



**SLOVENSKI STANDARD**  
**SIST EN 4415:2009**

01-julij-2009

---

5 YfcbUj h\_U!'BY\_cj ]bg\_]a UHf]U]!'HY\_gh]!'Y!'Cn\_c'h\_Ub]a UHf]U]!'HM b] bU  
gdYWZ\_UWU

Aerospace series - Non-metallic materials - Textiles - Narrow woven fabrics - Technical specification

Luft- und Raumfahrt - Nichtmetallische Werkstoffe - Textilien - Gewebebänder - Technische Lieferbedingungen

Série aérospatiale - Matériaux non-métalliques - Textiles - Tissus étroits - Spécification technique

**STANDARD PREVIEW**  
**(standards.iteh.ai)**  
<https://standards.iteh.ai/catalog/standards/sist/8b5c87b5-dc0e-4487-a416-d587140479d6/sist-en-4415-2009>

**Ta slovenski standard je istoveten z: EN 4415:2006**

---

**ICS:**

49.025.60      Tekstilije      Textiles

**SIST EN 4415:2009**      en,de

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 4415:2009

<https://standards.iteh.ai/catalog/standards/sist/8b5c87b5-dc0e-4487-a416-d587140479d6/sist-en-4415-2009>

EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 4415**

August 2006

---

ICS 49.025.60

English Version

**Aerospace series - Non-metallic materials - Textiles - Narrow  
woven fabrics - Technical specification**

Série aérospatiale - Matériaux non-métalliques - Textiles -  
Tissus étroits - Spécification technique

Luft- und Raumfahrt - Nichtmetallische Werkstoffe -  
Textilien - Gewebebänder - Technische Lieferbedingungen

This European Standard was approved by CEN on 24 June 2006.

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, 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.

[SIST EN 4415:2009](https://standards.iteh.ai/catalog/standards/sist/8b5c87b5-dc0e-4487-a416-d587140479d6/sist-en-4415-2009)

<https://standards.iteh.ai/catalog/standards/sist/8b5c87b5-dc0e-4487-a416-d587140479d6/sist-en-4415-2009>



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

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

## Contents

	Page
Foreword.....	3
Introduction .....	4
1 Scope .....	4
2 Normative references .....	4
3 Terms and definitions .....	5
4 Requirements .....	7
4.1 General requirements.....	7
4.2 Technical requirements .....	10
5 Qualification .....	11
5.1 Introduction .....	11
5.2 Approval of quality system.....	11
6 Release testing.....	11
6.1 General.....	11
6.2 Sampling.....	11
6.3 Required tests .....	12
6.4 Conformance.....	12
6.5 Special tests .....	13
6.6 Release test report.....	13
7 Preparation for delivery .....	13
7.1 Packaging .....	13
7.2 Marking .....	13
7.3 Shipping conditions .....	14
8 Declaration of conformity .....	14
Annex A (normative) Table of testing requirements .....	16
Annex B (normative) Defects.....	17
Annex C (informative) Dyed textiles .....	19

iTeh STANDARD PREVIEW  
(standards.iteh.ai)

SIST EN 4415:2009

<https://standards.iteh.ai/catalog/standards/sist/8b5c87b5-dc0e-4487-a416->

d587140479d6/sist-en-4415-2009

## Foreword

This European Standard (EN 4415:2006) 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 February 2007, and conflicting national standards shall be withdrawn at the latest by February 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.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, 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.

**ITEH STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN 4415:2009](https://standards.iteh.ai/catalog/standards/sist/8b5c87b5-dc0e-4487-a416-d587140479d6/sist-en-4415-2009)

<https://standards.iteh.ai/catalog/standards/sist/8b5c87b5-dc0e-4487-a416-d587140479d6/sist-en-4415-2009>

## Introduction

This standard is part of the series of EN non-metallic material standards for aerospace applications. The general organization of this series is described in EN 4385. This standard is a level 2 document as defined in EN 4385.

This standard has been prepared in accordance with EN 4387.

## 1 Scope

This standard defines the requirements for manufacture, inspection and testing of narrow woven fabrics for aerospace applications.

## 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 105-B02, *Textiles — Tests for colour fastness — Part B02: Colour fastness to artificial light: Xenon arc fading lamp test.*

ISO 105-E01, *Textiles — Tests for colour fastness — Part E01: Colour fastness to water.*

ISO 105-X12, *Textiles — Tests for colour fastness — Part X12: Colour fastness to rubbing.*

ISO 2060, *Textiles — Yarn from packages — Determination of linear density (mass per unit length) by the skein method.*

ISO 2061, *Textiles — Determination of twist in yarns — Direct counting method.*

ISO 2062, *Textiles — Yarns from packages — Determination of single-end breaking force and elongation at break.*

ISO 3801, *Textiles — Woven fabrics — Determination of mass per unit length and mass per unit area.*

ISO 5084, *Textiles — Determination of thickness of textiles and textile products.*

ISO 8498, *Woven fabrics — Description of defects — Vocabulary.*

ISO 13934-1, *Textiles — Tensile properties of fabrics — Part 1: Determination of maximum force and elongation at maximum force using the strip method.*

ISO/IEC 17050 (all parts), *Conformity assessment — Supplier's declaration of conformity.*

EN 1049-2, *Textiles — Woven fabrics — Construction — Methods of analysis — Part 2: Determination of number of threads per unit length (ISO 7211-2:1984 modified).*

EN 1773, *Textiles — Fabrics — Determination of width and length.*

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 4426, *Aerospace series — Non-metallic materials — Textiles — Test method — Determination of conductivity and pH of aqueous extracts.* <sup>1)</sup>

EN 4429, *Aerospace series — Non-metallic materials — Textiles — Testing of narrow woven fabrics — Determination of warp bow.*

EN 4503, *Aerospace series — Non-metallic materials — Textiles — Test method — Determination of water soluble chloride and sulfate of aqueous extracts.* <sup>1)</sup>

EN 4504, *Aerospace series — Non-metallic materials — Textiles — Test method — Determination of flexibility of narrow fabrics.* <sup>1)</sup>

EN 4505, *Aerospace series — Textiles — Test method — Determination of dimensional stability.* <sup>1)</sup>

EN 4507, *Aerospace series — Non-metallic materials — Textiles — Test method — Determination of water extractable matter.* <sup>1)</sup>

EN 9100, *Aerospace series — Quality management systems — Requirements (based on ISO 9001:2000) and Quality systems — Model for quality assurance in design, development, production, installation and servicing (based on ISO 9001:1994).*

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

EN 12562, *Textiles — Para-aramid multifilament yarns — Test methods.*

EN 20139, *Textiles — Standard atmospheres for conditioning and testing.*

TR 7000-1, *Aerospace series — Non-metallic materials — Rules for the drafting and presentation of material standards — Part 1: General rules.* <sup>2)</sup>

### 3 Terms and definitions

For the purposes of this standard, the terms and definitions given in EN 9100, EN 9133 and the following apply.

#### 3.1 Batch

##### 3.1.1

##### **loomstate fabric**

for loomstate fabric, both a Production Batch and an Inspection Batch are the quantity of fabric produced from one weaver's beam or one continuously woven length not exceeding 20 000 metres, provided that weft yarn of consistent and proven quality has been used

NOTE If a fresh delivery of weft yarn of unproven quality is introduced during weaving the warp, a fresh batch has been created.

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

2) Published as AECMA Technical Report at the date of publication of this standard.

**EN 4415:2006 (E)****3.1.2****piece treated fabric**

Finisher's Batch is that which comprises one or more loomstate Production Batches, possibly comprising more than one type of fabric, subject to piece treatment under the same conditions, within the same operation

An Inspection Batch is the quantity of fabric of the same type, from one loomstate Production Batch.

NOTE If several loomstate Production Batches are brought together during the finishing process to form one large Finisher's Batch, due note should be taken of the need to maintain identification of each individual batch.

**3.2****defect**

fault that would reduce the expected performance of the fabric or, if it appeared in a prominent position in an article made from the fabric, would readily be seen and rejected by a prospective purchaser

For definitions of specific defects refer to ISO 8498.

**3.3****fabric**

manufactured assembly of fibres and/or yarns that has substantial surface area in relation to its thickness and sufficient mechanical strength to give the assembly inherent cohesion

**3.4****manufacturer**

firm making the material into the form (yarn, loomstate fabric, finished fabric, etc.) in which it is consigned to the purchaser

**3.5****narrow woven fabric**

fabric woven at 450 mm width or less between selvages and not obtained by slitting wide fabric

**3.6****product**

in this document the word product refers to all forms of narrow woven fabric

**iTeh STANDARD PREVIEW**  
(standards.iteh.ai)  
SIST EN 4415:2009  
<https://standards.iteh.ai/catalog/standards/sist/8b5c87b5-dc0e-4487-a416-1587148437d6/standards/EN-4415-2006>

**3.7****purchaser**

body which purchases the product from a manufacturer or a stockist in accordance with the requirements of the user

NOTE The purchaser may also be the user.

**3.8****supplier**

firm consigning the material to the purchaser

NOTE The supplier may be either the manufacturer or the stockist.

**3.9****textile**

any fabric (however constructed), sewing thread or cordage made from natural or man made fibres and/or yarns, and blends of these



## 4 Requirements

### 4.1 General requirements

#### 4.1.1 Manufacturing schedule

The product shall be manufactured to fulfil the requirements of the relevant material standard and this technical specification. The manufacturer shall define the raw material, processes and inspection requirements in a manufacturing schedule.

#### 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.

#### 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. The requirements for freedom from defects are given in Annex B of this specification.

#### 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.

#### 4.1.5 Dimensions

##### 4.1.5.1 General <https://standards.iteh.ai/catalog/standards/sist/8b5c87b5-dc0e-4487-a416-d587140479d6/sist-en-4415-2009>

Dimensions and tolerances shall conform to the requirements of the order or drawing and unless otherwise specified in the individual material standard, with subclauses 4.1.5.2 to 4.1.5.4.

NOTE If loomstate fabric is subsequently to be processed, e.g. scoured, dyed or coated, allowance should be made for the consequent shrinkage.

##### 4.1.5.2 Width

When measured in accordance with the test method listed in Annex A, the width of the fabric shall be as specified in the individual material standard, with the tolerances given in Table 1.

Table 1

Nominal width mm	Tolerance mm
Less than 12	± 1,0
12 to less than 55	± 1,5
55 and over	± 4 % <sup>a</sup>
<sup>a</sup> Rounded up to nearest 1,0 mm	

**EN 4415:2006 (E)****4.1.5.3 Length**

The length of each roll of the product shall be:

- not less than 100 m for fabric weighing 50 g/m or less;
- not less than 50 m for fabric weighing more than 50 g/m

NOTE Length measurement by means of a roller counter has been found suitable.

In each roll there shall be not more than four cuts per 100 m which shall not be joined by pins, metal fasteners or other means. No individual part shall be less than 10 m long. The total number of cuts in a consignment shall not exceed four times the number of rolls for fabrics of 50 g/m or less, or twice the number of rolls for fabrics exceeding 50 g/m.

**4.1.5.4 Warp bow**

When measured in accordance with the test method listed in Annex A, the warp bow shall not exceed 10 mm/m length.

**4.1.6 Manufacture**

**4.1.6.1** The narrow woven fabric shall be uniformly manufactured.

**4.1.6.2** The edges shall be straight and even.

**4.1.6.3** If the edge structure is not specified in the material standard, the edges shall not be substantially thicker than the body of the fabric.

NOTE Certain weaving processes generate selvages that may be slightly thicker than the body of the fabric. Any difference in thickness should be kept to a minimum so as not to hinder the subsequent manufacturing process.

**4.1.6.4** The weaving process shall be as specified in the material standard and shall be one of the following approved for aerospace use:

- a) Conventional (i.e. woven on a shuttle loom);
- b) Shuttleless with the weft locked by a thread inserted from a "bobbin", the locking thread engaging with the weft within the body of the webbing at not less than 8 warp ends from the selvage;
- c) Shuttleless with the weft knitted at one selvage with a locking thread;
- d) Shuttleless with the weft secured at one selvage by two knitted locking threads.

NOTE The suitability of a weaving process for a narrow woven fabric for a particular equipment application is the responsibility of the equipment design authority.

**4.1.6.5** In fabric of multi-ply construction containing binder warp threads, the binders shall be uniformly spaced in the width of the fabric.

**4.1.7 Dyed textiles****4.1.7.1 Dyestuffs**

Sulfur dyes and dyes known to accelerate actinic damage shall not be used (see Annex C).

#### 4.1.7.2 Colour fastness

Unless otherwise stated in the material standard, the following minimum colour fastness ratings shall apply when tested in accordance with the test methods listed in Annex A, of this specification;

##### a) Cellulosic

Fastness to light	5
Fastness to water	3 (change of colour) 3 (staining adjacent fabric)
Fastness to rubbing	4 (dry staining) 3 (wet staining)

##### b) Wholly or partly synthetic

Fastness to light	4
Fastness to water	4 (change of colour) 4 (staining adjacent fabric)
Fastness to rubbing	4 (dry staining) 3 (wet staining)

The test for fastness of colour to light shall be a Type Test (see Clause 5).

#### 4.1.8 Freedom from corrosive impurities

**4.1.8.1** When tested to determine the conductivity of an aqueous extract in accordance with the test method listed in Annex A, of this specification, the result shall not exceed 15 mS/m.

**4.1.8.2** If the conductivity of the aqueous extract exceeds 15 mS/m e.g. owing to the presence of adventitious conducting, but not specially corrosive material then the following shall apply, when tested in accordance with the test methods listed in Annex A:

- the pH value of the aqueous extract shall be not less than 5,0 nor more than 8,0,
- the percentage of water soluble chloride expressed as sodium chloride, shall not exceed 0,10 %,
- the percentage of water soluble sulfate expressed as anhydrous sodium sulfate, shall not exceed 0,25 %.

#### 4.1.9 Yarn

**4.1.9.1** The yarn(s) used in the manufacture of the product shall be as specified in the material standard.

**4.1.9.2** Unless otherwise stated in the material standard the properties of the yarn(s) shall be determined in accordance with the test methods listed in Annex A of this specification. The results of the tests shall conform to the requirements specified in the material standard.

**4.1.9.3** The yarn tests shall be Type Tests (see Clause 5).

#### 4.1.10 Construction

**4.1.10.1** The product shall be constructed as specified in the material standard.

**4.1.10.2** Unless otherwise stated in the material standard the construction of the product shall be determined in accordance with the test methods listed in Annex A, of this specification. The results of the tests shall conform to the requirements specified in the material standard.