






















<b>Reamer Description</b> ▶	<b>Solid Carbide Reamer</b>					<b>Cermet Reamer</b>			<b>Brazed Reamers</b>		<b>PCD</b>
<b>DIN</b> ▶	HAM	ä. DIN	ä. DIN	ä. DIN	HAM	ä. DIN	HAM	HAM	8050	8093	HAM
<b>Reamer Length</b> ▶	—	—	—	—	—	—	—	—	—	—	—
<b>Part Number</b>	50-1000	50-1040	50-1080	50-1120	50-1160	52-1000	52-1040	52-1080	—	51-1040	53-1000
<b>Page Number</b>	—	71	72	72	73	74	74	75	—	—	76
<b>Reamer Type</b>	HAM	HAM	HAM	HAM	HAM	HAM	HAM	HAM	HAM	HAM	HAM
<b>Material</b>	Carbide	Carbide	Carbide	Carbide	Carbide	Cermet	Cermet	Cermet	HM	HM	PKD
<b>Flutes</b>	3 – 4	4 – 6	6 – 8	6 – 8	4 – 6	6	4 – 6	4 – 6	4 – 6	4 – 6	4
<b>Coating</b>	—	—	—	—	—	—	—	—	—	—	—
<b>Ø in mm</b>	0,5 – 3	1,9 – 13,5	2,75 – 14,5	2,75 – 14,5	3,97 – 12,03	4,75 – 12,5	5,95 – 16,06	5,95 – 16,06	8 – 20	8 – 20	6 – 20
<b>Coating</b>	—	—	—	—	IK	—	IK	IK	—	—	IK
<b>Point Angle</b>	180°	90°/120°	90°/120°	90°/120°	180°	120°	180°	180°	180°	180°	180°
<b>Direction of Cut</b>	Right	Right	Right	Right	Right	Right	Right	Right	Right	Right	Right
<b>Flute Style</b>	Straight	LH Spiral	RH Spiral	Straight	LH Spiral	RH Spiral	Straight	LH Spiral	Straight	LH Spiral	Straight
<b>Techn. Application</b> ▶	<b>H 7</b>	<b>H 7</b>	<b>H 7</b>	<b>H 7</b>	<b>H 7</b>	<b>H 7</b>	<b>H 7</b>	<b>H 7</b>	<b>H 7</b>	<b>H 7</b>	<b>H 7</b>
<b>Corner Chamfer</b>											
<b>Helix Angle</b>											
<b>Material Group</b>	○	●	●	○	●						●
<b>Aluminum</b>	○	●	●	○	●						●
<b>Aluminum &gt;</b>	●	●	●	●	●	●	●	●	●	●	
<b>9% Si</b>	●	●	●	●	●	●	●	●	●	●	
<b>Steel &lt; 23 HRC</b>	○	●	●	●	●				●	●	
<b>Steel &lt; 38 HRC</b>	●	●	●	●	○				○	○	
<b>Steel &lt; 48 HRC</b>											
<b>Steel &lt; 55 HRC</b>											
<b>Steel &lt; 60 HRC</b>		○	○		○				○	○	
<b>Steel &lt; 66 HRC</b>		○	○		○				○	○	
<b>SST &lt; 23 HRC</b>	●	●	●	●	●	●	●	●	●	●	
<b>SST &gt; 23 HRC</b>	●	●	●	●	●	●	●	●	●	●	
<b>Cast Iron</b>	○	○	○	○	○				○	○	
<b>Nodular, Ductile</b>	○	●	●	○	●						○
<b>Iron</b>	○	●	●	○	●						●
<b>Iconel, Super</b>											●
<b>Alloys</b>											

● very suitable ○ suitable

Zuschläge für Zwischenabmessungen und andere Passungstoleranzen außer H7 siehe Seite 86  
**Extra charge for intermediate sizes and other fit tolerances, except H7, see page 86**

## Schneidenausführung Design of Teeth

**Ungleichteilung und Extrem-Ungleichteilung für HAM Reibahlen**  
Standard-Reibahlen werden in normaler Ungleichteilung geliefert. Extrem-Ungleichteilung ermöglicht die Fertigung von Bohrungen hoher Kreisformgenauigkeit, mit einem maximalen Kreisformfehler von 1 – 3 microns und eine ISO-Passungsgenauigkeit von nahezu IT5.

**Unequal Division and Extreme Unequal Division for HAM Reamers**  
Standard reamers are delivered with normal unequal division. Extremely unequal division make it possible to make boreholes of high circularity precision with a maximum circularity deviation of 1 – 3 microns and an ISO fitting exactness of almost IT5.

### Standard Ungleichteilung Unequal Division

Nenn Ø-Bereich <b>Nom. Range of Dia.</b>	Z	Teilung <b>Division</b>
0,5 – 1,9	3	120°/ 120°/ 120°
1,9 – 2,65	4	93°/ 87°
2,65 – 13,2	6	63°/ 60°/ 57°
13,2 – 20,3	8	47°/ 43°/ 47°/ 43°

### Extrem Ungleichteilung Extreme Unequal Division

Nenn Ø-Bereich <b>Nom. Range of Dia.</b>	Z	Teilung <b>Division</b>
3,0 – 20,0	6	75°/ 60°/ 45°

## Empfohlene Bohrdurchmesser zum Reiben, Richtwert in mm Recommended Drill Hole Diameters for Reaming, Standard Values in mm

### Lagerung von Vollhartmetall Reibahlen

Vollhartmetall-Reibahlen und speziell PKD-bestückte Reibahlen sind HAMzeuge zur Feinstbearbeitung. Diese HAMzeuge sind äußerst empfindlich gegen Schlag. Bitte transportieren und lagern Sie diese HAMzeuge immer in den von uns mitgelieferten Verpackungen.

### Storage of Solid Carbide Reamers

**Solid carbide reamers and especially PCD-tipped reamers are tools for microfinish. These tools are extremely sensitive to stroke. Please transport and keep your tools always in the packings we supplied.**

HAMstoff <b>Material</b>	Ø to 6 <b>dia to 6</b>	Ø to 10 <b>dia to 10</b>	Ø to 16 <b>dia to 16</b>	Ø to 25 <b>dia to 25</b>	Ø From 25 <b>dia over 25</b>
Stahl/ <b>steel ≤ 800</b>	0,1 – 0,2	0,2	0,2 – 0,3	0,3 – 0,4	0,4 – 0,5
Stahlguß/ <b>steel casting</b>	0,1 – 0,2	0,2	0,2	0,2 – 0,3	0,3 – 0,4
Grauguß/ <b>cast iron</b>	0,1 – 0,2	0,2	0,2 – 0,3	0,3 – 0,4	0,4 – 0,5
Temperguß/ <b>mailable cast iron</b>	0,1 – 0,2	0,2	0,3	0,4	0,5
Kupfer/ <b>copper</b>	0,1 – 0,2	0,2 – 0,3	0,3 – 0,4	0,4 – 0,5	0,5
Messing, Bronze/ <b>brass, bronze</b>	0,1 – 0,2	0,2	0,2 – 0,3	0,3	0,3 – 0,4
Aluminium/ <b>aluminum</b>	0,1 – 0,2	0,2 – 0,3	0,3 – 0,4	0,4 – 0,5	0,5
Kunststoffe hart/ <b>hard plastic</b>	0,1 – 0,2	0,2	0,4	0,4 – 0,5	0,5
Kunststoffe weich/ <b>thermoplastic</b>	0,1 – 0,2	0,2	0,2	0,3	0,3 – 0,4

## Grundtoleranzen Basic Tolerances

### ISO-Grundtoleranzen

Auszug aus DIN 7151 (November 1964) Maße in microns

### Bezeichnung (Auszug)

Werden in Sonderfällen Reibahlen mit von dieser Norm abweichenden Größt- und Kleinstmaßen bestellt, so ist in der Bezeichnung an Stelle des ISO-Kurzzeichens für das Bohrungstoleranzfeld das obere und untere Abmaß der Reibahle in microns anzugeben, z. B. eine Reibahle mit Nenndurchmesser 20 mm, oberes Abmaß = + 25 microns und unteres Abmaß = + 15 microns: Reibahle 20 + 25 + 15 DIN...

### ISO Basic Tolerances

**Abstract of DIN 7151 (November 1964) dimensions in microns**

### Description (extract)

**If reamers with maximum and minimum sizes deviating from this standard are ordered in special cases, then in the description the over and under allowance of the reamer has to be stated in microns instead of the ISO-symbol for the drilling tolerance range, e. g. a reamer with nominal diameter 20 mm, over allowance = + 25 microns and under allowance = + 15 microns: reamer 20 + 25 + 15 DIN...**

### Nennmaßbereich in mm Nom. dia. mm

Qualität <b>Quality</b>	Grundtoleranzenreihe <b>Basic Tolerances</b>	1 to 3 <b>1 to 3</b>	From 3 to 6 <b>over 3 to 6</b>	From 6 to 10 <b>over 6 to 10</b>	From 10 to 18 <b>over 10 to 18</b>
5	IT 5	4	5	6	8
6	IT 6	6	8	9	11
7	IT 7	10	12	15	18
8	IT 8	14	18	22	27
9	IT 9	25	30	36	43
10	IT 10	40	48	58	70
11	IT 11	60	75	90	110
12	IT 12	100	120	150	180

Qualität <b>Quality</b>	Grundtoleranzenr. <b>Basic tolerances</b>	From 18 to 30 <b>over 18 to 30</b>	From 30 to 50 <b>over 30 to 50</b>	From 50 to 80 <b>over 50 to 80</b>	From 80 to 120 <b>over 80 to 120</b>
5	IT 5	9	11	13	15
6	IT 6	13	16	19	22
7	IT 7	21	25	30	35
8	IT 8	33	39	46	54
9	IT 9	52	62	74	87
10	IT 10	84	100	120	140
11	IT 11	130	160	190	220
12	IT 12	210	250	300	350

**Reibahlen-Herstellungstoleranz** Auszug aus DIN 1420 (Nov. 1966)  
**Manufacturing Tolerances for Reamers acc. DIN 1420**

Nenn-Ø Zulässiges oberes und unteres Abmaß vom Nenndurchmesser d1 der Reibahle in microns für Bohrungs-Toloranzfeld  
**Nom. Dia. Permissible Upper and Lower Allowance of Nominal Diameter d1 of the Reamer in microns for the Tolerance Zone of the Hole**

d1 in mm	JS				K			M		
	6	7	8	9	6	7	8	6	7	8
from 1	+2	+3	+4	-8	-1	-2	-3	-3	-4	-5
to 3	-1	-1	-1	-1	-4	-6	-8	-6	-8	-10
from 3	+2	+4	+6	+10	0	+1	+2	-3	-2	-1
to 6	-1	-1	-1	-1	-3	-4	-5	-6	-7	-8
from 6	+3	+5	+7	+12	0	+2	+2	-5	-3	-3
to 10	-1	-1	-1	-1	-4	-4	-6	-9	-9	-11
from 10	+3	+6	+9	+15	0	+3	+3	-6	-3	-3
to 18	-1	-1	-1	-1	-4	-4	-7	-10	-10	-13
from 18	+4	+7	+11	+18	0	+2	+5	-6	-4	-1
to 30	-1	-1	-1	-1	-5	-6	-7	-11	-12	-13

Nenn-Ø Zulässiges oberes und unteres Abmaß vom Nenndurchmesser d1 der Reibahle in microns für Bohrungs-Toloranzfeld  
**Nom. Dia. Permissible Upper and Lower Allowance of Nominal Diameter d1 of the Reamer in microns for the Tolerance Zone of the Hole**

d1 in mm	N						P		R	
	6	7	8	9	10	11	6	7	6	7
from 1	-5	-6	-7	-8	-10	-13	-7	-8	-11	-12
to 3	-8	-10	-12	-17	-24	-34	-10	-12	-14	-16
from 3	-7	-6	-5	-5	-18	-12	-11	-10	-14	-13
to 6	-10	-11	-12	-16	-25	-39	-14	-15	-17	-18
from 6	-9	-7	-7	-6	-9	-14	-14	-12	-18	-16
to 10	-13	-13	-15	-19	-30	-46	-18	-18	-22	-22
from 10	-11	-8	-8	-7	-11	-17	-17	-14	-22	-19
to 18	-15	-15	-18	-23	-36	-56	-21	-21	-26	-26
from 18	-13	-11	-8	-8	-13	-20	-20	-18	-26	-24
to 30	-18	-19	-20	-27	-43	-66	-25	-26	-31	-32

Nenn-Ø Zulässiges oberes und unteres Abmaß vom Nenndurchmesser d1 der Reibahle in microns für Bohrungs-Toloranzfeld  
**Nom. Dia. Permissible Upper and Lower Allowance of Nominal Diameter d1 of the Reamer in microns for the Tolerance Zone of the Hole**

d1 in mm	S		T		U			X		Z	
	6	7	6	6	7	10	10	11	10	11	
from 1	-15	-16	-19	-19	-10	-24	-26	-29	-32	-35	
to 3	-18	-20	-22	-22	-24	-38	-40	-50	-46	-56	
from 3	-18	-17	-22	-22	-29	-31	-36	-40	-43	-47	
to 6	-21	-22	-25	-25	-26	-48	-53	-67	-60	-74	
from 6	-22	-20	-27	-27	-25	-37	-43	-48	-51	-56	
to 10	-26	-26	-31	-31	-31	-58	-64	-80	-72	-88	
from 10							-51	-57	-61	-67	
to 14	-27	-24	-32	-32	-29	-44	-76	-96	-86	-106	
from 14	-31	-31	-36	-36	-36	-69	-56	-62	-71	-77	
to 18							-81	-101	-96	-116	
from 18				-39	-37	-54	-67	-74	-86	-93	
to 24	-33	-31	-39	-44	-45	-84	-97	-120	-116	-139	
from 24	-38	-39	-44	-46	-44	-61	-77	-84	-101	-108	
to 30				-51	-52	-91	-107	-130	-131	-154	

**ISO-Abmaße für Innenmaße (Bohrung)** Auszug aus DIN 7161 (Aug. 1965)  
**Borehole Allowance to ISO acc. DIN 7161 (Aug. 1965)**

Nenn-Ø Nom. Dia. mm		Abmaße in microns Deviations in microns									
		A		B				C			
		9	11	8	9	10	11	8	9	10	11
from	1	+295	+330	+154	+165	+180	+200	+74	+85	+100	+120
to	3	+270	+270	+140	+140	+140	+140	+60	+60	+60	+60
from	3	+300	+345	+158	+170	+188	+215	+88	+100	+118	+145
to	6	+270	+270	+140	+140	+140	+140	+70	+70	+70	+70
from	6	+316	+370	+172	+186	+208	+240	+102	+116	+138	+170
to	10	+280	+280	+150	+150	+150	+150	+80	+80	+80	+80
from	10	+333	+400	+177	+193	+220	+260	+122	+138	+165	+205
to	18	+290	+290	+150	+150	+150	+150	+95	+95	+95	+95
from	18	+352	+430	+193	+212	+244	+290	+143	+162	+194	+240
to	30	+300	+300	+160	+160	+160	+160	+110	+110	+110	+110
from	30	+372	+470	+209	+232	+270	+330	+159	+182	+220	+280
to	40	+310	+310	+170	+170	+170	+170	+120	+120	+120	+120
from	40	+382	+480	+219	+242	+280	+340	+169	+192	+230	+290
to	50	+320	+320	+180	+180	+180	+180	+130	+130	+130	+130

Nenn-Ø Nom. Dia. mm		Abmaße in microns Deviations in microns										
		D				E			F			
		8	9	10	11	7	8	9	6	7	8	9
from	1	+34	+45	+60	+80	+24	+28	+39	+12	+16	+20	+31
to	3	+20	+20	+20	+20	+14	+14	+14	+6	+6	+6	+6
from	3	+48	+60	+78	+105	+32	+38	+50	+18	+22	+28	+40
to	6	+30	+30	+30	+30	+20	+20	+20	+10	+10	+10	+10
from	6	+62	+76	+98	+130	+40	+47	+61	+22	+28	+35	+49
to	10	+40	+40	+40	+40	+25	+25	+25	+13	+13	+13	+13
from	10	+77	+93	+120	+160	+50	+59	+75	+27	+34	+43	+59
to	18	+50	+50	+50	+50	+32	+32	+32	+16	+16	+16	+16
from	18	+98	+117	+149	+195	+61	+73	+92	+33	+41	+53	+72
to	30	+65	+65	+65	+65	+40	+40	+40	+20	+20	+20	+20
from	30	+119	+142	+180	+240	+75	+89	+112	+41	+50	+64	+87
to	50	+80	+80	+80	+80	+50	+50	+50	+25	+25	+25	+25

Nenn-Ø Nom. Dia. mm		Abmaße in microns Deviations in microns											
		G		H					J				
		6	7	6	7	8	9	10	11	12	6	7	8
from	1	+8	+12	+6	+10	+14	+25	+40	+60	+100	+2	+4	+6
to	3	+2	+2	0	0	0	0	0	0	0	-4	-6	-8
from	3	+12	+16	+8	+12	+18	+30	+48	+75	+120	+5	+6	+10
to	6	+4	+4	0	0	0	0	0	0	0	-3	-6	-8
from	6	+14	+20	+9	+15	+22	+36	+58	+90	+150	+5	+8	+12
to	10	+5	+5	0	0	0	0	0	0	0	-4	-7	-10
from	10	+17	+24	+11	+18	+27	+43	+70	+110	+180	+6	+10	+15
to	18	+6	+6	0	0	0	0	0	0	0	-5	-8	-12
from	18	+20	+28	+13	+21	+33	+52	+84	+130	+210	+8	+12	+20
to	30	+7	+7	0	0	0	0	0	0	0	-5	-9	-13
from	30	+25	+34	+16	+25	+39	+62	+100	+160	+250	+10	+14	+24
to	50	+9	+9	0	0	0	0	0	0	0	-6	-11	-15

**ISO-Abmaße für Innenmaße (Bohrung)** Auszug aus DIN 7161 (Aug. 1965)  
**Borehole Allowance to ISO acc. DIN 7161 (Aug. 1965)**

Nenn-Ø Nom. Dia. mm		Abmaße in microns Deviations in microns									
		JS				K			M		
		6	7	8	9	6	7	8	6	7	8
from	1	+3	+5	+7	+12,5	0	0	0	-2	-2	-2
to	3	-3	-5	-7	-12,5	-6	-10	-14	-8	-12	-18
from	3	+4	+6	+9	+15	+2	+3	+5	-1	0	+2
to	6	-4	-6	-9	-15	-6	-9	-3	-9	-15	-16
from	6	+4,5	+7,5	+11	+18	+2	+5	+6	-3	0	+1
to	10	-4,5	-7,5	-11	-18	-7	-10	-16	-12	-12	-21
from	10	+5,5	+9	+13,5	+21,5	+2	+6	+8	-4	0	+2
to	18	-5,5	-9	-13,5	-21,5	-9	-12	-19	-15	-18	-25
from	18	+6,5	+10,5	+16,5	+26	+2	+6	+10	-4	0	+4
to	30	-6,5	-10,5	-16,5	-26	-11	-15	-23	-17	-21	-29
from	30	+8	+12,5	+19,5	+31	+3	+7	+12	-4	0	+5
to	50	-8	-12,5	-19,5	-31	-13	-18	-27	-20	-25	-34

Nenn-Ø Nom. Dia. mm		Abmaße in microns Deviations in microns									
		N					P		R		
		6	7	8	9	10	11	6	7	6	7
from	1	-4	-4	-4	-4	-4	-4	-6	-6	-10	-10
to	3	-10	-14	-18	-29	-44	-64	-12	-16	-16	-20
from	3	-5	-4	-2	0	0	0	-9	-8	-12	-11
to	6	-13	-16	-20	-30	-48	-75	-17	-20	-20	-23
from	6	-7	-4	-3	0	0	0	-12	-9	-16	-13
to	10	-16	-19	-25	-36	-58	-90	-21	-24	-25	-28
from	10	-9	-5	-3	0	0	0	-15	-11	-20	-16
to	18	-20	-23	-30	-43	-70	-110	-26	-29	-31	-34
from	18	-11	-7	-3	0	0	0	-18	-14	-24	-20
to	30	-24	-28	-36	-52	-84	-130	-31	-35	-37	-41
from	30	-12	-8	-3	0	0	0	-21	-17	-29	-25
to	50	-28	-33	-42	-62	-100	-160	-37	-42	-45	-50

Nenn-Ø Nom. Dia. mm		Abmaße in microns Deviations in microns									
		S		T	U			X		Z	
		6	7	6	6	7	10	10	11	10	11
from	1	-14	-14	-18	-18	-18	-18	-20	-20	-26	-26
to	3	-20	-24	-24	-24	-28	-58	-60	-80	-66	-86
from	3	-16	-15	-20	-20	-19	-23	-28	-28	-35	-35
to	6	-24	-27	-28	-28	-31	-71	-76	-103	-83	-110
from	6	-20	-17	-25	-25	-22	-28	-34	-34	-42	-42
to	10	-29	-32	-34	-34	-37	-86	-92	-124	-100	-132
from	10							-40	-40	-50	-50
to	14	-25	-21	-30	-30	-26	-33	-110	-150	-120	-160
from	14	-36	-39	-41	-41	-44	-103	-45	-45	-60	-60
to	18							-115	-155	-130	-170
from	18				-37	-33	-41	-45	-54	-73	-73
to	24	-31	-27	-37	-50	-54	-125	-138	-184	-157	-203
from	24	-44	-48	-50	-44	-40	-48	-64	-64	-88	-88
to	30				-57	-61	-132	-148	-194	-172	-218
from	30			-43	-55	-51	-60	-80	-80	-112	-112
to	40	-31	-34	-59	-71	-76	-160	-180	-240	-212	-272
from	40	-51	-59	-49	-65	-61	-70	-97	-97	-136	-136
to	50			-65	-81	-86	-170	-197	-257	-236	-296