 6064, *Aerospace series — Non-metallic materials — Analysis of non-metallic materials (cured) for the determination of the extent of cure by Differential Scanning Calorimetry (DSC)* <sup>1)</sup>

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<sup>1)</sup> Published as ASD-STAN Prestandard at the date of publication of this standard ([www.asd-stan.org](http://www.asd-stan.org)).

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EN 9100, *Quality Management Systems — Requirements for Aviation, Space and Defence Organizations*

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

EN 12092, *Adhesives — Determination of viscosity*

ISO Guide 22, *General criteria for supplier's declaration of conformity*

ISO 3768:1976, *Metallic coatings — Neutral salt spray test (NSS test)*

ESA PSS-01-702, *A thermal vacuum test for the screening of space materials*

TR 7000-6, *Aerospace series — Non-metallic materials — Rules for the drafting and presentation of material standards — Part 6: Structural adhesive systems* <sup>2)</sup>

### 3 Terms, definitions, symbols and abbreviations

For the purposes of this document, the terms, definitions, symbols and abbreviations given in EN 9100, EN 9133, TR 7000-6 and the following, apply.

#### 3.1

##### **batch**

quantity of adhesive material which is homogenous and has been manufactured from a single mix of each of its individual ingredients in one continuous production run

#### 3.2

##### **product**

in this document the word product refers to all forms of paste adhesive, either a single component or comprised of two parts

#### 3.3

##### **adhesive system**

combination of a paste adhesive and primer

#### 3.4

##### **adhesive material**

any paste or primer of which an adhesive system may be composed

#### 3.5

##### **filler**

inorganic material incorporated in an adhesive to improve its cure rheology and service performance

#### 3.6

##### **corrosion inhibitor**

substance added to the primer to improve its corrosion inhibiting characteristics

2) Published as ASD-STAN Technical Report at the date of publication of this standard ([www.asd-stan.org](http://www.asd-stan.org)).



**3.7****primer**

material used to coat the substrates prior to the application of adhesive to improve either the durability of the joint or adhesion characteristics and/or to protect a pre-treated metal surface prior to bonding, so allowing an increased period of handling

Note 1 to entry: Standard adhesive primers for adhesive systems consist of solvents and polymers.

Note 2 to entry: Corrosion inhibiting adhesive primers for adhesive systems consist of solvents, polymers and solid inhibitors. The solid inhibitors reduce corrosion of the substrate.

**3.8****shelf life**

period of time during which the adhesive material when stored in accordance with the specified conditions shall meet the specified property requirements

**3.9****shop life**

maximum cumulative period of time during which the adhesive material can be held out of refrigerated storage before commencement of cure

**3.10****pot life**

period of time at room temperature during which a two part paste adhesive and/or a primer may be used, after mixing

**3.11****lot**

consignment of adhesive material which is either whole or part of a batch

**3.12**

$T_{min}$ .

minimum service temperature of the material

**3.13**

$T_{max}$ .

maximum service temperature of the material

**3.14**

$T_g$

glass transition temperature of the material

**4 Requirements****4.1 General requirements****4.1.1 Manufacturing schedule for paste adhesive**

The product shall be manufactured to fulfil the requirements of the relevant material standard and this technical specification in accordance with EN 9133. The manufacturer shall define the raw material, processes and inspection requirements in a manufacturing schedule. Once approved any modifications to the manufacturing schedule shall be in accordance with EN 9133.

**4.1.2 Traceability**

All products shall be traceable to the raw material batches at all stages of manufacture and delivery. Similarly, each raw material batch shall be traceable to all products at all stages of manufacture and delivery.

**EN 4106:2013 (E)****4.1.3 Freedom from defects**

All products shall be free from defects not complying with the requirements of the material standard or order and this technical specification, or which may be prejudicial to the subsequent manufacture and/or use of the products.

Each primer component shall:

- a) be uniform in colour;
- b) be free from deleterious contamination, foreign matter or other defects;
- c) mix readily to a homogenous solution or suspension of consistency suitable for application;
- d) be free from lumps;
- e) not settle out or separate during a normal working day or the pot life, whichever is the shorter.

The adhesive shall:

- 1) be uniform in colour;
- 2) be free from deleterious contamination, foreign matter or other defects;
- 3) be free from lumps.

In the case of two part adhesives it shall also:

- i) mix readily to a homogenous solution or suspension of consistency suitable for application;
- ii) not settle out or separate during a normal working day or the pot life, whichever is the shorter.

**4.1.4 Health and safety**

It is the responsibility of the supplier to establish satisfactory health and safety information to ensure conformity with any European, National or local laws/regulations.

The safety data sheet shall be available and shall be provided prior to qualification testing.

**4.1.5 Dimensions**

Not applicable.

**4.2 Technical requirements****4.2.1 General**

The product shall satisfy the requirements of the relevant material standard and/or the order.

**4.2.2 Required testing**

Unless otherwise specified in the material standard, the test method and the test frequency for screening, qualification testing and release testing are given in Table 3 to Table 7.

The manufacturer, having regard for the provisions of EN 9133, shall implement a test programme under the supervision of the mandated body, on a minimum of three production batches of both the primer and the adhesive.

For the purposes of qualification a fixed combination of primer and adhesive, as defined in the material standard, shall be used throughout. Each pair of adhesive and primer involves a separate qualification programme.

Alloys, surface preparation, test panel manufacturing, machining and conditioning before testing of test pieces shall conform to the requirements of the Material Standard.

#### 4.2.3 Test samples

Samples and associated test pieces shall be marked in such manner that their identity with respect to the product and the batch is maintained.

Samples taken from fully finished products (condition of use) shall not be further processed.

Samples representing products in a condition other than the condition of use shall be processed in accordance with the material standard before testing.

#### 4.2.4 Shelf life

The adhesive system shall maintain all of its physical, chemical and mechanical properties within the specification requirements for the period of time (shelf life) specified in the material standard, when stored under the specified conditions.

Shelf life shall start from the date of manufacture.

#### 4.2.5 Shoplife

The product shall meet the physical, chemical and mechanical properties of the material standard for a period of time known as the shoplife during storage under normal shop conditions. These requirements will be met at all stages of the shelf life.

#### 4.2.6 Requirements specific to paste adhesive systems

##### 4.2.6.1 Colour

The colour of the primer and adhesive shall be established between the manufacturer and the mandated body at the time of qualification.

##### 4.2.6.2 Composition

There shall be no restriction on the chemical type or composition of the material except as limited by the material standard.

##### 4.2.6.3 Curing

The adhesive and/or primer shall cure satisfactorily at the temperature, pressure, time, vacuum and ventilation under breather layers as specified in the material standard.

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