



# SLOVENSKI STANDARD

SIST EN 1759-3:2004

01-junij-2004

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

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

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

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ICS 23.040.60

English version

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

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This European Standard was approved by CEN on 27 June 2003.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

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

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## Foreword

This document (EN 1759-3:2003) 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of an identical text or by endorsement, at the latest by March 2004, and conflicting national standards shall be withdrawn at the latest by March 2004.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)<sup>1)</sup>. For relationship with EU Directive(s), see informative annex ZA, which is an integral part of this standard.

EN 1759 consists of the following parts:

- *Part 1: Steel flanges (draft stage);*
- *Part 3: Copper alloy flanges (draft stage);*
- *Part 4: Aluminium alloy flanges (draft stage).*

The annexes A, B, C, D 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, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

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## Introduction

This standard is related, but not identical, to ISO 7005-3 in respect of flanges having designations Class 150 and Class 300. Outside diameters and mating dimensions are in accordance with ANSI B16.24.

Information on the use of metric bolting in lieu of imperial bolting which can be used with these flanges is given in an informative annex.

The mating dimensions of the flanges of this standard are compatible with Class designated flanges of other materials in accordance with the other parts of EN 1759.

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<sup>1)</sup> 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 Class designations Class 150 and Class 300 and nominal sizes from DN 10 to DN 900 (NPS ½ to NPS 36) 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 and 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.

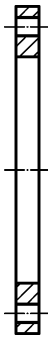
NOTE 1 The size of copper and copper alloy tubes is designated by reference to the outside diameter in millimetres.

NOTE 2 See also annex B.

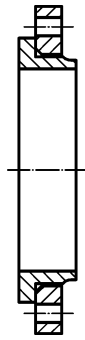
NOTE 3 Non-gasketed pipe joints are outside the scope of this standard.

**Table 1 — Types of flanges and collars**

Type No.	Description
01	Plate flange in copper alloy for brazing or welding
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
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 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

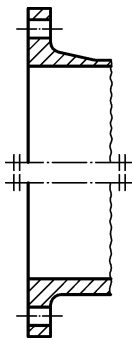
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**Type 14**  
Hubbed slip-on flange in copper alloy supplied with tube stops, for soft soldering, brazing or welding



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



Steel component



Copper alloy component

**Figure 1 — Types of flanges and collars**

## 2 Normative references

This European Standard incorporates by dated or undated references, 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 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 Specification (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

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

### 3.1

#### Class

alphanumeric designation used for reference purposes related to a combination of mechanical and dimensional characteristics of a component of a pipework system. It comprises the word Class followed by a dimensionless whole number

NOTE 1 The number following the word Class does not represent a measurable value and should not be used for calculation purposes except where specified in the relevant standard.

NOTE 2 The designation Class is not meaningful unless it is related to the relevant component standard number.

NOTE 3 It is intended that all components with the same Class and NPS (see below) designations have the same mating dimensions for compatible flange types.

### 3.2

#### DN

see EN ISO 6708:1995

### 3.3

#### NPS

alphanumeric designation of size for components of a pipework system, which is used for reference purposes. It comprises, for the purpose of Class designated flanges according to this standard, the letters NPS followed by a dimensionless number which is indirectly related to the physical size of the bore or outside diameter of the end connections

NOTE The number following the letters NPS does not represent a measurable value and should not be used for calculation purposes except where specified in the relevant standard. See EN ISO 6708.



## 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 Class shall be as given in Table 3.

NOTE 1 Flanges, which are identified and/or marked by NPS additionally or alternatively to DN, are deemed to comply with this standard.

NOTE 2 The relationship between DN and NPS is given for reference purposes in Tables 3, 4, 5 and 6.

### 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 1759-3;
- c) Number of flange type in accordance with Figure 1;
- d) Class designation, Class ..... (the word Class may be omitted);
- e) Nominal size, DN ..... (and/or NPS .....);
- f) Material number or symbol (see Tables 7 and 8) (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 in Class 150 and DN 600 (NPS 24) and in material symbol CuAl8Fe3:

**Flange EN 1759-3/01/Class 150/DN 600/CW303G**

or

**Flange EN 1759-3/01/150/NPS 24/CW303G**

EXAMPLE 2 Designation of a loose flange type 07 in Class 150 and DN 50 (NPS 2) and in material symbol S235JR:

**Flange EN 1759-3/07/Class 150/DN 50/S235JR**

or

**Flange EN 1759-3/07/150/NPS 6/S235JR**

EXAMPLE 3 Designation of a slip-on collar type 37 in Class 150 and DN 50 (NPS 2) and in material symbol CuZn20Al2As:

**Collar EN 1759-3/37/Class 150/DN 50/CW702R**

or

**Collar EN 1759-3/37/150/NPS 2/CW702R**

EXAMPLE 4 Designation of a blank flange type 05C with clad jointing face, in Class 300 and DN 150 (NPS 6) and in materials symbols, S235JR (for blank flange) and CuNi30Mn1Fe (for cladding):

**Flange EN 1759-3/05C/Class 300/DN 150/S235JR-CW354H**

or

**Flange EN 1759-3/05C/300/NPS 6/S235JR-CW354H**

### 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 7 and 8 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 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

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Flanges shall be suitable for use with the nominal size and number of bolts specified in Tables 4 and 5 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 annexes B and C.

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 04, 05C and 07, steel bolting should be used and reference should be made to EN 1515-1, EN 1515-2 and annex C.

### 5.4 Gaskets

The various gasket types, dimensions, design characteristics and material used are not within the scope of this standard. Dimensions of gaskets are given in the relevant parts of prEN 12560.

### 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 7 and 8 are given in Tables 9, 10 and 11.

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 7, reference should be made to the relevant product or application standard for the appropriate p/T ratings.

NOTE 3 The p/T rating of a flange is not necessarily the p/T rating of the whole pipework system. Gasket materials can also impose a 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

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

- Class 150 flanges: Table 4 and Figure 2; [SIST EN 1759-3:2004](#)
- Class 300 flanges: Table 5 and Figure 3. <https://standards.iTech.ai/catalog/standards/sist/f0b09364-b659-4df5-b5a7-14d4b74967e1/sist-en-1759-3-2004>

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 type 34 collars and type 11 flanges the recommended weld preparation angle is  $37,5 \pm 2,5^\circ$  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 2 and 3.

## 5.7 Flange facings

### 5.7.1 Types of facings

Types 01, 05, 11, 12, 14 and 21 flanges in copper alloy shall be provided with flat face.

NOTE 1 Flanges with flat face facings are suitable for bolting to flat face mating flanges using a full face gasket.

Types 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 2 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 EN ISO 4287 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 <sup>b</sup>	3,2	12,5	12,5	50
<sup>a</sup> $R_a$ and $R_z$ are defined in EN ISO 4287 <sup>b</sup> 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.				

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5.7.3 Rims

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

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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 complying 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 6.

5.9 Tolerances

Tolerances on dimensions shall be as specified in Table 6.

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 1759-3;
- b) Flange type number, e.g. 05;