Cross recessed countersunk flat head screws
(common head style), grade A
Steel of property class 8.8, stainless steel and non-ferrous metals
(ISO 7046-2: 1990)
English version of DIN EN ISO 7046-2

DIN
EN ISO 7046-2

This standard incorporates the English version of ISO 7046-2.

ICS 21.060.10

Descriptors: Fastener, screw, countersunk head screw, cross recessed head screw, steel, nonferrous metal.

This standard, together with DIN EN ISO 7046-1, October 1994 edition, supersedes DIN 965, August 1990 edition.

Senkschrauben mit Kreuzschlitz (Einheitskopf), Produktklasse A, Teil 2: Stahl mit Festigkeitsklasse 8.8; nichtrostender Stahl und Nichteisenmetalle (ISO 7046-2: 1990)

European Standard EN ISO 7046-2: 1994 has the status of a DIN Standard.

A comma is used as the decimal marker.

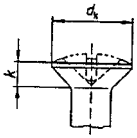
National foreword

This standard has been published in accordance with a decision taken by CEN/TC 185 to adopt, without alteration, International Standard ISO 7046-2 as a European Standard.

The responsible German body involved in its preparation was the *Normenausschuß Mechanische Verbindungselemente* (Fasteners Standards Committee).

The specifications for penetration depth of cross recesses and for the underhead shoulder given here are based on the specifications of DIN EN ISO 7721-2. In order to attain the head strength required for cross recessed head screws of property class 8.8, it is recommended that either a shallower penetration depth be used (though this may adversely affect wrenchability) or an underhead shoulder be provided.

The following comparison between significant head dimensions (d_k and k) for the old and the new head styles shows that cross recessed countersunk flat head screws remain interchangeable.



Dimensions in mm

Thread size (d)		M2	M2,5	M3	M3,5	M4	M5	M6	M8	M10
$d_{k\,max}$	DIN EN ISO 7046-2	3,8	4,7	5,5	7,3	8,4	9,3	11,3	15,8	18,3
	DIN 965	3,8	4,7	5,6	6,5	7,5	9,2	11	14,5	18
k_{max}	DIN EN ISO 7046-2	1,2	1,5	1,65	2,35	2,7	2,7	3,3	4,65	5
	DIN 965	1,2	1,5	1,65	1,93	2,2	2,5	3	4	5

Continued overleaf.
EN comprises 7 pages.

In order to facilitate the use of screws with countersunk head as specified in DIN EN 27721, a standard on the associated countersinks has been prepared (cf. DIN 66).

The DIN Standards corresponding to the International Standards referred to in clause 2 of the DIN EN ISO are as follows:

ISO Standard	DIN Standard
ISO 225	DIN EN 20225
ISO 898-1	DIN EN 20898-1
ISO 4757	DIN EN ISO 4757
ISO 6157-1	DIN EN 26157-1
ISO 6157-3	DIN EN 26157-3
ISO 7721	DIN EN 27721
ISO 7721-2	DIN EN ISO 7721-2
ISO 8839	DIN EN 28839

Tabular layout of article characteristics

The DIN 4000-2-1 tabular layout of article characteristics shall apply to the screws covered in this standard.

Amendments

In comparison with DIN 965, August 1990 edition, the following amendments have been made.

a) Size M 1,6 screws are no longer specified.

b) Some of the values of d_k and k have been changed.

c) The specifications for the thread length, b, have been changed.

d) The range of commercial lengths has been changed.

e) Property classes 5.8 and A 4-70 are no longer specified.

f) Steel screws of property class 4.8 are now specified in DIN EN ISO 7046-1.

g) Series 'shallow' and 'deep' have been established for the penetration depth of cross recesses, series 'shallow' complying only partly with the penetration depths hitherto used.

h) The technical delivery conditions have been revised.

Previous editions

DIN 965: 1971-12, 1984-12, 1990-08.

Standards referred to

(and not included in **Normative references** and **Annex ZA**)

DIN 66	Countersinks for countersunk head screws as in DIN ISO 7721
DIN 4000-2	Tabular layouts of article characteristics for screws and nuts
DIN EN 20225	Bolts, screws, studs and nuts; symbols and designations for dimensioning
DIN EN 20898-1	Mechanical properties of fasteners; bolts, screws and studs (ISO 898-1 : 1988)
DIN EN 26157-1	Fasteners; surface discontinuities; bolts, screws and studs for general requirements (ISO 6157-1 : 1988)
DIN EN 26157-3	Fasteners; surface discontinuities; bolts, screws and studs for special requirements (ISO 6157-3 : 1988)
DIN EN 27721	Countersunk head screws; head configuration and gauging (ISO 7721 : 1983)
DIN EN 28839	Mechanical properties of fasteners; bolts, screws, studs and nuts made of nonferrous metals
DIN EN ISO 4757	Cross recesses for screws (ISO 4757 : 1983)
DIN EN ISO 7721-2	Countersunk flat head screws; penetration depth of cross recesses (ISO 7721-2 : 1990)

International Patent Classification

F 16 B 023/00

F 16 B 035/00

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN ISO 7046-2

July 1994

UDC 621.882.215.6.091.6

Descriptors: Fastener, screw, countersunk head screw, cross recessed head screw, steel, nonferrous metal.

English version

Cross recessed countersunk flat head screws (common head style); grade A

Part 2: Steel of property class 8.8, stainless steel and non-ferrous metals (ISO 7046-2:1990)

Vis à métaux à tête fraisée à empreinte cruciforme; grade A. Partie 2: Acier de classe de qualité 8.8, acier inoxydable et métaux non ferreux (ISO 7046-2:1990)

Senkschrauben mit Kreuzschlitz (Einheitskopf); Produktklasse A. Teil 2: Stahl mit Festigkeitsklasse 8.8, nichtrostender Stahl und Nichteisenmetalle (ISO 7046-2:1990)

This European Standard was approved by CEN on 1994-07-26 and is identical to the ISO Standard as referred to.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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

CEN

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

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

Foreword

International Standard

ISO 7046-2 Cross recessed head countersunk flat head screws (common head style), grade A; steel of property class 8.8, stainless steel and nonferrous metals

has been taken over as a European Standard by Technical Committee CEN/TC 185 'Threaded and non-threaded mechanical fasteners and acessories' from the work of ISO/TC 2 'Fasteners' of the International Organization for Standardization (ISO).

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, and conflicting national standards withdrawn, by January 1995 at the latest.

In accordance with the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard:

Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

Endorsement notice

The text of the International Standard ISO 7046-2:1990 was approved by CEN as a European Standard without any modification.

NOTE: Normative references to international publications are listed in Annex ZA.

Introduction

Penetration depths of cross recesses for countersunk flat head screws

The penetration depth of cross recesses for countersunk flat head screws has to satisfy two requirements which act in opposite directions for a given head dimension.

First, there is the requirement for sufficient head strength to attain the proof and breaking loads of the respective property class. A shallow cross recess increases the head strength. On the other hand, the wrenchability of the screw should be satisfactory; this can only be achieved by a sufficiently deep cross recess.

ISO 7721-2 was developed in order to find a compromise which, as far as possible, would meet both requirements.

ISO 7721-2 specifies deep cross recesses for countersunk head screws of low strength: a good wrenchability is achieved and the head strength is still sufficient. This execution will be used in ISO 7046-1 (see the foreword).

For screws of higher strength, sufficient head strength can only be attained by a shallower penetration depth of the cross recesses. If such screws also require good wrenchability, then, under the conditions of the common head style, a shoulder has to be provided under the head, in addition to the larger penetration depth, in order to guarantee sufficient head strength. This part of ISO 7046 covers both possibilities.

This compromise, which unfortunately results in different, but interchangeable, types of cross recessed flat countersunk head screws, is at the moment the only way of reaching an agreement at the international level.

1 Scope

This part of ISO 7046 specifies the characteristics of recessed countersunk flat head screws with threads M2 up to and including M10, of grade A and of property class 8.8 for steel, A2 70 for stainless steel and CU2 and CU3 for non-ferrous metals.

If, in special cases, specifications other than those listed in this International Standard are required, they shall be selected from existing International Standards, for example ISO 261, ISO 888, ISO 898-1, ISO 965-2, ISO 3506, ISO 4759-1, ISO 8839.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 7046. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 7046 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 225 : 1983, *Fasteners — Bolts, screws, studs and nuts — Symbols and designations of dimensions.*

ISO 261 : 1973, *ISO general purpose metric screw threads — General plan.*

ISO 888 : 1976, *Bolts, screws and studs — Nominal lengths, and thread lengths for general purpose bolts.*

ISO 898-1 : 1988, *Mechanical properties of fasteners — Part 1: Bolts, screws and studs.*

ISO 965-2 : 1980, *ISO general purpose metric screw threads — Tolerances — Part 2: Limits of sizes for general purpose bolt and nut threads — Medium quality.*

ISO 3269 : 1988, *Fasteners — Acceptance inspection.*

ISO 3506 : 1979, *Corrosion-resistant stainless steel fasteners — Specifications.*

ISO 4042 : 1989, *Threaded components — Electroplated coatings.*

ISO 4757 : 1983, *Cross recesses for screws.*

ISO 4759-1 : 1978, *Tolerances for fasteners — Part 1: Bolts, screws and nuts with thread diameters ≥ 1,6 and ≤ 150 mm and product grades A, B and C.*

ISO 6157-1 : 1988, *Fasteners — Surface discontinuities — Part 1: Bolts, screws and studs for general requirements.*

ISO 6157-3 : 1988, *Fasteners — Surface discontinuities — Part 3: Bolts, screws and studs for special requirements.*

ISO 7721 : 1983, *Countersunk head screws — Head configuration and gauging.*

ISO 7721-2 : 1990, *Countersunk flat head screws — Part 2: Penetration depth of cross recesses.*

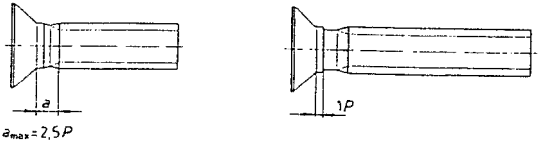
ISO 8839 : 1986, *Mechanical properties of fasteners — Bolts, screws, studs and nuts made of non-ferrous metals.*

3 Dimensions

See figures 1, 2 and 3, and table 1.

The shank diameter is approximately equal to the pitch diameter or equal to the major diameter permissible.

NOTE – Symbols and designations of dimensions are specified in ISO 225.



NOTE – For other dimensions see figures 2 and 3.

Figure 1 – Screw with underhead shoulder for penetration depth series 1 (deep)

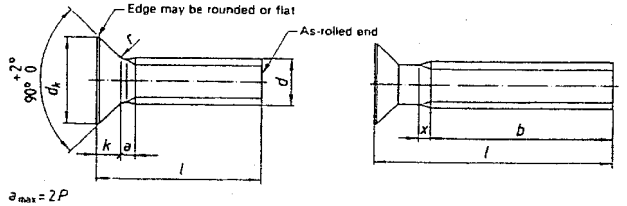


Figure 2 – Screw without underhead shoulder for penetration depth series 2 (shallow)

Figure 3 – Cross recess

Table 1

Dimensions in millimetres

Thread (*d*)				M2	M2.5	M3	(M3.5)[1]	M4	M5	M6	M8	M10
p[2]				0,4	0,45	0,5	0,6	0,7	0,8	1	1,25	1,5
b			min.	25	25	25	38	38	38	38	38	38
d_k		theoretical[3]	max.	4,4	5,5	6,3	8,2	9,4	10,4	12,6	17,3	20
		actual	max.	3,8	4,7	5,5	7,3	8,4	9,3	11,3	15,8	18,3
			min.	3,5	4,4	5,2	6,9	8,0	8,9	10,9	15,4	17,8
k			max.	1,2	1,5	1,65	2,35	2,7	2,7	3,3	4,65	5
r			max.	0,5	0,6	0,8	0,9	1	1,3	1,5	2	2,5
x			max.	1	1,1	1,25	1,5	1,75	2	2,5	3,2	3,8
Cross recesses	Series 1[4] (deep)	Recess No.		0	1		2			3	4	
		Type H	*m* ref.	1,9	2,9	3,2	4,4	4,6	5,2	6,8	8,9	10
			Penetration depth min.	0,9	1,4	1,7	1,9	2,1	2,7	3,0	4,0	5,1
			Penetration depth max.	1,2	1,8	2,1	2,4	2,6	3,2	3,5	4,6	5,7
		Recess No.		0	1		2			3	4	
		Type Z	*m* ref.	1,9	2,8	3	4,1	4,4	4,9	6,6	8,8	9,8
			Penetration depth min.	0,95	1,48	1,76	1,75	2,06	2,60	3,00	4,15	5,19
			Penetration depth max.	1,20	1,73	2,01	2,20	2,51	3,05	3,45	4,60	5,64
	Series 2[4] (shallow)	Recess No.		0	1		2			3	4	
		Type H	*m* ref.	1,9	2,7	2,9	4,1	4,6	4,8	6,6	8,7	9,6
			Penetration depth min.	0,9	1,25	1,4	1,6	2,1	2,3	2,8	3,9	4,8
			Penetration depth max.	1,2	1,55	1,8	2,1	2,6	2,8	3,3	4,4	5,3
		Recess No.		0	1		2			3	4	
		Type Z	*m* ref.	1,9	2,5	2,8	4	4,4	4,6	6,3	8,5	9,4
			Penetration depth min.	0,95	1,22	1,48	1,61	2,06	2,27	2,73	3,87	4,78
			Penetration depth max.	1,20	1,47	1,73	2,05	2,51	2,72	3,18	4,32	5,23

l[5] nom.[1]	min.	max.
3	2,8	3,2
4	3,76	4,24
5	4,76	5,24
6	5,76	6,24
8	7,71	8,29
10	9,71	10,29
12	11,65	12,35
(14)	13,65	14,35
16	15,65	16,35
20	19,58	20,42
25	24,58	25,42
30	29,58	30,42
35	34,5	35,5
40	39,5	40,5
45	44,5	45,5
50	49,5	50,5
(55)	54,05	55,95
60	59,05	60,95

Range of commercial lengths

1) Sizes in brackets should be avoided if possible.

2) *P* = pitch of the thread.

3) See ISO 7721.

4) In accordance with ISO 7721-2.

5) Screws with nominal lengths above the dashed thick line are threaded up to the head; $b = l - (k + a)$.

4 Specifications and reference International Standards

See table 2

Table 2

Material		Steel	Stainless steel	Non-ferrous metal
Thread	Tolerance	6g		
	International Standard	ISO 261, ISO 965 2		
Mechanical properties	Property class	8.8	A2-70	CU2, CU3[1]
	International Standard	ISO 898 1	ISO 3506	ISO 8839
Tolerances	Product grade	A		
	International Standard	ISO 4759-1		
Cross recesses		ISO 4757		
Finish		Plain Requirements for electroplating are covered in ISO 4042. If different electroplating requirements are desired or if requirements are needed for other finishes, they should be agreed between supplier and customer. Limits for surface discontinuities are covered in ISO 6157-1 and ISO 6157-3.		
Acceptability		For acceptance procedure, see ISO 3269.		

1) At the manufacturer's option.

5 Designation

Example for the designation of a cross recessed countersunk flat head screw, with thread M5, nominal length l = 20 mm, property class 8.8 and cross recess type Z, penetration depth series 1 or 2 at manufacturer's option:

Countersunk head screw ISO 7046-2-M5 × 20-8.8-Z

If, in special cases, one of the two series is wanted, the number of the series should be included in the designation, for example:

Countersunk head screw ISO 7046-2-M5 × 20-8.8-Z1

Annex ZA (normative)
Normative references to international publications with their relevant European publications

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).

Publication	Year	Title	EN/HD	Year
ISO 225	1983	Fasteners - Bolts, screws, studs-Symbols and designation of dimensions	EN 20225	1991
ISO 898-1	1988	Mechanical properties of fasteners - Part 1: Bolts, screws and studs	EN 20898-1	1991
ISO 6157-1	1988	Fasteners - Surface discontinuities - Part 1: Bolts, screws and studs for general requirements	EN 26157-1	1991
ISO 6157-3	1988	Fasteners - Surface discontinuities - Part 3: Bolts, screws and studs for special requirements	EN 26157-3	1991
ISO 7721	1983	Countersunk head screws - Head configuration and gauging	EN 27721	1991
ISO 8839	1986	Mechanical properties of fasteners - Bolts, screws studs and nuts made of non-ferrous metals	EN 28839	1991