



SLOVENSKI STANDARD

SIST EN 4408-001:2005

01-september-2005

Aeronavtika – Tehniške risbe – Prikaz delov, izdelanih iz kompozitov – 1. del: Splošna pravila

Aerospace series - Technical drawings - Representation of parts made of composite materials - Part 1: General rules

Luft- und Raumfahrt - Technische Zeichnungen - Darstellung von Teilen aus Verbundwerkstoffen - Teil 1: Allgemeine Regeln

Série aérospatiale - Dessins techniques - Représentation des articles en matériaux composites - Partie 1 : Règles générales

Ta slovenski standard je istoveten z: EN 4408-001:2005

ICS:

01.100.99	Other standards related to technical drawings
49.020	Aircraft and space vehicles in general

SIST EN 4408-001:2005 en

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 4408-001

May 2005

ICS 01.100.99; 49.020

English version

Aerospace series - Technical drawings - Representation of parts made of composite materials - Part 1: General rules

Série aérospatiale - Dessins techniques - Représentation
des articles en matériaux composites - Partie 1 : Règles
générales

Luft- und Raumfahrt - Technische Zeichnungen -
Darstellung von Teilen aus Verbundwerkstoffen - Teil 1:
Allgemeine Regeln

This European Standard was approved by CEN on 15 July 2004.

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, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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

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Foreword

This document (EN 4408-001:2005) has been prepared by the European Association of Aerospace Manufacturers - Standardization (AECMA-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 AECMA, 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 *November 2005*, and conflicting national standards shall be withdrawn at the latest by November 2005.

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, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

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EN 4408-001:2005 (E)**1 Scope**

This standard specifies the general rules for the representation of parts made of composite materials, in technical drawings.

It applies to aerospace structures using composites materials, and their applications when this standard is specified.

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 128 (all parts), *Technical drawings – General principles of presentation*.

ISO 129-1, *Technical drawings – Indication of dimensions and tolerances – Part 1: General principles*

ISO 406, *Technical drawings – Tolerancing of linear and angular dimensions*.

ISO 1101, *Geometrical Product Specifications (GPS) – Geometrical tolerancing – Tolerances of form, orientation, location and run-out*.

ISO 3098-2, *Technical product documentation – Lettering – Part 2: Latin alphabet, numerals and marks*.

ISO 5455, *Technical drawings – Scales*. (standards.iteh.ai)

ISO 5456-1, *Technical drawings – Projection methods – Part 1: Synopsis*.

ISO 5456-2, *Technical drawings – Projection methods – Part 2: Orthographic representations*.

ISO 5456-3, *Technical drawings – Projection methods – Part 3: Axonometric representations*.

ISO 5456-4, *Technical drawings – Projection methods – Part 4: Central projection*.

ISO 7200, *Technical product documentation – Data fields in title blocks and document headers*.

ISO 10579, *Technical drawings – Dimensioning and tolerancing – Non-rigid parts*.

EN 4408-002, *Aerospace series – Technical drawings – Representation of parts made of composite materials – Part 2: Laminated parts*.

EN 4408-003, *Aerospace series – Technical drawings – Representation of parts made of composite materials – Part 3: Parts including core materials*.

EN 4408-004, *Aerospace series – Technical drawings – Representation of parts made of composite materials – Part 4: Items obtained by winding*.

EN 4408-005, *Aerospace series – Technical drawings – Representation of parts made of composite materials – Part 5: Seams*.

EN 4408-006, *Aerospace series – Technical drawings – Representation of parts made of composite materials – Part 6: Preforms*.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

direction key

identification on the drawing, linked to the part, according to which the directions of the lay-up diagram are defined

3.2

laminated

two or more layers cured together

3.3

laminating

process or operation binding two or more layers of material

3.4

laminated area

it allows the variations in layer arrangements (thickness) of a laminated part to be distinguished by a particular identification

A laminated area defined by a structure of layers (fabric, web, roving, fibre or core material).

3.5

laminated motif

subassembly made of several layers or plies

3.6

lay-up diagram

lay-up diagram listing the designer's requirements relative to the part for a given function

It defines the layers with respect to each other, gives their directions and completes the image and its direction key.

3.7

layer

element or set of elements at a given level

One layer may be made of several plies.

3.8

ply

elementary part of a laminated with only one fibre or fabric direction

NOTE Ply also designates the same element before laminating.

4 Drawing presentation

The definition of a part made of composite materials includes a geometrical representation, applying general representation rules, as well as a schematic representation, applying particular rules; the whole allows for the identification of each element making up the part.

4.1 General rules

Drawings of parts made of composite materials are represented in compliance with the standardisation rules defined by the following standards:

EN 4408-001:2005 (E)

- ISO 128
- ISO 129-1
- ISO 3098-2
- ISO 5455
- ISO 5456

These rules are completed by this standard.

4.2 Specific rules

Specific rules for the drawing representation of parts made of composite materials are contained in the following standards:

- EN 4408-002
- EN 4408-003
- EN 4408-004
- EN 4408-005
- EN 4408-006

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5 Title block inscriptions

[SIST EN 4408-001:2005](https://standards.iteh.ai/catalog/standards/sist/67245844-ead9-4ddc-87ab-48a2d488107/sist/en-4408-001-2005)

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Rules for the representation and use of the title block are given in ISO 7200.

6 Title block indications**6.1 General tolerances**

General dimensional tolerances shall comply with the requirements of ISO 406 and ISO 1101 unless otherwise indicated in the drawing.

6.2 Marking

Recommended markings are mainly made with ink or paint.

6.3 Serialisation

Serialisation shall comply with the company's particular specifications.

6.4 Manufacturing conditions

Manufacturing conditions may be subject to requirements given in a reference document on definition (for example the drawing).

7 Dimensioning principle

Traditionally, the definition of each part given in a drawing applies to the unassembled part, ready for mounting and under the following environmental conditions:

- ambient temperature: $(20 \pm 0,5) ^\circ\text{C}$;
- relative humidity: $(50 \pm 10) \%$.

The rules for deformable parts defined in ISO 10579 shall be observed.

8 Image

Representation rules shall comply with ISO 128 and ISO 129-1.

9 Notes on drawings

To keep the "image" part of the drawing as readable as possible, requirements may be expressed in the form of notes which shall preferably be placed above the title block. If possible, the content of the notes shall be standardised, succinct, and sufficient in order to avoid any ambiguity.

10 Thickness of parts

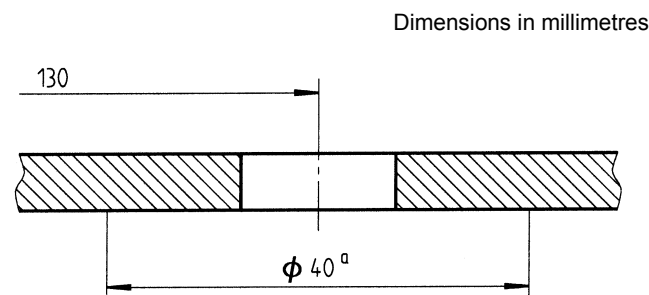
10.1 General case (structural function)

No thickness indication shall be given on the drawings, the thickness resulting from the number of layers, the elaboration and obtaining method, etc.

The basic thickness of the layers has to be summarised in a table which is called lay-up diagram.

10.2 Special case (other functions)

The thickness of parts in areas such as crimping areas, ..., has to be dimensioned at the crimping point or ...; in this case, the application area (localisation or dimension) shall be dimensioned and the thickness shall be specified in a note on the design document (see Figure 1).



^a The thickness in this area shall be equal to $(x \pm y)$ mm.

Figure 1 — Specification of thickness on design documents