SLOVENSKI STANDARD
SIST EN 4408-006:2005

01-september-2005

Aeronavtika – Tehniške risbe – Prikaz delov, izdelanih iz kompozitov – 6. del: Predhodne oblike

Aerospace series - Technical drawings - Representation of parts made of composite materials - Part 6: Preforms

Luft- und Raumfahrt - Technische Zeichnungen - Darstellung von Teilen aus Verbundwerkstoffen - Teil 6: Vorformen

Série aérospatiale - Dessins techniques - Représentation des articles en matériaux composites - Partie 6 : Préformes

Ta slovenski standard je istoveten z: **EN 4408-006:2005**

ICS:

01.100.99	Drugi standardi v zvezi s tehniļnim risanjem	Other standards related to technical drawings
49.020	Letala in vesoljska vozila na splošno	Aircraft and space vehicles in general

SIST EN 4408-006:2005 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 4408-006

May 2005

ICS 01.100.99; 49.020

English version

Aerospace series - Technical drawings - Representation of parts made of composite materials - Part 6: Preforms

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (EN 4408-006:2005) 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of an identical text or by endorsement, at the latest by November 2005, and conflicting national standards shall be withdrawn at the latest by November 2005.

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1 Scope

This standard specifies the rules for the representation of preforms of composite materials as well as the information to be indicated in the technical drawings.

It is applicable to aerospace structures using preforms.

It shall be used together with EN 4408-001.

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.

EN 4408-001, *Aerospace series – Technical drawings – Representation of parts made of composite materials – Part 1: General rules.*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 4408-001 and the following apply.

3.1
braided
tubular or plane shape obtained by a balance intertwining of continuous threads

3.2
braided into shape
braided with a mandrel

3.3
cowoven (hybrid fabric)
fabric made of different types of threads (e.g. carbon/aramid hybrid fabric)

3.4
cowoven into shape
woven into shape and made of different types of threads

3.5
level
elementary structure of one layer in the weft or warp direction

3.6
multilayer (2,5 D)
fabric the weft threads of which cross several levels of warp but not all of them

3.7
nD
oriented multidirectional reinforcement (industrial copyright)

3.8
preform
name given to different stage of all part of the item prior to obtaining the required composite material

3.9
rosette
circular piling of staggered layers of the direction with a recovering

3.10
woven
plane surface obtained by assembling intertwined threads which forms a definite framework

3.11
woven into shape
any non plain shape woven with or without the use of a shaping tool

4 Representation of preforms on drawings

It would appear to be difficult to characterise preforms due to:

— their complexity;

— the different ways of obtaining them.

Examples of the representation of the cases encountered are given below:

4.1 Representation of 2,5 D multilayers

The rules for the representation are those of lapped with, in addition, clear indications of parameters such as:

— the number of intertwined layers;

— the drawing of the repeated motif made up of the different levels;

— the quantity of threads warpwise and weftwise;

— etc.

An example of the representation of 2,5 D weaving is illustrated in Annex A and an example of the representation of 2,5 D multilayers is given in Figure 1.

In a reinforcement of the 2,5 D type the fibres are intertwined in a similar manner to those of a classic 2 D fabric, except that the warp threads may be intertwined with several layers made up of weft threads.

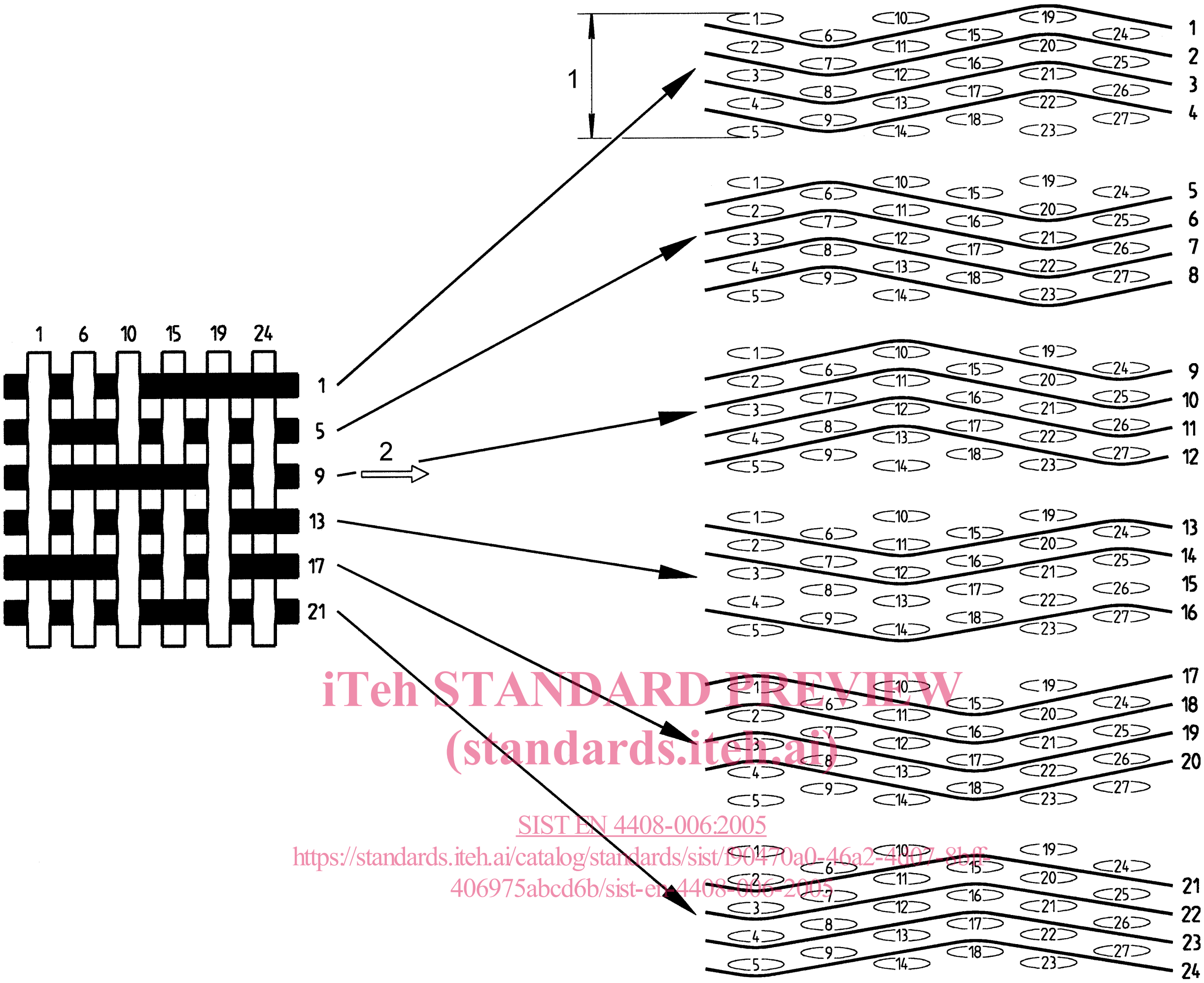
This type of intertwining allows the different basic geometries of preforms to be made up. These variations depend:

— on the number of intertwined layers;

— on the repeated motif;

— on the number of threads placed along the diagonal.

The representation on drawings shall clearly and concisely use these definition parameters to guarantee the designer's requirements.



Key

1 Thickness

2 Warp

Figure 1

4.2 Representation of rosettes

This representation of rosettes shall include the following parameters (see Figure 2):

— outside diameter: *D*

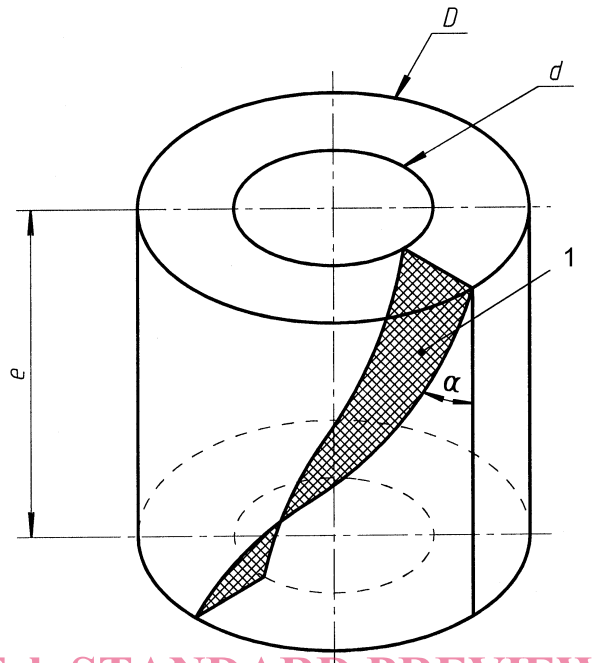
— inside diameter: *d*

— thickness: *e*

— spiral angle: α

— any additional requirement necessary to help understanding.

NOTE An explanatory table is not necessary since the layers are identical and of the same direction.



Key

1 Rosette

Figure 2

4.3 Representation of nDs

Representation shall be carried out on the drawing (a conventional image as well as a perspective) with the number of cross sections necessary for a proper understanding of the definer's requirement.

4.4 Representation of braids

See Figure 3 and Figure 4.

This representation shall give the indications necessary for manufacturing and shall use the representation rules for draped items with, if necessary, additions depending on the geometry of the braided item to be obtained in its final state. The braiding angle is given in the braiding table.

The definer uses marking with:

— areas which, associated with a braiding table, help identify the direction of braiding per section, if there is a need for identifying the section;

— an associated braiding table which identifies the area where the braiding angle undergoes changes.