BRITISH STANDARD

BS EN
1506:2007

Ventilation for buildings — Sheet metal air ducts and fittings with circular cross-section — Dimensions

The European Standard EN 1506:2007 has the status of a British Standard

ICS 91.140.30

National foreword

This British Standard is the UK implementation of EN 1506:2007. It supersedes BS EN 1506:1998 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee RHE/2, Ventilation for buildings, heating and hot water services.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 28 September 2007

ISBN 978 0 580 58082 6

Amendments issued since publication

Amd. No.	Date	Comments

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1506

June 2007

ICS 91.140.30

Supersedes EN 1506:1997

English Version

Ventilation for buildings - Sheet metal air ducts and fittings with circular cross-section - Dimensions

Ventilation des bâtiments - Conduits en tôle et accessoires à section circulaire - Dimensions

Lüftung von Gebäuden - Luftleitungen und Formstücke aus Blech mit rundem Querschnitt - Maße

This European Standard was approved by CEN on 24 May 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 1506:2007: E

Contents

Page

Foreword

This document (EN 1506:2007) has been prepared by Technical Committee CEN/TC 156 “Ventilation for buildings”, the secretariat of which is held by BSI.

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 December 2007, and conflicting national standards shall be withdrawn at the latest by December 2007.

This document supersedes EN 1506:1997.

This standard is one of a series of standards for ductwork used for ventilation and air conditioning of buildings for human occupancy, and it has a parallel standard referring to dimensions of rectangular ducts.

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 United Kingdom.

The position of this standard in the field of mechanical building services is shown in Figure 1.

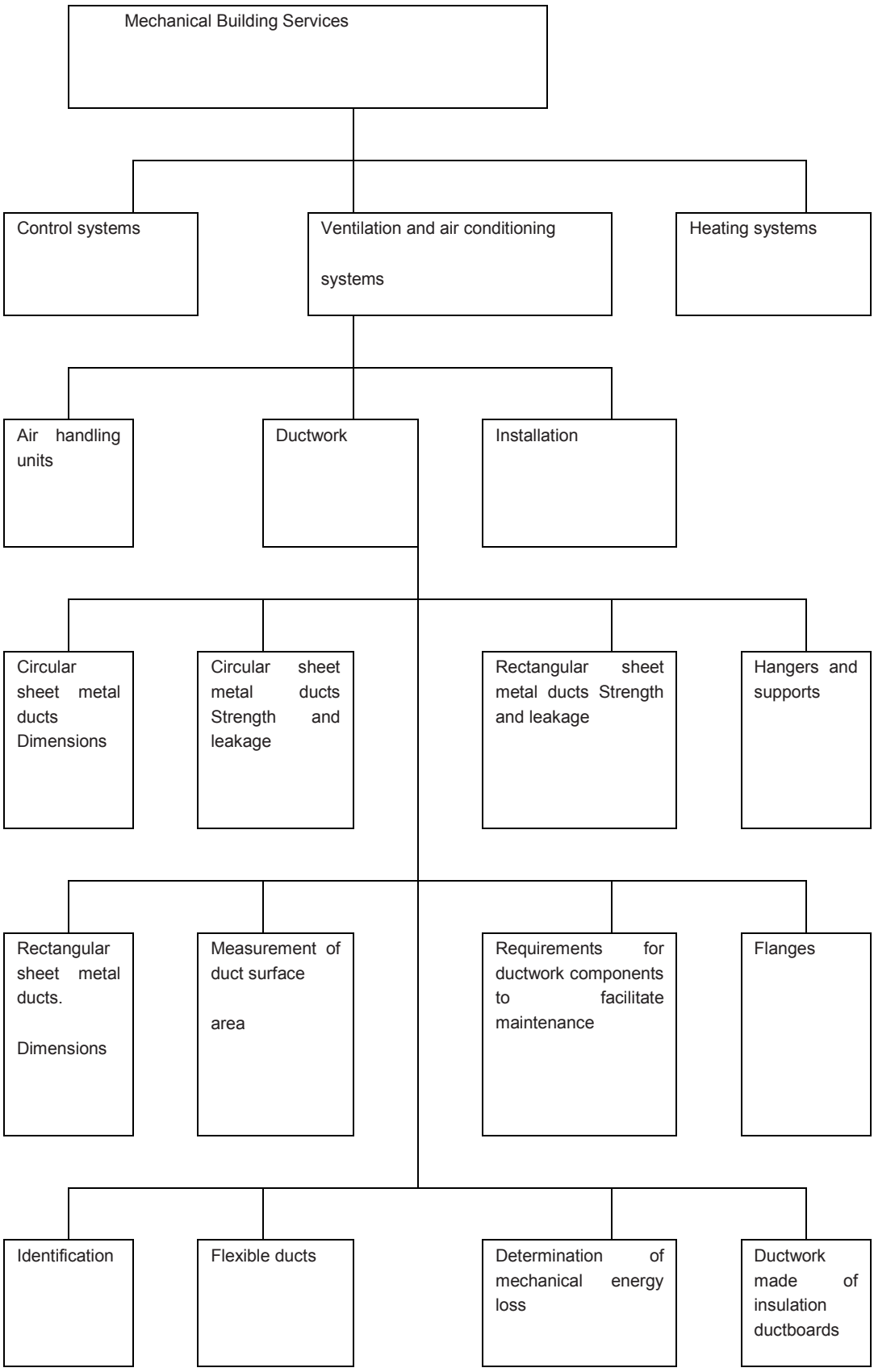


Figure 1 — Position of EN 1506 in the field of mechanical building servicesIntroduction

Introduction

This revised standard has been prepared by CEN/TC 156 to specify standardized dimensions and tolerances for ducts and duct fittings with circular cross-section, used in ventilation systems.

Dimensions and tolerances for straight ducts given in this standard are in accordance with ISO 7807: 1983 [3] concerning recommended sizes.

It is intended that the additional sizes (A) which are in use in some countries will be phased out and may be removed from a future edition of the standard.

The dimensions given for duct fittings are based on document EUROVENT 2/4 [4].

1 Scope

This European Standard specifies dimensions of ducts and duct fittings with circular cross- section. It applies to ductwork used in ventilating and air conditioning systems in buildings, subject to human occupancy. The wall thickness of ducts and fittings is not specified in this standard; strength and leakage are dealt with in EN 12237 [2].

The corresponding standard for rectangular ducts is EN 1505 [1].

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 12792:2003, *Ventilation for buildings - Symbols, terminology and graphical symbols*

3 Terms, definitions and symbols

For the purposes of this document, the terms and definitions given in EN 12792:2003 and the following apply.

3.1
nominal size (d, d_1, d_2, d_3 and d_4)
reference dimension used for designation, calculation and application of ducts and fittings

d denotes the inner diameter of ducts and female ends.

d_1, d_2, d_3 and d_4 denote the outer diameters of male ends of fittings.

3.2
effective length of a fitting (l, l_1, and l_3)
length by which a fitting contributes to the overall length of the air distribution system

3.3
effective length of a straight duct (L)
length by which a straight duct contributes to the overall length of the air distribution system

3.4
overlap (insertion) length (l_p)
length by which a fitting overlaps the duct

3.5
cross-sectional area (A_c)
for ducts with circular cross-section the cross-sectional area A_c is equal to

$$A_c = \frac{\pi d^2}{4}$$

3.6
straight duct surface area (A_i)
product of the internal perimeter and the duct length

For ducts with circular cross-section the duct surface area per metre length is

$$A_i = \pi d$$

3.7 Deviation, tolerance, clearance (see Figure 10)

3.7.1
upper deviation
algebraic difference between the maximum limit of size and the corresponding nominal size

3.7.2
lower deviation
algebraic difference between the minimum limit of size and the corresponding nominal size

3.7.3
tolerance
difference between the upper deviation and the lower deviation. The tolerance is an absolute value without sign

3.7.4
clearance
positive difference between the sizes of a female connector or duct and of a male connector

4 Dimensions and values for ducts

The nominal diameter d, cross-sectional area A_c and duct surface area A_i are given in Table 1. The nominal diameters also apply to fittings. Tolerances, deviations and clearances are given in Clause 6.

Table 1 — Ducts with circular cross-section: dimensions

Nominal diameter, d mm	**Cross-sectional area,** A_c m^2	**Duct surface area,** A_i m^2/m
Recommended sizes		
63	$3{,}12 \times 10^{-3}$	0,197
80	$5{,}03 \times 10^{-3}$	0,251
100	$7{,}85 \times 10^{-3}$	0,314
125	$12{,}3 \times 10^{-3}$	0,393
160	$20{,}1 \times 10^{-3}$	0,502
200	$31{,}4 \times 10^{-3}$	0,628
250	$49{,}1 \times 10^{-3}$	0,785
315	$77{,}9 \times 10^{-3}$	0,990
400	0,126	1,26
500	0,196	1,57
630	0,312	1,98
800	0,503	2,51
1000	0,785	3,14
1250	1,23	3,93
Additional sizes		
150	$17{,}7 \times 10^{-3}$	0,471
300	$70{,}7 \times 10^{-3}$	0,943
355	$98{,}9 \times 10^{-3}$	1,11
450	0,159	1,41
560	0,246	1,76
710	0,396	2,23
900	0,636	2,83
1120	0,985	3,52
NOTE Recommended sizes correspond to the sizes stated in ISO 7807.		

5 Dimensions for fittings

5.1 General

The nominal diameters are given in Table 1.

NOTE Pressed fittings are available in various forms and are normally limited to diameters not exceeding 315 mm.

5.2 Joints

The overlap length of overlapping joints is given in Table 2.

Table 2 — Overlap length

Nominal diameter in mm	63 to 315	> 315 to 800	> 800 to 1250
l_p in mm	≥ 25	≥ 50	≥ 100

For butt joints (see Figure A.3d) the diameters of the ducts to be connected at the joints are equal.

5.3 Bends

5.3.1 General

The radius of bends r_m for different nominal sizes is given in Table 3.

Table 3 — Radius of bends

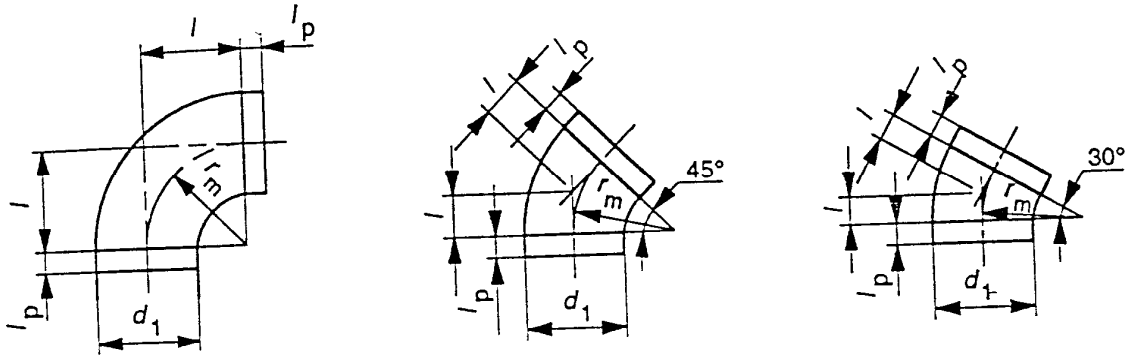
d_i in mm	r_m in mm
≤ 100 > 100	100 d_i

The effective length is given by the formula: $l = r_m \cdot \tan(\alpha/2)$

Bends with 15° and 30° angle are also available.

5.3.2 Pressed bends

Examples of pressed bends are shown in Figure 2.



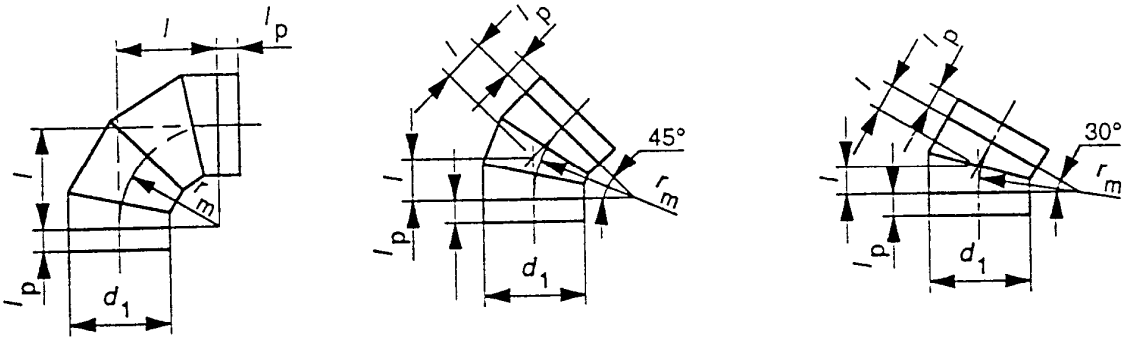
Key

a) 90° bend, $l = r_m$ b) 45° bend, l = 0,41 r_m c) 30° bend, l = 0,27 r_m

Figure 2 — Dimensions for pressed bends

5.3.3 Segmented bends

Examples of segmented bends are shown in Figure 3.



Key

a) 90° bend, $l = r_m$

minimum 3 segments

b) 45° bend, l = 0,41 r_m

minimum 2 segments

c) 30° bend, l = 0,27 r_m

minimum 2 segments

Figure 3 — Dimensions for segmented bends

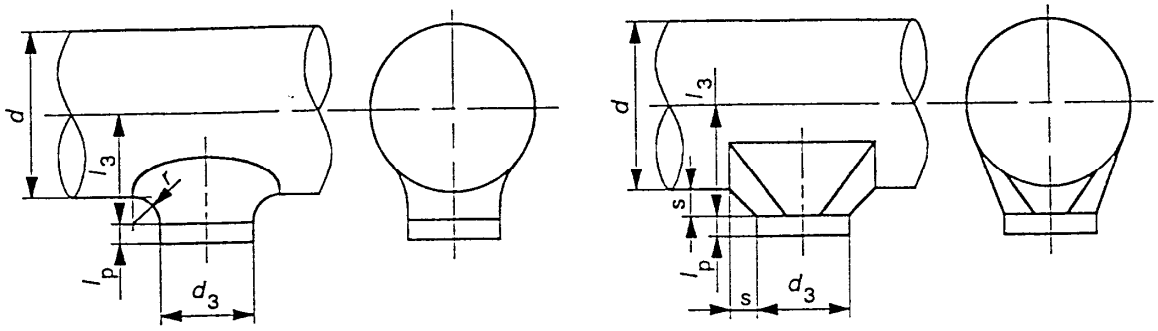
5.4 Branches and T-pieces

5.4.1 General

Dimensions for branches and T-pieces are given in Table 4. Recommended sizes are indicated by an “R” and additional sizes by an “A”.

Examples of branches and T-pieces are shown in Figures 4, 5 and 6.

5.4.2 Branches



Key

a) Pressed formed branch

$r \geq 10$ mm

$l_3 > 0{,}5\ d + r$

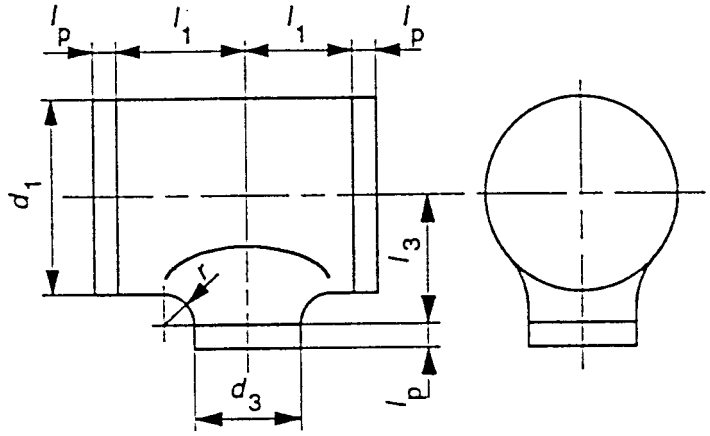
b) Conical branch

$s > 0{,}15\ d_3$

$l_3 > 0{,}5\ d + s$

Figure 4 — Examples of branches

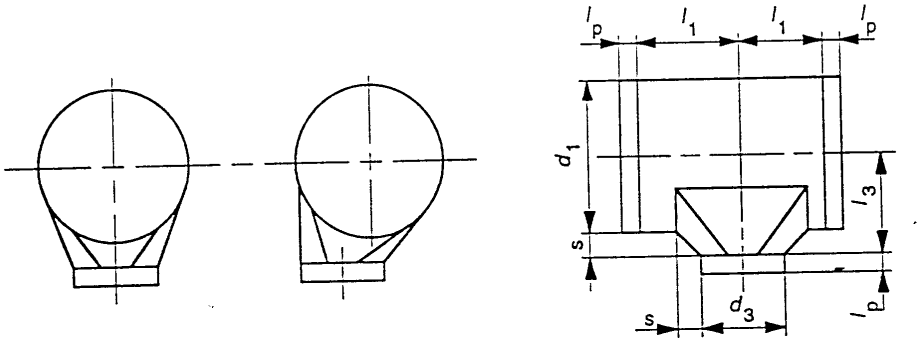
5.4.3 T-pieces



Key

$l_1 > 0{,}5\ d_3 + r$
$l_3 > 0{,}5\ d_1 + r$
$r \geq 10$ mm

Figure 5 — Example of T-piece with concentric pressed formed branch



Key

a) Concentric branch

b) Tangential branch

$l_1 > 0{,}5\ d_3 + s$

$l_3 > 0{,}5\ d_1 + s$

$s > 0{,}15\ d_3$

Figure 6 — Examples of T-pieces with conical branch

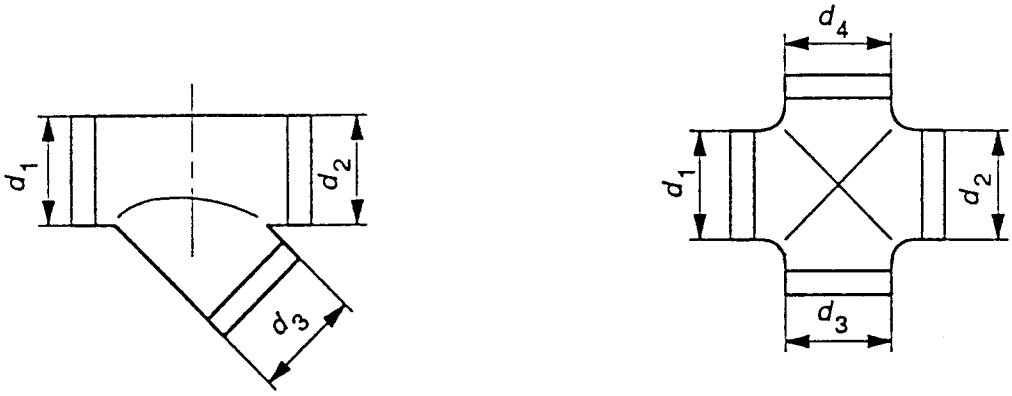
Table 4 — Dimensions for branches and T-pieces

d_3 d,d_1 mm	63	80	100	125	150	160	200	250	300	315	355	400	450	500	560	630	710	800	900	1000	1120	1250
80	R	R	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-
100	R	R	R	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-
125	-	R	R	R	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-
150	-	A	A	A	A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
160	-	R	R	R	A	R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
200	-	R	R	R	A	R	R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
250	-	R	R	R	A	R	R	R	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300	-	-	A	A	A	A	A	A	A	-	-	-	-	-	-	-	-	-	-	-	-	-
315	-	-	R	R	A	R	R	R	A	R	-	-	-	-	-	-	-	-	-	-	-	-
355	-	-	-	-	-	A	A	A	A	A	A	-	-	-	-	-	-	-	-	-	-	-
400	-	-	-	-	-	R	R	R	A	R	A	R	-	-	-	-	-	-	-	-	-	-
450	-	-	-	-	-	-	A	A	A	A	A	A	A	-	-	-	-	-	-	-	-	-
500	-	-	-	-	-	-	R	R	A	R	A	R	A	R	-	-	-	-	-	-	-	-
560	-	-	-	-	-	-	-	A	A	A	A	A	A	A	A	-	-	-	-	-	-	-
630	-	-	-	-	-	-	-	R	A	R	A	R	A	R	A	R	-	-	-	-	-	-
710	-	-	-	-	-	-	-	-	-	A	A	A	A	A	A	A	A	-	-	-	-	-
800	-	-	-	-	-	-	-	-	-	R	A	R	A	R	A	R	A	R	-	-	-	-
900	-	-	-	-	-	-	-	-	-	-	-	A	A	A	A	A	A	A	A	-	-	-
1000	-	-	-	-	-	-	-	-	-	-	-	R	A	R	A	R	A	R	A	R	-	-
1120	-	-	-	-	-	-	-	-	-	-	-	-	-	A	A	A	A	A	A	A	A	-
1250	-	-	-	-	-	-	-	-	-	-	-	-	-	R	A	R	A	R	A	R	A	R

R - Recommended sizes A - Additional sizes.

5.4.4 Special pieces

Examples of special pieces are shown in Figure 7.



Key

a) T-piece with 45° branch

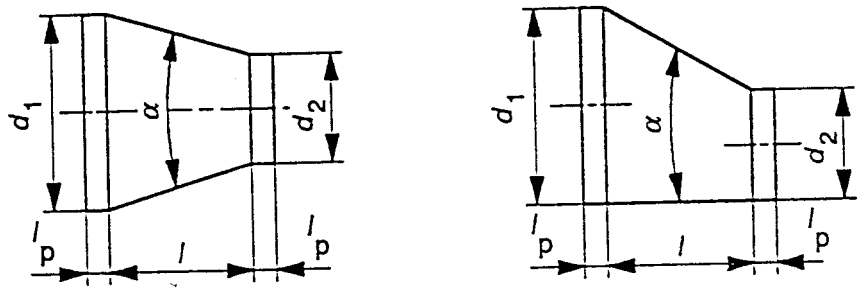
b) Cross (X-piece)

Figure 7 — Special pieces

5.4.5 Transformation pieces

Dimensions for transformation pieces are given in Table 5. Recommended sizes are indicated by an "R" and additional sizes by an "A".

Examples of transformation pieces with two male ends are shown in Figure 8. Transformation pieces with female ends and combinations of male and female ends are also available.



Key

a) Concentric

$l = (d_1 - d_2)/[2 \tan (\alpha/2)]$

b) Eccentric

$l = (d_1 - d_2)/\tan \alpha$

For diameters up to and including 315 mm, transformation pieces are normally pressed. In these cases α may be increased to a maximum of 90°.

Figure 8 — Examples of tapered concentric and eccentric transformation pieces

Table 5 — Dimensions for transformation pieces

d_3 mm / d_1 mm	63	80	100	125	150	160	200	250	300	315	355	400	450	500	560	630	710	800	900	1000	1120	1250
80	R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
100	R	R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
125	R	R	R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
150	-	A	A	A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
160	-	R	R	R	A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
200	-	-	R	R	A	R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
250	-	-	-	R	A	R	R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300	-	-	-	-	A	A	A	A	-	-	-	-	-	-	-	-	-	-	-	-	-	-
315	-	-	-	-	-	R	R	R	-	-	-	-	-	-	-	-	-	-	-	-	-	-
355	-	-	-	-	-	-	A	A	A	A	-	-	-	-	-	-	-	-	-	-	-	-
400	-	-	-	-	-	-	-	R	A	R	A	-	-	-	-	-	-	-	-	-	-	-
450	-	-	-	-	-	-	-	-	A	A	A	A	-	-	-	-	-	-	-	-	-	-
500	-	-	-	-	-	-	-	-	-	-	A	R	A	-	-	-	-	-	-	-	-	-
560	-	-	-	-	-	-	-	-	-	-	-	A	A	A	-	-	-	-	-	-	-	-
630	-	-	-	-	-	-	-	-	-	-	-	-	A	R	A	-	-	-	-	-	-	-
710	-	-	-	-	-	-	-	-	-	-	-	-	-	A	A	A	-	-	-	-	-	-
800	-	-	-	-	-	-	-	-	-	-	-	-	-	-	A	R	A	-	-	-	-	-
900	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	A	A	A	-	-	-	-
1000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	R	R	A	-	-	-
1120	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	A	A	A	-	-
1250	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	A	R	-	-

R - Recommended sizes. A - Additional sizes.

5.4.6 Closures

The nominal diameter of the closures is given in Table 1.

Examples of closures are shown in Figure 9.

Key

a) Plug end (for ducts and female ends) b) Cap end (for male ends)

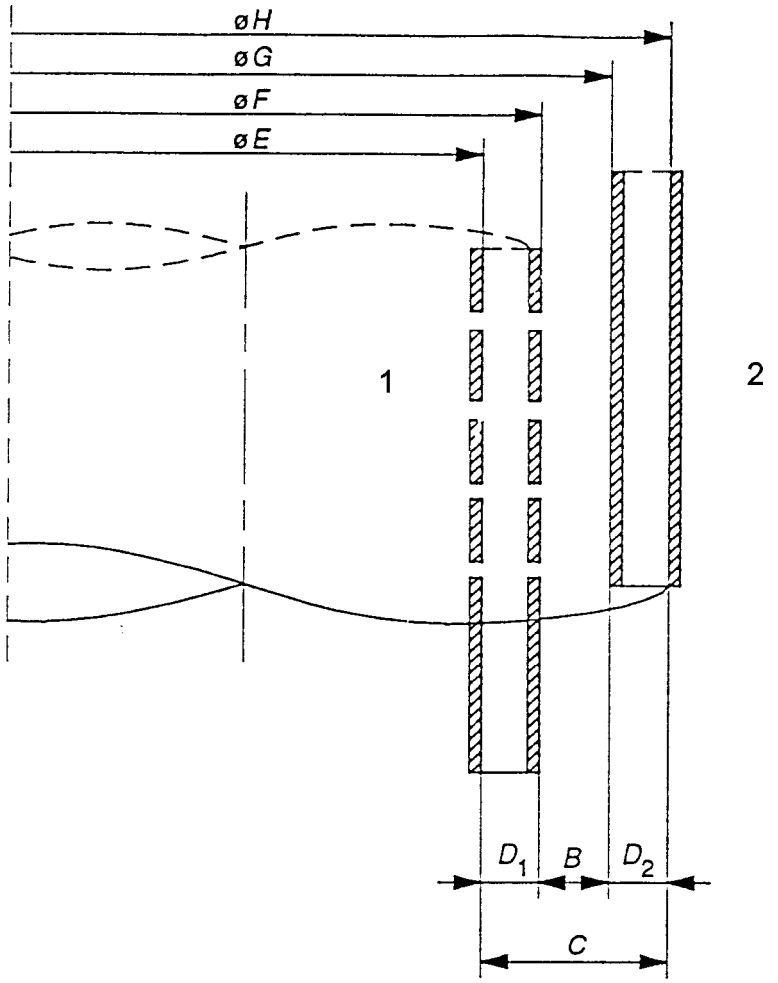
Figure 9 — Examples of closures

6 Tolerances and clearances

6.1 The manufacturing tolerances and resulting clearances for ducts and fittings (male and female connectors with reference to nominal diameter d, are given in Table 6.

Table 6 — Ducts and fittings, tolerances and clearances
(see also Figure 10)

d	*B*	*C*	D_1	D_2	*E*	*F*	*G*	*H*
Recommended sizes in mm								
63	0,7	1,7	0,5	0,5	61,8	62,3	63,0	63,5
80	0,7	1,7	0,5	0,5	78,8	79,3	80,0	80,5
100	0,7	1,7	0,5	0,5	98,8	99,3	100,0	100,5
125	0,7	1,7	0,5	0,5	123,8	124.3	125,0	125,5
160	0,7	1,9	0,6	0,6	158,7	159,3	160,0	160,6
200	0,7	2,1	0,7	0,7	198,6	199,3	200,0	200,7
250	0,7	2,3	0,8	0,8	248.5	249,3	250,0	250,8
315	0,7	2,5	0,9	0,9	313,4	314,3	315,0	315,9
400	0,7	2,7	1,0	1,0	398,3	399,3	400,0	401,0
500	0,7	2,9	1,1	1,1	498,2	499,3	500,0	501,1
630	0,7	3,1	1,2	1,2	628,1	629,3	630,0	631,2
800	0,7	3,6	1,3	1,6	798,0	799,3	800,0	801,6
1000	0,7	4,1	1,4	2,0	997,9	999,3	1000,0	1002,0
1250	0,7	4,7	1,5	2,5	1247,8	1249,3	1250,0	1252,5
Additional sizes in mm								
150	0,7	1,9	0,6	0,6	148,7	149,3	150,0	150,6
300	0,7	2,5	0,9	0,9	298,4	299,3	300,0	300,9
355	0,7	2,7	1,0	1,0	353,3	354,3	355,0	356,0
450	0,7	2,9	1,1	1,1	448,2	449,3	450,0	451,1
560	0,7	3,1	1,2	1,2	558,1	559,3	560,0	561,2
710	0,7	3,5	1,3	1,6	708,0	709,3	710,0	711,5
900	0,7	4,1	1,4	2,0	897,9	899,3	900,0	902,0
1120	0,7	4,7	1,5	2,5	1117,8	1119,3	1120,0	1122,5



Key

B minimum diameteral clearance
C maximum diameteral clearance
D_1 tolerance of the diameter of the male end
D_2 tolerance of the diameter of the female end
1 male end
2 duct or female end
E minimum diameter of the male end
F maximum diameter of the male end
G minimum diameter of the duct or female end
H maximum diameter of the duct or female end

Figure 10 — Ducts and fittings — tolerances and clearances

6.2 The tolerance of the length *L* of a straight duct is 0,005 *L*

The tolerance of angles is 2°

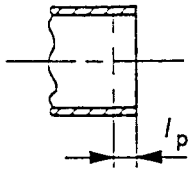
The deviation of l, r, r_m and s, are shown in Table 7.

Table 7 — Deviation of l, r, r_m and s

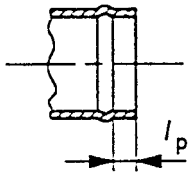
Dimension l, r, r_m and s in mm	Deviation in mm
≤ 15	$^{0}_{-2}$
> 15 to ≤ 100	$^{0}_{-5}$
> 100	$^{0}_{-10}$

Annex A
(informative)

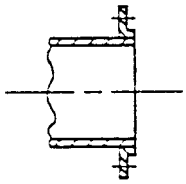
Examples of alternative designs of ends and connectors



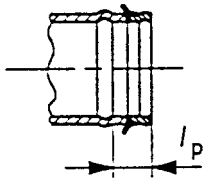
a) Plain end of fitting



b) End of fitting with swage

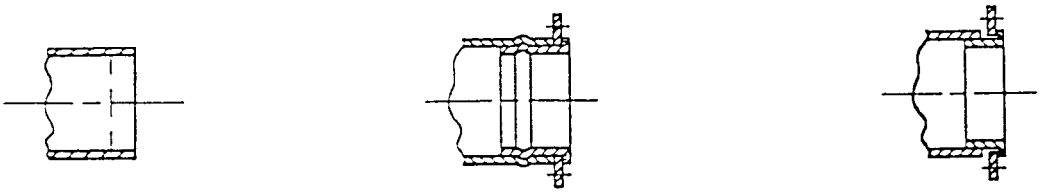


c) End of fitting with flange



d) End of fitting with seal

Figure A.1 — Examples of alternative designs of ends of fittings



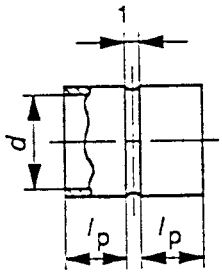
Key

a) Plain end of duct

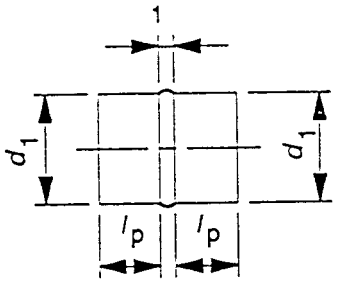
b) End of duct with integral flange, factory assembled

c) End of duct with loose (for site assembly)

Figure A.2 — Examples of alternative designs of ends of ducts



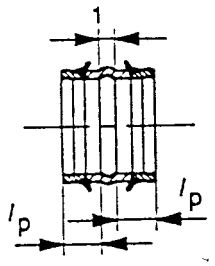
a) Female connector for use with fittings



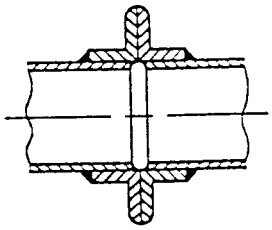
b) Male connector for use between ducts

Key

1 10 nominal



c) Male connector with seal



d) Butt connection with welded flanges

Key

1 10 nominal

Figure A.3 — Examples of connectors

Bibliography

[1] EN 1505, *Ventilation for buildings — Sheet metal air ducts and fittings with rectangular cross-section — Dimensions*

[2] EN 12237, *Ventilation for buildings - Ductwork - Strength and leakage of circular sheet metal ducts*

[3] ISO 7807, *Air distribution - Straight circular sheet metal ducts with a lock type spiral seam and straight rectangular sheet metal ducts - Dimensions*

[4] EUROVENT 2/4, *Sheet metal air ducts — Standard for fittings*

BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Tel: +44 (0)20 8996 9000. Fax: +44 (0)20 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: +44 (0)20 8996 9001. Fax: +44 (0)20 8996 7001. Email: orders@bsi-global.com. Standards are also available from the BSI website at http://www.bsi-global.com.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre. Tel: +44 (0)20 8996 7111. Fax: +44 (0)20 8996 7048. Email: info@bsi-global.com.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration. Tel: +44 (0)20 8996 7002. Fax: +44 (0)20 8996 7001. Email: membership@bsi-global.com.

Information regarding online access to British Standards via British Standards Online can be found at http://www.bsi-global.com/bsonline.

Further information about BSI is available on the BSI website at http://www.bsi-global.com.

Copyright

BSI
389 Chiswick High Road
London
W4 4AL