

ICS 23.040.60;

PN-EN 1092-3:2004/AC

Maj 2005

Wprowadza
EN 1092-3:2003/AC:2004, IDT

Zastępuje

Dotyczy

PN-EN 1092-3:2004 (U)

Kołnierze i ich połączenia - Kołnierze okrągłe do rur, armatury, kształtek i osprzętu z oznaczeniem PN - Część 3: Kołnierze ze stopów miedzi

Na wniosek Komitetu Technicznego nr 210

ds. ARMATURY PRZEMYSŁOWEJ I RUROCIĄGÓW PRZEMYSŁOWYCH

poprawka do normy europejskiej EN 1092-3:2003/AC:2004 Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN designated - Part 3: Copper alloy flanges

ma status Poprawki do Polskiej Normy

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1092-3:2003/AC

July 2004
Juillet 2004
Juli 2004

ICS 23.040.60

English version
Version Française
Deutsche Fassung

Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN designated - Part 3: Copper alloy flanges

Brides et leurs assemblages - Brides circulaires pour tubes, appareils de robinetterie, raccords et accessoires, désignées PN - Partie 3: Brides en alliages de cuivre

Flansche und ihre Verbindungen - Runde Flansche für Rohre, Armaturen, Formstücke und Zubehörteile, nach PN bezeichnet - Teil 3: Flansche aus Kupferlegierungen

This corrigendum becomes effective on 21 July 2004 for incorporation in the official German and English versions of the EN.

Ce corrigendum prendra effet le 21 juillet 2004 pour incorporation dans les versions officielles allemande et anglaise de la EN.

Die Berichtigung tritt am 21. Juli 2004 zur Einarbeitung in die offizielle Deutsche und Englische Fassung der EN in Kraft.



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

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

© 2004 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.
Tous droits d'exploitation sous quelque forme et de quelque manière que ce soit réservés dans le monde entier aux membres nationaux du CEN.
Alle Rechte der Verwertung, gleich in welcher Form und in welchem Verfahren, sind weltweit den nationalen Mitgliedern von CEN vorbehalten.

Ref. No.: EN 1092-3:2003/AC:2004 D/E

Contents

Page

Foreword.....	3
Introduction	3
1 Scope	4
2 Normative references	6
3 Terms and definitions.....	6
4 Designation	7
4.1 General.....	7
4.2 Standard designation	7
4.3 Information to be supplied by the equipment manufacturer.....	7
5 General requirements.....	8
5.1 Materials	8
5.2 Repairs	8
5.3 Bolting.....	8
5.4 Gaskets	8
5.5 Pressure/temperature (p/T) ratings.....	8
5.6 Dimensions.....	9
5.7 Flange facings.....	9
5.8 Spot facing or back facing	10
5.9 Tolerances	11
5.10 Marking	11
Annex A (informative) Information to be supplied by the equipment manufacturer.....	28
Annex B (informative) Application and installation	29
Annex C (informative) Approximate masses of flanges and collars.....	30
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 97/23/EC	34
Bibliography	35

Foreword

Due to the incorrect hatching, all figures were replaced.

This document (EN 1092-3:2003) has been prepared by Technical Committee CEN/TC 74 "Flanges and their joints" the secretariat of which is held by DIN.

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 March 2004, and conflicting national standards shall be withdrawn at the latest by March 2004.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of the Pressure Equipment Directive (PED)¹.

For relationship with EU Directive(s), see informative annex ZA, which is an integral part of this standard.

EN 1092 consists of the following parts:

- Part 1: Steel flanges;
- Part 2: Cast iron flanges;
- Part 3: Copper alloy flanges;
- Part 4: Aluminium alloy flanges.

The annexes A, B, C and ZA are informative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

This standard is related to ISO 7005-3 in respect of flanges having the same PN. The types of flanges and their mating dimensions are identical with those flanges of the same DN and PN given in ISO 7005-3, except that certain flange types in accordance with this standard may regularly be supplied with raised face facings.

The mating dimensions of the flanges of this standard are compatible with PN designated flanges of other materials in accordance with the other parts of EN 1092.

¹) Directive 97/23 EC of the European Parliament and of the Council of 29 May 1997 on the approximation of the Laws of the Member States concerning pressure equipment; OIEC L 181.

1 Scope

This European Standard specifies requirements for circular copper alloy flanges and copper alloy collars combined with loose steel plate flanges in PN designations from PN 6 to PN 40 and nominal sizes from DN 10 to DN 1800 in the types shown in Table 1.

This standard also specifies dimensions and tolerances, materials and their associated pressure/temperature (p/T) ratings, flange facings and related surface finish, weld repairs, and marking, together with information on bolting, gaskets, application/installation and approximate flange masses.

The flanges specified, with the exception of integral (type 21) flanges, are for attachment to copper or copper alloy tubes in accordance with EN 12449.

NOTE 1 When the flanges specified in this standard are required for use with copper or copper alloy tubes to EN 1057 in those tube diameters which are different to EN 12449, this should be agreed between the equipment manufacturer and the flange manufacturer.

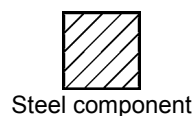
NOTE 2 The size of copper and copper alloy tubes is designated by reference to the outside diameter in millimetres.

NOTE 3 See also annex B.

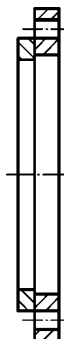
NOTE 4 Non-gasketed pipe joints are outside the scope of this standard.

Table 1 — Types of flanges and collars

Type no.	Description
01	Plate flange in copper alloy for brazing or welding
02	Loose plate flange in steel with a plate collar (type 32) in copper alloy, for brazing or welding.
04	Loose plate flange in steel with a weld-neck collar (type 34) in copper alloy, for welding.
05	Blank flange in copper alloy.
05C	Blank flange in steel clad with a copper alloy jointing face.
07	Loose plate flange in steel with a slip-on collar (type 37) in copper alloy, for soft soldering, brazing or welding.
11	Weld-neck flange in copper alloy for welding.
12	Hubbed slip-on flange in copper alloy, for soft soldering, brazing or welding.
14	Hubbed slip-on flange in copper alloy supplied with tube stops, for soft soldering, brazing or welding.
21	Integral flange in copper alloy as part of some other equipment or component
32	Plate collar in copper alloy
34	Weld-neck collar in copper alloy.
37	Slip-on collar in copper alloy.



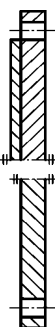
Type 01
Plate flange in copper alloy
for brazing or welding



Type 02, 32
Loose plate flange in steel with a
plate collar (type 32) in copper alloy
for brazing and welding



Type 04, 34
Loose plate flange in steel with a
weld-neck collar (type 34) in copper alloy
for welding



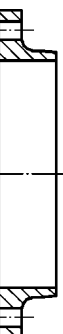
Type 05, 05C
05 Blank flange in copper alloy
05C Blank flange in steel clad with
a copper alloy jointing face



Type 07, 37
Loose plate flange in steel with a
slip-on collar (type 37) in copper alloy,
for soft soldering, brazing or
welding



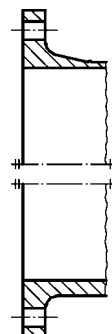
Type 11
Weld-neck flange in copper alloy for
welding



Type 12
Hubbed slip-on flange in copper
alloy, for soft soldering, brazing or
welding



Type 14
Hubbed slip-on flange in copper
alloy supplied with tube stops, for
soft soldering, brazing or
welding



Type 21
Integral flange in copper alloy as
part of some other equipment or
component

Figure 1 — Types of flanges and collars

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, 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 (including amendments).

EN 1333:1996, *Pipework components — Definition and selection of PN*.

EN 1652, *Copper and copper alloys — Plate, sheet, strip and circles for general purposes*.

EN 1982, *Copper and copper alloys — Ingots and castings*.

EN 10028-2, *Flat products made of steels for pressure purposes — Part 2: Non-alloy and alloy steels with specified elevated temperature properties*.

EN 10222-2, *Steel forgings for pressure purposes — Part 2: Ferritic and martensitic steels with specified elevated temperature properties*.

EN 12420, *Copper and copper alloys — Forgings*.

EN 12449, *Copper and copper alloys — Seamless round tubes for general purposes*.

EN ISO 887, *Plain washers for metric bolts, screws and nuts for general purposes — General plan (ISO 887:2000)*.

EN ISO 4287, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Terms, definitions and surface texture parameters (ISO 4287:1997)*.

EN ISO 6708:1995, *Pipework components — Definition and selection of DN (nominal size) (ISO 6708:1995)*.

3 Terms and definitions

For the purposes of this standard, the following terms and definitions apply.

3.1

DN

see EN ISO 6708:1995

3.2

PN

see EN 1333:1996

3.3

maximum allowable pressure, PS

means the maximum allowable pressure for which the equipment is designed, as specified by the equipment manufacturer

3.4

maximum allowable temperature, TS

means the maximum allowable temperature for which the equipment is designed, as specified by the equipment manufacturer

4 Designation

4.1 General

The types of flanges and their reference numbers are given in Table 1 and the range of DN applicable to each flange type and to each PN shall be as given in Table 3.

4.2 Standard designation

Flanges and collars in accordance with this standard shall be designated by the following:

- a) Designation, e.g. flange or collar;
- b) Number of this standard, EN 1092-3;
- c) Number of flange type in accordance with Figure 1;
- d) Type of flange facing, A or B in accordance with Figure 1 (only for types 11, 12, 14 and 21);
- e) PN designation, PN....;
- f) Nominal size, DN....;
- g) Bore diameter B_1 (only for flanges which can be made to suit more than one tube diameter — see Tables 5 to 9);
- h) Material number or symbol (see Tables 11 and 12) (for type 05C flanges it is necessary to specify both the material of the flange and the material of the cladding).

EXAMPLE 1 Designation of a plate flange type 01 with facing type A, in PN 6 and nominal size DN 800 and in material symbol CuAl8Fe3:

Flange EN 1092-3/01A/PN 6/DN 800/CW303G

EXAMPLE 2 Designation of a loose flange type 07, in PN 10 and nominal size DN 50 and in material symbol S235JR:

Flange EN 1092-3/07/PN 10/DN 50/S235JR

EXAMPLE 3 Designation of slip-on collar type 37, in PN 10 and nominal size DN 50 with bore diameter $B_1 = 57,23$ and in material symbol CuZn20Al2As:

Collar EN 1092-3/37/PN 10/DN 50/57,23/CW702R

EXAMPLE 4 Designation of a blank flange type 05C with clad jointing face, in PN 25 and nominal size DN 150 and in materials symbols S235JR (for blank flange) and CuNi30Mn1Fe (for cladding):

Flange EN 1092-3/05C/PN 25/DN 150/S235JR-CW354H

EXAMPLE 5 Designation of a weld-neck flange type 11 with facing type B, in PN 16 and nominal size DN 100 and in material symbol CuAl10Fe2-C:

Flange EN 1092-3/11B/PN 16/DN 100/CC331G

4.3 Information to be supplied by the equipment manufacturer

For information to be supplied by the equipment manufacturer see annex A.

5 General requirements

5.1 Materials

Flanges and collars shall be manufactured from the materials specified in Tables 11 and 12 except for type 21 flanges where the flange manufacturer may use other materials by agreement with the equipment manufacturer.

The flange manufacturer shall provide means of identifying the material of the flange. An equipment manufacturer may require a certificate in accordance with EN 10204 which is suitable for the category of the equipment to which the flange is fitted.

NOTE If a protective coating such as zinc coating or zinc painting is required on steel components, the equipment manufacturer should state this on the enquiry and/or order.

5.2 Repairs

5.2.1 Repairs by welding are permitted when there is a proven method and where not otherwise prohibited by the applicable material standard. All welding shall be carried out in accordance with a written procedure.

NOTE For approval of welding procedures, see EN 288-1. For approval of welders, see EN 287-1.

5.2.2 Any filler rod used for weld repairs shall be such as to produce a weld having characteristics at least equal to the parent metal. Flanges shall be heat treated after repair welding when the material standard requires such treatment.

5.3 Bolting

Flanges shall be suitable for use with the nominal size and number of bolts specified in Tables 5 to 9 as appropriate.

The bolting material shall be chosen by the equipment manufacturer according to the pressure, temperature, flange material and the selected gasket so that the flanged joint remains tight under the expected operating conditions.

NOTE 1 For information on bolting, see EN 1515-1 and EN 1515-2 and annex B.

NOTE 2 For flange types 01, 05, 11, 12, 14 and 21, where copper alloy bolting is used, the recommended bolting materials are EN 12420 Alloy Nos. CW306G or CW307G for temperatures up to and including 120 °C.

For flange types 02, 04, 05C and 07, steel bolting should be used and reference should be made to EN 1515.

5.4 Gaskets

The various gasket types, dimensions, design characteristics and materials used are not within the scope of this standard. Dimensions of gaskets are given in the relevant parts of EN 1514.

5.5 Pressure/temperature (p/T) ratings

5.5.1 General

The p/T ratings of the flanges manufactured from the materials specified in Tables 11 and 12 are given in Tables 13 and 14.

The p/T ratings indicate the relationship between the maximum allowable pressure, PS and the maximum allowable temperature, TS.

Linear interpolation is permitted for intermediate temperatures.

NOTE 1 See EN 764 for terminology.

NOTE 2 When type 21 flanges are supplied as part of another component (for example, a valve or pump) in a material other than those listed in Table 11, reference should be made to the relevant product or application standard for the appropriate p/T ratings.

NOTE 3 The rating of a flange is not necessarily the rating of the whole pipework system. Gasket materials can also impose limitation of the p/T rating of a flanged joint and the gasket manufacturer should be consulted when selecting the material of the gasket.

5.5.2 p/T ratings of flanged joints

When two flanges in a flanged joint do not have the same p/T rating at any temperature, then the lower of the two flange p/T ratings at that temperature shall apply.

NOTE 1 For any p/T rating, the temperature shown is considered to be the same as that of the contained fluid. Use at a pressure corresponding to a temperature other than that of the contained fluid is the responsibility of the user.

NOTE 2 Application of the p/T ratings given in this standard to flange joints should take into consideration the risks of leakage due to forces and moments developed in the connecting pipework, see annex B.

NOTE 3 These notes on service considerations are not intended to be exhaustive.

5.6 Dimensions

5.6.1 Flanges

Dimensions of flanges shall be in accordance with Figure 2 and the following tables and figures as appropriate:

- PN 6 flanges: Table 5 and Figure 3;
- PN 10 flanges: Table 6 and Figure 4;
- PN 16 flanges: Table 7 and Figure 5;
- PN 25 flanges: Table 8 and Figure 6;
- PN 40 flanges: Table 9 and Figure 7.

NOTE 1 The bore sizes of type 21 flanges are usually equal to the nominal size of the pipe, valve or fitting of which they form a part and the actual bore sizes are usually given in the appropriate standard(s) for the pipe, valve or fitting.

NOTE 2 When type 07, 12 and 14 flanges are for use with soft soldering techniques only, then reference should be made to EN 1254-1 for socket depths.

NOTE 3 For types 34 and 11 flanges the recommended weld preparation angle is $37,5^\circ \pm 2,5^\circ$ when butt welding to pipe with thickness of 3 mm and greater.

5.6.2 Bolt holes

Bolt holes shall be equally spaced on the pitch circle diameter. In the case of type 21 flanges, the bolt holes shall be positioned such that they are symmetrical to the principle axes and such that no holes fall on these axes, i.e. positioned "off-centre", see Figures 3 to 7.

5.7 Flange facings

5.7.1 Types of facings

Figure 2 illustrates facing types (types A and B) which are used, where applicable, in conjunction with the flanges shown in Figure 1. Diameters of type B raised faces are given in Table 4.

Types 01 and 05 flanges in copper alloy shall be provided with type A flat face. Types 11, 12, 14 and 21 flanges in copper alloy shall be provided with either type A flat face or type B raised face.

NOTE 1 Flanges with type A facings are suitable for bolting to flat face mating flanges using a full face gasket. Flanges with type B facings are suitable for bolting to raised face mating flanges and/or used with inside bolt circle gaskets.

NOTE 2 For types 11, 12, 14 and 21 flanges, the equipment manufacturer's enquiry or order should advise the flange manufacturer of the facing type required, see annex A.

NOTE 3 For certain large size flanges in types 11, 12 and 14 and PN 6 to PN 25 (see Tables 5 to 8), type B facings only are specified. The provision of type A facings on these flanges would be by agreement between the flange manufacturer and equipment manufacturer.

Types 02, 04, 05C and 07 flanges have a raised face formed by the face of the collar or the cladding, for bolting to raised face mating flanges using an inside bolt circle gasket.

NOTE 4 The bolting of these flanges to a flat face iron or steel mating flange using full face or inside bolt circle gaskets is not precluded.

5.7.2 Jointing face finish

All flange jointing faces shall be machine finished and when compared by visual or tactile means with reference specimens, shall be in accordance with Table 2.

NOTE 1 It is not intended that instrument measurements are taken on the flange faces, and the R_a and R_z values as defined in ISO 468 relate to the reference specimens.

NOTE 2 Other finishes may be agreed between the flange manufacturer and equipment manufacturer.

Table 2 — Surface finish of jointing faces

Method of machining	R_a^a μm		R_z^a μm	
	min.	max.	min.	max.
Turning ^b	3,2	12,5	12,5	50m
^a R_a and R_z are defined in EN ISO 4287				
^b Turning covers any method of machining operation producing either serrated concentric or serrated spiral grooves.				
Machining processes other than turning are permissible provided that they give a surface finish in accordance with the R_a and R_z values specified.				

5.7.3 Rims

Rims of flanges and collars may be machined or un-machined.

5.7.4 Collars and loose flanges

Collars and loose flanges shall be machine finished, or have a surface equivalent to that obtained by machining on all locating diameters, bores and abutment faces. The abutment faces shall be flat and square to the bore axis.

5.8 Spot facing or back facing

Any spot facing or back facing required shall not reduce the flange thickness to less than the minimum specified.

When spot facing is used, the diameter shall be large enough to accommodate the outside diameter of the equivalent normal series of washers in accordance with EN ISO 887 for the bolt size being fitted.

When a flange is back faced, it is permissible for the fillet radius to be reduced but it shall not be eliminated entirely. The bearing surfaces for the bolting shall be parallel to the flange jointing face within the limits given in Table 10.

5.9 Tolerances

Tolerances on dimensions shall be as specified in Table 10.

5.10 Marking

5.10.1 Other than type 21 flanges

All flanges and collars shall be marked as follows:

- a) Number of this standard, i.e. EN 1092-3;
- b) Flange or collar type number, e.g. 05;
- c) PN designation, e.g. PN 10;
- d) DN (Nominal size), e.g. DN 100. Where a flange or collar can be made to suit more than one tube size, the tube size shall be marked as appropriate (see Tables 5 to 9);
- e) Material designation. The alloy designation number given in Tables 11 and 12 shall be used, as appropriate;
- f) Flange manufacturer's name or trademark.

EXAMPLE 1 Copper alloy flanges:

EN 1092-3 - 12 — PN 16 — DN 300 — CW352H — XYZ

EXAMPLE 2 Copper alloy collars:

EN 1092-3 — 32 — PN 16 — DN 50/54 — CC491K — XYZ

EXAMPLE 3 Steel components:

EN 1092-3 — 02 — PN 16 — DN 300 — S235JR — XYZ

5.10.2 Method of markings

Copper alloy flanges shall be clearly and permanently marked by a method other than stamping with steel stamps.

NOTE 1 The flange manufacturer's name or trademark, together with other relevant markings may be produced during casting or forging for both copper alloy and steel components.

NOTE 2 Steel flanges may be marked round the rim of the flange with round nosed steel stamps.

5.10.3 Omission of markings

If a flange is too small to enable all the markings required in 5.10.1 to be marked on the flange, then some of the markings are permitted to be omitted. The order in which the markings are omitted shall be as follows:

- a) Flange type number;
- b) DN.

5.10.4 Declaration of compliance

The marking EN 1092-3, together with the flange manufacturer's name or trademark on or in relation to a product, represents a manufacturer's declaration of compliance, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of this standard.

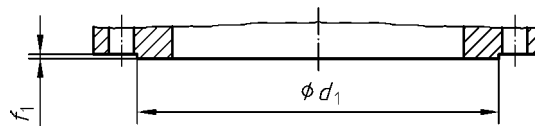
Table 3 — Synoptic table for flanges

Type No.	Table no.	PN	Size																	
			DN 10	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100	DN 125	DN 150	DN 175	DN 200	DN 250	DN 300	DN 350	DN 400
01	5	6	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	6	10	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	7	16	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
02 32	8	25	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	9	40	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
04 34	5	6	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	6	10	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	7	16	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	8	25	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
05 05C	5	6	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	6	10	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	7	16	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	8	25	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	9	40	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
07 37	5	6	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	6	10	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	7	16	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
11	5	6	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	6	10	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	7	16	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	8	25	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
12	5	6	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	6	10	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	7	16	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	8	25	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
14	5	6	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	6	10	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	7	16	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	8	25	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
21	5	6	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	6	10	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	7	16	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	8	25	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	9	40	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Note The range of DN of which a flange of a particular type and PN may be ordered to this standard is denoted by •



Type A Flat face



Type B Raised face

NOTE 1 For application, see 5.7.1.

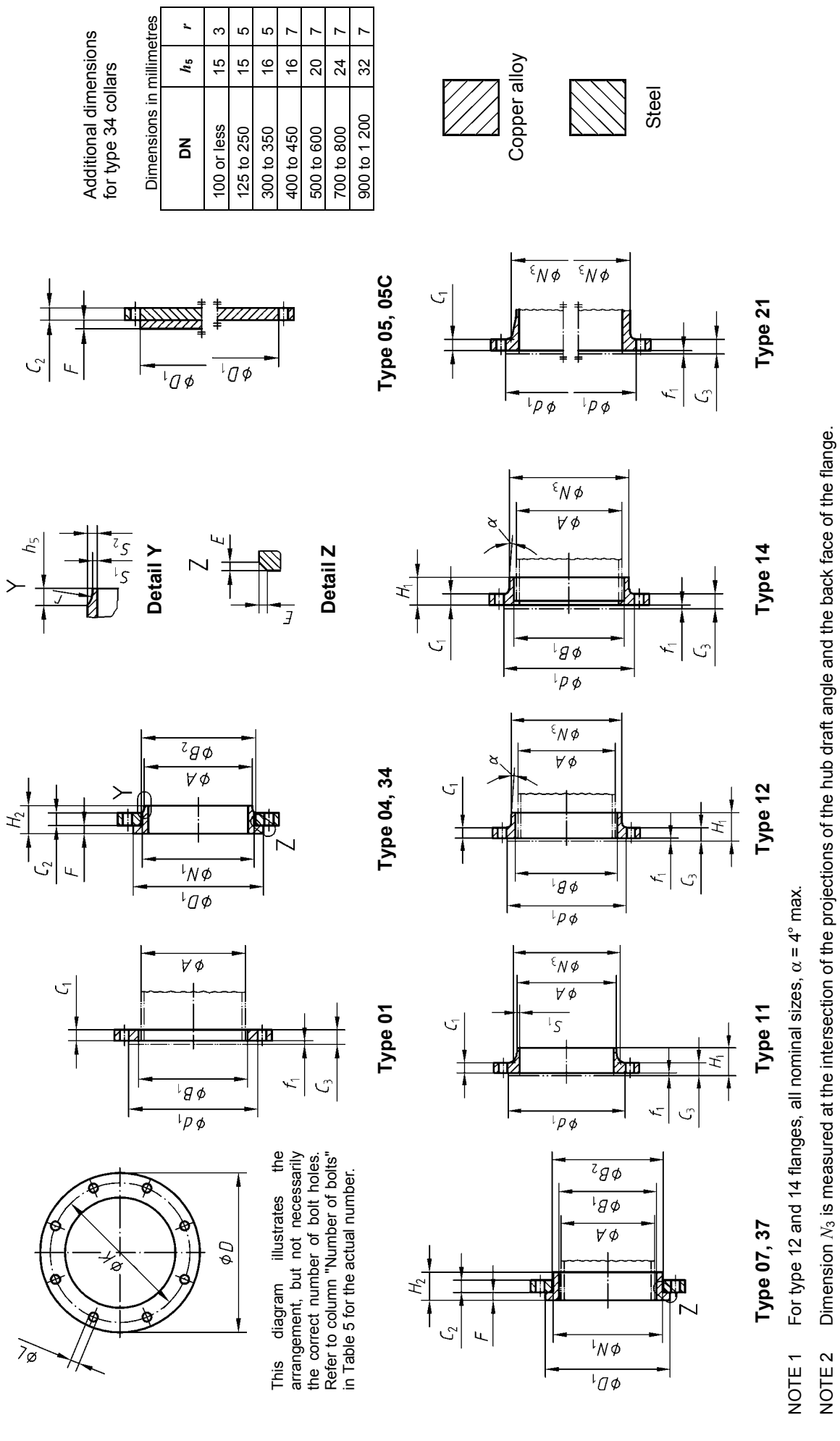
NOTE 2 For dimensions of type B facings, see Table 4.

Figure 2 — Flange facings, types A and B

Table 4 — Dimensions for type B flange facings

Dimensions in millimetres

DN	PN 6		PN 10		PN 16		PN 25		PN 40	
	d_1	f_1	d_1	f_1	d_1	f_1	d_1	f_1	d_1	f_1
10	33	2	41	2	41	2	41	2	41	2
15	38	2	46	2	46	2	46	2	46	2
20	48	2	56	2	56	2	56	2	56	2
25	58	2	65	2	65	2	65	2	65	2
32	69	2	76	2	76	2	76	2	76	2
40	78	2	84	2	84	2	84	2	84	2
50	88	2	99	2	99	2	99	2	99	2
65	108	2	118	2	118	2	118	2	118	2
80	124	2	132	2	132	2	132	2	132	2
100	144	2	156	2	156	2	156	2	156	2
125	174	2	184	2	184	2	184	2	184	2
150	199	2	211	2	211	2	211	2	211	2
175	229	2	242	2	242	2	—	—	—	—
200	254	2	266	2	266	2	274	2	284	2
250	309	2	319	2	319	2	330	2	345	2
300	363	2	370	2	370	2	389	2	409	2
350	413	2	429	2	429	2	448	2	465	2
400	463	2	480	2	480	2	503	2	535	2
450	518	2	530	2	—	—	—	—	—	—
500	568	2	582	2	609	2	609	2	—	—
600	667	2	682	2	—	—	—	—	—	—
700	772	5	794	5	—	—	—	—	—	—
800	878	5	901	5	—	—	—	—	—	—
900	978	5	1 001	5	—	—	—	—	—	—
1 000	1 078	5	1 112	5	—	—	—	—	—	—
1 200	1 295	5	1 328	5	—	—	—	—	—	—
1 400	1 510	5	1 530	5	—	—	—	—	—	—
1 600	1 710	5	1 750	5	—	—	—	—	—	—
1 800	1 918	5	1 950	5	—	—	—	—	—	—



NOTE 1 For type 12 and 14 flanges, all nominal sizes, $\alpha = 4^\circ$ max.

NOTE 2 Dimension N_3 is measured at the intersection of the projections of the hub draft angle and the back face of the flange.

Figure 3 — Dimensions of PN 6 flanges (see Table 5)

Table 5 — Dimensions of PN 6 flanges (see Figure 3)

Dimensions in millimetres																															
DN	Tube outside diameter	Mating dimensions				Flange thickness				Hub diameter	Neck diameter (min.)	Collar diameter	Length through hub of collar			Collar thickness	Collar flange thickness		Cladding thickness	Collar or cladding diameter		Bore of flange or collar	Bore of flange	Chamfer ^a							
		Outside diameter of flange	Pitch circle diameter	Bolt hole diameter	Bolts		Type A facing		Loose and blank flanges				Type B facing																		
					Number	Nom. size	C ₁	C ₂	C ₃				C ₂	C ₃																	
		01, 04, 05, 05C, 07, 11, 12, 14, 21				01 11 12 12 14	01 11 12 12 14	05 07 05C	11 12 12 12 14	11 12 12 12 14	21	N ₁		H ₁	11 12 14	H ₂	S ₂ min	34 37	05C	34 37	D ₁	01 37 14	12 14	04	07	04 07					
		Flange types																													
A		D	K	L	4. M10	6	10	16	18	14	16	104	94	116	110	123	45	20	50	21	2,5	4,0	5,5	10	309	268,13	274,13	278/284	288/296	5	7
10	15	16,0	75	50	11	6	10	10	10	10	10	21	16	28	10	35	16	1,0	2,0	5	5	33	15,07	16,07	19	23	2				
15	18	20,0	80	55	11	6	10	10	10	10	10	26	21	30	10	35	16	1,0	2,0	5	5	38	18,07	20,08	24	28	2				
20	22	25,0	90	65	11	6	10	10	10	10	10	31	28	32	10	40	16	1,5	2,5	5	5	48	22,08	25,08	28	33	3				
25	28	30,0	100	75	11	8	12	10	10	10	10	36	35	35	12	40	18	1,5	2,5	5	5	58	28,08	30,08	33	38	3				
32	35	38,0	120	90	14	8	12	10	10	10	10	45	42	40	18	18	1,5	2,5	5	5	69	35,09	38,08	41	47	3					
40	42	44,5	130	100	14	9	12	12	12	12	12	51	52	46,5	51	38	13	45	19	1,5	2,5	78	42,09	44,60	48	53	3				
50	54	57,0	140	110	14	11	12	12	12	12	12	67	64	59,0	67	38	15	45	19	1,5	2,5	88	54,09	57,23	62	69	3				
65	67	76,1	160	130	14	13	12	16	16	16	16	87	79	78,0	87	38	17	45	19	2,0	3,5	108	67,23	76,33	81	89	3				
80	88,9	190	150	18	4. M16	13	14	16	14	16	14	104	94	104	123	45	20	50	21	2,5	4,0	124	89,13	106	94	106	3				
100	108,0	210	170	18	4. M16	16	14	18	14	18	14	123	116	110	123	45	20	50	21	2,5	4,0	144	108,38	113	125	125	3				
125	133,0	240	200	18	8. M16	18	20	14	18	14	18	148	155	135	148	48	22	50	21	2,5	4,0	174	133,63	138	151	151	4				
150	159,0	265	225	18	8. M16	18	20	14	20	15	18	175	180	161	175	48	24	50	21	2,5	4,0	199	159,63	164	178	178	4				
175	193,7	295	255	18	8. M16	20	22	18	20	20	20	210	209	196	210	52	26	50	23	3,0	4,5	229	194,63	200	213	213	5				
200	219,1	320	280	18	8. M16	20	22	18	20	20	20	235	234	221	235	55	28	50	23	3,0	4,5	254	220,03	225	238	238	5				
250	267	273	375	335	18	12. M16	22	24	20	22	22	285	286	269	275	285	60	30	50	27	3,0	4,5	309	268,13	274,13	278/284	288/296	5	7		
300	323,9	440	395	22	12. M20	22	24	24	24	26	26	342	336	326	342	62	30	50	30	4,0	5,5	363	325,03	330	345	345	7				
350	368,0	490	445	22	12. M20	22	26	26	26	26	26	386	390	370	386	62	30	50	32	4,0	5,5	413	369,13	374	369	369	7				
400	419,0	540	495	22	16. M20	22	28	30	26	26	26	439	442	421	439	65	30	50	36	4,0	5,5	463	420,13	426	442	442	7				
450	457,2	595	550	22	16. M20	24	30	32	28	28	28	477	492	459	477	68	32	50	38	4,0	5,5	518	458,33	465	480	480	7				
500	508,0	645	600	22	20. M20	24	30	32	28	28	28	530	546	510	530	68	33	50	47	4,5	6,0	568	509,13	516	533	533	7				
600	610,0	755	705	26	20. M24	—	30	36	30	36	30	—	646	612	637	637	—	—	60	50	5,0	6,5	—	667	612	619	639	9			
700	711,0	860	810	26	24. M24	—	32	40	32	40	32	—	748	713	741	741	—	—	60	55	6,0	7,5	—	772	713	721	743	9			
800	813,0	975	920	30	24. M27	—	34	44	34	44	34	—	852	815	844	844	—	—	60	60	6,0	7,5	—	878	815	824	846	9			
900	914,0	1075	1020	30	24. M27	—	36	—	36	—	36	—	954	—	948	—	—	—	65	—	—	—	—	—	978	916	—	950	950	9	
1000	1016	1175	1120	30	28. M27	—	36	—	36	—	36	—	1054	—	1051	—	—	—	70	—	—	—	—	—	1078	1018	—	1050	1050	9	
1200	1220	1405	1340	33	32. M30	—	40	—	40	—	40	—	1260	—	1259	—	—	—	80	—	—	—	—	—	1295	1222	—	1262	1262	9	
1400	1420	1630	1560	36	36. M33	—	44	—	44	—	44	—	1466	—	1465	—	—	—	88	—	—	—	—	—	1510	1422	—	1468	1468	9	
1600	1620	1830	1760	36	40. M33	—	48	—	48	—	48	—	1672	—	1669	—	—	—	98	—	—	—	—	—	1710	1622	—	1672	1672	9	
1800	1820	2045	1970	39	44. M36	—	50	—	50	—	50	—	1876	—	1873	—	—	—	110	—	—	—	—	—	1918	1822	—	1876	1876	9	
NOTE 1 For type 12 and type 14 flanges of all DN, α = 4° max.																															
NOTE 2 For dimensions d ₁ and r ₁ ; see Table 4.																															
^a Dimension E is given for information only.																															

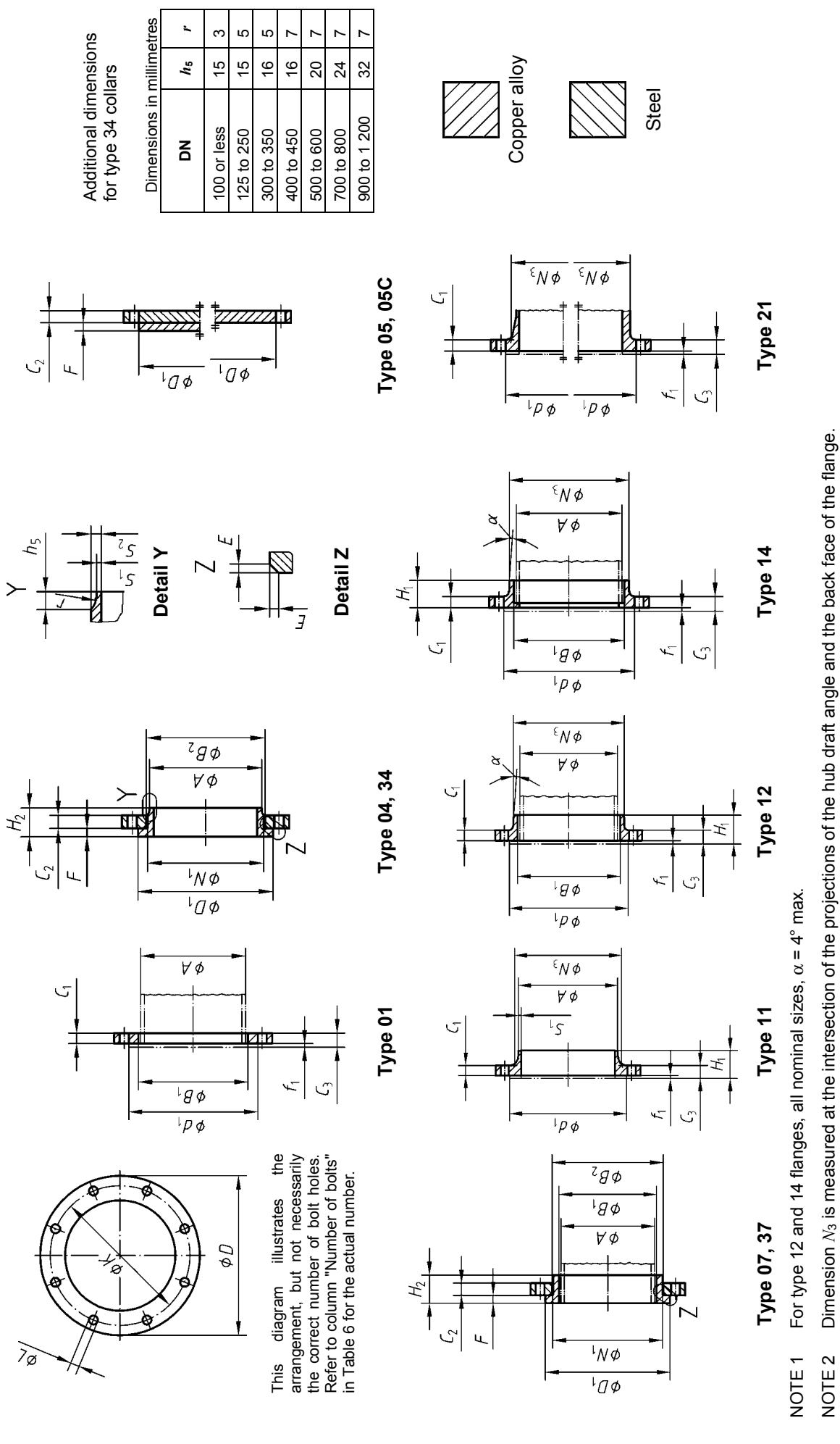


Figure 4 — Dimensions of PN 10 flanges (see Table 6)

NOTE 1 For type 12 and 14 flanges, all nominal sizes, $\alpha = 4^\circ$ max.

NOTE 2 Dimension N_3 is measured at the intersection of the projections of the hub draft angle and the back face of the flange.

Table 6 — Dimensions of PN 10 flanges (see Figure 4)

Dimensions in millimetres																												
DN	Tube outside diameter				Mating dimensions				Flange thickness			Hub diameter	Neck diameter (min.)	Collar diameter	Length through hub or collar				Collar thickness	Collar flange thickness	Cladding thickness	Collar or cladding diameter	Bore of flange or collar	Bore of flange	Chamfer ^a			
	Outside diameter of flange	Pitch circle diameter	Bolt hole diameter	Number	Nom. size	Bolts		Type A facing		Loose and blank flanges		Type B facing		C ₃	N ₃	N ₁	H ₄	H ₂	S _{1min}	S ₂	F	05C	D ₁	B ₁	B ₂	E		
						01 11 12 14	21	04 05 05C	11 12 14 21	34	37	11 12 14	34														37	11 34
Flange types																												
01,04,05,05C,07,11,12,14,21																												
A	D	K	L	C ₁		C ₂		C ₃		N ₃		N ₁		H ₄	H ₂	S _{1min}	S ₂	F	05C	D ₁	B ₁	B ₂	E					
10	15	16,0	90	60	14	4. M12	8	6	14	12	21	16	18,0	21	35	20	35	16	1,0	2,0	5	5	41	15,07	16,07	19	23	2
15	18	20,0	95	65	14	4. M12	8	6	14	12	26	21	22,0	26	35	20	35	16	1,0	2,0	5	5	46	18,07	20,08	24	28	2
20	22	25,0	105	75	14	4. M12	8	6	14	12	31	28	27,0	31	38	24	40	16	1,5	2,5	5	5	56	22,08	25,08	28	33	3
25	28	30,0	115	80	14	4. M12	9	8	16	12	36	35	32,0	36	38	24	40	18	1,5	2,5	5	5	65	28,08	30,08	33	38	3
32	35	38,0	140	100	18	4. M16	10	8	16	14	45	42	40,0	45	40	26	40	18	1,5	2,5	5	5	76	35,09	38,08	41	47	3
40	42	44,5	150	115	18	4. M16	11	9	16	14	51	52	46,5	51	42	26	45	19	1,5	2,5	6	5	84	42,09	44,60	48	53	3
50	54	57,0	165	125	18	4. M16	13	11	16	16	67	64	59,0	67	45	28	45	19	1,5	2,5	6	5	99	54,09	57,23	62	69	3
65	67	76,1	185	145	18	4. M16	13	13	16	16	87	79	78,0	87	45	17	45	19	2,0	3,5	6	5	118	67,23	76,33	81	89	3
80	88,9		200	160	18	8. M16	13	13	18	18	104	94	91,0	104	50	17	50	21	2,5	4,0	7	5	132	89,13		94	106	3
100	108,0		220	180	18	8. M16	16	16	18	20	123	116	110	123	52	20	50	21	2,5	4,0	7	5	156	108,38		113	125	3
125	133,0		250	210	18	8. M16	18	22	18	20	148	159	135	148	55	22	50	21	2,5	4,0	7	5	184	133,63		138	151	4
150	159,0		285	240	22	8. M20	20	22	18	22	175	184	161	175	55	24	50	21	2,5	4,0	9	5	211	159,63		164	178	4
175	193,7		315	270	22	8. M20	22	24	20	22	210	211	196	210	60	26	50	23	3,0	4,5	9	5	242	194,63		200	213	5
200	219,1		340	295	22	8. M20	24	26	20	22	235	240	221	235	62	28	50	23	3,0	4,5	9	5	266	220,03		225	238	5
250	267	273	395	350	22	12. M20	26	28	22	24	285	292	269	275	68	30	50	27	3,0	4,5	9	5	319	268,13	274,13	278	284	5
300	323,9		445	400	22	12. M20	26	28	26	24	342	342	326	342	68	30	50	30	4,0	5,5	11	5	370	325,03		330	345	7
350	368,0		505	460	22	16. M20	26	30	28	26	386	396	370	386	68	30	50	32	4,0	5,5	11	5	429	369,13		374	369	7
400	419,0		565	515	26	16. M24	26	32	32	28	439	448	421	439	72	30	50	36	4,0	5,5	12	5	480	420,13		426	442	7
450	457,2		615	565	26	20. M24	28	32	34	—	477	498	459	477	72	32	50	38	4,5	6,0	12	5	530	458,33		465	480	7
500	508,0		670	620	26	20. M24	28	34	38	30	530	552	510	530	75	33	50	42	5,0	6,5	12	5	582	509,13		516	533	7
600	610,0		780	725	30	20. M27	31	36	38	30	647	654	612	637	80	49	60	50	6,0	7,5	14	5	629	612		619	639	9
700	711,0		895	840	30	24. M27	33	40	40	32	751	760	713	741	80	53	60	55	6,5	9,5	15	5	733	713		727	743	9
800	813,0		1015	950	33	24. M30	35	44	44	34	853	866	815	844	90	55	60	60	7,5	10,5	16	5	836	815		829	846	9
900	914,0		1115	1050	33	28. M30	—	46	48	46	—	970	918	948	—	—	60	65	8,5	11,5	17	5	940	916		931	950	9
1000	1016		1230	1160	36	28. M36	—	50	52	50	—	1076	1018	1051	—	—	60	70	9,0	12,0	14	5	1043	1018		1025	1053	9
1200	1220		1455	1380	39	32. M36	—	56	60	56	—	1284	1223	1259	—	—	60	80	11,0	14,0	14	5	1251	1222		1230	1262	9
1400	1420		1675	1590	42	36. M39	—	62	66	62	—	1494	—	1465	—	—	—	88	—	—	20	5	1457	1422		—	1468	9
1600	1620		1915	1820	48	40. M45	—	68	74	68	—	1702	—	1669	—	—	—	98	—	—	24	5	1661	1622		—	1672	9
1800	1820		2115	2020	48	44. M45	—	70	84	70	—	1906	—	1873	—	—	—	110	—	—	26	5	1865	1822		—	1875	9
NOTE 1 For type 12 and type 14 flanges of all DN, α = 4° max.																												
NOTE 2 For dimensions d ₁ and r ₁ ; see Table 4.																												
^a Dimension E is given for information only.																												

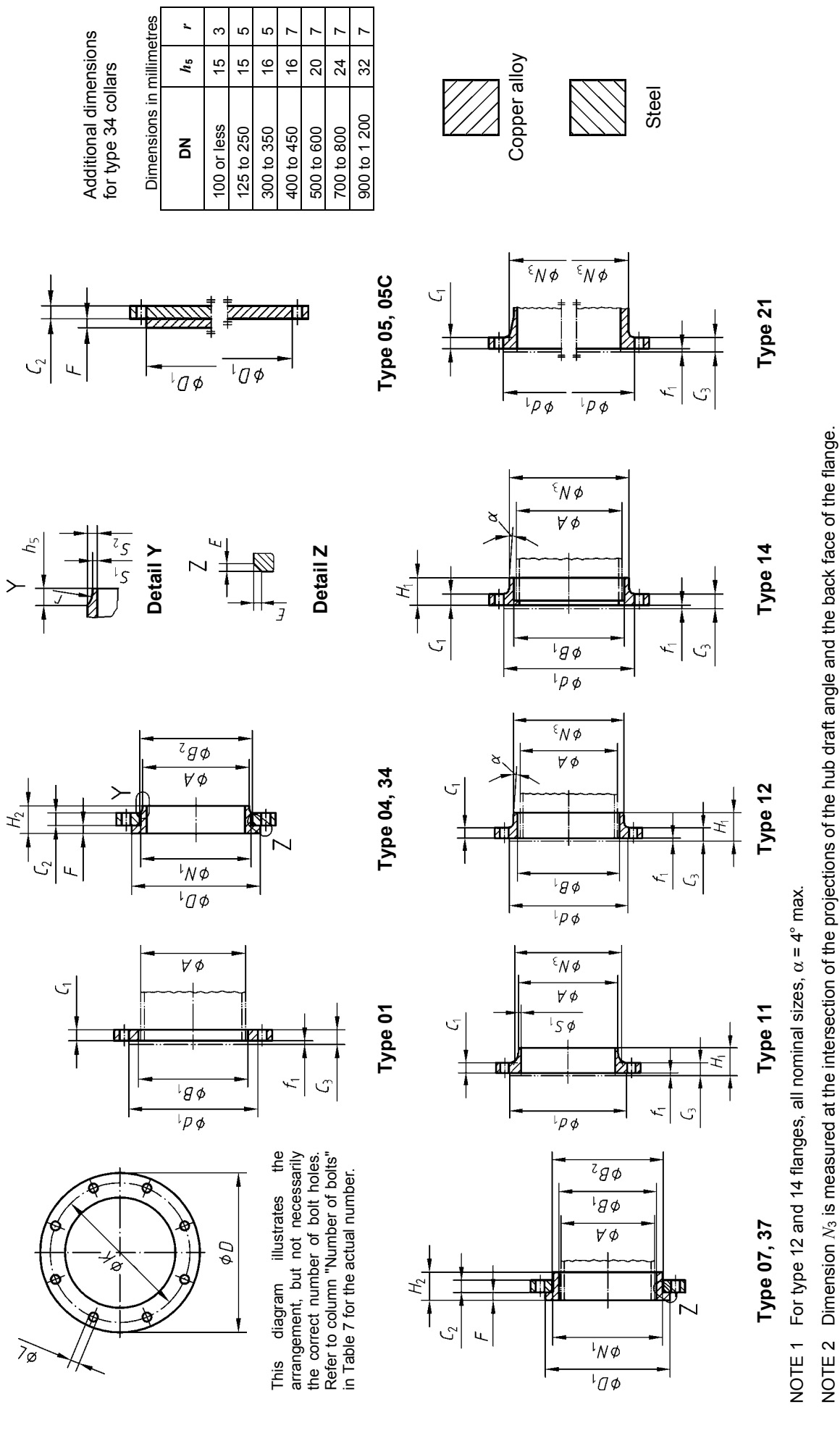


Figure 5 — Dimensions of PN 16 flanges (see Table 7)

NOTE 1 For type 12 and 14 flanges, all nominal sizes, $\alpha = 4^\circ$ max.

NOTE 2 Dimension N_3 is measured at the intersection of the projections of the hub draft angle and the back face of the flange.

Table 7 — Dimensions of PN 16 flanges (see Figure 5)

Dimensions in millimetres																																
DN	Tube outside diameter				Mating dimensions			Flange thickness			Hub diameter	Neck diameter (min.)	Collar diameter	Length through hub or collar				Collar thickness	Collar flange thickness	Cladding thickness	Collar or cladding diameter	Bore of flange or collar	Bore of flange	Chamfer ^a								
					Pitch circle diameter of flange	Bolt hole diameter	Number	Type A facing		Loose and blank flanges															Type B facing							
	D	K	L	C ₁				C ₂	C ₃	N ₃	N ₁	H ₁	H ₂	S _{min}	S ₂	F	D ₁	B ₁	B ₂	E ^a												
01, 04, 05, 05C, 07, 11, 12, 14, 21, 14					04, 05, 05C	11, 12, 14, 21	01, 04, 05, 05C, 07, 11, 12, 14, 21														04, 05, 05C	11, 12, 14, 21	11, 12, 14, 21	34, 37	11, 12, 14	34, 37	11, 34	34, 37	05C, 34	37	01, 12, 14, 37	04, 07
10	15	16,0	90	60	14	4. M12	8	6	14	12	11	16	18,0	21	35	20	35	16	1,0	2,5	5	5	41	15,07	16,07	19	23	2				
15	18	20,0	95	65	14	4. M12	8	6	14	12	12	26	22,0	26	35	20	35	16	1,0	2,5	5	5	46	18,07	20,08	24	28	2				
20	22	25,0	105	75	14	4. M12	8	6	14	12	12	31	27,0	31	38	24	40	16	1,5	2,5	5	5	56	22,08	25,08	28	33	3				
25	28	30,0	115	85	14	4. M12	9	8	16	12	12	36	32,0	36	38	24	40	18	1,5	2,5	5	5	65	28,08	30,08	33	38	3				
32	35	38,0	140	100	18	4. M16	10	8	16	14	14	45	40,0	45	40	26	40	18	1,5	2,5	5	5	76	35,09	38,08	41	47	3				
40	42	44,5	150	110	18	4. M16	11	9	16	14	14	51	46,5	51	42	26	45	19	1,5	2,5	6	5	84	42,09	44,60	48	53	3				
50	54	57,0	165	125	18	4. M16	13	11	16	16	16	67	59,0	67	45	28	45	19	1,5	2,5	6	5	99	54,09	57,23	62	69	3				
65	67	76,1	185	145	18	4 ^b M16	20	13	16	16	16	103	78,0	87	45	32	45	19	2,0	3,5	6	5	118	67,23	76,33	81	89	3				
80	88,9	200	160	180	18	8. M16	20	13	18	18	18	114	91,0	104	50	34	50	21	2,5	4,0	7	5	132	89,13	106	91	106	3				
100	100,0	220	180	180	18	8. M16	20	16	18	20	134	116	110,0	123	52	40	50	21	2,5	4,0	7	5	156	108,38	113	125	125	3				
125	133,0	250	210	18	8. M16	22	18	20	18	20	164	159	135,5	148	55	44	50	21	2,5	4,0	7	5	184	133,63	138	151	151	4				
150	159,0	285	240	22	8. M20	22	18	22	18	22	188	184	161,5	175	55	44	50	21	2,5	4,0	9	5	211	159,63	164	178	178	4				
175	193,7	315	270	22	8. M20	24	22	22	22	22	213	211	197,0	210	60	44	50	23	3,0	4,5	9	5	242	194,63	200	213	213	5				
200	219,1	340	295	22	12. M20	26	22	26	22	26	238	236	222,0	235	62	46	50	23	4,0	4,5	9	5	266	220,03	225	238	238	5				
250	267	273	405	355	26	12 M24	28	24	28	28	287	290	296	275	285	70	48	50	27	4,0	4,5	9	5	319	268,13	274,13	278	284	288	296	5	7
300	323,9	460	410	26	12. M24	—	28	28	—	28	—	—	327	—	—	—	50	—	5,0	6,5	11	5	370	325,03	—	330	—	—	—	—	7	
350	368,0	520	470	26	16. M24	—	30	32	—	30	—	—	371	—	—	—	50	—	6,0	7,5	11	5	429	369,13	—	374	—	—	—	—	7	
400	419,0	580	525	30	16. M27	—	32	36	—	32	—	—	422	—	—	—	50	—	7,5	9,0	12	5	480	420,13	—	426	—	—	—	—	7	
500	508,0	715	650	33	20. M30	—	34	—	—	34	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NOTE 1 For type 12 and type 14 flanges of all DN, α = 4° max.																																
NOTE 2 For dimensions d ₁ and f ₁ ; see Table 4.																																
^a Dimension E is given only for information.																																
^b According to EN 1092-1, steel flanges in this DN and PN may be supplied with 8 holes. For compliance with these, equivalent copper alloy flanges may be supplied with 8 holes, as a special order and after agreement between flange manufacturer and equipment manufacturer.																																

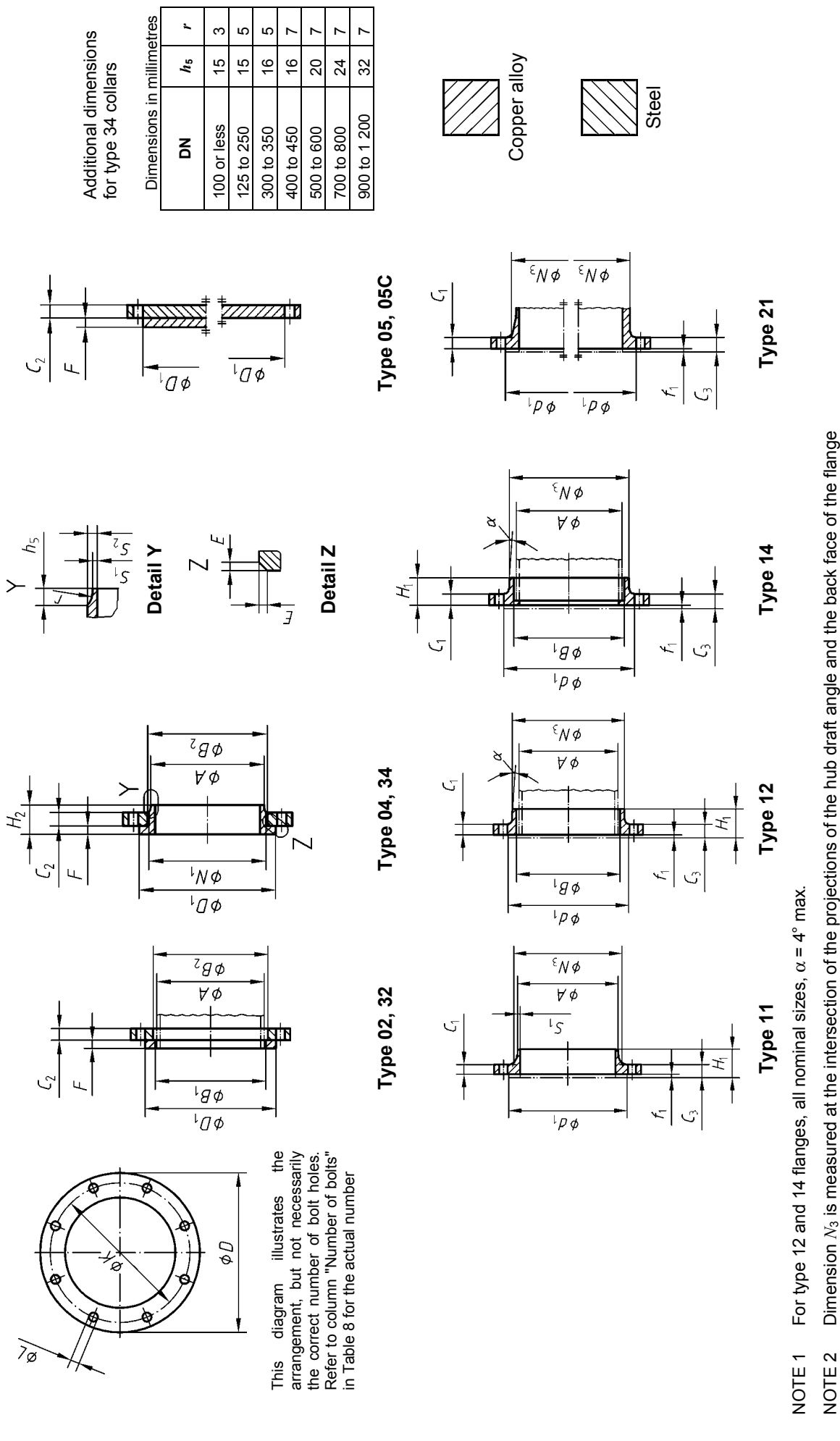
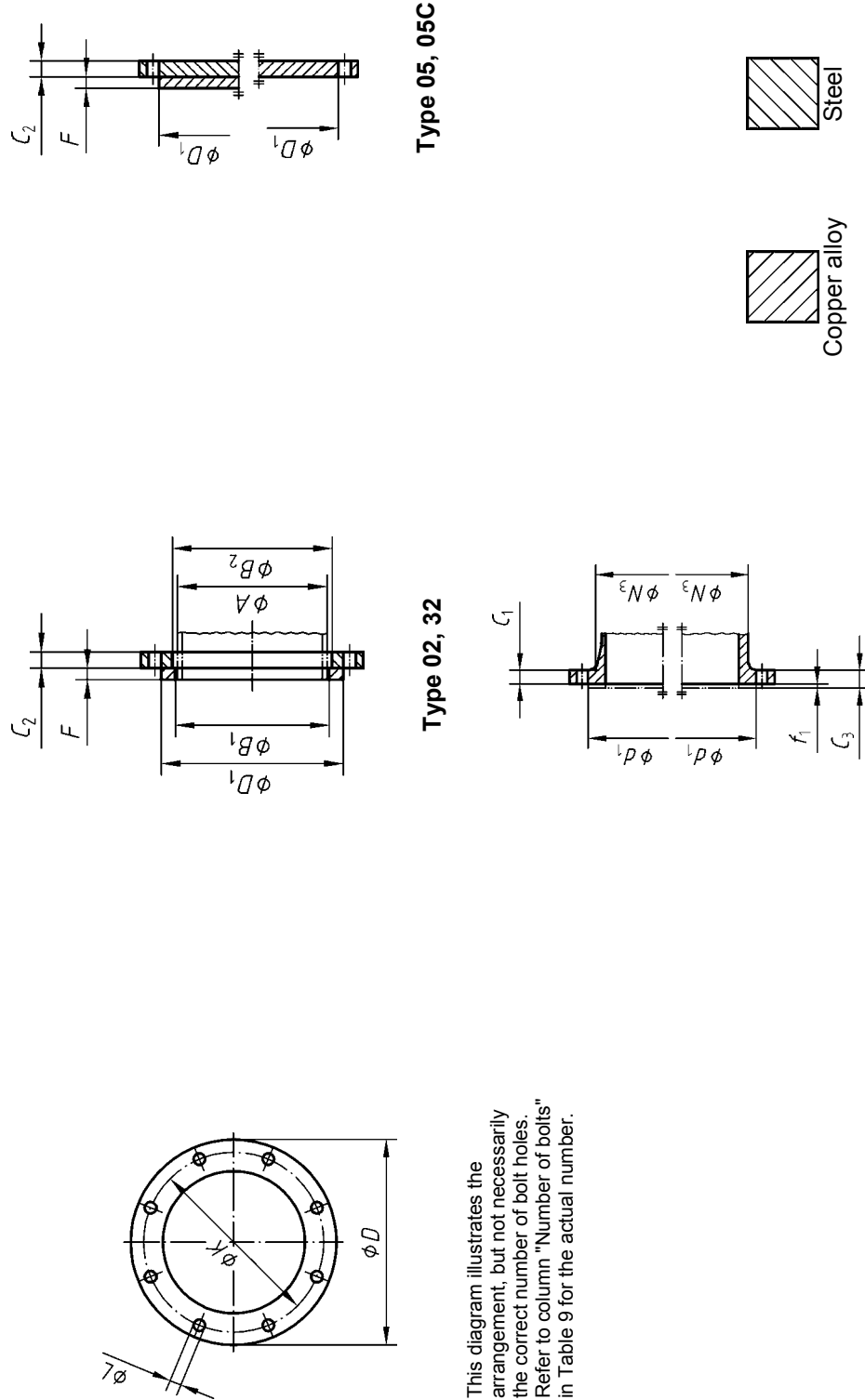


Figure 6 — Dimensions of PN 25 flanges (see Table 8)

Table 8 — Dimensions of PN 25 flanges (see Figure 6)

Dimensions in millimetres																									
DN	Tube outside diameter				Mating dimensions				Flange thickness		Hub diameter	Neck diameter (min.)	Length through hub or collar	Collar thickness	Collar flange thickness	Cladding thickness	Collar or cladding diameter	Bore of flange or collar	Bore of flange	Chamber					
	Outside diameter of flange	Pitch circle diameter	Bolt hole diameter	Bolts		Type A facing		Type B facing																	
				Number	Norm. size	Loose and blank flanges																			
Flange types																									
02, 04, 05, 05C, 11, 12, 14, 21																									
10	15	16,0	90	60	14	4. M12	8	C ₁	11	02	11	N ₃	21	H ₁	H ₂	S ₂	F	05C	05C	D ₁	B ₁	B ₂	E ^a		
									12	04	12													11	34
									14	05	14													11	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
15	18	20,0	95	65	14	4. M12	8	C ₁	11	04	12	N ₃	21	H ₁	H ₂	S ₂	F	05C	05C	D ₁	B ₁	B ₂	E ^a		
									12	04	12													11	34
									14	05	14													11	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
20	22	25,0	105	75	14	4. M12	8	C ₁	11	04	12	N ₃	21	H ₁	H ₂	S ₂	F	05C	05C	D ₁	B ₁	B ₂	E ^a		
									12	04	12													11	34
									14	05	14													11	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
25	28	30,0	115	85	14	4. M12	9	C ₁	11	04	12	N ₃	21	H ₁	H ₂	S ₂	F	05C	05C	D ₁	B ₁	B ₂	E ^a		
									12	04	12													11	34
									14	05	14													11	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
32	35	38,0	140	100	18	4. M16	10	C ₁	11	04	12	N ₃	21	H ₁	H ₂	S ₂	F	05C	05C	D ₁	B ₁	B ₂	E ^a		
									12	04	12													11	34
									14	05	14													11	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
40	42	44,5	150	110	18	4. M16	11	C ₁	11	04	12	N ₃	21	H ₁	H ₂	S ₂	F	05C	05C	D ₁	B ₁	B ₂	E ^a		
									12	04	12													11	34
									14	05	14													11	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
50	54	57,0	165	125	18	4. M16	13	C ₁	11	04	12	N ₃	21	H ₁	H ₂	S ₂	F	05C	05C	D ₁	B ₁	B ₂	E ^a		
									12	04	12													11	34
									14	05	14													11	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
65	67	76,1	185	145	18	4. M16	10	C ₁	11	04	12	N ₃	21	H ₁	H ₂	S ₂	F	05C	05C	D ₁	B ₁	B ₂	E ^a		
									12	04	12													11	34
									14	05	14													11	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
80	88,9	108,0	200	160	18	8. M16	24	C ₁	11	04	12	N ₃	21	H ₁	H ₂	S ₂	F	05C	05C	D ₁	B ₁	B ₂	E ^a		
									12	04	12													11	34
									14	05	14													11	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
100	125	133,0	270	220	26	8. M24	26	C ₁	11	04	12	N ₃	21	H ₁	H ₂	S ₂	F	05C	05C	D ₁	B ₁	B ₂	E ^a		
									12	04	12													11	34
									14	05	14													11	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
125	150	159,0	300	250	26	8. M24	28	C ₁	11	04	12	N ₃	21	H ₁	H ₂	S ₂	F	05C	05C	D ₁	B ₁	B ₂	E ^a		
									12	04	12													11	34
									14	05	14													11	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
150	175	193,7	330	280	30	8. M24	28	C ₁	11	04	12	N ₃	21	H ₁	H ₂	S ₂	F	05C	05C	D ₁	B ₁	B ₂	E ^a		
									12	04	12													11	34
									14	05	14													11	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
175	200	219,1	360	310	26	8. M24	30	C ₁	11	04	12	N ₃	21	H ₁	H ₂	S ₂	F	05C	05C	D ₁	B ₁	B ₂	E ^a		
									12	04	12													11	34
									14	05	14													11	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
200	250	267	425	370	30	8. M27	32	C ₁	11	04	12	N ₃	21	H ₁	H ₂	S ₂	F	05C	05C	D ₁	B ₁	B ₂	E ^a		
									12	04	12													11	34
									14	05	14													11	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
250	300	323,9	485	430	30	8. M27	32	C ₁	11	04	12	N ₃	21	H ₁	H ₂	S ₂	F	05C	05C	D ₁	B ₁	B ₂	E ^a		
									12	04	12													11	34
									14	05	14													11	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
300	350	368,0	555	490	33	8. M30	36	C ₁	11	04	12	N ₃	21	H ₁	H ₂	S ₂	F	05C	05C	D ₁	B ₁	B ₂	E ^a		
									12	04	12													11	34
									14	05	14													11	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
350	400	419,0	620	550	36	8. M33	38	C ₁	11	04	12	N ₃	21	H ₁	H ₂	S ₂	F	05C	05C	D ₁	B ₁	B ₂	E ^a		
									12	04	12													11	34
									14	05	14													11	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
400	450	468,0	680	600	36	8. M33	38	C ₁	11	04	12	N ₃	21	H ₁	H ₂	S ₂	F	05C	05C	D ₁	B ₁	B ₂	E ^a		
									12	04	12													11	34
									14	05	14													11	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
									14	05C	21													14	34
450	500																								



This diagram illustrates the arrangement, but not necessarily the correct number of bolt holes. Refer to column "Number of bolts" in Table 9 for the actual number.

NOTE Dimensions N_3 is measured at the intersection of the projections of the hub draft angle and the back face of the flange.

Figure 7 — Dimensions of PN 40 flanges (see Table 9)

Table 9 — Dimensions of PN 40 flanges (see Figure 7)

DN	Tube outside diameter	Mating dimensions				Flange thickness			Neck diameter (min.)	Collar flange thickness	Collar thickness	Collar or cladding diameter	Bore of flange or collar	Bore of flange		
		Outside diameter of flange	Pitch circle diameter	Bolt hole diameter	Bolts		Type A facing	Loose and blank flanges							Type B facing	
					Number	Nom. size										
Flange types																
		02, 05, 05C, 21						21	02 05 05C	21	32	05C	05C 32	32	02	
<i>A</i>		<i>D</i>	<i>K</i>	<i>L</i>			C₁	C₂	C₃	<i>N₃</i>	<i>F</i>			<i>D₁</i>	<i>B₁</i>	<i>B₂</i>
10	16,0	90	60	14	4	M12	9	16	16	16	12	5	40	16,07	18	
15	20,0	95	65	14	4	M12	9	16	16	16	12	5	45	20,08	22	
20	25,0	105	75	14	4	M12	9	16	16	16	14	5	58	25,08	28	
25	30,0	115	85	14	4	M12	11	18	18	18	14	5	68	30,08	33	
32	38,0	140	100	18	4	M16	11	18	18	18	14	5	78	38,10	42	
40	44,5	150	110	18	4	M16	13	18	20	20	14	5	88	44,60	50	
50	57,0	165	125	18	4	M16	13	20	22	22	16	5	102	57,23	62	
65	76,1	185	145	18	8	M16	14	20	22	22	16	5	122	76,33	81	
80	88,9	200	160	18	8	M16	16	22	24	24	18	5	138	89,13	94	
100	108,0	235	190	22	8	M20	19	22	26	26	20	5	162	108,38	113	
125	133,0	270	220	26	8	M24	—	24	—	—	22	5	188	133,63	138	
150	159,0	300	250	26	8	M24	—	24	—	—	22	5	218	159,63	164	
200	219,1	375	320	30	12	M27	—	30	—	—	26	5	285	220,03	225	
250	267 273	450	385	33	12	M30	—	36	—	—	30	5	345	268,13 274,13	278	
300	323,9	515	450	33	16	M30	—	40	—	—	34	5	410	325,03	329	
350	368,0	580	510	36	16	M33	—	46	—	—	38	5	465	369,13	374	
400	419,0	660	585	39	16	M36	—	50	—	—	42	5	535	420,13	426	
NOTE For dimensions <i>d</i> ₁ and <i>f</i> ₁ : see Table 4.																

Table 10 — Tolerances

Dimensions and tolerances in millimetres

Symbol	Feature	Flange type		Tolerances																		
				up to DN 50	DN 65	DN 80	DN 100	DN 125	DN 150	DN 175	DN 200	DN 250	DN 300	DN 350	DN 400	DN 450	DN 500	DN 600	DN 700	DN 800	DN 900	DN 1000
B ₁	Bore diameter	01 ^a	+ 0,05 0	+ 0,1 0				+ 0,25 0				+ 3 − 0										
								+ 1,5 0		+ 2 0												
		32 ^a	+ 0,05 0	+ 0,1 0				+ 0,25 0														
								+ 1,5 0		+ 2 0												
		02	+ 1 0		+ 1,5 0				+ 2 0													
		04	+ 1 0		+ 1,5 0				+ 2 0												+ 4 0	
		37 ^a	+ 0,05 0	+ 0,1 0				+ 0,25 0				+ 3 0										
								+ 1,5 0		+ 2 0												
B ₂	07	+ 1 0		+ 1,5 0				+ 2 0				+ 4 0										
B ₁	12 ^a 14 ^a	+ 0,05 0	+ 0,1 0				+ 0,25 0				+ 3 0											
							+ 1,5 0		+ 2 0													
H ₂	Length through hub of flange	34	± 1,5	± 2																		
H ₁		37	+ 1,5 0				+ 2,5 0				+ 3,5 0											
	11; 12; 14	+ 1,5 0		+ 2,5 0								+ 3,5 0										
N ₁	Hub, neck or collar diameter	34	± 0,5	± 1			± 1,5			± 2												
N ₃		37	± 0,5	± 1			± 2			± 3				± 4								
D	Outside diameter of flange	All types	machined	± 1				± 1,5		± 2		± 2										
			un-machined	± 2				± 2		± 3		± 5										
C	Flange thickness	C ₁ : 01; 11; 12; 14; 21 C ₂ : 02; 04; 05; 07 C ₃ : 11; 12; 14; 21	C ≤ 25			25 < C ≤ 50				50 < C ≤ 75				C > 75								
			+ 3,5 0			+ 5 0				+ 7,5 0				+ 10 0								
D ₁	Collar or cladding diameter	32	+ 1 0	+ 2 0						+ 3 0												
		34	± 1		± 2															± 3		
		05C	± 1		± 2																	
		37	+ 1 0	+ 2 0						+ 3 0												
F	Facing height	32	± 0,5			± 1																
		34	± 0,5			± 1														± 1,5		
		05C	± 0,3						± 0,6													
		37	+ 1 0	+ 2 0						+ 3 0												

Table 10 — Tolerances (continued)

Symbol	Feature	Flange type	Tolerances	
K	Pitch circle diameter ^c	All types	M10 to M24 ± 0,9	M27 to M45 ± 1,4
	Centre to centre ^c	All types	M10 to M24 ± 0,45	M27 to M45 ± 0,7
	Concentricity ^b	As given	≤ DN 100 1	> DN 100 2
L	Bolt hole diameter	All types	≤ 20 + 0,8	≥ 22 + 1,3
d ₁	Raised face diameter	11, 12, 14, 21	≤ DN 250 + 2 - 1	> DN 250 + 3 - 1
f ₁	Raised face height	11,12,14, 21	DN 10 to DN 1 800 0 - 1	
Bolt bearing surfaces shall be parallel to the flange jointing face as follows: machined face: 1° un-machined face: 2°				
NOTE Miscellaneous radii should be regarded as maximum unless otherwise specified.				
^a The wider tolerances for DN 250 to DN 500, types 01, 02, 07 and 12 flanges, are intended for attachment by fusion welding.				
^b Concentricity given, is between K and any machined diameter. The tolerance does not apply if a suitable machined diameter does not exist.				
^c Tolerances on the pitch circle diameter and centre-to-centre of adjacent bolt holes are based on the differences between the bolt and the bolt hole diameter and thus, in conjunction, cannot exceed the clearance together with any tolerance on the diameter of the bolt hole.				

Table 11 — Copper alloy materials

Copper alloy material				Flange or collar types ^c					
Product form	Standard	Alloy designation		12, 14, 37	01, 12, 14, 32, 37	01, 11, 12, 14, 32, 34, 37	05	05C	21
				Method of attachment					
		Symbol	Number	Soft solder (slip-on) ^a	Silver brazing (slip-on)	Fusion welding (slip-on)			
Casting	EN 1982	CuSn5Pb5Zn5-C	CC491K	•	•	—	•	—	•
		CuSn7Pb3Zn2-C	CC492K	•	•	—	•	—	•
		CuSn6Zn4Pb2-C	CC498K	•	•	—	•	—	•
		CuAl10Fe2-C	CC331G	—	—	•	—	—	•
		CuAl10Ni5Fe5-C	CC333G	—	—	•	—	—	•
Forging or plate	EN 12420 EN 1652	CuZn20Al2As	CW702R	—	•	•	•	•	—
		CuAl8Fe3	CW303G	—	—	•	•	•	—
		CuAl10Fe3Mn2	CW306G	—	—	•	•	•	—
		CuAl10Ni5Fe4	CW307G	—	—	•	•	•	—
		CuNi10Fe1Mn	CW352H	—	•	• ^b	•	•	—
		CuNi30Mn1Fe	CW354H	—	•	•	•	•	—
^a Applicable to attachment to copper tubes to EN 12449 and appropriate to sizes DN 50 and smaller.									
^b For certain seawater applications it is common practice to use the alloy CuNi10Fe1,6Mn for type 34 collars.									
^c The symbol • indicates the common material/flange type combinations.									

Table 12 — Steel grades

Steel grade			Flange types ^b
Product form	Standard	Designation	02, 04, 05C, 07
Plate	EN 10028-2	P265GH	•
	EN 10028-2	P295GH	•
Forging	EN 10222-2	P245GH ^a	•
^a For the purposes of this standard, steel in accordance with ASTM-A105 has material properties not inferior to P245GH and is therefore fully suitable for flange applications. ^b The symbol • indicates the common material/flange type combinations.			

Table 13 — Pressure/temperature ratings for general application ^{a, b, e, f}

PN	Maximum allowable temperature, TS in °C						
	-10 to 120 ^c	150	180	200 ^d	220	250	260
	Maximum allowable pressure, PS in bar ^g						
6	6,0	6,0	6,0	5,0	4,0	2,5	2,0
10	10,0	10,0	10,0	8,5	7,0	5,0	4,0
16	16,0	16,0	16,0	13,5	11,3	8,0	7,0
25	25,0	25,0	25,0	21,2	17,5	12,2	10,5
40	40,0	38,5	34,0	30,0	25,5	19,5	17,5
^a Ratings have been adopted from ISO 7005-3: 1988, Table 10. ^b Ratings are for flanges/collars manufactured in the materials listed in Tables 11 and 12, except for alloy numbers CC333G and CW354H (see Table 14). ^c Flanges/collars larger than DN 250 in all types and all PN ratings are limited to a maximum allowable temperature of 120 °C. ^d Flanges/collars in types 01,12, 14, 32 and 37 in all PN and all sizes, when used in conjunction with copper tubes to prEN 133/08 and attached by silver brazing, shall be limited to a maximum allowable temperature of 200 °C. ^e Flanges/collars in types 12, 14 and 37 and in ratings PN 6 to PN 25 inclusive and in sizes DN 50 and smaller, when used in conjunction with copper tubes to EN 12449 and attached by soft solder, shall be limited to the following maximum allowable temperatures and/or pressures: 6 bar at 110 °C; 10 bar at 66 °C; 16 bar at 30 °C. ^f Flanges/collars in types 01,12, 14, 32 and 37 in all PN and all sizes, when used in conjunction with copper tubes to prEN 133/08 and attached by silver brazing, are limited to a maximum allowable temperature of 200 °C. ^g 1 bar = 100 kPa.							

Table 14 — Pressure/temperature ratings for alloy types CC333G and CW354H^{a, c}

PN	Maximum allowable temperature, TS in °C										
	-10 to 120 _b	150	180	200	220	250	260	280	300	320	350
	Maximum allowable pressure, PS in bar ^d										
6	6,0	6,0	6,0	5,5	5,0	4,5	4,0	3,5	3,0	2,5	2,0
10	10,0	10,0	10,0	9,5	8,5	7,5	7,0	6,5	6,0	5,0	4,0
16	16,0	16,0	16,0	15,0	14,0	13,0	12,0	11,0	10,0	8,5	7,0
25	25,0	25,0	25,0	24,0	22,0	19,0	18,5	16,5	14,5	13,0	10,5
40	40,0	38,5	35,5	33,5	31,0	28,0	26,5	24,5	22,5	20,5	17,5
^a Ratings have been adopted from ISO 7005-3: 1988, Table 10a. ^b Flanges/collars larger than DN 250 in all types and all PN are limited to a maximum allowable temperature of 120 °C. ^c Flanges/collars in types 01, 12, 14, 32 and 37 in all PN and all sizes, when used in conjunction with copper tubes to EN 12449 and attached by silver brazing, shall be limited to a maximum allowable temperature of 200 °C. ^d 1 bar = 100 kPa.											

Annex A

(informative)

Information to be supplied by the equipment manufacturer

In addition to the standard designation specified in 4.2, the following additional information should be supplied by the equipment manufacturer in the enquiry and/or order, where appropriate:

- a) whether loose plate flanges in steel (type 02, 04 or 07) and blank flanges in steel (type 05C) are required to have any protective coating (e.g. zinc coating, painting), subject to agreement between the equipment manufacturer and flange manufacturer (see 5.1);
- b) whether types 07, 12 and 14 flanges are for use with soft soldering techniques (see 5.6.1);
- c) whether flanges are to be supplied un-drilled, or drilled to non-standard requirements (see 5.6.2);
- d) the facing type required for types 11, 12, 14 and 21 flanges (see 5.7.1);
- e) whether surface finish is required different from that specified in 5.7.2;
- f) whether flange rims are to be machined or un-machined (see 5.7.3).

Annex B (informative)

Application and installation

B.1 When using bolting materials other than copper alloy the equipment manufacturer should take into account the pressure, flange material and the related gasket so that the joint remains tight under the expected operating conditions.

B.2 Application of the p/T ratings to flanged joints at either high or low temperature should consider the effect of the risk of leakage due to forces and movement developed in the connecting pipes.

B.3 Flanges may be required to be pressure tested after attachment of a pipe or other equipment or when forming an integral part of such equipment. The test pressure is then dependent on the requirements of the appropriate standard or code of practice in accordance with which the equipment has been fabricated or manufactured. Any test pressure should not exceed 1.5 times the allowable pressure at 20 °C, rounded up to the next whole bar increment.

Annex C (informative)

Approximate masses of flanges and collars

Tables C.1 to C.5 give calculated masses of flanges and collars, which may be used for guidance only.

These calculated masses are based on nominal dimensions given in Tables 5 to 9 and on densities of 8,90 g/cm³ for copper alloy materials and 7,80 g/cm³ for steel materials.

The equipment manufacturer should consult the flange manufacturer to obtain actual masses, which may vary from the calculated masses due to dimensional variations within the permitted tolerances given in Table 10.

Table C.1 — Masses of PN 6 flanges and collars

DN	Mass (kg)												
	Type												
	01	05	11	14	34	04	34/04	05C	05C	05C	37	07	37/07
				12	Copper	Steel	Total	Copper	Steel	Total	Copper	Steel	Total
10	0,21	0,36	0,23	0,21	0,04	0,29	0,33	0,04	0,31	0,35	0,05	0,28	0,33
15	0,23	0,41	0,27	0,24	0,04	0,33	0,37	0,05	0,36	0,41	0,07	0,31	0,38
20	0,30	0,53	0,35	0,30	0,08	0,42	0,50	0,08	0,47	0,55	0,10	0,40	0,50
25	0,49	0,80	0,56	0,49	0,11	0,62	0,73	0,12	0,70	0,82	0,14	0,59	0,73
32	0,69	1,14	0,79	0,70	0,14	0,88	1,02	0,17	1,00	1,17	0,20	0,84	1,03
40	0,90	1,35	1,02	0,91	0,18	1,02	1,20	0,21	1,18	1,40	0,23	0,98	1,21
50	1,22	1,58	1,42	1,23	0,23	1,10	1,33	0,27	1,38	1,65	0,34	1,03	1,38
65	1,73	2,08	1,98	1,77	0,33	1,34	1,67	0,41	1,82	2,23	0,40	1,24	1,65
80	2,44	3,41	2,89	2,52	0,45	2,23	2,68	0,54	2,98	3,52	0,61	2,02	2,63
100	3,47	4,19	4,03	3,57	0,55	2,58	3,13	0,72	3,67	4,40	0,73	2,33	3,05
125	4,67	5,38	5,39	4,79	0,74	3,08	3,82	1,06	4,72	5,78	0,95	2,76	3,71
150	5,30	6,62	6,19	5,52	1,04	3,49	4,54	1,38	5,80	7,18	1,26	3,08	4,34
175	6,51	10,62	7,77	6,77	1,19	4,90	6,09	1,83	9,31	11,14	1,47	4,31	5,77
200	7,19	12,56	8,68	7,57	1,34	5,42	6,76	2,25	11,0	13,26	1,61	4,76	6,37
250 ^a	9,97	19,12	12,10	10,49	1,85	7,28	9,14	3,34	16,8	20,09	2,56	6,59	9,15
250 ^b	9,47	19,12	11,20	9,81	1,68	6,87	8,56	3,34	16,8	20,09	2,40	6,02	8,42
300	12,63	31,50	15,69	13,27	2,69	11,60	14,29	4,61	27,6	32,22	3,41	10,11	13,52
350	15,08	42,58	18,54	15,79	3,38	15,04	18,42	5,98	37,3	43,28	4,36	15,63	19,99
400	16,51	59,53	20,93	17,41	3,77	18,82	22,58	7,49	52,2	59,66	5,59	16,26	21,86
450	22,85	77,46	27,84	23,83	5,31	25,50	30,80	9,38	67,9	77,26	7,49	22,72	30,21
500	24,68	90,89	30,89	25,05	5,97	27,46	33,43	11,28	79,7	90,93	10,04	23,97	34,01
600	-	140,04	-	-	-	38,23	-	15,55	123	138,28	14,74	32,68	47,42
700	-	202,26	-	-	-	49,88	-	20,83	177	198,09	20,57	41,98	62,55
800	-	285,73	-	-	-	67,40	-	26,94	250	277,36	26,73	57,50	84,22
900	-	380,49	-	-	-	-	-	33,43	333	366,89	33,97	68,08	102,05
1000	-	492,67	-	-	-	-	-	40,62	432	472,40	40,64	80,57	121,21
1200	-	813,30	-	-	-	-	-	58,61	713	771,39	64,19	127,37	191,56
1400	-	1204,22	-	-	-	-	-	79,69	1055	1135,07	96,95	184,06	281,01
1600	-	1705,45	-	-	-	-	-	102,2	1495	1596,86	129,20	227,34	356,53
1800	-	2416,24	-	-	-	-	-	128,6	2118	2246,18	175,90	306,56	482,46

^a For flanges to suit 267 mm O.D. tube.
^b For flanges to suit 273 mm O.D. tube.

Table C.2 — Masses of PN 10 flanges and collars

DN	Mass (kg)												
	Type												
	01	05	11	14 12	34 Copper	04 Steel	34/04 Total	05C Copper	05C Steel	05C Total	37 Copper	07 Steel	37/07 Total
10	0,40	0,72	0,42	0,41	0,06	0,60	0,65	0,06	0,63	0,69	0,07	0,58	0,65
15	0,44	0,81	0,48	0,46	0,07	0,66	0,72	0,07	0,71	0,78	0,09	0,64	0,73
20	0,55	1,00	0,61	0,57	0,11	0,81	0,92	0,11	0,88	0,99	0,13	0,78	0,91
25	0,73	1,39	0,81	0,77	0,14	1,11	1,25	0,15	1,22	1,37	0,17	1,08	1,24
32	1,19	2,05	1,31	1,24	0,18	1,63	1,81	0,20	1,79	1,99	0,23	1,58	1,81
40	1,49	2,37	1,62	1,54	0,25	1,85	2,10	0,25	2,08	2,32	0,30	1,80	2,10
50	2,09	2,90	2,32	2,18	0,32	2,16	2,48	0,34	2,54	2,88	0,43	2,07	2,50
65	2,46	3,68	2,77	2,51	0,43	2,58	3,01	0,49	3,23	3,71	0,50	2,45	2,95
80	2,68	4,70	3,22	2,76	0,60	3,15	3,75	0,61	4,12	4,73	0,74	2,88	3,63
100	3,81	5,76	4,47	3,90	0,79	3,64	4,43	0,85	5,05	5,90	0,95	3,33	4,27
125	5,29	7,53	6,13	5,40	1,00	4,50	5,50	1,18	6,60	7,79	1,18	4,09	5,27
150	7,25	9,73	8,27	7,39	1,45	5,56	7,01	1,56	8,53	10,08	1,63	5,03	6,66
175	8,83	13,32	10,30	9,01	1,67	6,78	8,45	2,05	11,7	13,72	1,91	6,12	8,03
200	10,62	15,61	12,28	10,81	1,84	7,48	9,32	2,47	13,7	16,15	2,07	6,75	8,82
250 ^a	14,23	23,09	16,62	14,49	2,41	9,82	12,23	3,55	20,2	23,79	3,05	9,05	12,11
250 ^b	13,64	23,09	15,58	13,81	2,22	9,37	11,59	3,55	20,2	23,79	2,87	8,43	11,31
300	15,73	34,92	19,04	16,04	3,26	13,26	16,52	4,78	30,6	35,38	3,90	11,65	15,56
350	20,17	48,37	23,92	20,52	4,65	18,41	23,07	6,43	42,4	48,82	5,54	19,05	24,59
400	23,96	68,95	28,81	24,41	5,63	24,87	30,50	8,05	60,4	68,48	7,24	22,15	29,39
450	30,25	86,63	35,75	30,74	7,32	30,91	38,23	9,81	75,9	85,74	9,11	27,96	37,07
500	34,46	115,59	41,60	35,22	8,36	39,35	47,72	11,83	101	113,13	11,21	35,20	46,41
600	46,75	156,74	59,81	52,29	5,13	48,22	53,35	13,82	137	151,19	9,92	42,37	52,28
700	62,49	217,82	78,74	70,27	6,90	61,45	68,35	18,77	191	209,67	14,41	55,69	70,10
800	83,11	308,66	105,68	91,96	8,98	85,36	94,34	24,41	271	294,93	18,67	77,69	96,36
900	-	406,69	-	-	11,37	101,7	113,05	30,87	356	387,29	25,29	91,18	116,47
1000	-	536,45	-	-	12,69	135,6	148,32	38	470	508,15	31,28	117,11	148,39
1200	-	867,03	-	-	18,00	204,1	222,07	54,67	760	814,54	48,50	174,77	223,27
1400	-	-	-	-	-	-	-	-	-	-	72,73	237,26	309,99
1600	-	-	-	-	-	-	-	-	-	-	101,44	353,18	454,62
1800	-	-	-	-	-	-	-	-	-	-	139,39	440,38	579,77
^a For flanges to suit 267 mm O.D. tube.													
^b For flanges to suit 273 mm O.D. tube.													

Table C.3 — Masses of PN 16 flanges and collars

DN	Mass (kg)													
	Type													
	01	05	11	12	14	34	04	34/04	05C	05C	05C	37	07	37/07
						Copper	Steel	Total	Copper	Steel	Total	Copper	Steel	Total
10	0,40	0,72	0,42	0,41	0,41	0,06	0,60	0,65	0,06	0,63	0,69	0,06	0,58	0,65
15	0,44	0,81	0,48	0,47	0,46	0,07	0,66	0,72	0,07	0,71	0,78	0,08	0,64	0,72
20	0,55	1,00	0,61	0,60	0,57	0,11	0,81	0,92	0,11	0,88	0,99	0,11	0,78	0,90
25	0,73	1,39	0,81	0,79	0,77	0,14	1,11	1,25	0,15	1,22	1,37	0,15	1,08	1,23
32	1,19	2,05	1,31	1,28	1,24	0,18	1,63	1,81	0,20	1,79	2,00	0,20	1,58	1,78
40	1,49	2,37	1,62	1,58	1,54	0,25	1,85	2,10	0,25	2,08	2,32	0,27	1,80	2,07
50	2,09	2,90	2,32	2,25	2,19	0,32	2,16	2,48	0,34	2,54	2,88	0,38	2,07	2,46
65	3,79	3,68	4,31	4,19	4,19	0,43	2,58	3,01	0,49	3,23	3,71	0,50	2,45	2,95
80	4,12	4,71	4,83	4,61	4,61	0,60	3,15	3,75	0,61	4,12	4,73	0,74	2,89	3,63
100	4,76	5,76	5,69	5,63	5,63	0,79	3,64	4,43	0,85	5,05	5,90	0,95	3,33	4,28
125	6,47	7,54	7,81	7,86	7,86	0,99	4,51	5,50	1,18	6,61	7,79	1,18	4,09	5,27
150	7,98	9,73	9,49	9,49	9,49	1,44	5,56	7,00	1,56	8,53	10,09	1,63	5,04	6,67
175	9,64	14,66	11,23	10,69	10,69	1,65	7,46	9,11	2,05	12,85	14,90	1,91	6,74	8,65
200	11,16	16,88	13,23	12,31	12,31	1,97	7,97	9,94	2,47	14,80	17,27	2,07	7,16	9,24
250 ^a	16,44	26,16	19,39	17,91	17,91	2,60	11,56	14,16	3,56	22,92	26,48	3,05	10,73	13,78
250 ^b	15,81	26,16	18,33	16,82	16,82	2,41	11,06	13,47	3,56	22,92	26,48	2,87	10,04	12,92
300	-	39,83	-	-	-	3,44	16,22	19,66	4,78	34,90	39,69	-	-	-
350	-	58,06	-	-	-	5,11	23,47	28,58	6,43	50,89	57,32	-	-	-
400	-	81,03	-	-	-	6,58	30,99	37,57	8,05	71,01	79,07	-	-	-
500	-	-	-	-	-	-	-	-	-	-	-	-	-	-

^a For flanges to suit 267 mm O.D. tube.^b For flanges to suit 273 mm O.D. tube.

Table C.4 — Masses of PN 25 flanges and collars

DN	Mass (kg)											
	Type											
	05	11	14	34	04	34,04	05C	05C	05C	32	02	32/02
			12	Copper	Steel	Total	Copper	Steel	Total	Copper	Steel	Total
10	0,82	0,43	0,41	0,06	0,69	0,74	0,06	0,72	0,77	0,12	0,69	0,80
15	0,92	0,49	0,46	0,07	0,76	0,83	0,07	0,81	0,88	0,14	0,76	0,90
20	1,15	0,61	0,57	0,11	0,93	1,04	0,12	1,00	1,12	0,28	0,93	1,21
25	1,57	0,81	0,77	0,15	1,25	1,40	0,16	1,37	1,53	0,38	1,25	1,63
32	2,30	1,31	1,24	0,19	1,82	2,01	0,21	2,02	2,23	0,47	1,82	2,30
40	2,67	1,63	1,54	0,28	2,06	2,34	0,27	2,34	2,61	0,58	2,06	2,65
50	3,62	2,36	2,19	0,36	2,71	3,07	0,36	3,18	3,54	0,84	2,71	3,54
65	4,42	4,63	4,30	0,49	3,07	3,56	0,52	3,88	4,40	1,01	3,07	4,08
80	5,75	5,85	5,30	0,74	3,85	4,60	0,67	5,04	5,71	1,40	3,85	5,25
100	7,90	8,63	7,89	0,99	5,20	6,19	0,92	6,92	7,84	2,03	5,20	7,23
125	11,32	10,94	9,99	1,30	7,12	8,42	1,24	9,92	11,16	2,69	7,12	9,81
150	14,19	14,11	12,84	1,90	8,48	10,39	1,66	12,44	14,10	3,39	8,48	11,87
175	-	14,80	13,66	-	-	-	-	-	-	-	-	-
200	22,08	19,33	17,02	2,68	11,29	13,97	2,70	19,35	22,05	4,84	11,29	16,13
250 ^a	35,61	27,93	24,32	3,81	17,01	20,81	3,92	31,21	35,13	7,33	17,01	24,34
250 ^b	35,61	26,67	23,10	3,63	17,01	20,64	3,92	31,21	35,13	6,74	17,01	23,75
300	52,48	-	-	5,58	23,45	29,03	5,45	46,00	51,45	9,86	23,45	33,31
350	77,19	-	-	-	35,09	35,09	7,08	65,65	74,73	14,82	35,09	49,91
400	106,77	-	-	-	46,88	46,88	8,91	93,57	102,48	18,66	46,88	65,54
500	177,19	-	-	-	-	-	13,22	155,29	168,51	31,61	73,42	105,03

^a For flanges to suit 267 mm O.D. tube.^b For flanges to suit 273 mm O.D. tube.

Table C.5 — Masses of PN 40 flanges and collars

DN	Mass (kg)						
	Type						
	05	05C Copper	05C Steel	05C Total	32 Copper	02 Steel	32/02 Total
10	0,82	0,06	0,72	0,77	0,11	0,69	0,80
15	0,92	0,07	0,81	0,88	0,14	0,76	0,90
20	1,15	0,12	1,00	1,12	0,27	0,93	1,19
25	1,57	0,16	1,37	1,53	0,36	1,25	1,62
32	2,30	0,21	2,02	2,23	0,45	1,82	2,28
40	2,67	0,27	2,34	2,61	0,56	2,06	2,63
50	3,62	0,36	3,18	3,54	0,80	2,71	3,50
65	4,42	0,52	3,88	4,40	1,01	3,07	4,08
80	5,75	0,67	5,04	5,71	1,40	3,85	5,25
100	7,90	0,92	6,92	7,84	2,03	5,20	7,23
125	11,32	1,24	9,92	11,16	2,69	7,12	9,81
150	14,19	1,66	12,44	14,10	3,39	8,48	11,87
200	27,22	2,84	23,86	26,70	5,96	14,56	20,52
250 ^a	47,67	4,16	41,78	45,94	9,88	24,73	34,62
250 ^b	47,67	4,16	41,78	45,94	9,20	24,73	33,93
300	69,29	5,88	60,72	66,60	14,84	34,20	49,04
350	101,50	7,56	88,95	96,51	21,24	49,54	70,78
400	143,74	10,00	125,97	135,98	32,21	70,39	102,60
^a For flanges to suit 267 mm O.D. tube.							
^b For flanges to suit 273 mm O.D. tube.							

Annex ZA (informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 97/23/EC

This European standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association (EFTA) to provide a means of conforming to Essential Requirements of the New Approach Directive 97/23/EC (Pressure Equipment Directive, PED).

Once this standard is cited in the Official Journal of the European Communities under that Directive and has been implemented as a national standard in at least one Member State, compliance with the clauses of this standard given in table ZA confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding Essential Requirements of that Directive and associated EFTA regulations

Table ZA — Correspondence between this European Standard and Directive 97/23/EC

Clause(s)/sub-clause(s) of this EN	Essential requirements (ERs) of Directive 97/23/EC	Qualifying remarks/Notes
5.1	Materials: Materials for pressure equipment to be suitable during lifetime.	4
	Materials for pressurised parts to have appropriate properties for all operating and test conditions: — to be sufficiently ductile and tough.	4.1 (a)
5.5	Design	2
	To be designed to ensure safety throughout intended life — to incorporate appropriate safety coefficients.	2.1
	To be designed for adequate strength.	2.2
	To be designed for loadings appropriate to its intended use.	2.2.1
	To be designed for appropriate strength based on a calculation method.	2.2.2
	Requirements to be met by applying one of the following methods — design by formula.	2.2.3 (a)
	Design calculations to establish the resistance of equipment, in particular: — account to be taken of combinations of temperature and pressure; — maximum stresses and peak stresses to be within safe limits.	2.2.3 (b)
5.1 5.10.1 (f)	Traceability Identification of the material making up the component.	3.1.5

WARNING: Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

Bibliography

EN 287-1, *Approval testing of welders — Fusion welding — Part 1: Steels*

EN 288-1, *Specification and qualification of welding procedures for metallic materials — Part 1: General rules for fusion welding*

EN 764, *Pressure equipment — Terminology and symbols — Pressure, temperature and volume*

EN 1057, *Copper and copper alloys — Seamless round copper tubes for water and gas in sanitary and heating applications*

EN 1254-1, *Copper and copper alloys — Plumbing fittings — Part 1: Fittings with ends for capillary soldering or capillary brazing to copper tubes*

EN 1514-1, *Flanges and their joints — Dimensions of gaskets for PN-designated flanges — Part 1: Non-metallic flat gaskets with or without inserts*

EN 1514-2, *Flanges and their joints — Dimensions of gaskets for PN-designated flanges — Part 2: Spiral wound gaskets for use with steel flanges*

EN 1514-3, *Flanges and their joints — Dimensions of gaskets for PN-designated flanges — Part 3: Non-metallic PTFE envelope gaskets*

EN 1514-4, *Flanges and their joints — Dimensions of gaskets for PN-designated flanges — Part 4: Corrugated, flat or grooved metallic and filled metallic gaskets for use with steel flanges*

prEN 1514-6, *Flanges and their joints — Dimensions of gaskets for PN-designated flanges — Part 6: Covered serrated metal gaskets for use with steel flanges*

prEN 1514-7, *Flanges and their joints — Dimensions of gaskets for PN-designated flanges — Part 7: Covered metal jacketed gaskets for use with steel flanges*

prEN 1514-8, *Flanges and their joints — Dimensions of gaskets for PN-designated flanges — Part 8: Polymeric O-ring gaskets for grooved flanges*

EN 1515-1, *Flanges and their joints — Bolting — Part 1: Selection of bolting*

EN 1515-2, *Flanges and their joints — Bolting — Part 2: Classification of bolt materials for steel flanges, PN designated*

EN 10204, *Metallic products — Types of inspection documents*

ISO 468, *Surface roughness — Parameters, their values and general rules for specifying requirements*

ISO 7005-3:1998, *Metallic flanges — Part 3: Copper alloy and composite flanges*

ANSI/ASTM A105, *Forgings, carbon steel, for piping components*