BRITISH STANDARD

BS EN
1505:1998

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

The European Standard EN 1505:1997 has the status of a British Standard

ICS 91.140.30

National foreword

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The UK participation in its preparation was entrusted to Technical Committee RHE/2, Air distribution and air diffusion, which has the responsibility to:

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 10, an inside back cover and a back cover.

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

Ventilation des bâtiments — Conduits en tôle et accessoires à section rectangulaire — Dimensions

Lüftung von Gebäuden — Luftleitungen und Formstücke aus Blech mit Rechteckquerschnitt — Maße

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 156, Ventilation for buildings, the secretariat of which is held by BSI.

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 ducts with circular cross-section.

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

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of an identical text or by endorsement, at the latest by June 1998, and conflicting national standards shall be withdrawn at the latest by June 1998.

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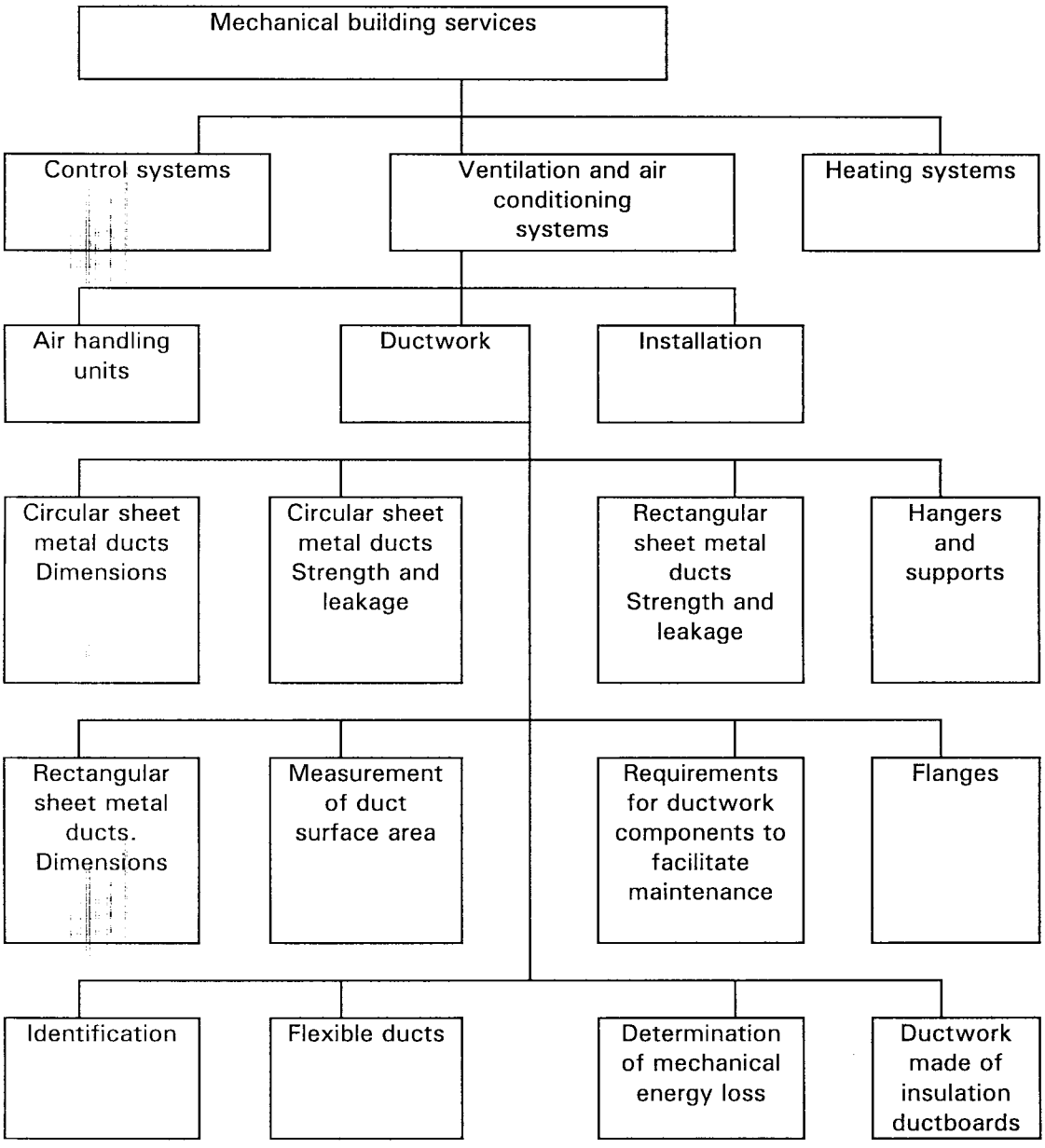


Figure 1 — Position of EN 1505 in the field of mechanical building services

Contents

Introduction

This standard has been prepared by CEN/TC 156 to specify dimensions and tolerances for rectangular ducts and duct fittings used in ventilation systems.

Dimension and tolerances for straight ducts given in this standard are in accordance with ISO 7807:1983[1)] concerning recommended sizes.

The dimensions given for duct fittings are based on document EUROVENT 2/4[1)].

1 Scope

This European Standard specifies dimensions of sheet metal air ducts and duct fittings with rectangular cross-section. It applies to ductwork used in ventilation 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 prEN 1507.

The corresponding standard for circular ducts is EN 1506.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references the subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

CR 12792, *Ventilation for buildings — Symbols and terminology*
EN 1506, *Ventilation for buildings — Ductwork. Circular sheet metal air ducts and duct fittings — Dimensions*
prEN 1507, *Ventilation for buildings — Ductwork — Rectangular sheet metal air ducts — Strength and leakage — Requirements and testing*

3 Definitions and symbols

For the purposes of this standard, the definitions given in CR 12792, together with the following, apply.

3.1
nominal size
reference dimension used for designation, calculation and application of ducts and fittings. For ducts, the nominal size is the internal dimension of side a and side b, where a is the visible side (see Figure 2). The lengths of the sides of the smaller end of a transformation piece are denoted by c and d, where c is the visible side (see Figure 2)

3.2
effective length of fitting (l)
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
cross-sectional area (A_c)
product of the side lengths a and b

3.5
duct surface area (A_i)
product of the internal perimeter and the duct length

3.6
hydraulic diameter (d_h)
for a rectangular duct, the diameter of a circular duct which will cause the same pressure drop at equal air velocity and equal friction coefficients

$$d_h = \frac{4\ (\text{cross-sectional area})}{\text{internal perimeter}} = \frac{2\,ab}{a+b}$$

3.7
equivalent diameter (d_e)
for a rectangular duct, the diameter of a circular duct which will cause the same pressure drop at equal air flow and equal friction coefficients

3.8
angle of a transformation piece (α)
the larger angle between two opposite sides of a transformation piece

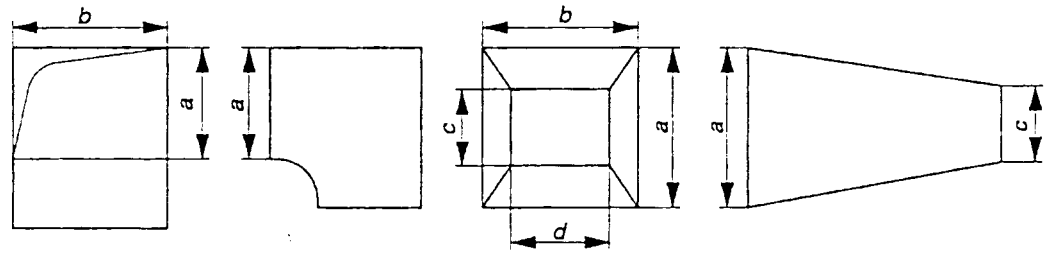


Figure 2 — Application of denominations for the nominal size

1) See annex C.

3.9 Deviation, tolerance

3.9.1

upper deviation

algebraic difference between the maximum limit of size and the corresponding nominal size

3.9.2

lower deviation

algebraic difference between the minimum limit of size and the corresponding nominal size

3.9.3

tolerance

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

4 Dimensions and values for ducts

The dimensions for ducts, including the corresponding values of cross-sectional area (A_c in m^2), hydraulic diameter (d_h in mm), equivalent diameter (d_e in mm) and duct surface area per metre length (A_i in m^2/m), are given in Table 1.

The equivalent diameter d_e is calculated using the following formula:

$$d_e = 2b(\pi^{2-n}\ (1 + a/b)^{1+n}/(a/b)^3)^{1/(n-5)}$$

where

$$n = 1/(1{,}05 \log R_e - 0{,}45)$$

Tolerances and deviations are given in clause **6**.

Table 1 — Dimensions and values for ducts

Side lengths mm	**100**	**150**	**200**	**250**	**300**	**400**	**500**	**600**	**800**	**1000**	**1200**	
200	0,020	0,030	0,040									A_c
	133	171	200									d_h
	149	186	218									d_c
	0,60	0,70	0,80									A_i
250	0,025	0,038	0,050	0,063								A_c
	143	188	222	250								d_h
	165	206	241	273								d_c
	0,70	0,80	0,90	1,00								A_i
300	0,030	0,045	0,060	0,075	0,090							A_c
	150	200	240	273	300							d_h
	180	224	262	296	327							d_c
	0,30	0,90	1,00	1,10	1,20							A_i
400	0,040	0,060	0,080	0,10	0,12	0,16						A_c
	160	218	267	308	343	400						d_h
	205	255	299	337	373	436						d_e
	1,00	1,10	1,20	1,30	1,40	1,60						A_i
500		0,075	0,10	0,13	0,15	0,20	0,25					A_c
		231	286	333	375	444	500					d_h
		283	331	374	413	483	545					d_e
		1,30	1,40	1,50	0,60	1,80	2,00					A_i
600		0,090	0,12	0,15	0,18	0,24	0,30	0,36				A_c
		240	300	353	400	480	545	600				d_h
		307	359	406	448	524	592	654				d_e
		1,50	1,60	1,70	1,80	2,00	2,20	2,40				A_i
800			0,16	0,20	0,24	0,32	0,40	0,48	0,64			A_c
			320	381	436	533	615	686	800			d_h
			410	463	511	598	675	745	872			d_e
			2,00	2,10	2,20	2,40	2,60	2,80	3,20			A_i

Table 1 — Dimensions and values for ducts *(continued)*

Side lengths mm	**100**	**150**	**200**	**250**	**300**	**400**	**500**	**600**	**800**	**1000**	**1200**	
1000				0,25	0,30	0,40	0,50	0,60	0,80	1,00		A_c
				400	462	571	667	750	889	1000		d_h
				512	566	662	747	825	965	1090		d_e
				2,50	2,60	2,80	3,00	3,20	3,60	4,00		A_i
1200					0,36	0,48	0,60	0,72	0,96	1,20	1,44	A_c
					480	600	706	800	960	1091	1200	d_h
					614	719	812	896	1049	1184	1308	d_e
					3,00	3,20	3,40	3,60	4,00	4,40	4,80	A_i
1400						0,56	0,70	0,84	1,12	1,40	1,68	A_c
						622	737	840	1018	1167	1292	d_h
						771	871	962	1125	1270	1403	d_e
						3,60	3,80	4,00	4,40	4,80	5,20	A_i
1600						0,64	0,80	0,96	1,28	1,60	1,92	A_c
						640	762	873	1067	1231	1371	d_h
						819	925	1022	1195	1350	1491	d_e
						4,00	4,20	4,40	4,80	5,20	5,60	A_i
1800							0,90	1,08	1,44	1,80	2,16	A_c
							783	900	1108	1286	1440	d_h
							976	1078	1261	1424	1573	d_e
							4,60	4,80	5,20	5,60	6,00	A_i
2000							1,00	1,20	1,60	2,00	2,40	A_c
							800	923	1143	1333	1500	d_h
							1024	1131	1323	1494	1650	d_e
							5,00	5,20	5,60	6,00	6,40	A_i

5 Dimensions for fittings

5.1 Bends

Examples of bends are shown in Figure 3.

In order to reduce the pressure loss, bends of larger dimensions may be provided with splitters. Examples of designing and positioning of splitters are given in annex B.

5.2 Branches

Examples of branches are shown in Figure 4. The dimensions r and f are given in Table 2.

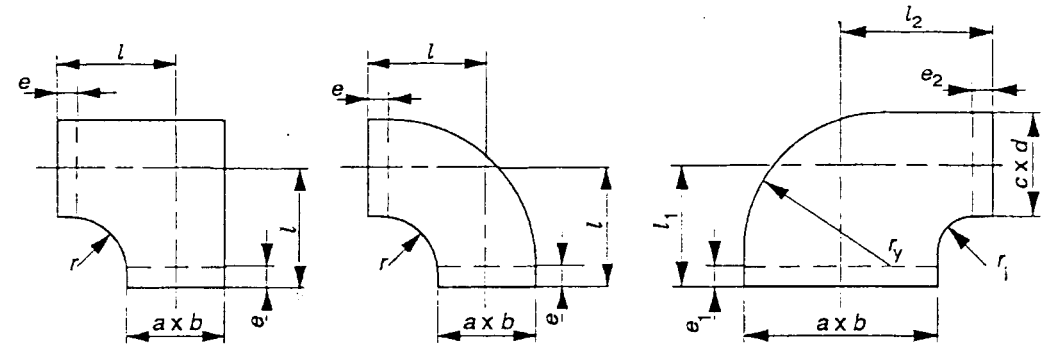
Table 2 — Minimum dimensions of r and f

Dimensions in millimetres

Branch duct of width a	r	f
$a < 200$	≥ 100	≥ 100
$200 < a \leq 300$	≥ 100	≥ 100
$300 < a \leq 400$	≥ 150	≥ 125
$400 < a \leq 600$	≥ 150	≥ 150
$a > 600$	≥ 150	≥ 200

5.3 Transformation pieces

Examples of transformation pieces are shown in Figures 5 to 7. For connections between rectangular and circular ducts see also EN 1506.



a)

90° bend

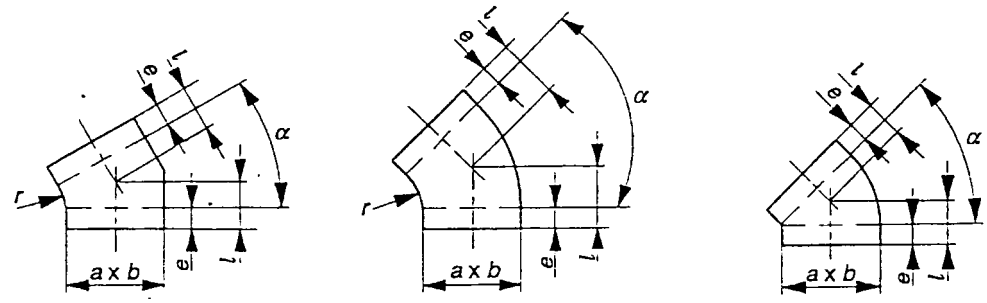
$e \geq 25$ mm
$r \geq 100$ mm
$r \geq 100$ mm
$l = 0{,}5\ a + r + e$

b)

c)

90° transformation bend

e_1 and $e_2 \geq 25$ mm
$r \geq 100$ mm
$r_y + c + r_i$
$l_1 = 0{,}5\ c + r_i + e_1$
$l_2 = 0{,}5\ c + r_i + e_2$



d)

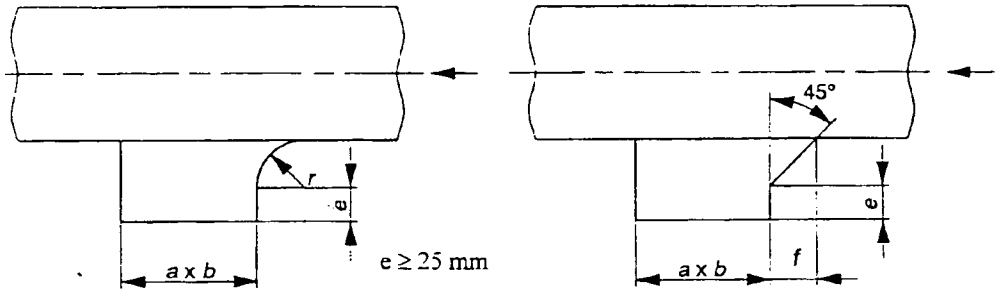
e)

bends, $\alpha \leq 90°$

$e \geq 25$ mm
$r_i \geq 100$ mm
$l = (0{,}5\ a + r)\ \tan\alpha/2 + e$

f)

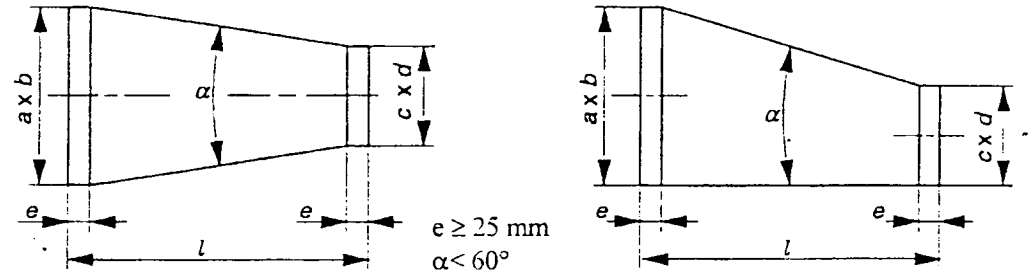
Figure 3 — Examples of bends



a)

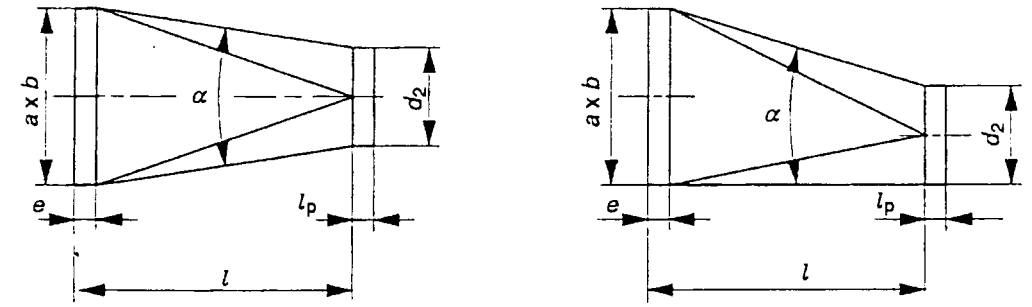
b)

Figure 4 — Branch mounted on the side wall of a duct



a) concentric b) eccentric

Figure 5 — Transformation between ducts with rectangular cross-section



a) concentric b) eccentric

Figure 6 — Transformation between one duct with rectangular, and one with circular cross-section

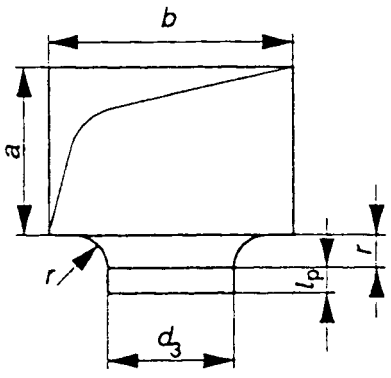


Figure 7 — Branch with circular cross-section as a transformation piece to a duct with rectangular cross-section

6 Tolerances and deviations

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

The tolerance of angles is 2°.

The deviation of a, b, c, d, e, f is $^{0}_{-4}$ mm

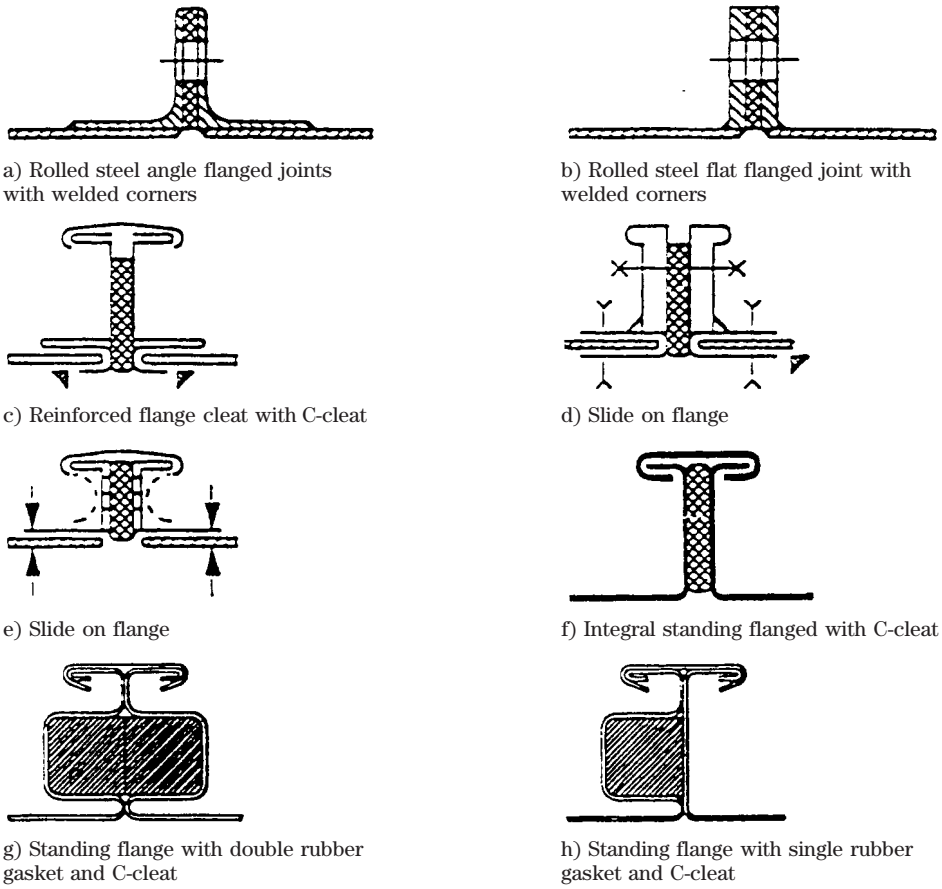
The deviation l, l_p and r is given in Table 3.

Table 3 — Deviation of l, l_p and r

Dimensions in millimetres

l, $l_p r$	Deviation
≤ 15	0 −2
> 15 ≤ 100	0 −5
> 100	− 0 −10

Annex A (informative)
Examples of alternative designs of connections



a) Rolled steel angle flanged joints with welded corners

b) Rolled steel flat flanged joint with welded corners

c) Reinforced flange cleat with C-cleat

d) Slide on flange

e) Slide on flange

f) Integral standing flanged with C-cleat

g) Standing flange with double rubber gasket and C-cleat

h) Standing flange with single rubber gasket and C-cleat

Figure A.1 — Examples of alternative designs of connections

Annex B (informative)
Comments and notes to clause 5

B.1 General

It is recommended that splitters are positioned in accordance with the examples given in Table B.1. Designers should take account of individual system requirements regarding acoustics, velocity and pressure when selecting duct fittings.

NOTE 1 The bend shown in Figure 3a) is only recommended for use on low pressure/velocity systems and smaller dimensions of ducts.

NOTE 2 For bends shown in Figures 3b) and 3c), with radius r less than 100 mm, splitters are recommended in accordance with Table B.1 and Figure B.1. If alternatively r is increased to $0{,}5a$ splitters may be omitted.

NOTE 3 For bends shown in Figures 3d), 3e) and 3f), with angles $\leq 45°$, splitters are not required but for angles $> 45°$, splitters are recommended.

NOTE 4 For transformation pieces, as shown on Figures 5 and 6, which are large or are used on high velocity systems the slope angle α should be reduced.

Table B.1 — Positioning of splitters

Duct width a mm	**Number of splitters**	**Distance between splitters** mm (approximate)		
		a_1	a_2	a_3
$> 400 \leq 800$	1	$a/3$		
$> 800 \leq 1600$	2	$a/4$	$a/2$	
$> 1600 \leq 2000$	3	$a/8$	$a/3$	$a/2$

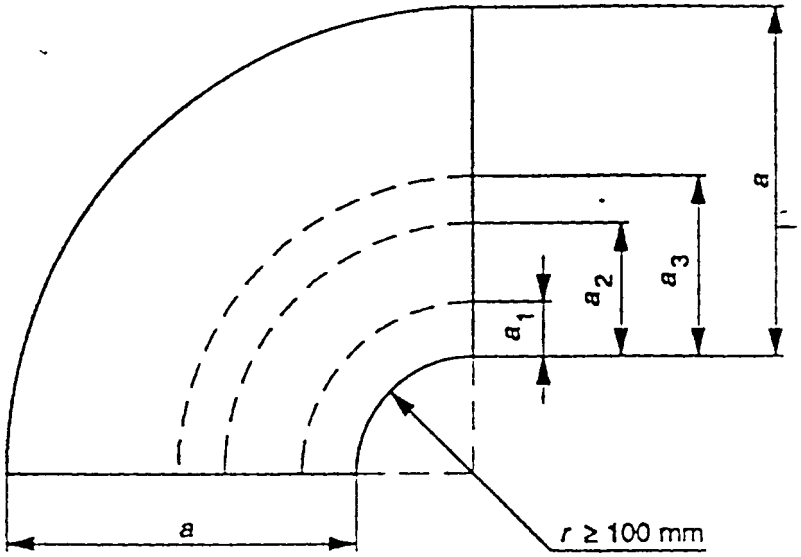


Figure B.1 — Positioning of splitters

Annex C (informative)

Bibliography

The following documents are referred to in the introduction.

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

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

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