SLOVENSKI STANDARD
oSIST prEN 4723:2014

01-julij-2014

Aeronavtika - Standardizirane metode za merjenje kriterija udobja in življenjskega prostora potniških sedežev v zračnih plovilih

Aerospace series - Standardized measurement methods for comfort and living space criteria for aircraft passenger seats

Luft- und Raumfahrt - Standardisierte Meßmethoden für Komfort und Living Space Kriterien bei Passagiersitzen im Flugzeug

Série aérospatiale - Mesure standardisée du confort et de léspace de vie des sièges passagers dávion

Ta slovenski standard je istoveten z: **prEN 4723**

ICS:

49.095	Oprema za potnike in oprema kabin	Passenger and cabin equipment

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Aerospace series - Standardized measurement methods for comfort and living space criteria for aircraft passenger seats

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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.

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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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Foreword

This document (prEN 4723:2014) 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 European Standard specifies requirements and measurement methods for the capturing of passenger living space and comfort.

The aim of this document is to improve the passenger comfort quality of the aircraft cabins and provide measurement methods to clearly compare cabin seat layouts and seats in terms of the above.

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 ISO 1856, *Flexible cellular polymeric materials — Determination of compression set*

SAE AS8049B, *Performance Standard for Seats in Civil Rotorcraft, Transport Aircraft, and General Aviation Aircraft* [1)]

SAE J826, *Devices for Use in Defining and Measuring Vehicle Seating Accommodations* [1)]

ASTM D3574, *Standard Test Methods for Flexible Cellular Materials — Slab, Bonded, and Molded Urethane Foams* [2)]

1) Published by: SAE National (US) Society of Automotive Engineers http://www.sae.org/

2) Published by: ASTM National (US) American Society for Testing and Materials http://www.astm.org/

3 Abbreviations and definitions

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

A/C	Aircraft
ACH	Armrest height over compressed cushion height
ARL	Armrest length
ARW	Armrest width
ATD	Anthropomorphic test dummy
BPD	Seat bottom pressure distribution / mapping
CAD	Computer-aided design
CCD	Compressed cushion datum
CHoF	Cushion height over floor level
CRP	Cushion reference point
E/C	Economy Class
e.g.	exempli gratia (for example)
FS	Foot space
H-point	Hip-point
HR	Headrest
HT	Headrest thickness
KS	Knee space
LR	Long range
P/C	Premium Class
PAX	Passenger
SAE	Society of automotive engineers
SCRP	Seat comfort reference point
SHC	Shine clearance
SOH	Shoulder obstruction height
SMRP	Seat measurement reference point
SRP	Seat reference point
SWAR	Seat width between armrests
TACH	Armrest top height over seat bottom cushion
TH	Table height over bottom cushion
TTL	Taxi-take off-landing
VS	Visual space
w/o	Without

4 Requirements

4.1 General

For the aim of this document the aircraft coordinate system is shown in Figure 1.

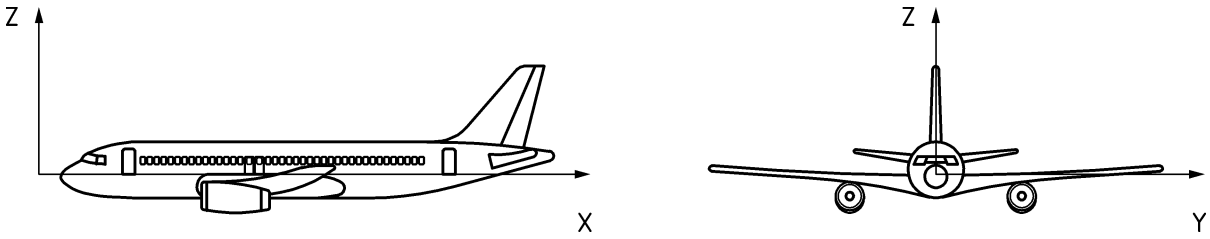


Figure 1 — Aircraft coordinate system

4.2 Comfort and living space metrics

Compliance with airworthiness requirements, e.g. passageways, minimum aisle widths between armrests etc. are mandatory.

Comfort and living space criteria are often mixed up. Table 1, Table 2 and Table 3 indicate the category each criterion belongs to.

Table 1 — Economy class passenger seats

Living space	Comfort
Economy class seat metrics	
Pitch	Armrest height relative to cushion height
3-D living space	Seat surface climate
Shin clearance at 60°, 45°	Cushion height above cabin floor level
Shin clearance at 35° for LR A/C only	Seat depth
Shoulder obstruction height	Backrest angle to seat bottom cushion (with and w/o recline)
Table height over bottom cushion edge	Headrest thickness
Visual space	Traverse path of headrest including extreme positions
Knee space	For seats with kinematics and hinge point in the backrest traverse path of headrest including extreme positions for basic and hinged position
Clearance height below seat in front	Seat pan pressure mapping
Length of armrest	Headrest type (hammock, movable x-ways, integrated in backrest foam)
Width of armrest	Foam hardness
Seat width between armrests	
Usable seat bottom cushion width between armrests	
Ingress/egress at 28 in (711,2 mm), 30 in (762 mm), 32 in (812,8 mm) pitch, each with backrest table deployed/undeployed at no and full recline	

Table 2 — Premium class passenger seats lie flat

Living space	Comfort
Lie flat business class metrics	
Shoulder obstruction height	Armrest height relative to cushion height
Pitch	Seat height
Table height over bottom cushion edge	Cushion height above cabin floor level in upright (TTL) mode
3-D living space	Seat surface climate
Visual space	Total seat depth in full recline position
Knee space	Average bed angle in full recline position
Bed length in full recline position	Headrest thickness
Seat bottom width in upright (TTL) position	Traverse path of headrest including extreme positions
Bed width at elbow level 43 in (1 092,2 mm) from end of bed in full recline position	Backrest angle to seat bottom cushion (with and w/o recline)
Bed with at shoulder level 60 in (1 524 mm) from end of bed in full recline position	Seat pan pressure mapping
Length of armrest	Headrest type (hammock, movable x-ways, integrated in backrest foam)
Width of armrest	Foam hardness
Seat width between armrests	
Usable seat bottom cushion width between armrests	

Table 3 — Premium class passenger seats full flat

Living space	Comfort
Full flat/full horizontal business class metrics	
Shoulder obstruction height	Armrest height relative to cushion height
Pitch	Seat height
3-D living space	Seat surface climate
Table height over bottom cushion edge	Cushion height above cabin floor level in upright (TTL) mode
Visual space	Total seat depth in full recline position
Knee space	Headrest thickness
Bed length in full recline position	Traverse path of headrest including extreme positions
Seat bottom width in upright (TTL) position	Backrest angle to seat bottom cushion (with and w/o recline)
Bed width at elbow level 43 in (1 092,2 mm) from end of bed in full recline position	Seat pan pressure mapping
Living space at elbow level in full recline position	Headrest type (hammock, movable x-ways, integrated in backrest foam)
Bed width at shoulder level 60 in (1 524 mm) from end of bed in full recline position	Foam hardness
Length of armrest	
Width of armrest	
Seat width between armrests	
Usable seat bottom cushion width between armrests	

5 Technical/geometric definitions and measurement methods

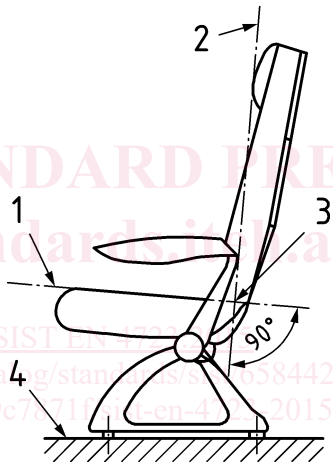
This chapter informs about the different geometrical points from which measures are taken. Measuring methods are indicated below each of the measure explanations and sketches. They shall help to provide an objective and reproducible result for each seat measured. Measurements shall be carried out as indicated using anthropomorphic dummies (95%ile, 50%ile male and 5%ile Japanese female) according to SAE AS8049B if not stated differently. In case of non-availability, humans matching the anthropomorphic data can be used. Generally speaking, measures shall be taken in an upright and fully reclined position.

5.1 Cushion reference point (CRP)

5.1.1 CRP definition

The cushion reference point (CRP), see Figure 2, is defined as the intersection of the plane of the uncompressed top of the seat cushion with the plane perpendicular to the seat cushion, which touches the most forward surface of the uncompressed centre of the seat back.

If a lumbar device is provided, and if it alters the position of the CRP, then the most extended position (most forward position of the CRP) must be considered.



Key

1 Uncompressed cushions centre line
2 Plane perpendicular to seat cushion touching most forward surface of uncompressed centre of seat back
3 Cushion reference point (CRP)
4 Top of track

Figure 2 — Cushion reference point (CRP)

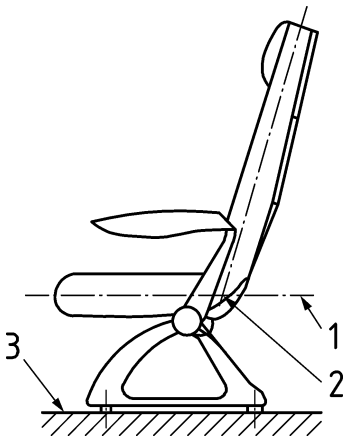
5.1.2 CRP measurement method

Place a thin, but rigid sheet of metal or plastic on top of the uncompressed seat bottom cushion and place a back square /tri-square with a long upper leg on top. Move the back square /tri-square towards the uncompressed centre of the backrest cushion until it touches the most forward position of the backrest cushion, be it a fully extended lumbar support or in the case of no lumbar support, the backrest cushion itself. The point of intersection between the prolonged line of the contact to the backrest cushion and the plane of the uncompressed seat bottom cushion perpendicular to it marks the cushion reference point.

5.2 Seat reference point (SRP)

5.2.1 SRP definition

The seat reference point (SRP), see Figure 3, is the intersection of the compressed cushion datum (CCD) and the back tangent line of a seat occupied by a 75 kg to 80 kg (160 lb to 180 lb) subject or 50%ile male anthropomorphic test dummy (ATD). The methods achieving SRP data is derived from SAE AS8049B.



Key

1 Compressed seat cushion lowest point (for H-point method plane 97 mm below H-point)
2 Seat reference point (SRP)
3 Top of track

Figure 3 — Seat reference point (SRP)

5.2.2 SRP measurement method

The SRP shall be measured in accordance with SAE AS8049B. The preferred measurement method is: measure SRP with H-Point machine according to SAE J826.

H-point method using H-point machine - procedure for establishing SRP:

1) Place an H-point machine in the seat in accordance with SAE J826 and measure the horizontal and vertical coordinate of a seat datum point (typically the front stud), the H-point, and note the indicated seat back angle.

2) Establish the back tangent line. The back tangent line is the line parallel to the seat back angle passing through a point 127 mm (5.0 in) directly behind the H-point.

3) Establish the compressed cushion datum (CCD). The CCD is a line parallel to the floor water line 97 mm (3.8 in) below the H-point.

4) The SRP is located at the intersection of the CCD and the back tangent line.

CAUTION — Measurement tolerances of up to ± 4 mm (0.157 in) in x-direction and ± 4 mm (0.157 in) in z-direction need to be taken into account during measurement procedure with the H-point machine. Measurement tolerances of up to ± 15 mm (0.591 in) in x-direction and ± 2 mm (0.079 in) in z-direction need to be taken into account for repeated setting of the dummy in the seat.