# Hexagon socket head cap screws

(modified version of ISO 4762)

<u>DIN</u> 912

Zylinderschrauben mit Innensechskant; ISO 4762 modifiziert

Supersedes September 1979 edition

As it is current practice in standards published by the International Organization for Standardization (ISO), the comma has been used throughout as a decimal marker.

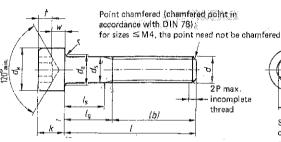
This standard contains the main specifications of ISO 4762-1977, adopted in a modified form, with national addenda. These addenda are shaded grey in clauses 1 and 3 to 6.

### Dimensions in mm

### 1 Field of application

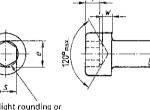
This standard specifies product grade A hexagon socket head cap screws with metric screw threads and thread diameters from 1,4 to 100 mm. 1,1 in exceptional cases, the screws are to meet requirements other than those given in this standard, these shall be selected in accordance with the appropriate standards.

## 2 Dimensions



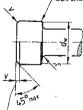
 $d_{s}$  only applies to positive values of  $l_{
m s}$ 

Permissible alternative form of socket

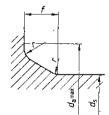


Slight rounding or countersink permissible at the mouth of the socket

Bottom edge of head may be rounded or chamfered to  $d_{
m w}$ /but shall be deburred



Top head may be radiused or chamfered Maximum underhead fillet



 $f_{\text{max}} = 1.7 r_{\text{max}}$   $r_{\text{max}} = \frac{d_{\text{a} \text{ max}} - d_{\text{s} \text{ max}}}{2}$   $r_{\text{mun}} = \frac{d_{\text{a} \text{ max}} - d_{\text{s} \text{ max}}}{2}$ see table

<sup>2</sup>) In ISO 4762, this is given incorrectly as  $r_{max} = \frac{d_a - d_s}{2}$ ; an application has been made to ISO to correct this

Continued on pages 2 to 12

<sup>1)</sup> in ISO 4762, the range is M 1,5 to M 36.

Мε scr

M 10 M 10 M 12

M 14 M 16 M 18 M 20 M 22 M 24 : M 26 ) M 30 > 444 36 × M 38 X M 42 X M 45 X M 48 X 1 M 52 X Table 1.

-	Phone Latin		IV.	1 1,4	P	/ 1,6		M 2	l N	1 2,5	
	Thread size o	a		_		_		-		_	
P	1)			0,3		0,35		0,4		0,45	
b	P 1   B   Reference dimension   Reference	nce dimension	1.	4	1	5	1	6	1	7	
		mex. 2)		2,6		3		3,8		4,5	
d	k	max. 3)		2,74		3,14		3,98	,	4,68	
		min.		2,46		2,86		3,62		4,32	
d,	a	max.		1,8		2		2,6	. :	3,1	
<i>بر</i>		max.		,4		1,6		2	•	2,5	
μ,	<b>.</b>	min.	•	,26		1,46		1,86	2	2,36	
е		min. 4)		1,5		1,73		1,73		2,3	
f	max	നമ്യ,	(	0,34		0,34	(	0,51	(	0,51	
ь	k max.			,4		1,6		2	2	2,5	
1.		min.	1	,26		1,46		1,86	2	2,36	
r		min.		),1		0,1	(	0,1		),1	
	Nominal dimens			,3	1,5			1,5	2	2	
8		min.	1	,32		1,52	·	1,52	2	2,02	
		max.		,36		1,56		1,56	2,06		
. t		min,		),6		0,7		1	1	,1	
υ		max.	0,14		0,16		0,2			),25	
d,	v	mín.		,32		2,72		3,48	4	,18	
w		min.	C	,5	(	), <b>5</b> 5 j		),55	0	,85	
	t					Shank lengt	hs $l_{ m s}$ and	$l_{\mathbf{g}}$		1	
Nominal	ı	1	$l_s$	l <sub>g</sub>	$l_s$	l <sup>g</sup>	$l_{\mathbf{s}}$	$l_g$	$l_{\mathrm{s}}$	1,8	
length	min.	max,	min,	max,	min.	max.	mlπ,	max,	min.	тикі	
. 2	1,8	2,2		0.9							
2,5	2,3	2,7	_	0.9	_	1,05					
3	2,8	3,2	_	0,9	-	1,05	_	1,2			
4	3,76	4,24	·	0,9	_	1,05		1,2	_	1,35	
5	-4,76	5,24		0,9	_	1,05		1,2		1,36	
6	5,76	6,24		0,9		1,05	<u> </u>	1,2	_	1,35	
8	7,71	8,29		0,9	-	1,05		1,2	-	1,35	
10	9,71	10,29		0,9	-	1,05		1,2		1,35	
12	11,65	12,35		0,9		1,05		1,2		1,35	
						11 10 00 10 00 00 00 00 00		Brussussussussussussussussussussussussuss		properties and loc	

1,2 1,2

1,05

1,35

1,35 1,35

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80

3 Mater St = 9 SM<sub>L</sub> UOSt A1 = Stain: Al-Leg = A CuZn = Co PA = Polya Other mate

1) e min  $^2$ ) The  $t_{\rm i}$ head :

4 Finish Product clas Surface peal

General tole

3) These mati

previous ec

1) P =Thread pitch of coarse thread in accordance with DIN 13 Part 12.

16

20

25

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35

40

45

50

55

60

65

70

80

15,65

19,58

24,58

29,58

34,5

39,5

44,5

49,5

54,4

59,4

64.4

69.4

79,4

16,35

20,42

25,42

30,42

35,5

40,5

45,5

50,5

55,6

60,6

65,6

70,6

80,6

3) For knurled heads and for heads with designation on circumference.

4) e min. = 1,14 · s min.

158

e 1, (Con	tinued)						M 5		M 6		M 8	
			М 3		M 4						M8X1	
Thre	ad size d								1		1,25	
			· 0,5		0,7		0,8 22		24		2B	
P 1)	Reference dim	nensian	18		20		8,5		10		13	
.,	max. 2)		5,5	i_	7		8,72		10,22		13,27	
	max. 3)		5,68		7,22		8,28		9,78		12,73	
$d_k \downarrow$	min.		5,32	2	6,78		5,7		6,8		9,2	
$d_8$	max.		3,6		4,7		5,,		6		8	
в	туах.		3		4	<del>, -  </del>	4,82	>	5,82	2	7,78	
d <sub>s</sub>	min.		2,80		3,82		4,58		5,73	2	6,86	
e .	min. 4)		2,8		3,44	*	0,6		0,6	3	1,02	
1	max.		0,5	1	0,6		5		6		8	
	max		3		4		4,8	2	5,7		7,64	
k	min	14	2,8		3,8		0,2		0,2	5	0,4	
r	min.		0,1		0,2 3		4		5		6	
	Nominal di	mension	2,5		3,0	2	4,0	2	5,0	2	6,02	
s 2	min.		2,5		3,0		4,0	95	5,1	4	6,14	4
	max.		2,5		2		2,5	j	3_		0,8	
t r	min.		1,3		0,4		0,5	5	<u>, 0,0</u>		12,3	
υ	max.		0,3 5,1		6,5		8,0	)3	9,0		3	
d <sub>w</sub>	min.			15	1,4	4	1,9		2,	3		
w	min.		<del> '</del>		<del>-</del> -	Sh	ank lengt	hs $l_{ m s}$ and	g			
	1, , .		\	. 1	ı l	lg [	l <sub>s</sub>	l <sub>g</sub>	ls	$l_{\mathbf{g}}$	I <sub>s</sub>	l <sub>g</sub>
			$l_s$	I <sub>g</sub>	l <sub>s</sub>	- 1	min,	max.	min.	max.	min.	ma
Nominal leagth	min:	mišx,	min.	max.	mln.	max.		<del></del> +				
2:	1,8	2,2	1			<u> </u>	<u> </u>					
	2,3	2,7	T	],		ļ	<u> </u>	<u> </u>				
$-\frac{2.5}{3}$	2,8	3,2	T			ļ	<u> </u>					
<del></del>	3,76	4,24				<u></u>	<u> </u>	ļ———-		[		
<del>*</del>	4.76	5,24		1,5				<del> </del> '				
<u>- 6</u>	5,76	6,24		1,5		2,1		2,4		1		
<del></del> -	7,71	8,29		1,5	ļ_ <u>-</u>	2,1	<del> </del>	2,4		3		**********
10	9,71	10,29		1,5		2,1	}- <del>-</del> -	2,4		3		3
- 2 -	11,65	12,35		1,5		2,1	<u></u>	2,4		3		
16	15,65	16,35		1,5	<u> </u>	2,1		2,4		3	_=_	
1:0	19,58	20,42		<u>11,5</u> _	<u> </u>	2,1	1	2,4		3		
25	24,58	25,42			<u> </u>	10	4	8	1 -	3	<u></u> _	
30	29,58	30,42	9,5	12	6,5	15	9	13	6	11	<u></u>	4
35	34,5	35,5	┧		11,5	20	14	18	117	- 16	5,75	1
40	39,5	40,5			16,5	20	19	23	16	· 21_	10,75	$\frac{1}{2}$
45	44,5	45,5			_	+	24	28	21	26	15,75	
50	49,5	50,5			-}		- <del></del> -		26	31_	20,75	
55	54,4	55,6		+-	-	+	+	1.	31	36	25,75	
60	59,4	60,6				_	<del></del>		T		30,75	7
	64,4	65,6		_Ļ	+	<del> </del>			T=-		35,75	
65					1	ı		<del></del>		1	45,75	;   9
	69,4	70,6		_+							40,70	

M sc

M M 1 M 1

M 1 M 1

M 10 M 20

M 22 M 24 M 26

M 30

M 38

M 42 / M 45 / M 48 / M 52 /

1) e m<sub>1</sub>.
2) The heac

3 Mat St = 9 St UQS A1 = Sta Al-Leg = CuZn = C Other ma 4 Finis Product c Surface ps General to

į

I d I b

			īv	10	M	12	(IV	1 14)	М	16	(M)	18)
т	hread size	d	M 10	X 1,25	M 12	X 1,25	(M 14	1 X 1,5	IXI 1€	X 1,5	(M 18	X 1.5
			M 1	0 X 1	M 12	X 1,5		_			(M)	3 X 2)
P 1)			1	,5	1,	,75	2		2		2,	5
b	Referenc	e dimension	32		36		40		44		48	
	max. 2)		16		18		21		24		27	_
$d_{\mathbf{k}}$	max, 3)		16	,27	18,	,27	21	,33	24,	.33	27,	33
·· K	min.		15	,73	17,	73	20	,67	23,	67	26,	67
$d_{\mathbf{a}}$	max.		11	,2	13,	.7	15	,7	17,	7	20,	2
	max.	-	10		12		14		16		18	
$d_s$	min.		9	,78	11,	73	13	,73	15,	73	17,	73
e	min. 4)		9,		11,	43	13	,72	16		16	
f	max.		1,	1,02		87	1	,87	1,	87	17,	87
,	max.		10		12	4	14		16		18	
k	min.		9	,64	11,	57	13	,57	15,	57	17,	57
r	mln.		0,4		0,	6	0	,6	0,	6	0,0	6
	Nominal dimensi		8		10		12		14		14	
s	min.		8,025		_	025		,032	<u> </u>	032	14,	
	min. max,		8,	175	10,	175	12,	,212		212		212
t	min,		5 1		6 1,2		7 1,4		8		9	
U	max.								1,		1,1	
$d_{\mathrm{w}}$	min.		15,	33	17,		20,		23,		25,	
w	min,		4		4,	8	5	,8	6,	8	7,1	
	ı					Sh	ank lenç	gths $l_{f s}$ and	$l_{\mathbf{g}}$			
			$l_s$	l lg	l <sub>s</sub>	l <sub>g</sub>	$l_s$	$l_{g}$	$l_s$	l <sub>e</sub>	$l_s$	$l_2$
Nominal length		max,	min.	max.	min,	max.	min,	max.	min.	max,	min.	ms.
	min.	16,35		4,5	1			<del> </del>				
16 20	15,65			4,5		5,25			,			
25	19,58 24,58	20,42 25,42		4,5	-	6,25	_	6		6		
30	29,58	30,42		4,5		5,25		6		6		7
35	34.5	35,5		4,5		5,25		6	_	6	_	7,
40	39,5	40,5		4,5		5,25		6		6		7,
45	44,5	45,5	5,5	13		5,25		6		6		7.
50	49,5	50,5	10,5	18		5,25	_	6		6	_	7
55	54,4	55,6	15,5	23	10,25	19		6		- 6	-	7
60	59,4	60,6	20,5	28	15,25	24	10	20		6	_	7
65	64,4	65,6	25,5	33	20,25	29	15	25	11	21		7
70	69,4	70,6	30,5	38	25,25	34	20	30	16	26	9,5	22
80	79,4	80,6	40,5	48	35,25	44	30	40	26	36	19,5	32
90	89,3	90,7	50,5	58	45,25	54	40	50	36	46	29,5	42
100	99,3	100,7	60,5	68	55,25	64	50	60	46	56	39,5	52
110	109,3	110,7			65,25	74	60	70	56	66	49,5	62
120	119,3	120,7			75,25	84	70	80	66	76	59,5	72
130	129,2	130,8					80	90	76	86	69,5	82
140	139,2	140,8					90	100	86	96	79,5	92
	149,2	150,8							96	106	89,5	102
150		160,8				1			106	116	99,5	112
150 160	159.2											
	179,2	180,8									119,5	132

3) These m previous

abl	e 1. (Cont	inued)			1040	184 601	55.73		M 24	1.3	(M 27)		M 30	******
			_  _	M 20		(M.22)	21	- N	VI 24 X		(M 27 X	2)	M 30 X	2
	Threa	d size d		M 20 X 1	7	(M 22 × 1	10 To 10 To 10	3.49	<u> </u>					
				M 20 X	2	(M 22 X	2)						3,5	
	D 1)			2,5		2,5			3		66		72	
	P 1)	eference dir	nension	52		56			60		40		45	
		max. 2)		30		33			36 36,39		40,39		45,39	
		max. 3)		30,33		33,39			35,61		39,61		44,61	_
		min.		29,67		32,61			26,4		30,4		33,4	
-		max.		22,4		24,4			24		27		30	
		max.		20		22		_	23,67		26,67	,	29,67	
	$d_s$ –	min.		19,6		21,67		· · -	21,73		21,73		25,15	
		min. 4)		19,44	4	19,44		ļ	2,04		2,89		2,89	
-	f	max,		2,0	4	2,04			24		27		20	
-		max.		20		22					26,48	3	29,48	
	k -	min.		19,4	8	21,48	3	-	23,48 0,8	+	1		11	_
-	r	mln.		0,8		0,8		├-	19		19		22_	
-		Nominal d	imension	17		17		-	19,06	5	19,0	65	22,06	35
	s	min.		17,0	5	17,0		+-	19,27		19,2	75	- 22,27	75
	8	max.		17,2	3	17,2	3	+	12	<del>-</del> -	13,5		15,5	
+	t	min.		10		11		+	2,4		2,7		3	
+	v	max,		2		2,2		+	34,81		38,6	1	43,6	1
$\vdash$	$d_{\mathbf{w}}$	min.		28,8	37	31,8		+	10,4		11,9	)	13,1	
-		min.		8,6	3	9,4		┵	k length	a Lond	1			
ŀ		1					5	nan	. 1		rg l <sub>s</sub> . ↓	l <sub>a</sub>	l <sub>s</sub>	i
				$l_s$	$l_{\mathbf{g}}$	l <sub>s</sub>	$l_{\mathbf{g}}$	1	l <sub>s</sub>	<sup>l</sup> g ]		_	min.	m
	Nominal			min.	max.	min.	max.	ł	min.	max.	mln.	max.	<del>                                     </del>	
	length	min.	max.									ļ		_
	16	15,65	16,35	┼──┤		+		I				<u> </u>	+	
るわり	20	19,58	20,42	┼──								<del> </del>	+	
	25	24,58	25,42	<del> </del>	7,5	J					<u> </u>	<del></del>	<del></del> -	 
ğ.	30	29,58	30,42 35,5	<del>  </del>	7,5	- 1	7,5	5			<u> </u>		+	┌╴
	35	34,5	40,5	<del> </del>	7,5		7,8	5		9	<u> </u>	9	+	
Š.	40	39,5	46,5	<del> </del>	7,5	- 1	7,5	5		9	<u> </u>	9	<del></del>	
	45	44,5	50,5	<del>+</del>	7.5	7 -	7,	5		9	<u> </u>	+ <u>-</u>	+	
l,	50	49,5	55,6	<del></del>	7,5		7,1	5		9	<u> </u>	9	+	
	55	54,4	60,6		7,5	T	7,	5		9	<u> </u>	9	+	m
	60	59,4 64,4	65,6	+	7.5		7,	5		9	<u> </u>	- 9		T
	65	+	70,6	<del>  _</del> _	7,5		7,	5		9_	<b></b>	+ - 9		
	70	69,4 79,4	80,6	15,5	28	11,5	24			9	<u> </u>	<del>  9</del>		177
A.S.	80	89,3	90,7	25,5	38	21,5	34	_	15	30	19	34	<del></del>	
	90	99,3	100,7	35,5	48	31,5	44	_	25	40	29	44	— <del>—</del> ———	+
	100		110,7	45,5	58	41,5	54		35	50		54	20 E	$\top$
N.A	110	109,3	120,7	55,5		51,5	64		45_	60	39 49	64		
	120	119,3 129,2	130,8	65,5	+	61,5	74		55	70	59			$\neg$
	130	139,2	140,8	75,5		71,5			65	80		-+		
	140	149,2	150,8			81,5			75_	90				1_
鰯	150	159,2	160,8			91,5			85	100				
1.00	160_	108,4	,00,0	115,9		111,5	124	1	105	120	33		4 110,5	$\neg \neg$

			(M. 3	3)	M 3	6	M 42		M 4		M 50	
Th	aread size $d$	F	(M 33	× 2)	M 36	X 3	M 42	₹3	M 48	X 3	M 56	مننسس
72.13			3,5		4		4,5		5		6,5	
P 1)	Reference c	imanaina	78	ì	84		96		108		124	
b	max, 2)	IIII BITAIO II	50		54		63		72		84_	
,			50,39	,	54,4	3	63,4	6	72,	46	84,5	
$d_{\mathbf{k}}$	max. 3)	<del>-</del>	49,6		53,54	4 -	62,5	4	71,	54	83,4	16
	mln,		36,4	·	39,4		45,5		52,	6	63_	
d <sub>a</sub>	max,		33		36		42		48		56_	
$d_s$	max,		32,6	1 -	35,6	1	41,6	1	_47,	61	55,	
	min.		27,4		30,8		36,5	7	41,	13	46,8	_
<u>e</u>	min. 4)		2,8		2,8		3,0	6	3,	91	5,0	95
<u>f</u>	max.		33		36		42		48		56	
k	max,		32,3	Q -	35,3	8	41,3	8	47,	38	56,	26
	min.		<u>32,3</u> 1	-	1		1,2	!	1,	6	2	
<u>r</u>	min				27		32		36		41	
	Nominal o	imension	24,065		27.0	65	32,0	8	36	08	41,	08
S	min.				27,2		32,3		36	,33	41,	33
	max,		24,2	/5	19		24		28		34	
t	min.		18		3,6		4.2	, -	4	,8	5,	5
υ	max.		3,3		52,5		61,3		70	,34	82,	26
$\_d_{\mathbf{w}}$	min,		48,6		15,3		16,3		17	,5	19	
w	min.		13,5		10,0		<u>-</u>			<u>.</u>		
	1					Sh	ank lengt	hs $l_{\mathbf{g}}$ and	•		, ,	ī
	•		l <sub>s</sub>	$l_{g}$	$l_s$	$l_{\mathbf{g}}$	ł,	l <sub>g</sub>	l <sub>s</sub>	$l_{\mathbf{g}}$	l <sub>s</sub>	$l_{\mathbf{g}}$
Iomina			min.	max.	min.	max.	min.	max.	min.	max.	mln.	max
length	min.	max.		$\longrightarrow$		<del> </del>						
50	49,5	50,5		10,5		12						
55	54,4	55,6		10,5		12		13,5				
60	59,4	60,6		10,5		12		13,5				
65	64,4	65,6		10,5		12		13,5		15	i	L
70	69,4	70,6		10,5		12		13,5		15		16
80	79,4	80,6		10,5		12		13,5		15		16
90	89,3	90,7		10,5				13,5		15	-	16
100	99,3	100,7		10,5	_=_	12 12		13,5		15		16
110	109,3	110,7	14,5	32	-	36 7		13,5		15	Ţ <u></u>	16
120	119,3	120,7	24,5	. 42	16	46	<u> </u>	13.5		15		16
130	129,2	130,8	34,5	52	26		21,5	44		15		16
	139,2	140,8	44,5	62	36	56 66	31,5	54	<del>  _</del> _	15	T	16
140	1	150,8	54,5	72	46	+	41,5	64	27	52	Ţ <u></u>	1.
140 150	149,2		1 045	82	56	76		84	47	72	56	Ę
	149,2 159,2	160,8	64,5				61,5	L-04-	<del></del> -	92	48,5	716
150		160,8 180,8	84,5	102	76	96	01 =	104				
150 160	159,2		<del></del>	102 122	96	116	81,5	104	67		68,5	.96
150 160 180	159,2 179,2	180,8	84,5	102	96 116	116 136	101,5	124	87	112	68,5 88,5	
150 160 180 200	159,2 179,2 199,1	180,8 200,9	84,5 104,5	102 122	96 116 136	116 136 156	101,5 121,5	124 144	87 107	112	88,5	316
150 160 180 200 220 240	159,2 179,2 199,1 219,1	180,8 200,9 220,9	84,5 104,5 124,5	102 122 142	96 116 136 156	116 136 156 176	101,5 121,5 141,5	124 144 164	87 107 127	112 132 152	88,5 108,5	130
150 160 180 200 220	159,2 179,2 199,1 219,1 239,1	180,8 200,9 220,9 240,9	84,5 104,5 124,5 144,5	102 122 142 162	96 116 136	116 136 156	101,5 121,5	124 144	87 107	112	88,5	130 150 17

<sup>3)</sup> These previo

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М

М:

M 48 M 48 M 53

1) e 2) T

3 M St = 9 U A1 = 5 AL-Ler, CuZn PA = F Other 4 Fit. Produc Surface General

158

Table	1.	Cast	tinued	•

016 1. (00	ontinued)		M 64		M 72>		M 80		M 90		M 100	
Th	read size d	-	M 84)	< 4	M 72>	4	M 80	<b>∠4</b>	M 90	× 4	M 100	Х 4
P 1)			6		6		6		6	- — +	6	
- <del>P )</del>	Reference of	imension	140		156		172		192	—— <del>`</del>	212	
	max. 2)	III I CHAICH	96		108		120		135		150	
ر	max. 3)	+	96,5	4	108,5	4	120,8	54	135,		150,	
$d_{\mathbf{k}}$			95,4		107,4	6	119,4	16	134,	37	149,	31
	min,		71		79		87		97		107_	
d	max.		64	_	72		80		90		100	
$d_s$	max.		63,5	4	71,5	4	79,	54	_89,	46	99,	
	min. 41		52,5		62,8	31	74,	21	85,		97,	
<u>e</u>	min. 4)		5.9		5,9	35	5,	95		95		95
	max.		64	-	72		80		90		100	
k	max.		63,2	26	71,	26	79,	26	89		99	
	min.		2		2		2			,5		,5
r	min.	imposion	46		55		65		75		85	
	Nominal dimension		46.0	n8 i	55,	10	65,	10	75	,10		,12
S			46		55,		65,	40	75	,40		<u>,47</u>
	max.		38	-	43		48		54		60	
t	min.		6,	Δ	7,	2 i	8		9		10	
<u>v</u>	max.		94,		106,		118	16	133	,17	148	
$d_{\mathbf{w}}$	min.		22		25		27		32		34	
tv	min.						ank lengt	hs I and	1.			
						الت	allik lelligi		* g			
	l	Į.					· ·	-	1 ,		I.	1 4
			l <sub>s</sub>	l <sub>g</sub>	$l_s$	l <sub>g</sub>	$I_{\mathrm{s}}$	$l_{\mathbf{g}}$	l <sub>s</sub>	l <sub>g</sub>	I <sub>s</sub>	l <sub>g</sub>
Nominal		max.	l <sub>s</sub>	lg max.	l <sub>s</sub>		· ·	-	l <sub>s</sub> min.	lg max.	I <sub>s</sub>	
length	min.	max.	- i	-	-	l <sub>g</sub>	$l_{\mathrm{s}}$	$l_{\mathbf{g}}$			_	max
length 50	min. 49,5	50,5	- i	-	-	l <sub>g</sub>	$l_{\mathrm{s}}$	$l_{\mathbf{g}}$			_	1
50 55	min. 49,5 54,4	50,5 55,6	- i	-	-	l <sub>g</sub>	$l_{\mathrm{s}}$	$l_{\mathbf{g}}$			_	1
50 55 60	49,5 54,4 59,4	50,5 55,6 60,6	- i	-	-	l <sub>g</sub>	$l_{\mathrm{s}}$	$l_{\mathbf{g}}$			_	
50 55 60 65	49,5 54,4 59,4 64,4	50,5 55,6 60,6 65,6	- i	-	-	l <sub>g</sub>	$l_{\mathrm{s}}$	$l_{\mathbf{g}}$			_	1
50 55 60 65 70	49,5 54,4 59,4 64,4 69,4	50,5 55,6 60,6 65,6 70,6	- i	-	-	l <sub>g</sub>	$l_{\mathrm{s}}$	$l_{\mathbf{g}}$			_	1
50 55 60 65 70 80	54,4 59,4 64,4 69,4 79,4	50,5 55,6 60,6 65,6 70,6 80,6	- i	max.	-	l <sub>g</sub>	$l_{\mathrm{s}}$	$l_{\mathbf{g}}$			_	1
50 55 60 65 70 80	9,5 54,4 59,4 64,4 69,4 79,4 89,3	50,5 55,6 60,6 65,6 70,6 80,6 90,7	min.	max.	-	n ax.	$l_{\mathrm{s}}$	$l_{\mathbf{g}}$			_	1
length	9,5 54,4 59,4 64,4 69,4 79,4 89,3 99,3	50,5 55,6 60,6 65,6 70,6 80,6 90,7	min.	18 18	-	nax.	$l_{\mathrm{s}}$	$l_{\mathbf{g}}$			_	1
length	69,4 69,4 69,4 79,4 89,3 99,3	50,5 55,6 60,6 65,6 70,6 80,6 90,7 100,7	min.	18 18 18	-	18 18	$l_{\mathrm{s}}$	$l_{\mathbf{g}}$			_	1
length	69,4 69,4 79,4 89,3 99,3 119,3	50,5 55,6 60,6 65,6 70,6 80,6 90,7 100,7 110,7 120,7	min.	18 18 18	-	1g max.	I <sub>s</sub>	t <sub>g</sub> max.			_	1
length	79,4 64,4 69,4 79,4 89,3 99,3 109,3 119,3 129,2	50,5 55,6 60,6 65,6 70,6 80,6 90,7 100,7 110,7 120,7 130,8	min.	18 18 18 18 18 18	min.	18 18 18	l <sub>s</sub> min.	t <sub>g</sub> max.			_	max
length	79,4 64,4 69,4 79,4 89,3 99,3 109,3 119,3 129,2 139,2	50,5 55,6 60,8 65,6 70,6 80,6 90,7 100,7 110,7 120,7 130,8 140,8	min.	18 18 18 18 18 18 18 18	-	18 18 18 18 18	Is min.	l <sub>g</sub> max.		max.	_	max
length	99,3 119,3 129,2 149,5 554,4 59,4 64,4 69,4 79,4 89,3 99,3 109,3 119,3 129,2 139,2	50,5 55,6 60,6 65,6 70,6 80,6 90,7 100,7 110,7 120,7 130,8 140,8	min.	18 18 18 18 18 18 18	min.	18 18 18 18 18 18 18	l <sub>s</sub> min.	lg max.	min.	max.	_	max
length	99,3 109,3 119,3 129,2 159,2	50,5 55,6 60,6 65,6 70,6 80,6 90,7 100,7 110,7 120,7 130,8 140,8 150,8 160,8	min.	18 18 18 18 18 18 18 18 18	min.	18 18 18 18 18 18	Is min.	lg max.	min.	18 18	min,	1: 1:
length	min. 49,5 54,4 59,4 64,4 69,4 79,4 89,3 99,3 109,3 119,3 129,2 139,2 149,2 159,2 179,2	50,5 55,6 60,6 65,6 70,6 80,6 90,7 100,7 110,7 120,7 130,8 140,8 160,8 180,8	min.	18 18 18 18 18 18 18 18 18 18 18 18 18 1	min.	18 18 18 18 18 18 18 18	Is min.	18 18 18 18 18	min.	18 18 18	min,	11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
length	min. 49,5 54,4 59,4 64,4 69,4 79,4 89,3 99,3 109,3 119,3 129,2 139,2 149,2 179,2 199,1	50,5 55,6 60,6 65,6 70,6 80,6 90,7 100,7 110,7 120,7 130,8 160,8 160,8 200,9	min.	18 18 18 18 18 18 18 18 18 18 18 18 18 1	min.	18 18 18 18 18 18 18 18 18 18 18 18	I <sub>s</sub> min.	18 18 18 18 18	min.	18 18 18 18	min.	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
length	min. 49,5 54,4 59,4 64,4 69,4 79,4 89,3 99,3 109,3 119,3 129,2 139,2 149,2 159,2 179,2 199,1 219,1	50,5 55,6 60,6 65,6 70,6 80,6 90,7 100,7 110,7 120,7 130,8 140,8 160,8 180,8 200,9 220,9	30 50	18 18 18 18 18 18 18 18 18 18 18 18 18 1	min.	18 18 18 18 18 18 18 18 18	Is min.	1g max.	min.	18 18 18 18 18	min.	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
length	min. 49,5 54,4 59,4 64,4 69,4 79,4 89,3 99,3 109,3 119,3 129,2 139,2 149,2 179,2 199,1 219,1 239,1	50,5 55,6 60,6 65,6 70,6 80,6 90,7 100,7 110,7 120,7 130,8 140,8 160,8 120,9 220,9 240,9	30 50	18 18 18 18 18 18 18 18 18 18 18 18 18 1	min.	18 18 18 18 18 18 18 18 18 18 18 18 48	Is min.	18 18 18 18 18 18 18 18	min.	18 18 18 18 18 18	min.	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
length	min.  49,5  54,4  59,4  64,4  69,4  79,4  89,3  99,3  109,3  119,3  129,2  139,2  149,2  159,2  179,2  199,1  219,1  239,1  258,95	50,5 55,6 60,6 65,6 70,6 80,6 90,7 100,7 110,7 120,7 130,8 140,8 160,8 180,8 200,9 220,9 240,9 261,05	30 50 70	18 18 18 18 18 18 18 18 18 18 18 18 10 100 10	min.	18 18 18 18 18 18 18 18 18 18 18 18 4 4 104	I <sub>s</sub> min.	18 18 18 18 18 18 18 18 88	min.	18 18 18 18 18 18 18 18	min,	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
length	min. 49,5 54,4 59,4 64,4 69,4 79,4 89,3 99,3 109,3 119,3 129,2 139,2 149,2 179,2 199,1 219,1 239,1	50,5 55,6 60,6 65,6 70,6 80,6 90,7 100,7 110,7 120,7 130,8 140,8 160,8 120,9 220,9 240,9	30 50	18 18 18 18 18 18 18 18 18 18 18 18 18 1	min.	18 18 18 18 18 18 18 18 18 18 18 18 48	Is min.	18 18 18 18 18 18 18 18	min.	18 18 18 18 18 18 18 18	min,	1: 1:

The commercial nominal lengths are designated by giving the shank lengths  $l_{\rm s}$  and/or  $l_{\rm g}$ . Thread sizes and intermediate lengths given in brackets shall be avoided where possible. Nominal lengths above 300 mm shall be in 20 mm steps. Screws with nominal length above the dashed stepped line are threaded to head (distance between the last full thread and Screws with nominal length above the dashed stepped line have  $l_{\rm g}$  and  $l_{\rm g}$  values in the head bearing surface  $l_{\rm g}$  max. = 3 P). Screws with nominal length below the dashed stepped line have  $l_{\rm g}$  and  $l_{\rm g}$  values in accordance with the following formulae:  $l_{\rm g}$  max. = l (nominal length) — b (reference dimension);  $l_{\rm g}$  min. =  $l_{\rm g}$  max. — 5 P. The values given for  $l_{\rm g}$  and  $l_{\rm g}$  apply to screws with coarse threads.

### Technical delivery conditions

Mat	erial	Steel	Stainless steel	Non-ferrous metal						
General requirer		In accordance with DIN 287 Part 1.  5g8g for property class 12.9; 6g <sup>1</sup> ) for other property classes.								
	Tolerance									
Thread	Standard	ISO 261, ISO	965 OIN 13 Part 12	and Part 15						
Mechanical properties	Property class (material)	≤ M39 ²): 8.8; 10.9; 12.9 > M39: as agreed	≤ M 20: A2-70; A4-70 > M 20 ≤ M 39: A2-50 <sup>3</sup> ) A4-50 ≤ M 39: C3 > M 39; B5 agreed							
	Standard	DIN ISO 898 Part 1	ISO 3506 4) DIN 267 Part 11 4)	DIN 267 Part 18 5)						
Tolerances on dimensions	Product grade		Α							
and form	Standard	ISC	4759/1/DIN ISO 4759 Pa	rt 1						
101711		Black oxide (thermal or chemical)	Bright	Bright						
Surface		oallay heights of the surface. DIN 267 Part 19 shall app	oly with regard to the perif ly with regard to electropia por other surface protectio	issible surface defects. ting.						
Acceptance test	ting		shall apply with regard to a	icceptance testing.						

- 1) Only for screws without surface protection, 6g makes it possible for normal coating thicknesses to be applied in accordance with DIN 267 Part 9 but the reference line shall not be exceeded. Depending on the coating thickness required, a larger fundamental deviation shall be selected than that for the glossition. A larger fundamental deviation of the coating thickness required a larger fundamental deviation shall be selected than that for the glossition. A larger fundamental deviation is a larger fundamental deviation of the coating thickness required in the coating the coati tion may impair the stripping strength of the screw/nut connection.

  2) in 150:4782, only up to M 36 or below.
- 3) In ISO 4742 A2.80 is not correct, and an application has been made to ISO for a correction.
- The content of ISO 3508 is covered by DIN 267 Part 11, it was still being prepared when ISO 4762 1977 was published.
- 5) A selection of materials from DIN 267 Part 18 will be specified later for hexagon socket head cap screws.

## 4 Designation

Designation of a hexagon-socket head cap scraw with M 12 scraw thread, nominal length i = 60 mm and assigned to prop-Hexagon socket head cap screw DIN 912 - M 12 imes 60 - 12.9 erty class 12,9:

DIN 962 shall apply with regard to the designation of types and designs with additional data to be given when ordering, e.g. type B with shank dlameter \* pitch dlameter.

DIN 6900 shall apply with regard to the designation of designs with captive components (screw assemblies).

DIN 7500 applies with regard to the designation of designs with thread-forming properties.

The international designation for hexagon socket head cap screws in accordance with ISO 4762 (not the shaded data) is, Hexagon socket head cap screw ISO 4762 - M 12 imes 60 - 12.9

As present, the ISO 4762 designation does not include an acceptance test in accordance with DIN 267 Part 5. DIN 4000-2-1 tabular layout of article characteristics shall apply to screws in accordance with this standard.

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<sup>3)</sup> The prev

The values of mass given are guidance values and are given for the commercial lengths.

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able 2.				<del></del>									- 0) 8	a 16	(M 18)	M :	20
hread size d	м 1,4	M 1,6	M 2	M 2,5	M 3	M 4	M 5	M 6	M 8	M 10	M 12	(IVI	14/11	110			_
ominal ength					M	ass (7,8	5 kg/dm	3) kg p	er 1000	) units f	* 	T					_
2	0,055											+-				$\perp$	
2,5	0,060	0,085							<u> </u>			i				1_	
	0,065	0,090	0,155									+			<u></u>	1	
4	0,075		0,175			ļ. <u>.                                   </u>									<u> </u>	┷	
5	0,085	0,110	0,195	0,375	0,67	1	<del> </del>				-	+			<u></u>	4_	
6	0,095	0,120	0,215		0.71	1,50	0.45				-	1				1	
9	0,115	0,140	0,255	0,465	0,80	1,65	2,45	4.70		·	1	1				1	
10	0,135	0,160	0,295		0,88	1,80	2,70	5.07	10,9		1	+				$\perp$	
12	0,155	0,180			0,96	1,95	2,95	5.75	12.1	20,9	┼┈╹				J		
16		0,220	0,415	0,705	1,16	2,25	3,45	6,53		22,9	32,	1			<u> </u>		
20			0,495		1,36	2,65	4,01	7,59	-	<del></del>	35,	7	48,0	71,3		4	
25				0,975	1,61	3,15		8,30	+	<del></del>	39	3	53,0	77,8			128
30					1,86	3,65	_ <del></del>	9,91	<del></del>		42	9	58,0	84,4			139
35						4,15		11,0	20,9		46	,5	63,0	91,0	129		150
40				<del></del>	<del></del>	4,65	7,86	12,1	22,9			,1	68,0	97,			161
45					<del> </del>	∔—	8,63	13,2	24,9			,5	73,0	106	147	-+	172
50			_Ĺ	<u> </u>	<b>↓</b>		8,03	14,3	26,9		_	9	78,0	114	156	ì	183
55					<del>-</del>			15,4	28,9		-	,4	84,0	122	169		194
60						<del>-</del>		110,4	31,0			,8	90,0	130	17	-+	205
65					<del></del>				33,0		_+-	,3	96,0	138	18	3	216
70					<del></del>			<del> </del>	37,			),2	108	154	20	3	241
80			_L	\	<u> </u>				-+	64,		9,1	120	170	-+		266
90			\					+		71		3,0	132	186		_	29
100				_						.——	10	7	144	202			310
110				_Ļ_	4-	_+_	<del></del> -		_		11		156	218			34
120							_+	+-		-+-	-		168	234		_	36
130								<del></del>	-	-+-	<u> </u>		180	250		23	39
140						_+-			-+-		-+-			266	3	43	41
150	_+_									_+-	-		ļ	283	2 3	63	44
160						_+-			- <del></del>	-					4	03	49
180							}		$\dashv -$	-+-							54
20		$-t^-$		1					L_								

For hexagon socket head cap screws with fine threads, approximately the same masses may be assumed.

Thread size d	(M 22)	M 24	(M 27)	M 30	(M 33)	М 3	36	M 42	M 48	M 56	M 64	M 72 × 6	X 6	M 90 × 6	M 100 × 8
Nominal length					Λ	Aass	(7,8	5 kg/di	m <sup>3</sup> ) kg	per 100	0 units ≈				······································
35	211		<u> </u>			. —									
40	224	270	<u> </u>			!	$\dashv$	<del>-</del>			+				
45	237	285	330	500	<u> </u>				1			-			
50	250	300	352	527	630	ļ. <u> </u>					<del> </del>				
55	263	316	374	554	665	<u> </u>	70	4070	L		<del> </del>	<del> †</del>			
60	276	330	396	581	700		10	1370	-	_					
65	291	345	418	608	735	<del></del>	50	1420	2010				_— <del>-</del>		
70	306	363	440	635	770	<u>. —                                    </u>	90	1470	2040		ļ			— <del></del>	
80	336	399	484	690	830	10	_	1580	2180	<u> </u>					
90	366	435	529	745	900	11	_	1680	2320	<u>-</u> -					
100	396	471	574	800	970	12		1790	2460		<u> </u>				
110	426	507	619	855	1040	13		1890	2600	<u> </u>	-				i
120	456	543	664	910	1110	13		2000	2740		<u> </u>	<del></del>			
130	486	579	709	965	1180		70	2100	2880		<del> </del>		i		
140	516	615	754	1020	1250	<del>-</del>	50	2210	3020	<del>                                      </del>		<u> </u>			-
150	546	651	799	1080	1320	+	30	2320	3160	4000	<del> </del>			<del></del>	i
160	576	687	844	1130	1390		10	2420	3300	4880	7 250	<del> </del>	<del></del>		†
180	636	759	934	1240	1530		70	2640	3590	5270 5650	7 750	9 950	<del>                                     </del>	<u> </u>	-
200	696	831	1020	1350	1670		30	2860	3870	6040	<del></del>	10 600	<del> </del>	<u> </u>	
220	756	903	1110	1460	<del>-</del>	+	90	3080	4150		8 750	11 300	14 300	j — - —	_
240		975	1230	1570	1950	<del></del>	250	3300	4430	6420	9 260	11 900	15 100	19 900	25 7
260		J	1340	1680		+	10	3520	4710	6810	9 760	12 600	15 800	20 900	26 9
280				1790			570	3740	4990	7200	10 300	13 300	16 600	21 900	28 2
300	1	Ţ		1900	2320	27	730	3960	5270	7580	10 300	113 300	10 000	12,000	

# Standards referred to

a)	in	ISO	4762	_	1977
a i	111	100	777 064		

ISO 261 - 1973

ISO 888 - 1976

ISO general purpose metric screw threads — General plan (see DIN 13 Part 12) Bolts, screws and study — Nominal lengths and thread lengths for general purpose bolts (no comparable DIN Standard available; the ISO Standard has been taken into account in the

relevant DIN Standards on bolts and screws)

ISO 898/1 - 1978 ISO 965/1 - 1980 Mechanical properties of fasteners; Part 1: Bolts, screws and studs (see DIN ISO 898 Part 1) ISO general purpose metric screw threads — Tolerances; Part 1: Principles and basic data (see

DIN 13 Part 14) ISO general purpose metric screw threads — Tolerances; Part 2: Limits of sizes for general

ISO 965/2 - 1980

purpose bolt and nut threads — Medium quality (see DIN 13 Part 15)

ISO 3506 - 1979

Corrosion-resistant stainless steel fasteners — Specifications (see DIN 267 Part 11)

ISO 4759/1 - 1978

Tolerances for fasteners; Part 1: Bolts, screws and nuts with thread diameters  $\geq$  1,6 < 150 mm

and product grades A, B and C

b) in this standard

DIN 13 Part 12

ISO metric screw threads; coarse and fine threads from 1 to 300 mm diameter; selection of

13 Part 15 DIN

diameters and pitches ISO metric screw threads; fundamental deviations and tolerances for screw threads from 1 mm. diameter

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DIN		Thread ends, lengths of projection of thread ends for ISO metric screw threads as defined in DIN 13
DIN DIN	267 Part 1 267 Part 2	Fasteners; technical delivery conditions; general requirements  (at present at the stage of draft) Fasteners; technical delivery conditions, types of finishes and dimensional accuracy
DIN DIN DIN DIN	267 Part 5 267 Part 9 267 Part 11 267 Part 18 267 Part 19 962 4000 Part 2	Fasteners; technical delivery conditions, acceptance testing Fasteners; technical delivery conditions, components with electroplated coatings Fasteners; technical delivery conditions with supplements to ISO 3506, components made of Fasteners; technical delivery conditions, components made of non-ferrous metals Fasteners; technical delivery conditions, components made of non-ferrous metals Fasteners; technical delivery conditions, surface defects on bolts and screws Screws, bolts, studs and nuts; designations, types and finishes Tabular layouts of article characteristics for bolts, studs and nuts
110 110 110	N 6900 N 7500 N ISO 898 Part 1 N ISO 4759 Part 1	Screw assemblies Thread-forming screws for ISO metric screw threads Mechanical properties of fasteners; bolts, screws and studs Tolerances for fasteners; bolts, screws and nuts with thread diameters ≥ 1,6 and ≤ 150 mm and product grades A, B and C

DIN 912 Part 1: 11.70; DIN 912 Part 2: 10.69; DIN 912: 10.33, 02.37, 04.46, 07.63, 03.61, 12.67, 09.79

Compared with the September 1979 edition, the following amendments have been made:

- a) The content of the standard has been revised editorially.
- b) The designation in accordance with ISO 4762 has been included.
- c) The values for  $d_{\rm a}$  have been changed for sizes M 12, M 14 and M 16.
- d) The masses for sizes M 58 to M 100  $\times$  6 have been corrected.
- e) The M 18  $\times$  2, M 20  $\times$  2 and M 22  $\times$  2 fine threads have been included.
- f) The reference to the permissible product grade F for sizes up to M 2.5 has been deleted.
- g) For general requirements, reference has been made to DIN 267 Part 1 and for permissible surface defects to
- h) The position of the dashed stepped line for M 12, M 16, M 18, M 20, M 30, M 36, M 42, M 48 and M 56 has been changed.

As can be seen from the amendment section, no major or misleading amendments have been made to this revised edition of DIN 912 compared with the previous September 1979 edition. A few important points which have resulted from adopting ISO 4762 in modified form are explained below to help understand the standard:

- a) It was not possible to adopt ISO 4762 1977 as national Standard DIN ISO 4762 and as a replacement for the November 1970 edition of DIN 912 Part 1 and the October 1969 edition of Part 2 in unmodified form, as ISO 4762 only covers parts of the scope of these standards (M 1,6 to M 36) and does not specify any intermediate sizes. Also, ISO 4762 does not contain some international reference standards which, until they appear, have to be replaced by national standards, e.g. DIN 267 Part 5 for the acceptance test.
- b) In order to include ISO 4762 in modified form in DIN 912, the so called shading solution, which in the meantime has also been used for other standards on fasteners, has been adopted, i. e. all the national specifications deviating from or extending beyond ISO 4762 – 1977 have been indicated by shading. Nothing has been deleted from ISO 4762.
- c) Translator's note. Paragraph c) is only of relevance to the German original and has thus been omitted from this trans-
- d) In the 1979 edition of DIN 912, some of the previous thread lengths were increased to comply with ISO 4762. After this edition was published, difficulties of conversion resulted in some cases which have, however, been resolved in the meantime. As is well known, b = 2 d + 12 mm applies uniformly for calculating the thread lengths.

e) Detailed dimensions have been given for the head bearing surface and maximum underhead fillet. As before, doubts still exist about the value specified in ISO 4762 - 1977 for the bearing surface diameter  $d_{\rm w}$  min. Values corresponding to  $d_{\rm w}$  min.  $= d_{\rm k}$  min. - IT 15 are more suitable in practice from the cold forming point of view. Discussions are being held on an international basis about a corresponding revision of ISO 4762 and ISO 4759/1 (see DIN ISO 4759 Part 1). When calculating the surface pressures, it is recommended using the following proposed values in the range M 3 to M 24:

	Thread size d		M 4	M 5	M 6	M 8	M 10	M 12
d <sub>w</sub>	ISO 4762 (DIN 912)	5,07	6,53	8,03	9,38	12,33	15,33	17,23
min,	(Proposal)	4,84	6,20	7,70	9,20	12,03	15,03	17,03

	Thread size d	M 14	M 16	M 18	M 20	M 22	M 24
$d_{\mathbf{w}}$	ISO 4762 (DIN 912)	20,17	23,17	25,87	28,87	31,81	34,81
min.	(Proposal)	19,83	22,83	25,83	28,83	31,61	34,61

- f) The previous depths of the hexagon sockets have been reduced in line with ISO 4762 for reasons of head strength and a resulting minimum base thickness w given. The tolerances for the widths across flats have been narrowed somewhat. A second type for the hexagon socket (prebored and finished) has been included.
- g) The limiting values of the individual dimensions have been included. They have been calculated in accordance with DIN ISO 4759 Part 1 (supersedes parts of DIN 267 Part 2).
- h) Instead of the previous "design m", product grade A has been given in line with DIN ISO 4759 Part 1 without any major changes to the tolerances resulting.
- j) The masses of hexagon socket head cap screws not included in ISO 4762 1977 have been listed in a separate table. As before, because of the tolerances on dimensions, these are approximate values.
- k) As a supplement to ISO 4762 1977, fine threads have been included in line with the selection described in DIN 13 Part 13. It also applies to sizes M 10 × 1 and M 12 × 1,5 not included in the international selection of thread sizes for screws (ISO 262), but which are required nationally. Efforts are being made to have ISO 262 revised.
- The October 1969 edition of DIN 912 Part 2 also specified product grade F in accordance with DIN 267 Part 6 for sizes up to M 2,5. However, this product grade is not usual for hexagon socket head cap screws, even in the small sizes. Therefore, it has been deleted.
- m) The technical delivery conditions have been supplemented with references to the corresponding basic standards.
- n) The contents of the standard have been aligned editorially with ISO 4762 1977, ISO 4762 1977 contains some printing errors. These have been corrected in this standard. Corresponding corrections are planned for the ISO Standard.

# International Patent Classification

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