INTERNATIONAL STANDARD

ISO 13351

First edition
1996-06-15

Industrial fans — Dimensions

Ventilateurs industriels — Dimensions

Reference number
ISO 13351:1996(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 13351 was prepared by Technical Committee ISO/TC 117, *Industrial fans*.

International Organization for Standardization
Case Postale 56 • CH-1211 Geneva 20 • Switzerland

Printed in Switzerland

Introduction

This International Standard gives details of circular and rectangular flanges as well as specifying "fan size designation". For circular flanges, the values specified in ISO 6580:1981, *General purpose industrial fans — Circular flanges — Dimensions* are retained for the next five years in parallel with those given in table 2 of this International Standard.

Though not constraining a manufacturer's choice of flange details, this International Standard provides the opportunity for interchangeability and therefore a reduction in technical obstacles to free trading.

Throughout this International Standard, the principal dimensions are based on the rounded values of "preferred" numbers given in ISO 497.

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Industrial fans — Dimensions

1 Scope

This International Standard specifies size designations for industrial fans and specifies dimensions for the circular and rectangular flanges of general purpose industrial fans as defined in 3.1.1. It does not apply to cross-flow fans, or fan appliances used for household or similar applications.

For circular flanges, this International Standard provides two different flange series, one for standard casing thicknesses and a second for heavy duty fans as used on board sea-going vessels or in heavy industry.

In order not to restrict fan designs unduly, only the pitch diameter, hole numbers and hole diameters are standardized. Flange thickness as well as internal and external flange diameters can be chosen freely within the limits of good engineering practice.

2 Normative references

The following standards contain provisions, which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreement based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 3:1973, *Preferred numbers — Series of preferred numbers.*

ISO 497:1973, *Guide to the choice of preferred numbers and of series containing more rounded values of preferred numbers.*

ISO 13349:—[1], *Industrial fans — Terminology.*

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of this International Standard, the definitions given in ISO 13349 and the following definitions apply.

3.1.1 general purpose industrial fan: Fan for which the flange dimensions conform to those given in figure 4 and table 2.

3.1.2 heavy duty fan: Fan for which the flange dimensions are greater and conform to those given in figure 4 and table 3.

3.1.3 nominal impeller tip diameter, D: Diameter of the impeller tip on which the design of the fan is based.

3.2 Symbols and abbreviations

For the purposes of this International Standard, the following symbols and abbreviations apply:

D nominal impeller tip diameter (see figures 1, 2 and 3)
D_R actual impeller tip diameter (see figures 1, 2 and 3)
d_1 pitch circle diameter
d_2 hole diameter
d_3 bolt diameter
d_4 washer diameter
e casing thickness
g hole offset
l arc length between bolt holes
N number of holes
α angle between bolt holes

1) To be published.

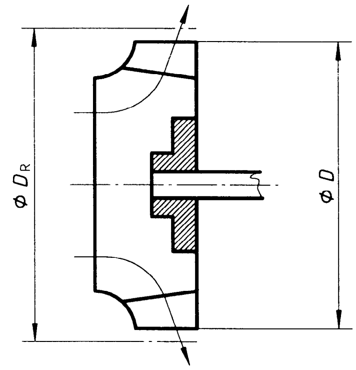


Figure 1 — Impeller of a centrifugal fan

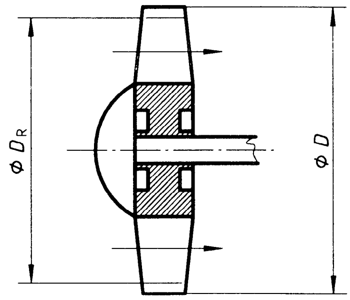
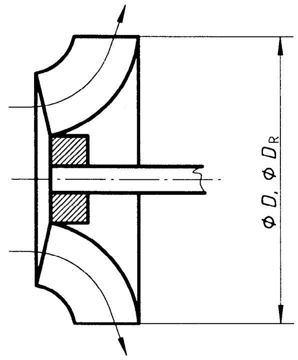


Figure 2 — Impeller of an axial-flow fan



NOTE — Usually $D = D_R$

Figure 3 — Impeller of a mixed-flow fan

4 Required characteristics

4.1 General

This International Standard adopts the Renard R 20 Series as given in ISO 497 as the nominal dimensions for impeller tip diameters, inside diameters of circular flanges and the inside lengths of the sides of rectangular flanges. It takes into account the maximum casing thicknesses likely to be used for general purpose industrial fans as well as typical manufacturing tolerances representative of "good practice".

The dimensions of circular and rectangular flanges are given in sizes which correspond to nominal diameters from 100 mm to 2 000 mm. In many cases, in the smaller sizes, below about 200 mm, flange details are determined by the customer's specification. However, where this is not the case, then this International Standard shall be used.

4.2 Designation of fan size

Fan size shall be designated by the nominal impeller tip diameter as defined in 3.1.3.

This International Standard uses the R 20 Series (see ISO 3) for the fan size designation (nominal impeller tip diameter, D), in the range 100 mm to 2 000 mm, as shown in table 1. For impeller tip diameters greater than 2 000 mm, the numbers may be selected from the R 20, R 40 or R 80 series.

Table 1 — Fan sizes

Dimensions in millimetres

Nominal impeller tip diameter D 1)		
100	280	800
112	315	900
125	355	1 000
140	400	1 120
160	450	1 250
180	500	1 400
200	560	1 600
224	630	1 800
250	710	2 000

1) R 10 series numbers are underlined.

4.3 Circular flange characteristics

The smallest practical pitch circle diameter can be related to the inside diameter of the fan casing, the casing thickness, the size of the weld fillet or bend radius at the junction of the flange and the casing and the normal washer diameter.

This International Standard accepts that the number and diameter of bolts or screws cannot be established on a theoretical basis. Practical experience of satisfactory service, optimum cost of installation and manufacture as well as dimensional tolerances of production are the most important considerations.

The number of flange holes is divisible by four to permit the orientation of cylindrical cased fans to positions at 90°. The holes are disposed equally each side of the centrelines of the fan. This permits a flange to be divided in half should a split casing be required. It

also allows better access to the fixings on the remote side of a fan in a confined installation.

Should an intermediate fan size be required, then the R 40 series shall be used to obtain the nominal inside diameter. The flange details shall be interpreted from the next larger R 20 size.

In exceptional circumstances when even smaller increments of fan size are required, it is suggested that the R 80 series be used.

4.4 Rectangular flange characteristics

The objective of the system is to provide a maximum of freedom of choice of rectangular dimensions, using standardized flange dimensions and standardized locations and sizes of bolt holes throughout the range of fan outlet sizes.

The system is applied by selecting standard bolt hole locations from table 4 for each of the two dimensions of the fan outlet.

Tables 5 and 6 show a series of rectangular outlets based on the R 20 series for two alternate methods of determining aspect ratio.

No recommendations are given for the size of angle to be used in the lap-welded design, the choice being determined by the hole offset dimension, g, and the ability to apply a tightening spanner to the nut and bolt specified. For certain aspect ratios other than 1, there are selections where unequal flanges could result from the system (see note 2 of figure 5). If unequal flanges are undesirable, then equal flange dimensions and bolt sizes may be selected to correspond with the dimensions for the longer of the two sides, but retaining the pitch between the bolt holes to correspond to each outlet side dimension. The offset dimension, g, must remain unaltered to maintain the dimensional integrity of the hole positions.

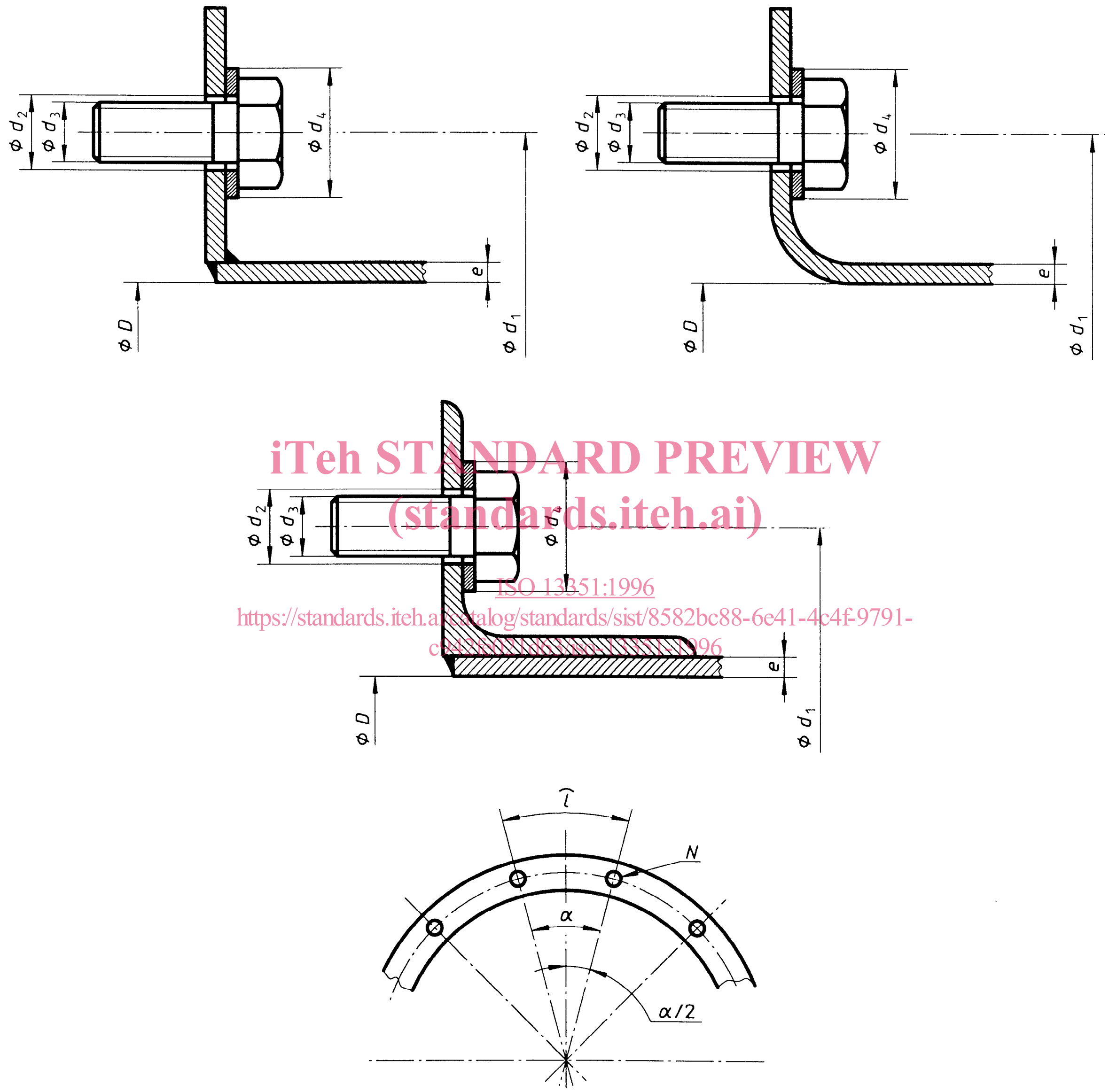


Figure 4 — Circular flanges

Table 2 — Circular flanges — Dimensions for general purpose fans

Dimensions in millimetres

D	d_1	$\frac{d_1 - D}{2}$	Number of holes N	α degrees	l	d_2	d_3	d_4 [1]	e [1]
100	139	19,5	4	90	109	9,5	M8	17	$1,5 \leqslant e \leqslant 6$
112	151	19,5	4	90	119	9,5	M8	17	$1,5 \leqslant e \leqslant 6$
125	165	20	4	90	130	9,5	M8	17	$1,5 \leqslant e \leqslant 6$
140	182	21	8	45	71	11,5	M10	21	$1,5 \leqslant e \leqslant 6$
160	200	20	8	45	79	11,5	M10	21	$1,5 \leqslant e \leqslant 6$
180	219	19,5	8	45	86	11,5	M10	21	$1,5 \leqslant e \leqslant 6$
200	241	20,5	8	45	95	11,5	M10	21	$1,5 \leqslant e \leqslant 6$
224	265	20,5	8	45	104	11,5	M10	21	$1,5 \leqslant e \leqslant 6$
250	292	21	8	45	115	11,5	M10	21	$1,5 \leqslant e \leqslant 6$
280	332	26	8	45	130	11,5	M10	21	$1,5 \leqslant e \leqslant 6$
315	366	25,5	8	45	144	11,5	M10	21	$1,5 \leqslant e \leqslant 6$
355	405	25	8	45	159	11,5	M10	21	$1,5 \leqslant e \leqslant 6$
400	448	24	12	30	117	11,5	M10	21	$1,5 \leqslant e \leqslant 6$
450	497	23,5	12	30	130	11,5	M10	21	$1,5 \leqslant e \leqslant 6$
500	551	25,5	12	30	144	11,5	M10	21	$1,5 \leqslant e \leqslant 6$
560	629	34,5	16	22,5	124	14	M12	24	$2 \leqslant e \leqslant 6$
630	698	34	16	22,5	137	14	M12	24	$2 \leqslant e \leqslant 6$
710	775	32,5	16	22,5	152	14	M12	24	$2,5 \leqslant e \leqslant 6$
800	869	34,5	24	15	113	14	M12	24	$2,5 \leqslant e \leqslant 6$
900	958	29	24	15	125	14	M12	24	$3 \leqslant e \leqslant 6$
1 000	1 067	33,5	24	15	140	14	M12	24	$3 \leqslant e \leqslant 6$
1 120	1 200	40	32	11,25	118	18	M16	30	$4 \leqslant e \leqslant 6$
1 250	1 337	43,5	32	11,25	131	18	M16	30	$4 \leqslant e \leqslant 6$
1 400	1 475	37,5	32	11,25	145	18	M16	30	$5 \leqslant e \leqslant 6$
1 600	1 675	37,5	40	9	132	18	M16	30	$5 \leqslant e \leqslant 6$
1 800	1 875	37,5	40	9	147	18	M16	30	6
2 000	2 073	36,5	40	9	163	18	M16	30	6

1) Given for information.