DIN EN ISO 4762

DIN

ICS 21.060.10

Supersedes
February 1998 edition.

Hexagon socket head cap screws

(ISO 4762 : 2004)
English version of DIN EN ISO 4762

Zylinderschrauben mit Innensechskant (ISO 4762 : 2004)

European Standard EN ISO 4762 : 2004 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 4762 as a European Standard.

The responsible German body involved in its preparation was the *Normenausschuss Mechanische Verbindungselemente* (Fasteners Standards Committee), Technical Committee *Schrauben mit Innenantrieb.*

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

ISO Standard	DIN Standard
ISO 225	DIN EN 20225
ISO 261	DIN ISO 261
ISO 898-1	DIN EN ISO 898-1
ISO 965-2	DIN ISO 965-2
ISO 965-3	DIN ISO 965-3
ISO 3269	DIN EN ISO 3269
ISO 3506-1	DIN EN ISO 3506-1
ISO 4042	DIN EN ISO 4042
ISO 4753	DIN EN ISO 4753
ISO 4759-1	DIN EN ISO 4759-1
ISO 6157-1	DIN EN 26157-1
ISO 6157-3	DIN EN 26157-3
ISO 8839	DIN EN 28839
ISO 8992	DIN ISO 8992
ISO 10683	DIN EN ISO 10683
ISO 23429	DIN EN ISO 23429

Continued overleaf.
Document comprises 14 pages.

English price group 10
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Amendments

This standard differs from the February 1998 edition in that it has been completely revised.

Previous editions

DIN 912: 1933-10, 1937-02, 1946-04, 1953-07, 1961-03, 1967-12, 1979-09, 1983-12; DIN 912-1: 1970-11; DIN 912-2: 1969-10; DIN EN ISO 4762: 1998-02.

National Annex NA

Standards referred to

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

DIN EN 20225	Bolts, screws, studs and nuts – Symbols and designations for dimensioning (ISO 225 : 1983)
DIN EN 26157-1	Fasteners – Surface discontinuities – Part 1: Bolts, screws and studs for general requirements (ISO 6157-1 : 1988)
DIN EN 26157-3	Fasteners – Surface discontinuities – Part 3: Bolts, screws and studs for special requirements (ISO 6157-3 : 1988)
DIN EN 28839	Mechanical properties of fasteners – Bolts, screws, studs and nuts made of non-ferrous metals (ISO 8839 : 1986)
DIN EN ISO 898-1	Mechanical properties of fasteners made of carbon steel and alloy steel – Part 1: Bolts, screws and studs (ISO 898-1 : 1999)
DIN EN ISO 3269	Fasteners – Acceptance inspection (ISO 3269 : 2000)
DIN EN ISO 3506-1	Mechanical properties of corrosion-resistant stainless steel fasteners – Part 1: Bolts, screws and studs (ISO 3506-1 : 1997)
DIN EN ISO 4042	Fasteners – Electroplated coatings (ISO 4042 : 1999)
DIN EN ISO 4753	Fasteners – Ends of parts with external ISO metric screw thread (ISO 4753:1999)
DIN EN ISO 4759-1	Tolerances for fasteners – Part 1: Bolts, screws, studs and nuts – Product grades A, B and C (ISO 4759-1 : 2000)
DIN EN ISO 10683	Fasteners – Non-electrolytically applied zinc flake coatings (ISO 10683 : 2000)
DIN EN ISO 23429	Gauging of hexagon sockets (ISO 23429 : 2004)

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN ISO 4762

March 2004

ICS 21.060.10

Supersedes EN ISO 4762 : 1997.

English version

Hexagon socket head cap screws
(ISO 4762 : 2004)

Vis à tête cylindrique à six pans creux (ISO 4762 : 2004)

Zylinderschrauben mit Innensechskant (ISO 4762 : 2004)

This European Standard was approved by CEN on 2004-01-16.

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.

The European Standards exist 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.

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CEN

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

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

Ref. No. EN ISO 4762 : 2004 E

Foreword

International Standard

ISO 4762 : 2004 Hexagon socket head cap screws,

which was prepared by ISO/TC 2 ‘Fasteners’ of the International Organization for Standardization, has been adopted by Technical Committee CEN/TC 185 ‘Threaded and non-threaded mechanical fasteners and accessories’, the Secretariat of which is held by DIN, as a European Standard.

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 September 2004 at the latest.

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

Austria, Belgium, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom.

Endorsement notice

The text of the International Standard ISO 4762 : 2004 was approved by CEN as a European Standard without any modification.

Contents

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1 Scope

This International Standard specifies the characteristics of hexagon socket head cap screws with coarse pitch thread from M1,6 up to and including M64 and product grade A.

For approximate masses of screws see Annex A.

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

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

ISO 261, *ISO general-purpose metric screw threads — General plan*

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

ISO 898-1, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs*

ISO 965-2, *ISO general purpose metric screw threads — Tolerances — Part 2: Limits of sizes for general purpose external and internal screw threads — Medium quality*

ISO 965-3, *ISO general purpose metric screw threads — Tolerances — Part 3: Deviations for constructional screw threads*

ISO 3269, *Fasteners — Acceptance inspection*

ISO 3506-1, *Mechanical properties of corrosion-resistant stainless-steel fasteners — Part 1: Bolts, screws and studs*

ISO 4042, *Fasteners — Electroplated coatings*

ISO 4753, *Fasteners — Ends of parts with external ISO metric thread*

ISO 4759-1, *Tolerances for fasteners — Part 1: Bolts, screws, studs and nuts — Product grades A, B and C*

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

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

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

ISO 8992, *Fasteners — General requirements for bolts, screws, studs and nuts*

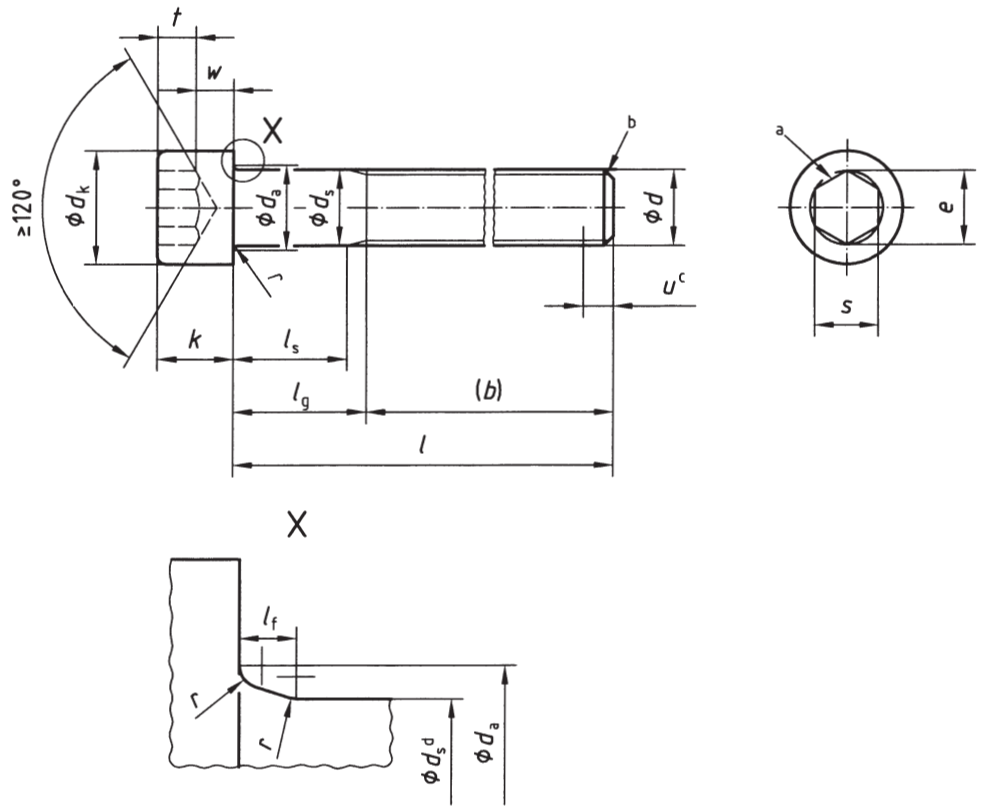
ISO 10683, *Fasteners — Non-electrolytically applied zinc flake coatings*

ISO 23429, *Gauging of hexagon sockets*

3 Dimensions

See Figure 1 and Table 1.

Symbols and designations of dimensions are defined in ISO 225.



Maximum underhead fillet

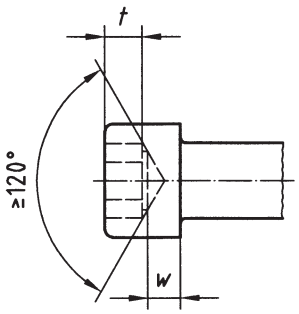
$l_{f,\,max} = 1{,}7\, r_{max}$

$r_{max} = \frac{d_{a,\,max} - d_{s,\,max}}{2}$

r_{min}, see Table 1

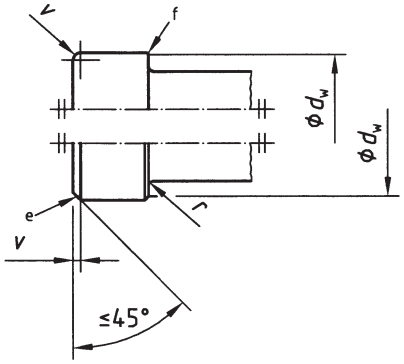
Figure 1

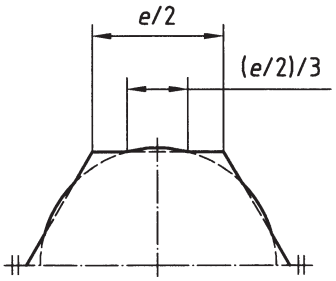
Permissible alternative form of socket



For broached sockets which are at the maximum limit of size the overcut resulting from drilling shall not exceed 1/3 of the length of any flat of the socket which is $e/2$.

Top and bottom edge opf the head





[a] A slight rounding or countersink at the mouth of the socket is permissible.

[b] Point chamfered or for sizes M4 and below “as rolled” according to ISO 4753.

[c] Incomplete thread $u \leqslant 2\ P$.

[d] d_s applies if values of $l_{s,\ min}$ are specified.

[e] Top edge of head may be rounded or chamfered as shown at the option of the manufacturer.

[f] Bottom edge of head may be rounded or chamfered to d_w but in every case shall be free from burrs.

Figure 1 (*continued*)

Table 1 — Dimensions

Dimensions in millimetres

Thread (d)		M1,6	M2	M2,5	M3	M4	M5	M6	M8	M10	M12
P[a]		0,35	0,4	0,45	0,5	0,7	0,8	1	1,25	1,5	1,75
b[b]	ref.	15	16	17	18	20	22	24	28	32	36
d_k	max.[c]	3,00	3,80	4,50	5,50	7,00	8,50	10,00	13,00	16,00	18,00
	max.[d]	3,14	3,98	4,68	5,68	7,22	8,72	10,22	13,27	16,27	18,27
	min.	2,86	3,62	4,32	5,32	6,78	8,28	9,78	12,73	15,73	17,73
d_a	max.	2	2,6	3,1	3,6	4,7	5,7	6,8	9,2	11,2	13,7
d_s	max.	1,60	2,00	2,50	3,00	4,00	5,00	6,00	8,00	10,00	12,00
	min.	1,46	1,86	2,36	2,86	3,82	4,82	5,82	7,78	9,78	11,73
e[e, f]	min.	1,733	1,733	2,303	2,873	3,443	4,583	5,723	6,863	9,149	11,429
l_f	max	0,34	0,51	0,51	0,51	0,6	0,6	0,68	1,02	1,02	1,45
k	max.	1,60	2,00	2,50	3,00	4,00	5,00	6,0	8,00	10,00	12,00
	min.	1,46	1,86	2,36	2,86	3,82	4,82	5,7	7,64	9,64	11,57
r	min.	0,1	0,1	0,1	0,1	0,2	0,2	0,25	0,4	0,4	0,6
s[f]	nom.	1,5	1,5	2	2,5	3	4	5	6	8	10
	max.	1,58	1,58	2,08	2,58	3,08	4,095	5,14	6,14	8,175	10,175
	min.	1,52	1,52	2,02	2,52	3,02	4,020	5,02	6,02	8,025	10,025
t	min.	0,7	1	1,1	1,3	2	2,5	3	4	5	6
v	max.	0,16	0,2	0,25	0,3	0,4	0,5	0,6	0,8	1	1,2
d_w	min	2,72	3,48	4,18	5,07	6,53	8,03	9,38	12,33	15,33	17,23
w	min.	0,55	0,55	0,85	1,15	1,4	1,9	2,3	3,3	4	4,8

l^g			Shank length l_s and grip length l_g																			
			l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g
nom.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
2,5	2,3	2,7																				
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																				

Table 1 — Dimensions (*continued*)

16	15,65	16,35																				
20	19,58	20,42			2	4																
25	24,58	25,42					5,75	8	4,5	7												
30	29,58	30,42							9,5	12	6,5	10	4	8								
35	34,5	35,5									11,5	15	9	13	6	11						
40	39,5	40,5									16,5	20	14	18	11	16	5,75	12				
45	44,5	45,5											19	23	16	21	10,75	17	5,5	13		
50	49,5	50,5											24	28	21	26	15,75	22	10,5	18		
55	54,4	55,6													26	31	20,75	27	15,5	23	10,25	19
60	59,4	60,6													31	36	25,75	32	20,5	28	15,25	24
65	64,4	65,6															30,75	37	25,5	33	20,25	29
70	69,4	70,6															35,75	42	30,5	38	25,25	34
80	79,4	80,6															45,75	52	40,5	48	35,25	44
90	89,3	90,7																	50,5	58	45,25	54
100	99,3	100,7																	60,5	68	55,25	64
110	109,3	110,7																			65,25	74
120	119,3	120,7																			75,25	84
130	129,2	130,8																				
140	139,2	140,8																				
150	149,2	150,8																				
160	159,2	160,8																				
180	179,2	180,8																				
200	199,075	200,925																				
220	219,075	220,925																				
240	239,075	240,925																				
260	258,95	261,05																				
280	278,95	281,05																				
300	298,95	301,05																				

Table 1 — Dimensions (*continued*)

Dimensions in millimetres

Thread (d)		(M14)[h]	M16	M20	M24	M30	M36	M42	M48	M56	M64
P[a]		2	2	2,5	3	3,5	4	4,5	5	5,5	6
b[b]	ref.	40	44	52	60	72	84	96	108	124	140
d_k	max.[c]	21,00	24,00	30,00	36,00	45,00	54,00	63,00	72,00	84,00	96,00
	max.[d]	21,33	24,33	30,33	36,39	45,39	54,46	63,46	72,46	84,54	96,54
	min.	20,67	23,67	29,67	35,61	44,61	53,54	62,54	71,54	83,46	95,46
d_a	max.	15,7	17,7	22,4	26,4	33,4	39,4	45,6	52,6	63	71
d_s	max.	14,00	16,00	20,00	24,00	30,00	36,00	42,00	48,00	56,00	64,00
	min.	13,73	15,73	19,67	23,67	29,67	35,61	41,61	47,61	55,54	63,54
e[e, f]	min.	13,716	15,996	19,437	21,734	25,154	30,854	36,571	41,131	46,831	52,531
l_f	max	1,45	1,45	2,04	2,04	2,89	2,89	3,06	3,91	5,95	5,95
k	max.	14,00	16,00	20,00	24,00	30,00	36,00	42,00	48,00	56,00	64,00
	min.	13,57	15,57	19,48	23,48	29,48	35,38	41,38	47,38	55,26	63,26
r	min.	0,6	0,6	0,8	0,8	1	1	1,2	1,6	2	2
s[f]	nom.	12	14	17	19	22	27	32	36	41	46
	max.	12,212	14,212	17,23	19,275	22,275	27,275	32,33	36,33	41,33	46,33
	min.	12,032	14,032	17,05	19,065	22,065	27,065	32,08	36,08	41,08	46,08
t	min.	7	8	10	12	15,5	19	24	28	34	38
v	max.	1,4	1,6	2	2,4	3	3,6	4,2	4,8	5,6	6,4
d_w	min	20,17	23,17	28,87	34,81	43,61	52,54	61,34	70,34	82,26	94,26
w	min.	5,8	6,8	8,6	10,4	13,1	15,3	16,3	17,5	19	22

l^g			Shank length l_s and grip length l_g																			
			l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g
nom.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
2,5	2,3	2,7																				
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																				

Table 1 — Dimensions (*continued*)

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	54,4	55,6																				
60	59,4	60,6	10	20																		
65	64,4	65,6	15	25	11	21																
70	69,4	70,6	20	30	16	26																
80	79,4	80,6	30	40	26	36	15,5	28														
90	89,3	90,7	40	50	36	46	25,5	38	15	30												
100	99,3	100,7	50	60	46	56	35,5	48	25	40												
110	109,3	110,7	60	70	56	66	45,5	58	35	50	20,5	38										
120	119,3	120,7	70	80	66	76	55,5	68	45	60	30,5	48	16	36								
130	129,2	130,8	80	90	76	86	65,5	78	55	70	40,5	58	26	46								
140	139,2	140,8	90	100	86	96	75,5	88	65	80	50,5	68	36	56	21,5	44						
150	149,2	150,8			96	106	85,5	98	75	90	60,5	78	46	66	31,5	54						
160	159,2	160,8			106	116	95,5	108	85	100	70,5	88	56	76	41,5	64	27	52				
180	179,2	180,8					115,5	128	105	120	90,5	108	76	96	61,5	84	47	72	28,5	56		
200	199,075	200,925					135,5	148	125	140	110,5	128	96	116	81,5	104	67	92	48,5	76	30	60
220	219,075	220,925													101,5	124	87	112	68,5	96	50	80
240	239,075	240,925													121,5	155	107	132	88,5	116	70	100
260	258,95	261,05													141,5	164	127	152	108,5	136	90	120
280	278,95	281,05													161,5	184	147	172	128,5	156	110	140
300	298,95	301,05													181,5	204	167	192	148,5	176	130	160

Table 1 — Dimensions (*continued*)

[a] P is the pitch of the thread.

[b] For lengths between the bold stepped lines in the unshaded area.

[c] For plain heads.

[d] For knurled heads.

[e] $e_{min} = 1{,}14\ s_{min}$

[f] Combined gauging of socket dimensions e and s, see ISO 23429.

[g] The range of commercial lengths is between the bold stepped lines. Lengths in the shaded area are threaded to the head within 3 P. Lengths below the shaded area have values of l_g and l_s in accordance with the following formulae:

$$l_{g,\,max} = l_{nom} - b$$

$$l_{s,\,min} = l_{g,\,max} - 5\ P$$

[h] The size in brackets should be avoided if possible.

4 Requirements and reference International Standards

See Table 2.

Table 2 — Requirements and reference International Standards

Materials		Steel	Stainless steel	Non-ferrous metal
General requirements	International Standard	ISO 8992		
Thread	Tolerances	5g6g for property class 12.9; for other property classes: 6g		
	International Standards	ISO 261, ISO 965-2, ISO 965-3		
Mechanical properties	Property class	M3: as agreed ⩾ M3 and ⩽ M39: 8.8, 10.9, 12.9 > M39: as agreed	⩽ M24: A2-70[a], A3-70, A4-70, A5-70 > M24 and ⩽ M39: A2-50[b], A3-50, A4-50, A5-50 > M39: as agreed	As agreed
	International Standards	ISO 898-1	ISO 3506-1	ISO 8839
Tolerances	Product grade	A		
	International Standard	ISO 4759-1		
Finish		As processed Requirements for electroplating are covered in ISO 4042. Requirements for non-electrolytically applied zinc flake coatings are covered in ISO 10683.	Plain —	Plain Requirements for electroplating are covered in ISO 4042.
Surface discontinuities		Limits for surface discontinuities are covered in ISO 6157-1 and ISO 6157-3 for property class 12.9.	—	—
Acceptability		Acceptance procedure is covered in ISO 3269.		

[a] For stainless steel screws machined from bat it is permissible to use grade A1-70 for sizes ⩽ M12 and the product shall be marked accordingly.

[b] For stainless steel screws machined from bar it is permissible to use grade A1-50 and the product shall be marked accordingly.

5 Designation

EXAMPLE A hexagon socket head cap screw with thread M5, nominal length $l = 20$ mm and property class 12.9 is designed as follows:

Hexagon socket head cap screw ISO 4762-M5×20-12.9

Annex A
(informative)
Masses

In Table A.1 approximate masses of screws with commercial lengths are given for information only.

Table A.1 — Masses

Thread	M1,6	M2	M2,5	M3	M4	M5	M6	M8	M10	M12	(M14)	M16	M20	M24	M30	M36	M42	M48	M56	M64
Nominal length l mm	Approximate mass, in kilograms per 1 000 pieces ($\rho = 7{,}85$ kg/dm^3) (for information only)																			
2,5	0,085																			
3	0,090	0,155																		
4	0,100	0,175	0,345																	
5	0,110	0,195	0,375	0,67																
6	0,120	0,215	0,405	0,71	1,50															
8	0,140	0,255	0,465	0,80	1,65	2,45														
10	0,160	0,295	0,525	0,88	1,80	2,70	4,70													
12	0,180	0,355	0,585	0,96	1,95	2,95	5,07	10,9												
16	0,220	0,415	0,705	1,16	2,25	3,45	5,75	12,1	20,9											
20		0,495	0,825	1,36	2,65	4,01	6,53	13,4	22,9	32,1										
25			0,975	1,61	3,15	4,78	7,59	15,0	25,4	35,7	48,0	71,3								
30				1,86	3,65	5,55	8,30	16,9	27,9	39,3	53,0	77,8	128							
35					4,15	6,32	9,91	18,9	30,4	42,9	58,0	84,4	139							
40					4,65	7,09	11,0	20,9	32,9	46,5	63,0	91,0	150	270						
45						7,86	12,1	22,9	36,1	50,1	68,0	97,6	161	285	500					
50						8,63	13,2	24,9	39,3	54,5	73,0	106	172	300	527					
55							14,3	26,9	42,5	58,9	78,0	114	183	316	554	870				
60							15,4	28,9	45,7	63,4	84,0	122	194	330	581	910	1 370			
65								31,0	48,9	67,8	90,0	130	205	345	608	950	1 420			
70								33,0	52,1	71,3	96,0	138	216	363	635	990	1 470	2 040		
80								37,0	58,5	80,2	108	154	241	399	690	1 070	1 580	2 180	3 340	
90									64,9	89,1	120	170	266	435	745	1 150	1 680	2 320	3 530	5 220
100									71,2	98,0	132	186	291	471	800	1 230	1 790	2 460	3 720	5 470
110										107	144	202	316	507	855	1 310	1 890	2 600	3 920	5 730
120										116	156	218	341	543	910	1 390	2 000	2 740	4 110	5 980
130											168	234	366	579	965	1 470	2 100	2 880	4 300	6 230
140											180	250	391	615	1 020	1 550	2 210	3 020	4 490	6 490
150												266	416	651	1 080	1 630	2 320	3 160	4 680	6 740
160												282	441	687	1 130	1 710	2 420	3 300	4 880	6 900
180													491	759	1 240	1 870	2 640	3 590	5 270	7 250
200													541	831	1 350	2 030	2 860	3 870	5 650	7 750
220														903	1 460	2 190	3 080	4 150	6 040	8 250
240														975	1 570	2 250	3 300	4 430	6 420	8 750
260															1 680	2 410	3 520	4 710	6 810	9 260
280															1 790	2 570	3 740	4 990	7 200	9 760
300															1 900	2 730	3 960	5 270	7 580	10 300