
International Standard



7721

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Countersunk head screws — Head configuration and gauging

Vis à tête fraisée — Configuration de la tête et vérification par calibre

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Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 7721 was developed by Technical Committee ISO/TC 2, *Fasteners*, and was circulated to the member bodies in December 1981.

It has been approved by the member bodies of the following countries:

Australia	Germany, F.R.	New Zealand
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Finland	Mexico	Switzerland
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The member body of the following country expressed disapproval of the document on technical grounds:

United Kingdom

Countersunk head screws — Head configuration and gauging

1 Scope and field of application

This International Standard specifies the characteristics of head configurations of slotted and recessed countersunk head screws, and recommends a gauging method for the head dimensions laid down in the respective product standards.

2 Head configuration

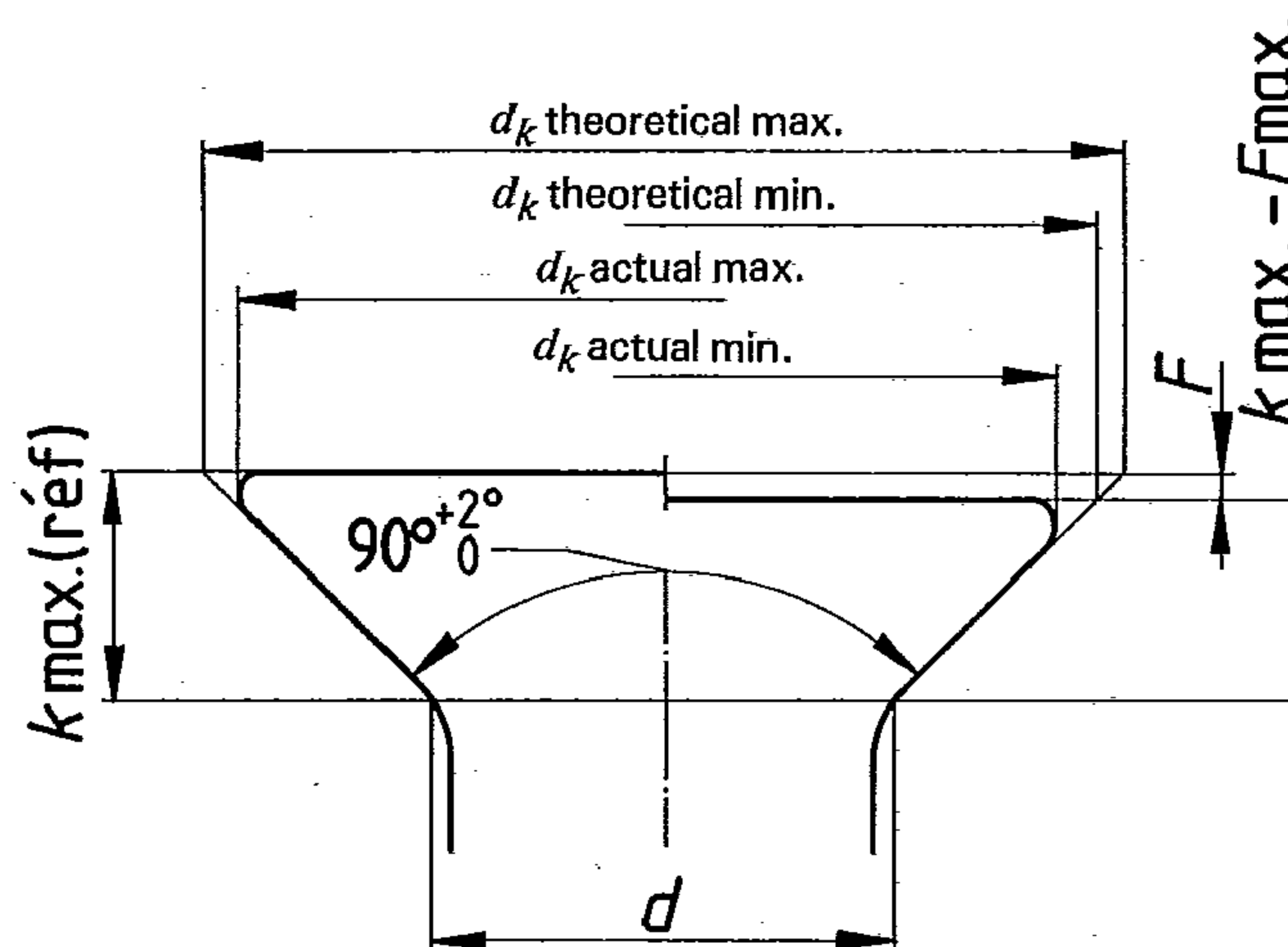


Table 1

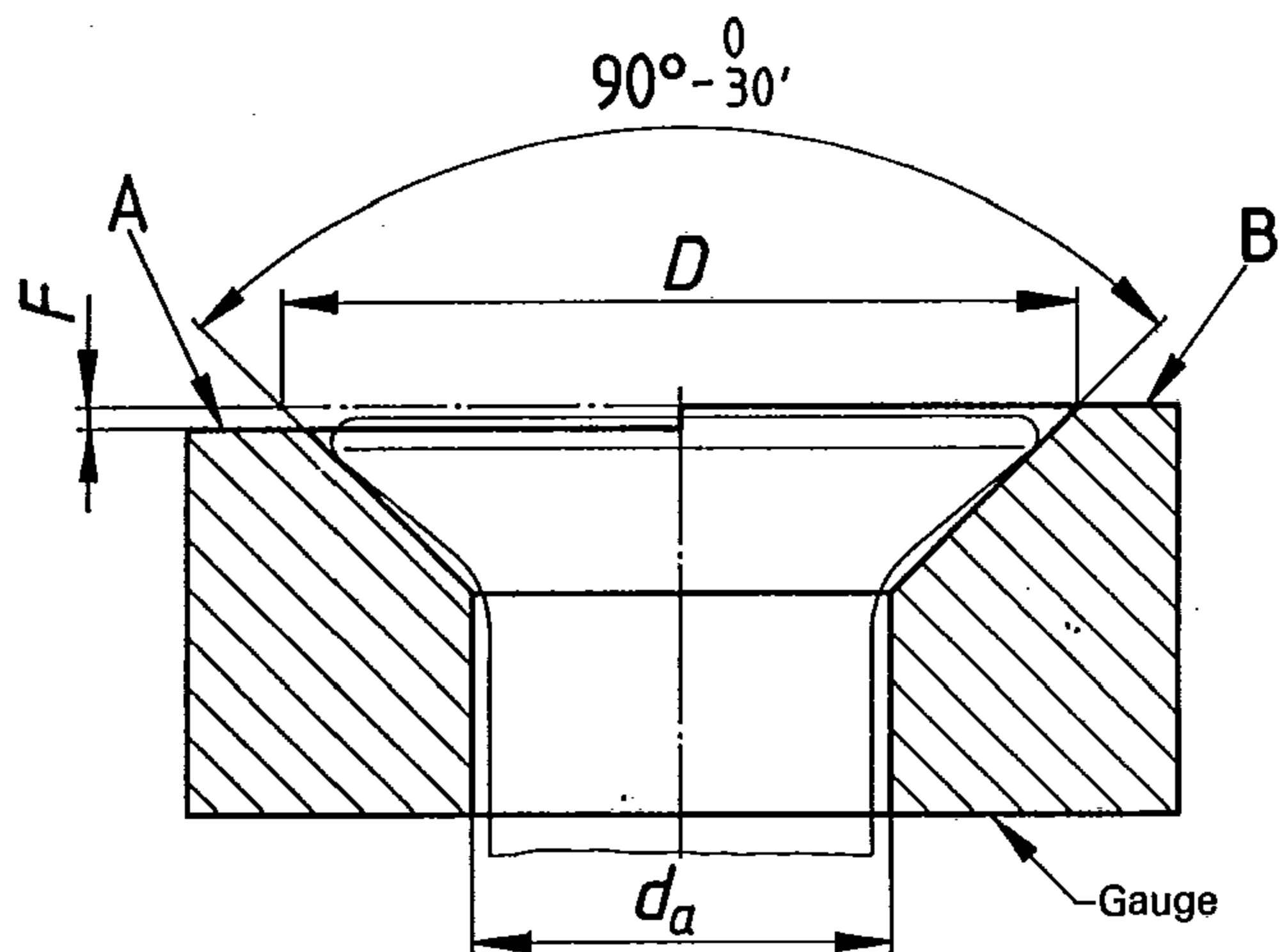
Dimensions in millimetres

Thread size, d	metric	M 1,6	M 2	M 2,5	M 3	M 3,5	M 4	M 5	—	M 6	M 8	M 10	M 12	M 14	M 16	M 18	M 20	
	tapping	—	ST 2,2	—	ST 2,9	ST 3,5	ST 4,2	ST 4,8	ST 5,5	ST 6,3	ST 8	ST 9,5	—	—	—	—	—	
d_k	theoretical	max.	3,6	4,4	5,5	6,3	8,2	9,4	10,4	11,5	12,6	17,3	20	24	28	32	36	40
		min.	3,3	4,1	5,1	5,9	7,7	8,9	9,8	10,9	11,9	16,5	19,2	23,1	27	30,8	34,7	38,5
	actual	max.	3	3,8	4,7	5,5	7,3	8,4	9,3	10,3	11,3	15,8	18,3	22	25,5	29	32,5	36
		min.	2,7	3,5	4,4	5,2	6,9	8	8,9	9,9	10,9	15,4	17,8	21,5	25	28,5	31,9	35,4
F	max.	0,15	0,15	0,2	0,2	0,25	0,25	0,3	0,3	0,35	0,4	0,4	0,45	0,5	0,6	0,65	0,75	
k max. (ref.)	metric	1	1,2	1,5	1,65	2,35	2,7	2,7	—	3,3	4,65	5	6	7	8	9	10	
	tapping	—	1,1	—	1,7	2,35	2,6	2,8	3	3,15	4,65	5,25	—	—	—	—	—	

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3 Gauging method

Flushness gauge
for the head height



The top surface of the screw head must lie between gauge surfaces A and B.

Ring gauge
No go gauge for d_k actual min.

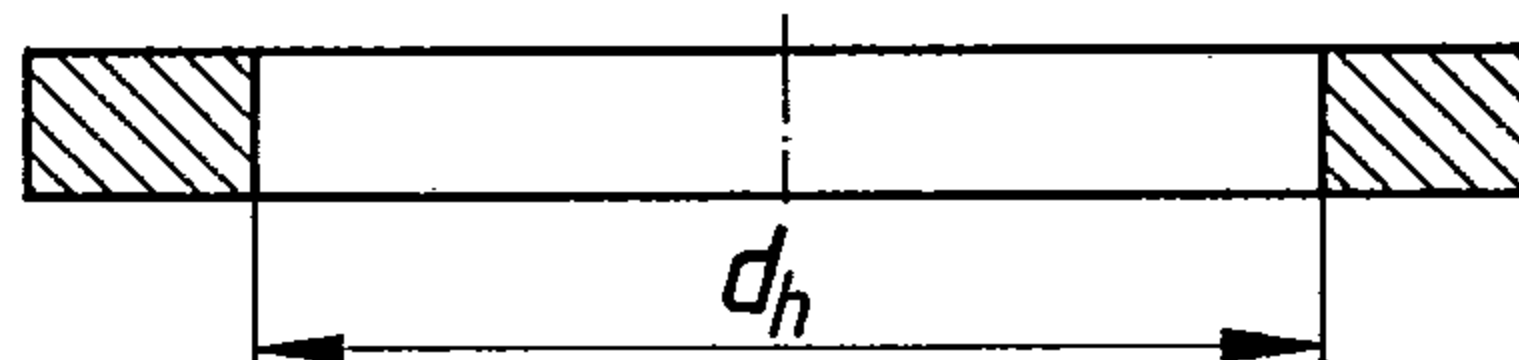


Table 2

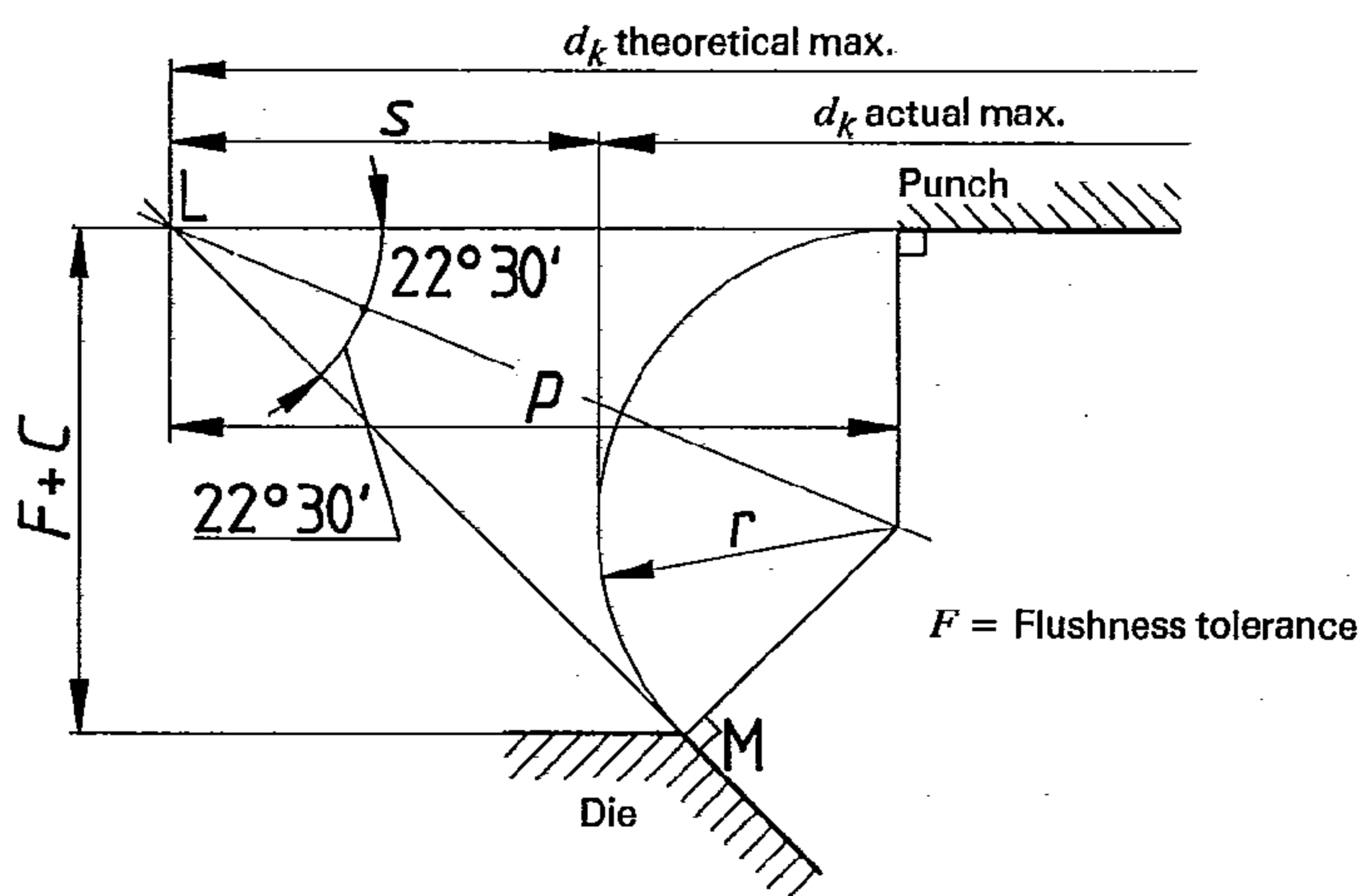
Dimensions in millimetres

Thread size, d	metric	M 1,6	M 2	M 2,5	M 3	M 3,5	M 4	M 5	—	M 6	M 8	M 10
	tapping	—	ST 2,2	—	ST 2,9	ST 3,5	ST 4,2	ST 4,8	ST 5,5	ST 6,3	ST 8	ST 9,5
D	max.	3,6	4,4	5,5	6,3	8,2	9,4	10,4	11,5	12,6	17,3	20
	min.	3,55	4,35	5,45	6,25	8,15	9,35	10,35	11,45	12,55	17,25	19,95
d_a	max.	1,84	2,36	2,74	3,3	3,9	4,4	5,5	5,68	6,6	8,54	10,62
	min.	1,74	2,26	2,64	3,2	3,8	4,3	5,4	5,58	6,5	8,44	10,52
F	max.	0,15	0,15	0,2	0,2	0,25	0,25	0,3	0,3	0,35	0,4	0,4
	min.	0,14	0,14	0,19	0,19	0,24	0,24	0,29	0,29	0,34	0,39	0,39
d_h	min.	2,68	3,48	4,38	5,18	6,88	7,98	8,88	9,88	10,88	15,38	17,78
	max.	2,7	3,5	4,4	5,2	6,9	8	8,9	9,9	10,9	15,4	17,8

NOTE — Diameters d_a min. are based on fillet radius $r = 0,25 d$ for metric screws and $0,4 d$ for tapping screws.

Annex

Calculation basis for the maximum head diameter of countersunk heads for screws



Basic assumptions

1. When heads are being formed with minimum heights, the clearance between punch and die will have minimum values C as follows:

Thread size, d	metric	M 1,6	M 2	M 2,5	M 3	M 3,5	M 4	M 5	—	M 6	M 8	M 10
	tapping	—	—	ST 2,2	—	ST 2,9	ST 3,5	ST 4,2	ST 4,8	ST 5,5	ST 6,3	ST 8
C	min.	0,2	0,22	0,28	0,3	0,32	0,35	0,38	0,4	0,42	0,5	0,63

2. When heads are being formed with maximum heights and maximum actual diameters, the peripheral contour of the head and the clearance between punch and die will be as shown in the above diagram.

From the diagram:

$$s = p - r$$

$$\text{but } p = LM = (F + C) \sec 45^\circ$$

$$\text{and } r = LM \tan 22^\circ 30' = (F + C) \sec 45^\circ \times \tan 22^\circ 30'$$

$$\begin{aligned} s &= (F + C) \sec 45^\circ - (F + C) \sec 45^\circ \times \tan 22^\circ 30' \\ &= (F + C) (\sec 45^\circ) (1 - \tan 22^\circ 30') \approx 0,83 (F + C) \end{aligned}$$

$$d_k \text{ actual max.} = d_k \text{ theoretical max.} - 2s = d_k \text{ theoretical max.} - 1,66 (F + C)$$

It is also assumed that the relationship between theoretical and actual diameters is roughly constant:

$$d_k \text{ actual min.} \approx d_k \text{ theoretical min.} - (d_k \text{ theoretical max.} - d_k \text{ actual max.})$$

$$\text{where } d_k \text{ theoretical min.} = d_k \text{ theoretical max.} - 2F.$$

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