SLOVENSKI STANDARD
SIST EN 3658:2008

01-junij-2008

Aeronavtika - Krivinski polmeri cevi za uporabo pri motorjih - Standard za projektiranje

Aerospace series - Tube bend radii, for engine application - Design standard

Luft- und Raumfahrt - Biegeradien von Rohren, für Triebwerksanwendung - Konstruktionsnorm

Série aérospatiale - Rayons de cintrage des tubes, pour application moteurs - Norme de conception

Ta slovenski standard je istoveten z: **EN 3658:2008**

ICS:

49.080	Letalski in vesoljski hidravliļ ni sistemi in deli	Aerospace fluid systems and components

SIST EN 3658:2008 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 3658

March 2008

ICS 49.080

English Version

Aerospace series - Tube bend radii, for engine application - Design standard

Série aérospatiale - Rayons de cintrage des tubes, pour application moteurs - Norme de conception

Luft- und Raumfahrt - Biegeradien von Rohren, für Triebwerksanwendung - Konstruktionsnorm

This European Standard was approved by CEN on 21 December 2007.

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 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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, 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.

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

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

Ref. No. EN 3658:2008: E

Contents

Page

Foreword

This document (EN 3658:2008) 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 September 2008, and conflicting national standards shall be withdrawn at the latest by September 2008.

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, Bulgaria, 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.

1 Scope

This standard provides details of bend radii used in the manufacture of rigid tubes. It also provides details of the minimum length of straight permissible between such radii during manufacture.

This standard applies to rigid tubes conforming to EN 3717 and produced only in ASD materials.

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 3717, *Aerospace series — Tubes — Selection for engines fluid systems.* [1)]

3 Purpose

To lay the foundations for rigid tube design.

4 Design features and considerations

4.1 To allow an unbroken sequence of bending operations, all bends in a given tube configuration should have the same radius.

4.2 The standard bend radius measured to the centre line of the tube has been fixed for each tube diameter.

4.3 Standard bend radii using a range of preferred tube sizes are given in Table 1. Bend radii must lie in one plane only as shown on Figure 1. Bend radii are based on 2,5 D for steel and 3 D for titanium.

4.4 The distance between bends in a tube configuration shall be sufficient to facilitate mandrel bending. This requires a straight length to accommodate clamp widths. Minimum lengths quoted in Table 2 should be exceeded wherever possible (see Figure 2).

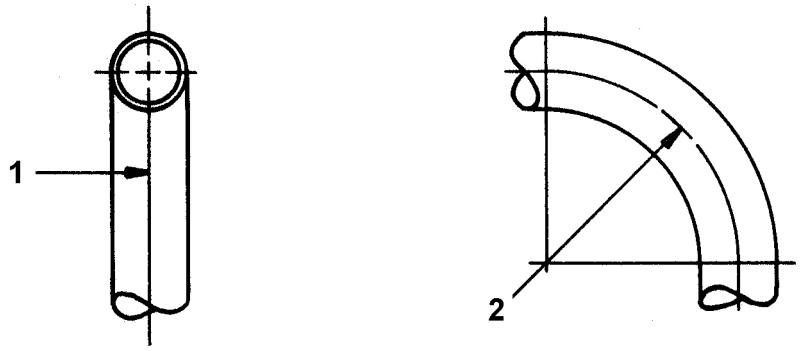
4.5 During bending the wall thickness of the outer side of the bend is reduced (see Figure 3). The acceptable minimum wall thickness T_1 after bending shall not be less than 90 % of the nominal wall thickness T.

4.6 Ovality may be defined as the difference between the maximum and minimum diameters of a tube at any section normal to the axis (see Figure 4). The maximum ovality acceptable at any section of the tube after bending, measured normal to the axis, shall not exceed 10 % of the nominal tube outside diameter.

5 Dimensions

All dimensions are in millimetres.

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



Key

1 Radius Y to lie in one plane only

2 Radius Y (based on 2,5 D for steel and 3 D for titanium where D = Outside diameter of the tube)

Figure 1

Table 1

Tube outside diameter	Radius Y	
	Steel	Titanium
4	10	12
5	12,5	15
6	15	18
8	20	24
9	22,5	27
10	25	30
11	27,5	33
12	30	36
14	35	42
15	37,5	45
16	40	48
18	45	54
20	50	60
22	55	66
25	62,5	75
28	70	84
32	80	96
36	90	108
40	100	120
45	112,5	135
50	125	150

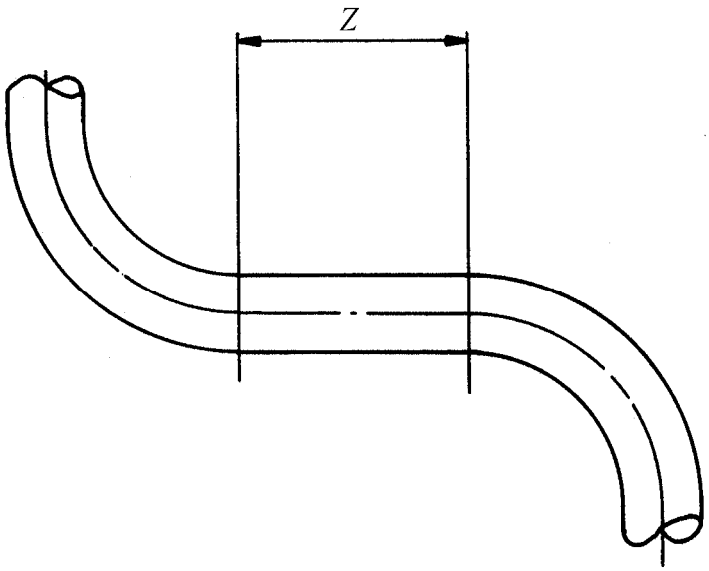
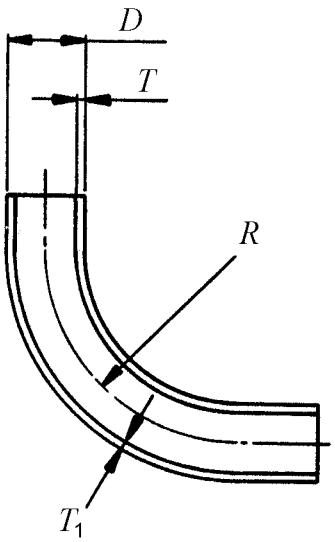


Figure 2

Table 2

Tube outside diameter	Minimum length Z used for mandrel bending
4 to 50	Length equal to 3 × tube outside diameter
≤ 16 [a]	Length equal to 2 × tube outside diameter

[a] If necessary, for tube diameters of ≤ 16 a minimum length Z of 2 × tube outside diameter can be used but this is not preferable.



D = Nominal tube outside diameter

R = Bending radius

T = Nominal wall thickness

T_1 = Minimum wall thickness after bending

Figure 3