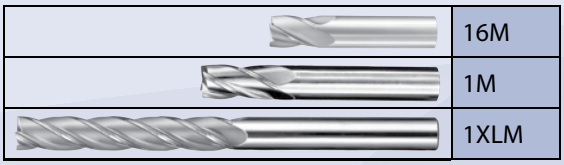
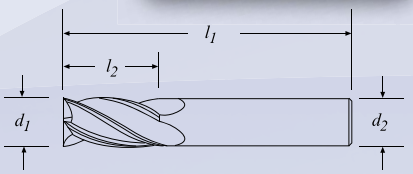
4 Flute – Single End – Square End

Metric Series **1M**





TOLERANCES

d_1=+0,000–0,05
d_2=h6

Series 1M

4-Flute End Mills – Square End – Micrograin Solid Carbide – 30° Right Hand Spiral – Right Hand Cutting – Center Cutting

Serie 1M

Fresas de 4 filos – Punta plana – Carburo sólido con micrograno – Hélice a derecha 30° – Corte a derecha – Corte al Centro

Série 1M

Fraises 4 dents – Bout plat – Carbure monobloc, micrograin – Hélice à droite, 30° – Coupe à droite – Coupe au centre

Cutting Diameter d_1 mm	Length of Cut l_2 mm	Overall Length l_1 mm	Shank Diameter d_2 mm	Uncoated EDP No.	Ti-NAMITE (TiN) EDP No.	Ti-NAMITE-C (TiCN) EDP No.	Ti-NAMITE-A (AlTiN) EDP No.	Series Number
1	2	38	3	41605	49136	49157	49178	16M
1	4	38	3	40105	48500	48522	48543	1M
1,5	3	38	3	41609	49137	49158	49179	16M
1,5	4,5	38	3	40109	48501	48523	48544	1M
2	4	38	3	41613	49138	49159	49180	16M
2	6,3	38	3	40113	48502	48524	48545	1M
2,5	5	38	3	41617	49139	49160	49181	16M
2,5	9,5	38	3	40117	48503	48525	48546	1M
3	6	38	3	41621	49140	49161	49182	16M
3	12	38	3	40121	48504	48526	48547	1M
3,5	7	50	4	41625	49141	49162	49183	16M
3,5	12	50	4	40125	48505	48527	48548	1M
3	25	75	3	43101	49388	49401	49414	1XLM
4	8	50	4	41629	49142	49163	49184	16M
4	14	50	4	40129	48506	48528	48549	1M
4	25	75	4	43103	49389	49402	49415	1XLM
4,5	9,5	50	4,5	41633	49143	49164	49185	16M
4,5	16	50	6	40133	48507	48529	48550	1M
5	10	50	5	41637	49144	49165	49186	16M
5	16	50	6	40137	48508	48530	48551	1M
5	25	75	5	43107	49391	49404	49417	1XLM
6	12	50	6	41641	49145	49166	49187	16M
6	19	50	6	40141	48509	48531	48552	1M
6	25	75	6	43105	49390	49403	49416	1XLM
7	12	50	8	41645	49146	49167	49188	16M
7	19	63	8	40145	48510	48532	48553	1M
8	12	50	8	41649	49147	49168	49189	16M
8	20	63	8	40149	48511	48533	48554	1M
8	25	75	8	43115	49392	49405	49418	1XLM
9	14	50	9	41653	49148	49169	49190	16M
9	22	75	10	40153	48512	48534	48555	1M
10	16	50	10	41657	49149	49170	49191	16M
10	22	75	10	40157	48513	48535	48556	1M

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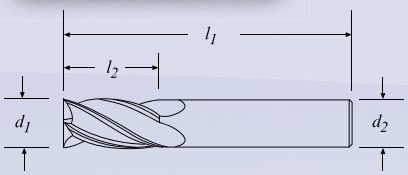
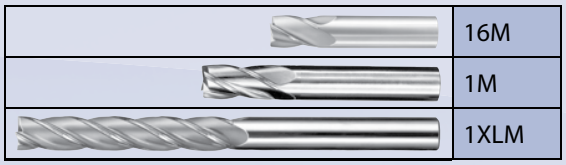
Metric Series **1M**

4 Flute – Single End – Square End



TOLERANCES

d_1=+0,000–0,05
d_2=h6

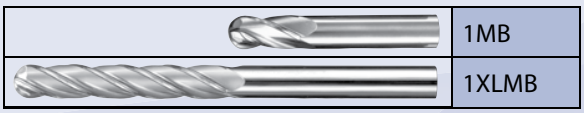


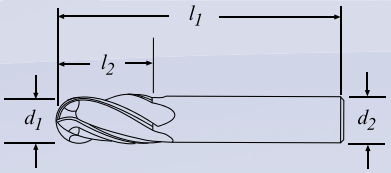
Cutting Diameter d_1 mm	Length of Cut l_2 mm	Overall Length l_1 mm	Shank Diameter d_2 mm	Uncoated EDP No.	Ti-NAMITE (TiN) EDP No.	Ti-NAMITE-C (TiCN) EDP No.	Ti-NAMITE-A (AlTiN) EDP No.	Series Number
10	38	100	10	43125	49393	49406	49419	1XLM
11	19	63	12	41661	49150	49171	49192	16M
11	25	75	12	40161	48514	48536	48557	1M
12	19	63	12	40165	49151	49172	49193	16M
12	25	75	12	41665	48515	48537	48558	1M
12	50	100	12	43135	49394	49407	49420	1XLM
12	75	150	12	43145	49395	49408	49421	1XLM
14	32	89	14	40169	48516	48538	48559	1M
14	75	150	14	43155	49396	49409	49422	1XLM
16	32	89	16	40173	48517	48539	48560	1M
16	75	150	16	43165	49397	49410	49423	1XLM
18	38	100	18	40177	48518	48540	48561	1M
18	75	150	18	43175	49398	49411	49424	1XLM
20	38	100	20	40181	48519	48541	48562	1M
20	75	150	20	43185	49399	49412	49425	1XLM
25	38	100	25	40185	48520	48542	48563	1M
25	75	150	25	43195	49400	49413	49426	1XLM

END MILLS
265–266 Tech

4 Flute – Single End – Ball End

Metric Series **1MB**





TOLERANCES

d_1=+0,000–0,05
d_2=h6

Series 1MB

4 Flute End Mills – Ball End – Micrograin Solid Carbide – 30° Right Hand Spiral – Right Hand Cutting – Center Cutting

Serie 1MB

Fresas de 4 filos – Punta radial o esférica – Carburo sólido con micrograno – Hélice a derecha 30° – Corte a derecha - Corte al centro

Série 1MB

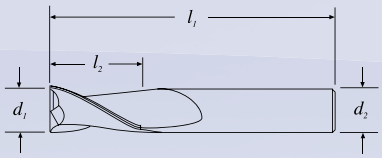
Fraise 4 dents – Bout hémisphérique – Carbure monobloc, micrograin – Hélice à droite, 30° – Coupe à droite - Coupe au centre

Cutting Diameter d_1 mm	Length of Cut l_2 mm	Overall Length l_1 mm	Shank Diameter d_2 mm	Uncoated EDP No.	Ti-NAMITE (TiN) EDP No.	Ti-NAMITE-C (TiCN) EDP No.	Ti-NAMITE-A (AlTiN) EDP No.	Series Number
1	4	38	3	40106	48564	48586	48607	1MB
1,5	4,5	38	3	40110	48565	48587	48608	1MB
2	6,3	38	3	40114	48566	48588	48609	1MB
2,5	9,5	38	3	40118	48567	48589	48610	1MB
3	12	38	3	40122	48568	48590	48611	1MB
3	25	75	3	43102	49505	49518	49531	1XLMB
3,5	12	50	4	40126	48569	48591	48612	1MB
4	14	50	4	40130	48570	48592	48613	1MB
4	25	75	4	43104	49506	49519	49532	1XLMB
4,5	16	50	6	40134	48571	48593	48614	1MB
5	16	50	6	40138	48572	48594	48615	1MB
5	25	75	5	43108	49508	49521	49534	1XLMB
6	19	50	6	40142	48573	48595	48616	1MB
6	25	75	6	43106	49507	49520	49533	1XLMB
7	19	63	8	40146	48574	48596	48617	1MB
8	20	63	8	40150	48575	48597	48618	1MB
8	25	75	8	43116	49509	49522	49535	1XLMB
9	22	75	10	40154	48576	48598	48619	1MB
10	22	75	10	40158	48577	48599	48620	1MB
10	38	100	10	43126	49510	49523	49536	1XLMB
11	25	75	12	40162	48578	48600	48621	1MB
12	25	75	12	41666	48579	48601	48622	1MB
12	50	100	12	43136	49511	49524	49537	1XLMB
12	75	150	12	43146	49512	49525	49538	1XLMB
14	32	89	14	40170	48580	48602	48623	1MB
14	75	150	14	43156	49513	49526	49539	1XLMB
16	32	89	16	40174	48581	48603	48624	1MB
16	75	150	16	43166	49514	49527	49540	1XLMB
18	38	100	18	40178	48582	48604	48625	1MB
18	75	150	18	43176	49515	49528	49541	1XLMB
20	38	100	20	40182	48583	48605	48626	1MB
20	75	150	20	43186	49516	49529	49542	1XLMB
25	38	100	25	40186	48584	48606	48627	1MB
25	75	150	25	43196	49517	49530	49543	1XLMB

265–266 Tech

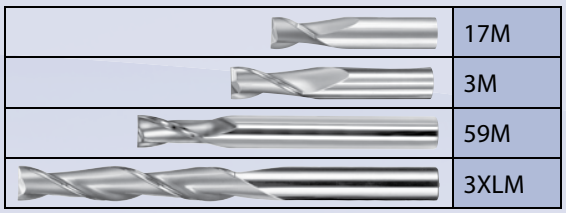
Metric Series **3M**

2 Flute – Single End – Square End



TOLERANCES

d_1=+0,000–0,05
d_2=h6



Cutting Diameter d_1 mm	Length of Cut l_2 mm	Overall Length l_1 mm	Shank Diameter d_2 mm	Uncoated EDP No.	Ti-NAMITE (TiN) EDP No.	Ti-NAMITE-C (TiCN) EDP No.	Ti-NAMITE-A (AlTiN) EDP No.	Series Number
1	2	38	3	41705	49262	49283	49304	17M
1	4	38	3	40305	48628	48650	48671	3M
1,5	3	38	3	41709	49263	49284	49305	17M
1,5	4,5	38	3	40309	48629	48651	48672	3M
2	4	38	3	41713	49264	49285	49306	17M
2	6,3	38	3	40313	48630	48652	48673	3M
2,5	5	38	3	41717	49265	49286	49307	17M
2,5	9,5	38	3	40317	48631	48653	48674	3M
3	6	38	3	41721	49266	49287	49308	17M
3	9	60	6	43910	43920	43930	43950	59M
3	12	38	3	40321	48632	48654	48675	3M
3	25	75	3	43301	49427	49440	49453	3XLM
3,5	7	50	4	41725	49267	49288	49309	17M
3,5	12	50	4	40325	48633	48655	48676	3M
4	8	50	4	41729	49268	49289	49310	17M
4	12	70	6	43911	43921	43931	43951	59M
4	14	50	4	40329	48634	48656	48677	3M
4	25	75	4	43303	49428	49441	49454	3XLM
4,5	9,5	50	4,5	41733	49269	49290	49311	17M
4,5	16	50	6	40333	48635	48657	48678	3M
5	10	50	5	41737	49270	49291	49312	17M
5	16	50	6	40337	48636	48658	48679	3M
5	25	75	5	43307	49430	49443	49456	3XLM
6	12	50	6	41741	49271	49292	49313	17M
6	15	80	6	43912	43922	43932	43952	59M
6	19	50	6	40341	48637	48659	48680	3M
6	25	75	6	43305	49429	49442	49455	3XLM
7	12	50	8	41745	49272	49293	49314	17M
7	19	63	8	40345	48638	48660	48681	3M
8	12	50	8	41749	49273	49294	49315	17M
8	20	63	8	40349	48639	48661	48682	3M
8	20	90	8	43913	43923	43933	43953	59M
8	25	75	8	43315	49431	49444	49457	3XLM
9	14	50	9	41753	49274	49295	49316	17M
9	22	75	10	40353	48640	48662	48683	3M

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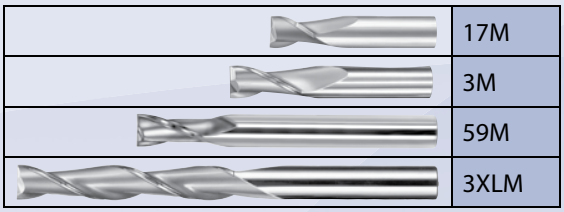
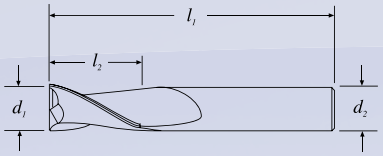
END MILLS
263–266 Tech

2 Flute – Single End – Square End

Metric Series **3M**





TOLERANCES

d_1=+0,000–0,05
d_2=h6

Series 3M

2-Flute End Mills – Square End
Micrograin Solid Carbide
30° Right Hand Spiral – Right Hand Cutting – Center Cutting

Serie 3M

Fresas de 2 filos – Punta plana
Carburo sólido con micrograno
Hélice a derecha 30° – Corte a derecha – Corte al centro.

Série 3M

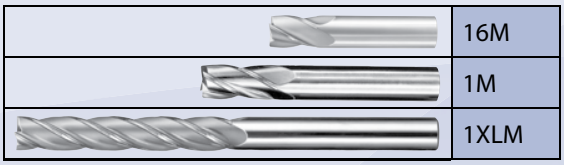
Fraises 2 dents – Bout plat
Carbure monobloc, micrograin
Hélice à droite, 30° – Coupe à droite – Coupe au centre

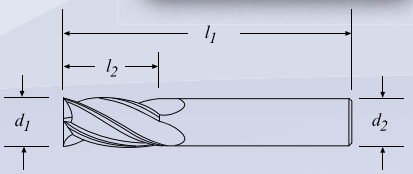
Cutting Diameter d_1 mm	Length of Cut l_2 mm	Overall Length l_1 mm	Shank Diameter d_2 mm	Uncoated EDP No.	Ti-NAMITE (TiN) EDP No.	Ti-NAMITE-C (TiCN) EDP No.	Ti-NAMITE-A (AlTiN) EDP No.	Series Number
10	16	50	10	41757	49275	49296	49317	17M
10	22	75	10	40357	48641	48663	48684	3M
10	25	100	10	43914	43924	43934	43954	59M
10	38	100	10	43325	49432	49445	49458	3XLM
11	19	63	12	41761	49276	49297	49318	17M
11	25	75	12	40361	48642	48664	48685	3M
12	19	63	12	41765	49277	49298	49319	17M
12	25	75	12	40365	48643	48665	48686	3M
12	30	110	12	43915	43925	43935	43955	59M
12	50	100	12	43335	49433	49446	49459	3XLM
12	75	150	12	43345	49434	49447	49460	3XLM
14	32	89	14	40369	48644	48666	48687	3M
14	35	120	16	43916	43926	43936	43956	59M
14	75	150	14	43355	49435	49448	49461	3XLM
16	32	89	16	40373	48645	48667	48688	3M
16	40	120	16	43917	43927	43937	43957	59M
16	75	150	16	43365	49436	49449	49462	3XLM
18	38	100	18	40377	48646	48668	48689	3M
18	40	130	20	43918	43928	43938	43958	59M
18	75	150	18	43375	49437	49450	49463	3XLM
20	38	100	20	40381	48647	48669	48690	3M
20	45	130	20	43919	43929	43939	43959	59M
20	75	150	20	43385	49438	49451	49464	3XLM
25	38	100	25	40385	48648	48670	48691	3M
25	75	150	25	43395	49439	49452	49465	3XLM

265–266 Tech

4 Flute – Single End – Square End

Metric Series **1M**





TOLERANCES

d_1=+0,000–0,05
d_2=h6

Series 1M

4-Flute End Mills – Square End – Micrograin Solid Carbide – 30° Right Hand Spiral – Right Hand Cutting – Center Cutting

Serie 1M

Fresas de 4 filos – Punta plana – Carburo sólido con micrograno – Hélice a derecha 30° – Corte a derecha – Corte al Centro

Série 1M

Fraises 4 dents – Bout plat – Carbure monobloc, micrograin – Hélice à droite, 30° – Coupe à droite – Coupe au centre

Cutting Diameter d_1 mm	Length of Cut l_2 mm	Overall Length l_1 mm	Shank Diameter d_2 mm	Uncoated EDP No.	Ti-NAMITE (TiN) EDP No.	Ti-NAMITE-C (TiCN) EDP No.	Ti-NAMITE-A (AlTiN) EDP No.	Series Number
1	2	38	3	41605	49136	49157	49178	16M
1	4	38	3	40105	48500	48522	48543	1M
1,5	3	38	3	41609	49137	49158	49179	16M
1,5	4,5	38	3	40109	48501	48523	48544	1M
2	4	38	3	41613	49138	49159	49180	16M
2	6,3	38	3	40113	48502	48524	48545	1M
2,5	5	38	3	41617	49139	49160	49181	16M
2,5	9,5	38	3	40117	48503	48525	48546	1M
3	6	38	3	41621	49140	49161	49182	16M
3	12	38	3	40121	48504	48526	48547	1M
3,5	7	50	4	41625	49141	49162	49183	16M
3,5	12	50	4	40125	48505	48527	48548	1M
3	25	75	3	43101	49388	49401	49414	1XLM
4	8	50	4	41629	49142	49163	49184	16M
4	14	50	4	40129	48506	48528	48549	1M
4	25	75	4	43103	49389	49402	49415	1XLM
4,5	9,5	50	4,5	41633	49143	49164	49185	16M
4,5	16	50	6	40133	48507	48529	48550	1M
5	10	50	5	41637	49144	49165	49186	16M
5	16	50	6	40137	48508	48530	48551	1M
5	25	75	5	43107	49391	49404	49417	1XLM
6	12	50	6	41641	49145	49166	49187	16M
6	19	50	6	40141	48509	48531	48552	1M
6	25	75	6	43105	49390	49403	49416	1XLM
7	12	50	8	41645	49146	49167	49188	16M
7	19	63	8	40145	48510	48532	48553	1M
8	12	50	8	41649	49147	49168	49189	16M
8	20	63	8	40149	48511	48533	48554	1M
8	25	75	8	43115	49392	49405	49418	1XLM
9	14	50	9	41653	49148	49169	49190	16M
9	22	75	10	40153	48512	48534	48555	1M
10	16	50	10	41657	49149	49170	49191	16M
10	22	75	10	40157	48513	48535	48556	1M

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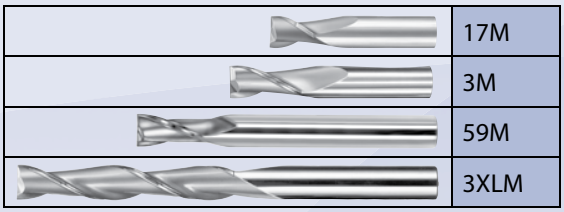
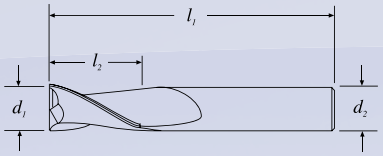
2 Flute – Single End – Square End

Metric Series **3M**





TOLERANCES

d_1=+0,000–0,05
d_2=h6

Series 3M

2-Flute End Mills – Square End
Micrograin Solid Carbide
30° Right Hand Spiral – Right Hand Cutting – Center Cutting

Serie 3M

Fresas de 2 filos – Punta plana
Carburo sólido con micrograno
Hélice a derecha 30° – Corte a derecha – Corte al centro.

Série 3M

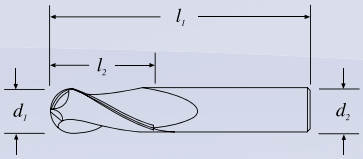
Fraises 2 dents – Bout plat
Carbure monobloc, micrograin
Hélice à droite, 30° – Coupe à droite – Coupe au centre

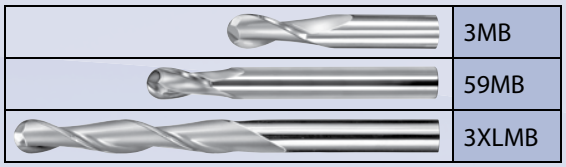
Cutting Diameter d_1 mm	Length of Cut l_2 mm	Overall Length l_1 mm	Shank Diameter d_2 mm	Uncoated EDP No.	Ti-NAMITE (TiN) EDP No.	Ti-NAMITE-C (TiCN) EDP No.	Ti-NAMITE-A (AlTiN) EDP No.	Series Number
10	16	50	10	41757	49275	49296	49317	17M
10	22	75	10	40357	48641	48663	48684	3M
10	25	100	10	43914	43924	43934	43954	59M
10	38	100	10	43325	49432	49445	49458	3XLM
11	19	63	12	41761	49276	49297	49318	17M
11	25	75	12	40361	48642	48664	48685	3M
12	19	63	12	41765	49277	49298	49319	17M
12	25	75	12	40365	48643	48665	48686	3M
12	30	110	12	43915	43925	43935	43955	59M
12	50	100	12	43335	49433	49446	49459	3XLM
12	75	150	12	43345	49434	49447	49460	3XLM
14	32	89	14	40369	48644	48666	48687	3M
14	35	120	16	43916	43926	43936	43956	59M
14	75	150	14	43355	49435	49448	49461	3XLM
16	32	89	16	40373	48645	48667	48688	3M
16	40	120	16	43917	43927	43937	43957	59M
16	75	150	16	43365	49436	49449	49462	3XLM
18	38	100	18	40377	48646	48668	48689	3M
18	40	130	20	43918	43928	43938	43958	59M
18	75	150	18	43375	49437	49450	49463	3XLM
20	38	100	20	40381	48647	48669	48690	3M
20	45	130	20	43919	43929	43939	43959	59M
20	75	150	20	43385	49438	49451	49464	3XLM
25	38	100	25	40385	48648	48670	48691	3M
25	75	150	25	43395	49439	49452	49465	3XLM

265–266 Tech

Metric Series **3MB**

2 Flute – Single End – Ball End





TOLERANCES

d_1=+0,000–0,05
d_2=h6

Cutting Diameter d_1 mm	Length of Cut l_2 mm	Overall Length l_1 mm	Shank Diameter d_2 mm	Uncoated EDP No.	Ti-NAMITE (TiN) EDP No.	Ti-NAMITE-C (TiCN) EDP No.	Ti-NAMITE-A (AlTiN) EDP No.	Series Number
1	4	38	3	40306	48692	48714	48735	3MB
1,5	4,5	38	3	40310	48693	48715	48736	3MB
2	6,3	38	3	40314	48694	48716	48737	3MB
2,5	9,5	38	3	40318	48695	48717	48738	3MB
3	9	60	6	43900	49622	49632	49642	59MB
3	12	38	3	40322	48696	48718	48739	3MB
3	25	75	3	43302	49544	49557	49570	3XLMB
3,5	12	50	4	40326	48697	48719	48740	3MB
4	12	70	6	43901	49623	49633	49643	59MB
4	14	50	4	40330	48698	48720	48741	3MB
4	25	75	4	43304	49545	49558	49571	3XLMB
4,5	16	50	6	40334	48699	48721	48742	3MB
5	16	50	6	40338	48700	48722	48743	3MB
5	25	75	5	43308	49547	49560	49573	3XLMB
6	15	80	6	43902	49624	49634	49644	59MB
6	19	50	6	40342	48701	48723	48744	3MB
6	25	75	6	43306	49546	49559	49572	3XLMB
7	19	63	8	40346	48702	48724	48745	3MB
8	20	63	8	40350	48703	48725	48746	3MB
8	20	90	8	43903	49625	49635	49645	59MB
8	25	75	8	43316	49548	49561	49574	3XLMB
9	22	75	10	40354	48704	48726	48747	3MB
10	22	75	10	40358	48705	48727	48748	3MB
10	25	100	10	43904	49626	49636	49646	59MB
10	38	100	10	43326	49549	49562	49575	3XLMB
11	25	75	12	40362	48706	48728	48749	3MB
12	25	75	12	40366	48707	48729	48750	3MB
12	30	110	12	43905	49627	49637	49647	59MB
12	50	100	12	43336	49550	49563	49576	3XLMB
12	75	150	12	43346	49551	49564	49577	3XLMB
14	32	89	14	40370	48708	48730	48751	3MB
14	35	120	16	43906	49628	49638	49648	59MB
14	75	150	14	43356	49552	49565	49578	3XLMB
16	32	89	16	40374	48709	48731	48752	3MB
16	40	120	16	43907	49629	49639	49649	59MB
16	75	150	16	43366	49553	49566	49579	3XLMB
18	38	100	18	40378	48710	48732	48753	3MB
18	40	130	20	43908	49630	49640	49650	59MB
18	75	150	18	43376	49554	49567	49580	3XLMB
20	38	100	20	40382	48711	48733	48754	3MB
20	45	130	20	43909	49631	49641	49651	59MB
20	75	150	20	43386	49555	49568	49581	3XLMB
25	38	100	25	40386	48712	48734	48755	3MB
25	75	150	25	43396	49556	49569	49582	3XLMB

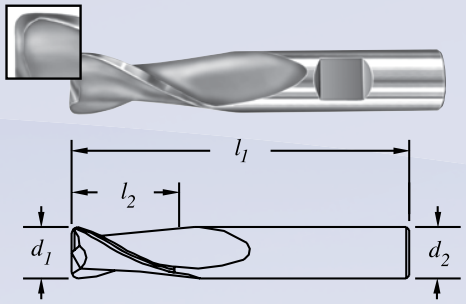
END MILLS
263–266 Tech

Fractional Series **3CR**

2 Flute – Single End – Corner Radius

TOLERANCES

d_1=–.001–.002
d_2=h6
r=+.000–.002



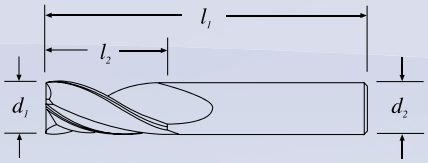
Nominal Cutting Diameter d_1	Actual Cutting Diameter	Shank Diameter d_2	Length of Cut l_2	Overall Length l_1	(TiCN) Ti-NAMITE-C 0.015 EDP No.	(TiCN) Ti-NAMITE-C 0.020 EDP No.	(TiCN) Ti-NAMITE-C 0.030 EDP No.	(TiCN) Ti-NAMITE-C 0.045 EDP No.	(TiCN) Ti-NAMITE-C 0.060 EDP No.	(TiCN) Ti-NAMITE-C 0.090 EDP No.	(TiCN) Ti-NAMITE-C 0.125 EDP No.	Series Number
1/8	.1240/.1230	1/8	1/2	1-1/2	38315	38316	–	–	–	–	–	3CR
3/16	.1865/.1855	3/16	5/8	2	38317	38318	38319	–	–	–	–	3CR
1/4	.2490/.2480	1/4	3/4	2-1/2	38320	38321	38322	38323	–	–	–	3CR
5/16	.3115/.3105	5/16	13/16	2-1/2	38324	38325	38326	38327	–	–	–	3CR
*3/8	.3740/.3730	3/8	1	2-1/2	38328	38329	38330	38331	–	–	–	3CR
*1/2	.4990/.4980	1/2	1	3	38332	38333	38334	38335	38336	–	–	3CR
*5/8	.6240/.6230	5/8	1-1/4	3-1/2	38337	38338	38339	38340	38341	38342	–	3CR
*3/4	.7490/.7480	3/4	1-1/2	4	38343	38344	38345	38346	38347	38348	38349	3CR
*1	.9990/.9980	1	1-1/2	4	38350	38351	38352	38353	38354	38355	38356	3CR

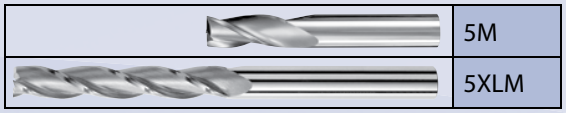
Nominal Cutting Diameter d_1	Actual Cutting Diameter	Shank Diameter d_2	Length of Cut l_2	Overall Length l_1	(AlTiN) Ti-NAMITE-A 0.015 EDP No.	(AlTiN) Ti-NAMITE-A 0.020 EDP No.	(AlTiN) Ti-NAMITE-A 0.030 EDP No.	(AlTiN) Ti-NAMITE-A 0.045 EDP No.	(AlTiN) Ti-NAMITE-A 0.060 EDP No.	(AlTiN) Ti-NAMITE-A 0.090 EDP No.	(AlTiN) Ti-NAMITE-A 0.125 EDP No.	Series Number
1/8	.1240/.1230	1/8	1/2	1-1/2	38357	38358	–	–	–	–	–	3CR
3/16	.1865/.1855	3/16	5/8	2	38359	38360	38361	–	–	–	–	3CR
1/4	.2490/.2480	1/4	3/4	2-1/2	38362	38363	38364	38365	–	–	–	3CR
5/16	.3115/.3105	5/16	13/16	2-1/2	38366	38367	38368	38369	–	–	–	3CR
*3/8	.3740/.3730	3/8	1	2-1/2	38370	38371	38372	38373	–	–	–	3CR
*1/2	.4990/.4980	1/2	1	3	38374	38375	38376	38377	38378	–	–	3CR
*5/8	.6240/.6230	5/8	1-1/4	3-1/2	38379	38380	38381	38382	38383	38384	–	3CR
*3/4	.7490/.7480	3/4	1-1/2	4	38385	38386	38387	38388	38389	38390	38391	3CR
*1	.9990/.9980	1	1-1/2	4	38392	38393	38394	38395	38396	38397	38398	3CR

END MILLS
263–264 Tech

Metric Series **5M**

3 Flute – Single End – Square End





TOLERANCES

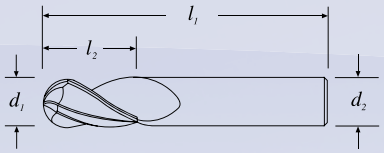
d_1=+0,000–0,05
d_2=h6

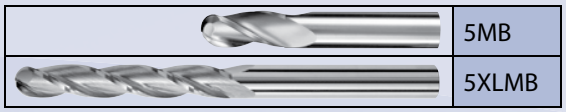
Cutting Diameter d_1 mm	Length of Cut l_2 mm	Overall Length l_1 mm	Shank Diameter d_2 mm	Uncoated EDP No.	Ti-NAMITE (TiN) EDP No.	Ti-NAMITE-C (TiCN) EDP No.	Ti-NAMITE-A (AlTiN) EDP No.	Series Number
1	4	38	3	40505	48756	48778	48799	5M
1,5	4,5	38	3	40509	48757	48779	48800	5M
2	6,3	38	3	40513	48758	48780	48801	5M
2,5	9,5	38	3	40517	48759	48781	48802	5M
3	12	38	3	40521	48760	48782	48803	5M
3	25	75	3	43501	49466	49479	49492	5XLM
3,5	12	50	4	40525	48761	48783	48804	5M
4	14	50	4	40529	48762	48784	48805	5M
4	25	75	4	43503	49467	49480	49493	5XLM
4,5	16	50	6	40533	48763	48785	48806	5M
5	16	50	6	40537	48764	48786	48807	5M
5	25	75	5	43507	49469	49482	49495	5XLM
6	19	50	6	40541	48765	48787	48808	5M
6	25	75	6	43505	49468	49481	49494	5XLM
7	19	63	8	40545	48766	48788	48809	5M
8	20	63	8	40549	48767	48789	48810	5M
8	25	75	8	43515	49470	49483	49496	5XLM
9	22	75	10	40553	48768	48790	48811	5M
10	22	75	10	40557	48769	48791	48812	5M
10	38	100	10	43525	49471	49484	49497	5XLM
11	25	75	12	40561	48770	48792	48813	5M
12	25	75	12	40565	48771	48793	48814	5M
12	50	100	12	43535	49472	49485	49498	5XLM
12	75	150	12	43545	49473	49486	49499	5XLM
14	32	89	14	40569	48772	48794	48815	5M
14	75	150	14	43555	49474	49487	49500	5XLM
16	32	89	16	40573	48773	48795	48816	5M
16	75	150	16	43565	49475	49488	49501	5XLM
18	38	100	18	40577	48774	48796	48817	5M
18	75	150	18	43575	49476	49489	49502	5XLM
20	38	100	20	40581	48775	48797	48818	5M
20	75	150	20	43585	49477	49490	49503	5XLM
25	38	100	25	40585	48776	48798	48819	5M
25	75	150	25	43595	49478	49491	49504	5XLM

END MILLS
263–266 Tech

Metric Series **5MB**

3 Flute – Single End – Ball End





TOLERANCES

d_1=+0,000–0,05
d_2=h6

Cutting Diameter d_1 mm	Length of Cut l_2 mm	Overall Length l_1 mm	Shank Diameter d_2 mm	Uncoated EDP No.	Ti-NAMITE (TiN) EDP No.	Ti-NAMITE-C (TiCN) EDP No.	Ti-NAMITE-A (AlTiN) EDP No.	Series Number
1	4	38	3	40506	48820	48842	48863	5MB
1,5	4,5	38	3	40510	48821	48843	48864	5MB
2	6,3	38	3	40514	48822	48844	48865	5MB
2,5	9,5	38	3	40518	48823	48845	48866	5MB
3	12	38	3	40522	48824	48846	48867	5MB
3	25	75	3	43502	49583	49596	49609	5XLMB
3,5	12	50	4	40526	48825	48847	48868	5MB
4	14	50	4	40530	48826	48848	48869	5MB
4	25	75	4	43504	49584	49597	49610	5XLMB
4,5	16	50	6	40534	48827	48849	48870	5MB
5	16	50	6	40538	48828	48850	48871	5MB
5	25	75	5	43508	49586	49599	49612	5XLMB
6	19	50	6	40542	48829	48851	48872	5MB
6	25	75	6	43506	49585	49598	49611	5XLMB
7	19	63	8	40546	48830	48852	48873	5MB
8	20	63	8	40550	48831	48853	48874	5MB
8	25	75	8	43516	49587	49600	49613	5XLMB
9	22	75	10	40554	48832	48854	48875	5MB
10	22	75	10	40558	48833	48855	48876	5MB
10	38	100	10	43526	49588	49601	49614	5XLMB
11	25	75	12	40562	48834	48856	48877	5MB
12	25	75	12	40566	48835	48857	48878	5MB
12	50	100	12	43536	49589	49602	49615	5XLMB
12	75	150	12	43546	49590	49603	49616	5XLMB
14	32	89	14	40570	48836	48858	48879	5MB
14	75	150	14	43556	49591	49604	49617	5XLMB
16	32	89	16	40574	48837	48859	48880	5MB
16	75	150	16	43566	49592	49605	49618	5XLMB
18	38	100	18	40578	48838	48860	48881	5MB
18	75	150	18	43576	49593	49606	49619	5XLMB
20	38	100	20	40582	48839	48861	48882	5MB
20	75	150	20	43586	49594	49607	49620	5XLMB
25	38	100	25	40586	48840	48862	48883	5MB
25	75	150	25	43596	49595	49608	49621	5XLMB

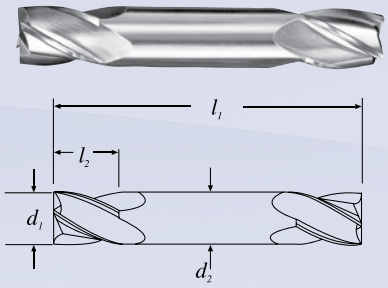
END MILLS
263–266 Tech

Metric Series **14M**

4 Flute – Double End – Square End

TOLERANCES

d_1=+0,000–0,05
d_2=h6

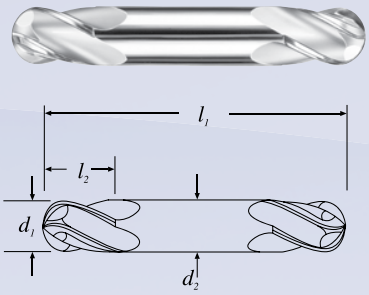


Cutting Diameter d_1 mm	Length of Cut l_2 mm	Overall Length l_1 mm	Shank Diameter d_2 mm	Uncoated EDP No.	Ti-NAMITE (TiN) EDP No.	Ti-NAMITE-C (TiCN) EDP No.	Ti-NAMITE-A (AlTiN) EDP No.	Series Number
1	2	38	3	41405	48884	48905	48926	14M
1,5	3	38	3	41409	48885	48906	48927	14M
2	4	38	3	41413	48886	48907	48928	14M
2,5	5	38	3	41417	48887	48908	48929	14M
3	6	38	3	41421	48888	48909	48930	14M
3,5	7	50	4	41425	48889	48910	48931	14M
4	8	50	4	41429	48890	48911	48932	14M
4,5	9,5	63	4,5	41433	48891	48912	48933	14M
5	10	63	5	41437	48892	48913	48934	14M
6	12	63	6	41441	48893	48914	48935	14M
7	12	63	8	41445	48894	48915	48936	14M
8	12	63	8	41449	48895	48916	48937	14M
9	14	75	9	41453	48896	48917	48938	14M
10	14	75	10	41457	48897	48918	48939	14M
11	14	75	12	41461	48898	48919	48940	14M
12	16	75	12	41465	48899	48920	48941	14M

END MILLS
263–266 Tech

Metric Series **14MB**

4 Flute – Double End – Ball End



TOLERANCES

d_1=+0,000–0,05
d_2=h6

Cutting Diameter d_1 mm	Length of Cut l_2 mm	Overall Length l_1 mm	Shank Diameter d_2 mm	Uncoated EDP No.	Ti-NAMITE (TiN) EDP No.	Ti-NAMITE-C (TiCN) EDP No.	Ti-NAMITE-A (AlTiN) EDP No.	Series Number
1	2	38	3	41406	48947	48968	48989	14MB
1,5	3	38	3	41410	48948	48969	48990	14MB
2	4	38	3	41414	48949	48970	48991	14MB
2,5	5	38	3	41418	48950	48971	48992	14MB
3	6	38	3	41422	48951	48972	48993	14MB
3,5	7	50	4	41426	48952	48973	48994	14MB
4	8	50	4	41430	48953	48974	48995	14MB
4,5	9,5	63	4,5	41434	48954	48975	48996	14MB
5	10	63	5	41438	48955	48976	48997	14MB
6	12	63	6	41442	48956	48977	48998	14MB
7	12	63	8	41446	48957	48978	48999	14MB
8	12	63	8	41450	48958	48979	49000	14MB
9	14	75	9	41454	48959	48980	49001	14MB
10	14	75	10	41458	48960	48981	49002	14MB
11	14	75	12	41462	48961	48982	49003	14MB
12	16	75	12	41466	48962	48983	49004	14MB

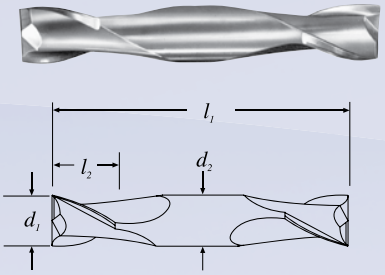
END MILLS
263–266 Tech

Metric Series **15M**

2 Flute – Double End – Square End

TOLERANCES

d_1=+0,000–0,05
d_2=h6



Cutting Diameter d_1 mm	Length of Cut l_2 mm	Overall Length l_1 mm	Shank Diameter d_2 mm	Uncoated EDP No.	Ti-NAMITE (TiN) EDP No.	Ti-NAMITE-C (TiCN) EDP No.	Ti-NAMITE-A (AlTiN) EDP No.	Series Number
1	2	38	3	41505	49010	49031	49052	15M
1,5	3	38	3	41509	49011	49032	49053	15M
2	4	38	3	41513	49012	49033	49054	15M
2,5	5	38	3	41517	49013	49034	49055	15M
3	6	38	3	41521	49014	49035	49056	15M
3,5	7	50	4	41525	49015	49036	49057	15M
4	8	50	4	41529	49016	49037	49058	15M
4,5	9,5	63	4,5	41533	49017	49038	49059	15M
5	10	63	5	41537	49018	49039	49060	15M
6	12	63	6	41541	49019	49040	49061	15M
7	12	63	8	41545	49020	49041	49062	15M
8	12	63	8	41549	49021	49042	49063	15M
9	14	75	9	41553	49022	49043	49064	15M
10	14	75	10	41557	49023	49044	49065	15M
11	14	75	12	41561	49024	49045	49066	15M
12	16	75	12	41565	49025	49046	49067	15M

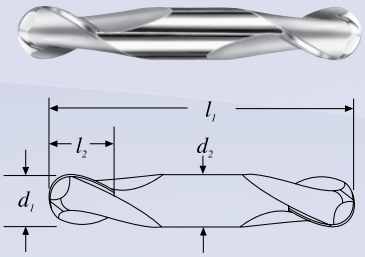
END MILLS
263–266 Tech

Metric Series **15MB**

2 Flute – Double End – Ball End

TOLERANCES

d_1=+0,000–0,05
d_2=h6



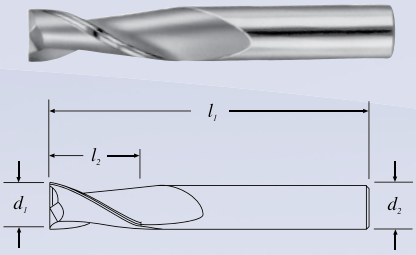
Cutting Diameter d_1 mm	Length of Cut l_2 mm	Overall Length l_1 mm	Shank Diameter d_2 mm	Uncoated EDP No.	Ti-NAMITE (TiN) EDP No.	Ti-NAMITE-C (TiCN) EDP No.	Ti-NAMITE-A (AlTiN) EDP No.	Series Number
1	2	38	3	41506	49073	49094	49115	15MB
1,5	3	38	3	41510	49074	49095	49116	15MB
2	4	38	3	41514	49075	49096	49117	15MB
2,5	5	38	3	41518	49076	49097	49118	15MB
3	6	38	3	41522	49077	49098	49119	15MB
3,5	7	50	4	41526	49078	49099	49120	15MB
4	8	50	4	41530	49079	49100	49121	15MB
4,5	9,5	63	4,5	41534	49080	49101	49122	15MB
5	10	63	5	41538	49081	49102	49123	15MB
6	12	63	6	41542	49082	49103	49124	15MB
7	12	63	8	41546	49083	49104	49125	15MB
8	12	63	8	41550	49084	49105	49126	15MB
9	14	75	9	41554	49085	49106	49127	15MB
10	14	75	10	41558	49086	49107	49128	15MB
11	14	75	12	41562	49087	49108	49129	15MB
12	16	75	12	41566	49088	49109	49130	15MB

END MILLS
263–266 Tech

2-Flute End Mills for Aluminum – Single End – Square End

TOLERANCES

d_1=+0,000–0,05
d_2=h6



Cutting Diameter d_1 mm	Length of Cut l_2 mm	Overall Length l_1 mm	Shank Diameter d_2 mm	Uncoated EDP No.	Ti-NAMITE-C (TiCN) EDP No.
3	7	38	3	45277	49829
3,5	7	57	6	45279	49830
4	8	57	6	45281	49831
4,5	8	57	6	45283	49832
5	10	57	6	45285	49833
6	10	57	6	45287	49834
8	16	63	8	45289	49835
10	19	72	10	45291	49836
12	22	83	12	45293	49837
14	22	83	14	45295	49838
16	26	92	16	45297	49839
20	32	104	20	45299	49840

END MILLS
267 Tech

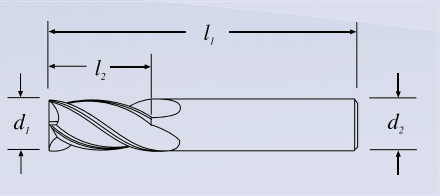
Metric Series **54M**

4-Flute End Mills for Aluminum – Single End – Square End

TOLERANCES

d_1=+0,000–0,05

d_2=h6



Cutting Diameter d_1 mm	Length of Cut l_2 mm	Overall Length l_1 mm	Shank Diameter d_2 mm	Uncoated EDP No.	Ti-NAMITE-C (TiCN) EDP No.
3	8	38	3	45477	45478
3,5	10	57	6	45479	45480
4	11	57	6	45481	45482
4,5	11	57	6	45483	45484
5	13	57	6	45485	45486
6	13	57	6	45487	45488
8	19	63	8	45489	45490
10	22	72	10	45491	45492
12	26	83	12	45493	45494
14	26	83	14	45495	45496
16	32	92	16	45497	45498
20	38	104	20	45499	45500

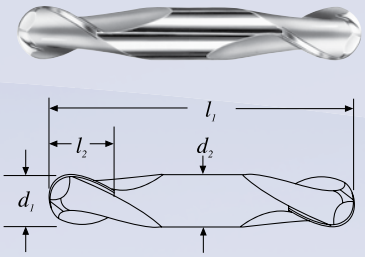
END MILLS
267 Tech

Metric Series **15MB**

2 Flute – Double End – Ball End

TOLERANCES

d_1=+0,000–0,05
d_2=h6



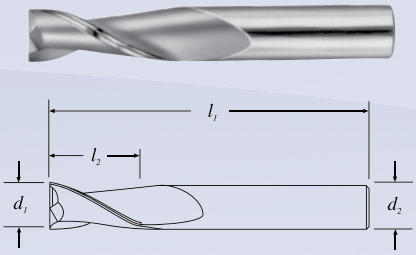
Cutting Diameter d_1 mm	Length of Cut l_2 mm	Overall Length l_1 mm	Shank Diameter d_2 mm	Uncoated EDP No.	Ti-NAMITE (TiN) EDP No.	Ti-NAMITE-C (TiCN) EDP No.	Ti-NAMITE-A (AlTiN) EDP No.	Series Number
1	2	38	3	41506	49073	49094	49115	15MB
1,5	3	38	3	41510	49074	49095	49116	15MB
2	4	38	3	41514	49075	49096	49117	15MB
2,5	5	38	3	41518	49076	49097	49118	15MB
3	6	38	3	41522	49077	49098	49119	15MB
3,5	7	50	4	41526	49078	49099	49120	15MB
4	8	50	4	41530	49079	49100	49121	15MB
4,5	9,5	63	4,5	41534	49080	49101	49122	15MB
5	10	63	5	41538	49081	49102	49123	15MB
6	12	63	6	41542	49082	49103	49124	15MB
7	12	63	8	41546	49083	49104	49125	15MB
8	12	63	8	41550	49084	49105	49126	15MB
9	14	75	9	41554	49085	49106	49127	15MB
10	14	75	10	41558	49086	49107	49128	15MB
11	14	75	12	41562	49087	49108	49129	15MB
12	16	75	12	41566	49088	49109	49130	15MB

END MILLS
263–266 Tech

2-Flute End Mills for Aluminum – Single End – Square End

TOLERANCES

d_1=+0,000–0,05
d_2=h6



Cutting Diameter d_1 mm	Length of Cut l_2 mm	Overall Length l_1 mm	Shank Diameter d_2 mm	Uncoated EDP No.	Ti-NAMITE-C (TiCN) EDP No.
3	7	38	3	45277	49829
3,5	7	57	6	45279	49830
4	8	57	6	45281	49831
4,5	8	57	6	45283	49832
5	10	57	6	45285	49833
6	10	57	6	45287	49834
8	16	63	8	45289	49835
10	19	72	10	45291	49836
12	22	83	12	45293	49837
14	22	83	14	45295	49838
16	26	92	16	45297	49839
20	32	104	20	45299	49840

END MILLS
267 Tech

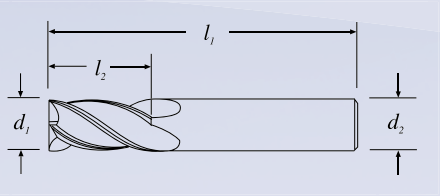
Metric Series **54M**

4-Flute End Mills for Aluminum – Single End – Square End

TOLERANCES

d_1=+0,000–0,05

d_2=h6



Cutting Diameter d_1 mm	Length of Cut l_2 mm	Overall Length l_1 mm	Shank Diameter d_2 mm	Uncoated EDP No.	Ti-NAMITE-C (TiCN) EDP No.
3	8	38	3	45477	45478
3,5	10	57	6	45479	45480
4	11	57	6	45481	45482
4,5	11	57	6	45483	45484
5	13	57	6	45485	45486
6	13	57	6	45487	45488
8	19	63	8	45489	45490
10	22	72	10	45491	45492
12	26	83	12	45493	45494
14	26	83	14	45495	45496
16	32	92	16	45497	45498
20	38	104	20	45499	45500

END MILLS
267 Tech

V-Carb™ – Series 55M Speed and Feed Recommendations – Metric

Solid Carbide Tools
An ISO 9001 Certified Company

www.sgstool.com

V-Carb™ Five Flute End Mills

	★★★★ Finishing • Acabado • Finition				★★★ Semi-Finishing • Semiacabado • Semi-finition				★★ Heavy Peripheral • Fresado periférico pesado • Fraisage périphérique épais				★ Slotting • Ranurado • Rainurage			
	Rw	Ad	SpC	FeC	Rw	Ad	SpC	FeC	Rw	Ad	SpC	FeC	Rw	Ad	SpC	FeC
*Short • Cortas • Court	.05 x D	LOC	0	0	.1 x D	LOC	.8	1.2	.5 x D	1.25 x D	.6	.35	1 x D	.7 x D	.5	.30
Regular • Normales • Normal	.05 x D	LOC	0	0	.1 x D	LOC	.8	1.2	.5 x D	1 x D	.6	.35	1 x D	.5 x D	.5	.30
Long • Largas • Long	.02 x D	3 x D	0	0	.05 x D	3 x D	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Material Type	Bhn	Cutting Diameter 6		8		10		12		16		20	
		rpm	mm/min	rpm	mm/min	rpm	mm/min	rpm	mm/min	rpm	mm/min	rpm	mm/min
Low Carbon Steels	~175	11,080	1,780	8,310	1,780	6,645	1,780	5,540	1,525	4,155	1,525	3,325	1,525
Low Carbon Steels	~275	9,705	1,270	7,275	1,270	5,820	1,270	4,855	1,145	3,640	1,145	2,910	1,145
Med Alloy Steels	~275	8,085	1,015	6,065	1,015	4,850	1,015	4,045	1,015	3,035	1,015	2,425	1,015
Mold And Die Steels	~275	7,280	890	5,460	890	4,365	890	3,640	890	2,730	890	2,185	890
Cast Iron - Gray	~200	6,230	1,015	4,670	1,015	3,735	1,015	3,115	1,015	2,335	1,015	1,870	1,015
Cast Iron - Ductile	~300	5,580	635	4,185	635	3,350	635	2,790	635	2,095	635	1,675	635
Cast Iron - Malleable	~300	3,480	380	2,610	380	2,085	380	1,740	380	1,305	380	1,045	380
Stainless 300 Series	~275	5,660	635	4,245	635	3,395	635	2,830	635	2,125	635	1,700	635
Stainless 400 Series	~185	8,085	1,145	6,065	1,145	4,850	1,145	4,045	1,145	3,035	1,145	2,425	1,145
Stainless PH Series	~325	4,850	510	3,640	510	2,910	510	2,425	510	1,820	510	1,455	510
Titanium Alloys	~295	6,065	890	4,550	890	3,640	890	3,030	890	2,275	890	1,820	890
High Temp. Alloys	~300	1,615	205	1,215	205	970	205	810	205	610	205	485	205

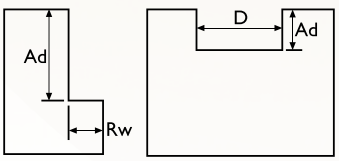
Rates shown are for finish milling. When performing an alternate cut, multiply the speed and feed rates shown by the correction factors SpC and FeC.

*Available in diameters 6, 8, 10 and 12

V-Carbs are not intended for plunging. Recommendations are a starting point. Some adjustments may be required.

Application Tips:

- Tool holders with adequate gripping pressure are required
- Stub length solid holders are recommended for heavy stock removal
- Avoid re-milling chips.
- Avoid straight plunging – ramp or spiral plunge into pockets
- Set-up rigidity critical during heavy roughing
- Regrind and recondition services are available from SGS



Radial Width of Cut (Rw)
Axial Depth of Cut (Ad)
Tool Diameter (D)
Speed Correction Factor (SpC)
Feed Correction Factor (FeC)

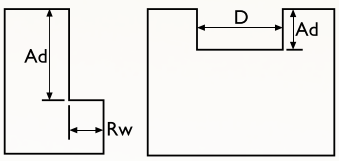
Los valores mostrados son para fresado de acabado. Al realizar un corte alternado, multiplique la velocidad y el avance mostrados por los factores de corrección SpC y FeC.

*Disponibles en diámetros 6, 8, 10 y 12

Las V-Carbs no son aptas para la penetración. Las recomendaciones son un punto de partida. Es posible que se necesiten algunos ajustes.

Sugerencias de aplicación:

- Se requieren portaherramientas con una presión de agarre adecuada
- Se recomiendan portaherramientas sólidos cortos para lograr un arranque de viruta abundante
- Evite volver a fresar las virutas.
- Evite la penetración recta en cavidades; haga el fresado en rampa o en espiral
- La rigidez del sistema de fijación es crítica en tareas de desbastado pesadas
- SGS ofrece servicios de reafilado y reacondicionamiento



Ancho radial del corte (Rw)
Profundidad axial del corte (Ad)
Diámetro de la herramienta (D)
Factor de corrección de velocidad (SpC)
Factor de corrección de avance (FeC)

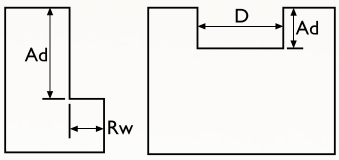
Les taux indiqués s'appliquent au fraisage de finition. Pour d'autres fraisages, multipliez la vitesse de rotation et la vitesse d'avance indiquées par les facteurs de correction SpC et FeC.

*Disponible dans les diamètres 6, 8, 10 et 12

Les fraises V-Carb ne sont pas conçues pour pratiquer des incisions à la verticale. Il est recommandé de commencer par un point de départ. Certains réglages peuvent être nécessaires.

Conseils d'utilisation:

- Des supports d'outils avec une pression de serrage suffisante sont nécessaires
- Des supports massifs courts sont recommandés pour les enlèvements de matière épais
- Éviter les copeaux de refraisage
- Évitez les incisions directes – Dans les poches, pratiquez une incision en oblique ou en spirale
- Rigidité initiale critique durant les opérations de dégrossissage épais
- SGS Tool Company offre des services de refraisage et de reconditionnement

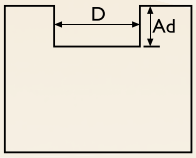


Largeur radiale de taille (Rw)
Profondeur axiale de taille (Ad)
Diamètre de l'outil (D)
Facteur de correction de vitesse de rotation (SpC)
Facteur de correction d'avance (FeC)

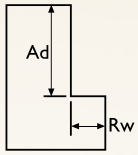
Tri-Carb® – Series 65 Speed and Feed Recommendations – Fractional and Metric

Diameter (D)		Alloy Steel ≤ 275 Bhn 350 sfm 105 m / min		Titanium ≤ 300 Bhn 300 sfm 90 m / min		Inconel ≤ 300 Bhn 80 sfm 24 m / min		Stainless ≤ 275 Bhn 300 sfm 90 m / min	
		Feed Rate – Per Tooth							
in	mm	in	mm	in	mm	in	mm	in	mm
1/8	3	.0004	.010	.0003	.007	.0002	.005	.0003	.007
–	4	–	.015	–	.010	–	.007	–	.010
3/16	5	.0009	.023	.0005	.013	.0004	.010	.0004	.013
1/4	6	.0012	.030	.0009	.023	.0006	.015	.0006	.018
5/16	8	.0014	.035	.0012	.030	.0010	.025	.0009	.025
3/8	10	.0018	.045	.0015	.038	.0012	.030	.0011	.033
1/2	12	.0023	.058	.0019	.048	.0016	.040	.0017	.043
5/8	16	.0026	.066	.0024	.060	.0020	.050	.0022	.055
3/4	20	.0029	.073	.0026	.066	.0024	.060	.0025	.064
1	–	.0032	.081	.0035	.088	.0025	.064	.0033	.084

rpm = sfm x 3.82 / tool diameter
rpm = (m/min x 1000) / (3.14 x tool diameter)
feed per minute = feed per tooth x no. of teeth x rpm

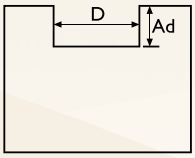


Axial Depth (Ad) < .5 x Diameter

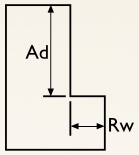


Radial Width (Rw) < .5 x Diameter
Axial Depth (Ad) < 1 x Diameter

rpm = sfm x 3.82 / diámetro de la herramienta
rpm = (m/min x 1000) / (3.14 x diámetro de la herramienta)
avance por minuto = avance por diente x Nº de dientes x rpm

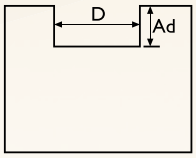


Prof. axial < 0.5 x diámetro

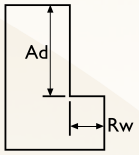


Ancho radial < 0.5 x diámetro
Prof. axial < 1 x diámetro

r/min = pi/min x 3,82 / diamètre de l'outil
r/min = (m/min x 1000) / (3,14 x diamètre de l'outil)
avance par minute = avance par dent x nbre de dents x r/min

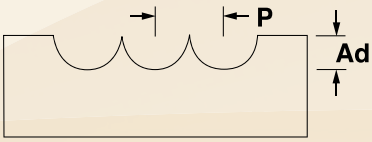


Profondeur axiale < 0,5 x diamètre



Largeur radiale < 0,5 x diamètre
Profondeur axiale < 1 x diamètre

Turbo-Carb® Speed and Feed Recommendations – Fractional



See formulas page 294.

Roughing – Fractional

Diameter	Steels < 40 Rc Ad = 10% dia			Steels > 40 – 50 Rc Ad = 5% dia			Steels > 50 – 60 Rc Ad = 4% dia		
	Axial Depth[1]	rpm[2]	Feed / Tooth	Axial Depth[1]	rpm[2]	Feed / Tooth	Axial Depth[1]	rpm[2]	Feed / Tooth
1/32	.0031	76,740	.0006	.0016	90,200	.0005	.0013	61,270	.0004
1/16	.0063	38,065	.0015	.0031	45,745	.0011	.0025	31,190	.0008
3/32	.0094	25,430	.0020	.0047	30,335	.0015	.0038	20,655	.0011
1/8	.0125	19,100	.0030	.0063	22,700	.0023	.0050	15,595	.0017
3/16	.0188	12,720	.0040	.0094	15,170	.0030	.0075	10,395	.0023
1/4	.0250	9,550	.0050	.0125	11,395	.0038	.0100	7,800	.0029
5/16	.0313	7,635	.0060	.0156	9,120	.0050	.0125	6,240	.0038
3/8	.0375	6,365	.0080	.0188	7,585	.0060	.0150	5,200	.0045
1/2	.0500	4,775	.0100	.0250	5,695	.0075	.0200	3,900	.0057
5/8	.0625	3,820	.0110	.0312	4,560	.0080	.0250	3,120	.0060
3/4	.0750	3,185	.0120	.0375	3,800	.0085	.0300	2,600	.0063

P (pitch) = up to 40% of dia • P (paso) = hasta 40% del diámetro • P (pas) = jusqu'à 40% du diamètre

Finishing – Fractional

Diameter	Steels < 40 Rc Ad = 3% dia			Steels > 40 – 50 Rc Ad = 2% dia			Steels > 50 – 60 Rc Ad = 1% dia		
	Axial Depth[1]	rpm[2]	Feed / Tooth	Axial Depth[1]	rpm[2]	Feed / Tooth	Axial Depth[1]	rpm[2]	Feed / Tooth
1/32	.0010	116,925	.0007	.0006	144,870	.0006	.0003	125,465	.0005
1/16	.0019	58,370	.0017	.0013	69,595	.0012	.0006	62,680	.0009
3/32	.0030	38,890	.0022	.0019	46,975	.0017	.0010	39,655	.0012
1/8	.0040	29,185	.0033	.0025	35,470	.0025	.0013	30,125	.0019
3/16	.0060	19,455	.0044	.0038	23,495	.0033	.0019	20,340	.0025
1/4	.0075	14,590	.0055	.0050	17,735	.0042	.0025	15,355	.0032
5/16	.0095	11,675	.0066	.0063	14,135	.0055	.0031	12,335	.0042
3/8	.0110	9,730	.0088	.0075	11,825	.0066	.0038	10,170	.0050
1/2	.0150	7,295	.0110	.0100	8,870	.0082	.0050	7,680	.0063
5/8	.0200	5,835	.0120	.0125	7,095	.0090	.0063	6,120	.0067
3/4	.0230	4,865	.0130	.0150	5,645	.0100	.0075	5,120	.0071

P (pitch) = dependent on finish requirement (see formulas) • P (paso) = depende del requisito de acabado (vea las fórmulas) • P (pas) = selon les exigences de finition (voir formules)

* On flat surface
[1] Suggested maximum
[2] If recommendation exceeds your machine limit use the maximum available

Application Tips:

- Pressurized air with oil extends tool life in materials <40 HRc
- Use dry air when finish milling or roughing materials harder than 40 HRc
- Unique coating eliminates flood coolant requirements
- The Z-level cutting method and climb milling extend tool life in roughing applications
- Helical interpolation is the preferred entry method. Avoid direct plunging.
- Attention to programming details, tool holders, TIR & balance contribute to additional tool life
- Speed and feed recommendations are based on using the tool tip.

* En superficie plana
[1] Máximo recomendado
[2] Si la recomendación supera el límite de su máquina, utilice el máximo disponible

Sugerencias de aplicación:

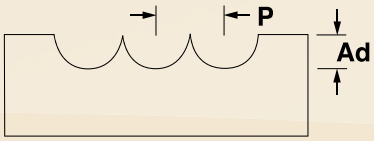
- El aire presurizado con aceite extiende la vida útil de la herramienta en materiales <40 HRc
- Para el fresado de acabado o el desbastado de materiales de dureza mayor de 40 HRc, utilice aire seco.
- Recubrimiento único elimina los requisitos de un sistema refrigerante por inmersión
- El método de corte de nivel Z y el fresado en trepado extienden la vida útil de la herramienta en aplicaciones de desbastado
- El método de acceso preferido es la interpolación helicoidal. Evite la penetración directa.
- La atención a los detalles de programación, portaherramientas, excentricidad total indicada (TIR) y equilibrio contribuyen a prolongar la vida útil de la herramienta
- Las recomendaciones de velocidad y de avance se basan en el uso del inserto o punta de la herramienta.

* Sur surface plane
[1] Maximum suggéré
[2] Si la recommandation dépasse les limites de votre machine, utilisez le maximum disponible

Conseils d'utilisation :

- L'air pressurisé et l'huile augmentent la longévité des outils sur les matériaux <40 HRc
- Utilisez de l'air durant le dégrossissement des matériaux ayant une dureté supérieure à 40 HRc
- Revêtement unique ne nécessitant pas de refroidissement par mouillage abondant
- Le fraisage à niveau Z et le fraisage en avalant augmentent la longévité des outils dans les applications de dégrossissage
- La meilleure méthode d'entrée est l'interpolation hélicoïdale. Éviter l'entrée verticale.
- Pour maximiser la longévité des outils, faire attention aux détails de programmation, aux supports d'outils, au TIR, à l'équilibre, etc.
- Les recommandations de vitesse de rotation et d'avance sont basées sur l'application des conseils d'utilisation.

Turbo-Carb® Speed and Feed Recommendations – Metric



See formulas page 294.

Roughing – Metric

Diameter	Steels < 40 Rc Ad = 10% dia			Steels > 40 – 50 Rc Ad = 5% dia			Steels > 50 – 60 Rc Ad = 4% dia		
	Axial Depth[1]	rpm[2]	Feed / Tooth	Axial Depth[1]	rpm[2]	Feed / Tooth	Axial Depth[1]	rpm[2]	Feed / Tooth
1	.10	60,640	.015	.05	72,285	.015	.04	49,485	.010
1.5	.15	40,400	.030	.08	48,155	.025	.06	32,965	.020
2	.20	30,335	.045	.10	36,160	.035	.08	24,755	.025
2.5	.25	24,265	.050	.13	28,920	.040	.10	19,800	.030
3	.30	20,215	.075	.15	24,100	.055	.12	16,495	.045
4	.40	15,160	.095	.20	18,070	.065	.16	12,370	.050
5	.50	12,125	.100	.25	14,455	.075	.20	9,895	.060
6	.60	10,110	.125	.30	12,050	.095	.24	8,250	.075
8	.80	7,580	.150	.40	9,035	.125	.32	6,185	.095
10	1.0	6,065	.205	.50	7,230	.150	.40	4,950	.115
12	1.2	5,055	.255	.60	6,025	.190	.48	4,125	.145
16	1.6	3,790	.280	.80	4,520	.200	.64	3,095	.150
20	2.0	3,030	.300	1.0	3,615	.215	.80	2,475	.160

P (pas) = selon les exigences de finition (voir formules

Finishing – Metric

Diameter	Steels < 40 Rc Ad = 3% dia			Steels > 40 – 50 Rc Ad = 2% dia			Steels > 50 – 60 Rc Ad = 1% dia		
	Axial Depth[1]	rpm[2]	Feed / Tooth	Axial Depth[1]	rpm[2]	Feed / Tooth	Axial Depth[1]	rpm[2]	Feed / Tooth
1	.03	92,660	.020	.02	112,555	.020	.010	97,030	.010
1.5	.05	61,730	.045	.03	74,980	.030	.015	64,635	.025
2	.06	46,355	.050	.04	56,305	.040	.020	48,540	.030
2.5	.08	37,075	.055	.05	45,035	.045	.025	38,820	.040
3	.09	30,890	.085	.06	37,520	.065	.030	32,345	.050
4	.12	23,165	.100	.08	28,135	.075	.040	24,255	.060
5	.15	18,530	.110	.10	22,505	.085	.050	19,400	.065
6	.18	15,445	.140	.12	18,760	.105	.060	16,175	.080
8	.24	11,580	.170	.16	14,065	.140	.080	12,125	.105
10	.30	9,265	.225	.20	11,255	.170	.100	9,700	.130
12	.36	7,720	.280	.24	9,380	.210	.120	8,085	.160
16	.48	5,790	.305	.32	7,035	.230	.160	6,065	.170
20	.60	4,635	.320	.40	5,630	.255	.200	4,850	.180

P (pitch) = dependent on finish requirement (see formulas) • P (paso) = depende del requisito de acabado (vea las fórmulas) • P (pas) = selon les exigences de finition (voir formules)

* On flat surface
[1] Suggested maximum
[2] If recommendation exceeds your machine limit use the maximum available

Application Tips:

- Pressurized air with oil extends tool life in materials <40 HRc
- Use dry air when finish milling or roughing materials harder than 40 HRc
- Unique coating eliminates flood coolant requirements
- The Z-level cutting method and climb milling extend tool life in roughing applications
- Helical interpolation is the preferred entry method. Avoid direct plunging.
- Attention to programming details, tool holders, TIR & balance contribute to additional tool life
- Speed and feed recommendations are based on using the tool tip.

* En superficie plana
[1] Máximo recomendado
[2] Si la recomendación supera el límite de su máquina, utilice el máximo disponible

Sugerencias de aplicación:

- El aire presurizado con aceite extiende la vida útil de la herramienta en materiales <40 HRc
- Para el fresado de acabado o el desbastado de materiales de dureza mayor de 40 HRc, utilice aire seco.
- Recubrimiento único elimina los requisitos de un sistema refrigerante por inmersión
- El método de corte de nivel Z y el fresado en trepado extienden la vida útil de la herramienta en aplicaciones de desbastado
- El método de acceso preferido es la interpolación helicoidal. Evite la penetración directa.
- La atención a los detalles de programación, portaherramientas, excentricidad total indicada (TIR) y equilibrio contribuyen a prolongar la vida útil de la herramienta
- Las recomendaciones de velocidad y de avance se basan en el uso del inserto o punta de la herramienta.

* Sur surface plane
[1] Maximum suggéré
[2] Si la recommandation dépasse les limites de votre machine, utilisez le maximum disponible

Conseils d'utilisation :

- L'air pressurisé et l'huile augmentent la longévité des outils sur les matériaux <40 HRc
- Utilisez de l'air durant le dégrossissement des matériaux ayant une dureté supérieure à 40 HRc
- Revêtement unique ne nécessitant pas de refroidissement par mouillage abondant
- Le fraisage à niveau Z et le fraisage en avalant augmentent la longévité des outils dans les applications de dégrossissage
- La meilleure méthode d'entrée est l'interpolation hélicoïdale. Éviter l'entrée verticale.
- Pour maximiser la longévité des outils, faire attention aux détails de programmation, aux supports d'outils, au TIR, à l'équilibre, etc.
- Les recommandations de vitesse de rotation et d'avance sont basées sur l'application des conseils d'utilisation.

Power-Carb™ Speed and Feed Recommendations – Fractional and Metric

Power-Carb™ HIGH PERFORMANCE CARBIDE END MILLS

Slotting		Steels 30–45 Rc		Steels 45–55 Rc		Steels 55–60 Rc		Steels 60–65 Rc	
		Rw 1 x D Ad ≤.3 x D		Rw 1 x D Ad ≤.2 x D		Rw 1 x D Ad ≤.1 x D		Rw 1 x D Ad ≤.1 x D	
		Speed		Speed		Speed		Speed	
		215 sfm	65 m / min	145 sfm	45 m / min	100 sfm	30 m / min	65 sfm	20 m / min
Diameter (D)		Feed per Tooth		Feed per Tooth		Feed per Tooth		Feed per Tooth	
in	mm	in	mm	in	mm	in	mm	in	mm
1/4	6	.0014	.035	.0013	.033	.0012	.030	.0011	.028
5/16	8	.0016	.040	.0015	.040	.0014	.035	.0012	.030
3/8	10	.0020	.050	.0018	.045	.0016	.040	.0014	.035
1/2	12	.0024	.060	.0022	.055	.0020	.050	.0018	.045

Profiling		Steels 30–45 Rc		Steels 45–55 Rc		Steels 55–60 Rc		Steels 60–65 Rc	
		Rw ≤.1 x D Ad ≤1.5 x D		Rw ≤.05 x D Ad ≤1.5 x D		Rw ≤.05 x D Ad ≤1.5 x D		Rw ≤.05 x D Ad ≤1.5 x D	
		Speed		Speed		Speed		Speed	
		330 sfm	100 m / min	300 sfm	90 m / min	260 sfm	80 m / min	200 sfm	60 m / min
Diameter (D)		Feed per Tooth		Feed per Tooth		Feed per Tooth		Feed per Tooth	
in	mm	in	mm	in	mm	in	mm	in	mm
1/4	6	.0018	.045	.0015	.040	.0014	.035	.0012	.030
5/16	8	.0022	.055	.0020	.050	.0018	.045	.0015	.040
3/8	10	.0024	.065	.0024	.060	.0022	.055	.0020	.050
1/2	12	.0030	.075	.0027	.070	.0026	.065	.0024	.060

High Speed Profiling		Steels 30–45 Rc		Steels 45–55 Rc		Steels 55–60 Rc		Steels 60–65 Rc	
		Rw ≤.04 x D Ad ≤1.5 x D		Rw ≤.04 x D Ad ≤1.5 x D		Rw ≤.01 x D Ad ≤1.5 x D		Rw ≤.01 x D Ad ≤1.5 x D	
		Speed		Speed		Speed		Speed	
		825 sfm	250 m / min	825 sfm	250 m / min	425 sfm	130 m / min	425 sfm	130 m / min
Diameter (D)		Feed per Tooth		Feed per Tooth		Feed per Tooth		Feed per Tooth	
in	mm	in	mm	in	mm	in	mm	in	mm
1/4	6	.0040	.100	.0035	.090	.0030	.070	.0025	.060
5/16	8	.0045	.110	.0040	.100	.0035	.090	.0030	.070
3/8	10	.0050	.130	.0047	.120	.0040	.100	.0035	.090
1/2	12	.0055	.140	.0050	.130	.0047	.120	.0045	.110

Radial Width of Cut (Rw)
Axial Depth of Cut (Ad)

Ancho radial del corte (Rw)
Profundidad axial del corte (Ad)

Largeur radiale de taille (Rw)
Profondeur axiale de taille (Ad)

Ski-Carb® Speed and Feed Recommendations – Fractional and Metric

SGS Solid Carbide Tools
An ISO 9001 Certified Company

www.sgstool.com

RPM – Use Maximum Available – No speed limits for SGS SKI-CARB®
rpm: utilice el máximo valor disponible; no hay límites de velocidad para las SKI-CARB® de SGS
Utilisez la vitesse de rotation maximale; aucune limite de vitesse de rotation ne s'applique aux fraises SKI-CARB®

Recommendations:

- Increase feed based on motor load
- Adjust feed appropriately when finish milling
- Use sufficient coolant, particularly in aluminum applications
- Mist may be advantageous when milling deep pockets
- For optimum performance balance holder/tool assembly

Contact SGS Tool Company for re-sharpening information.

Recomendaciones:

- Aumente el avance en base a la carga del motor
- Al realizar fresado de acabado, ajuste el avance en forma apropiada
- Utilice una cantidad suficiente de refrigerante, particularmente en aplicaciones de aluminio
- La niebla puede ser ventajosa al fresar cavidades profundas
- Para lograr un rendimiento óptimo, equilibre el conjunto de herramienta y porta-herramientas

Para obtener información sobre reafilado, comuníquese con SGS Tool Company

Recommandations:

- Augmenter l'avance selon la charge du moteur
- Régler correctement l'avance lorsque le fraisage est terminé
- Utiliser suffisamment de liquide de refroidissement, particulièrement sur l'aluminium
- Des pulvérisations de gouttelettes peuvent être avantageuses pour le fraisage de poches profondes
- Pour des performances optimales, équilibrer l'assemblage support/outil

Pour obtenir des renseignements sur les réaffutages, contactez la société SGS Tool Company

Diameter (D)		Aluminum Alloys 1600–2000 sfm 490–610 m/min		Plastics 1200–1600 sfm 365–490 m/min		Copper Alloys 800–1200 sfm 245–365 m/min		Brass/Bronze 800–1500 sfm 245–455 m/min	
		Feed Rate Per Tooth							
in	mm	in	mm	in	mm	in	mm	in	mm
–	3	–	.04	–	.08	–	.04	–	.04
–	4	–	.05	–	.10	–	.05	–	.05
–	5	–	.06	–	.12	–	.06	–	.06
1/4	6	.003	.07	.006	.14	.003	.07	.003	.07
5/16	8	.004	.10	.008	.20	.004	.10	.004	.10
3/8	10	.005	.12	.010	.24	.005	.12	.005	.12
1/2	12	.006	.15	.012	.30	.006	.15	.006	.15
–	14	–	.17	–	.34	–	.17	–	.17
5/8	16	.007	.18	.014	.36	.007	.18	.007	.18
–	18	–	.20	–	.40	–	.20	–	.20
3/4	20	.008	.22	.016	.44	.008	.22	.008	.22
1	–	.010	–	.018	–	.010	–	.010	–

The above are recommended starting points for regular or short flute length mills – adjust feed accordingly for extra-long flute lengths

Los anteriores son puntos de partida recomendados para fresas con canales de longitud normal o reducida; para canales extralargos ajuste el avance como corresponda.

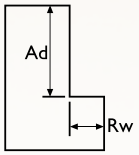
Les conseils ci-dessus sont des points de départ recommandés pour les opérations de fraisage à goujures normales ou courtes (avec des goujures très longues, ajustez la vitesse d'avance en conséquence).

Profiling • Perfilado • Détourage

Axial Depth (Ad) ≤ 1.5 x D
Radial Width ≤ (Rw) .5 x D

Prof. axial ≤ 1.5 x diámetro
Ancho radial ≤ 0.5 x diámetro

Profondeur axiale ≤1,5 x diamètre (max.)
Largeur radiale ≤ 0,5 x diamètre (max.)

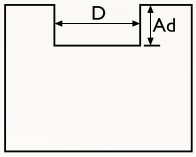


Slotting • Ranurado • Rainurage

Axial Depth (Ad) ≤ 1 x D

Prof. axial ≤ 1 x diámetro

Profondeur axiale ≤ 1 x diamètre (max.)



rpm = sfm x 3.82 / tool diameter
rpm = (m/min x 1000) / (3.14 x tool diameter)
feed per minute = feed per tooth x no. of teeth x rpm

rpm = sfm x 3.82 / diámetro de la herramienta
rpm = (m/min x 1000) / (3.14 x diámetro de la herramienta)
avance por minuto = avance por diente x Nº de dientes x rpm

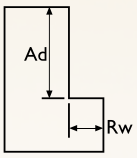
r/min = pi/min x 3,82 / diamètre d'outil
r/min = (m/min x 1000) / (3,14 x diamètre d'outil)
avance par minute = avance par dent x nombre de dents x r/min

S-Carb® Series 43 and 47 Speed and Feed Recommendations – Fractional and Metric

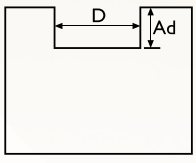
		Aluminum Alloys 1600–2000 sfm 490–610 m/min		Plastics 1200–1600 sfm 365–490 m/min		Copper Alloys 800–1200 sfm 245–365 m/min		Brass / Bronze 800–1500 sfm 245–455 m/min	
Diameter (D)		**Feed Rate Per Tooth**							
in	**mm**	**in**	**mm**	**in**	**mm**	**in**	**mm**	**in**	**mm**
1/8	3	0.0015	0.04	0.0030	0.08	0.0015	0.04	0.0015	0.04
–	4	–	0.05	–	0.10	–	0.05	–	0.05
3/16	5	0.0025	0.06	0.0050	0.12	0.0025	0.06	0.0025	0.06
1/4	6	0.0030	0.07	0.0060	0.14	0.0030	0.07	0.0030	0.07
5/16	8	0.0040	0.10	0.0080	0.20	0.0040	0.10	0.0040	0.10
3/8	10	0.0050	0.12	0.0100	0.24	0.0050	0.12	0.0050	0.12
1/2	12	0.0060	0.15	0.0120	0.30	0.0060	0.15	0.0060	0.15
–	14	–	0.17	–	0.34	–	0.17	–	0.17
5/8	16	0.0070	0.18	0.0140	0.36	0.0070	0.18	0.0070	0.18
3/4	20	0.0080	0.22	0.0160	0.44	0.0080	0.22	0.0080	0.22
1	25	0.0100	0.25	0.0180	0.46	0.0100	0.25	0.0100	0.25

Feed rates shown are for slotting.
Rates shown can be increased 40% when profile milling.
When finish milling, reduce feed to obtain desired finish.

rpm = sfm x 3.82 / tool diameter
rpm = (m/min x 1000) / (3.14 x tool diameter)
feed per minute = feed per tooth x number of teeth x rpm



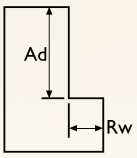
Axial Depth (Ad) ≤ 1.5 x Diameter
Radial Width (Rw) ≤ .5 x Diameter



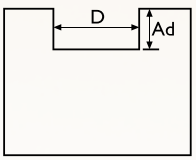
Axial Depth (Ad) ≤ 1 x Diameter

Las velocidades de avance indicadas son para ranurado.
Estas velocidades pueden incrementarse en un 40% para fresado de perfiles.
En el fresado de acabado, reduzca el avance para obtener el acabado deseado.

rpm = sfm x 3.82 / diámetro de la herramienta
rpm = (m/min x 1000) / (3.14 x diámetro de la herramienta)
avance por minuto = avance por diente x Nº de dientes x rpm



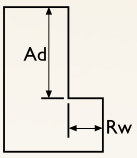
Prof. axial ≤ 1.5 x diámetro
Ancho radial ≤ 0.5 x diámetro



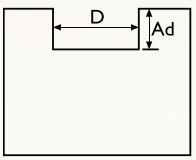
Prof. axial ≤ 1 x diámetro

Les vitesses d'avance indiquées s'appliquent au rainurage.
Les vitesses indiquées peuvent être augmentées de 40% lors des opérations de détourage.
Après le fraisage, réduire la vitesse d'avance pour obtenir la finition désirée.

r/min = pi/min x 3,82 / diamètre d'outil
r/min = (m/min x 1000) / (3,14 x diamètre d'outil)
avance par minute = avance par dent x nombre de dents x r/min



Profondeur axiale ≤ 1,5 x diamètre
Largeur radiale ≤ 0,5 x diamètre



Profondeur axiale ≤ 1 x diamètre

S-Carb Series 43 and 47 Speed and Feed Recommendations – Extended Reach – Fractional

Aluminum

	Slotting		Peripheral		Contouring	
	Roughing	Finishing	Roughing	Finishing	Roughing	Finishing
Radial Width (Rw)	1xD	1xD	.25xD	.05xD	.3xD	.04xD
Axial Depth (Ad)	.5xD	.05xD	1xD	.8xD	.3xD	.05xD
Speed (sfm)	2000	2000	2000	2000	2000	2000

	Feed / Tooth by Diameter (inch)							
	1/4		3/8		1/2–5/8		3/4	
Operation	Roughing	Finishing	Roughing	Finishing	Roughing	Finishing	Roughing	Finishing
Slotting	.0016	.0020	.0035	.0040	.0045	.0055	.0070	.0085
Peripheral	.0020	.0028	.0040	.0045	.0055	.0070	.0085	.0100
Contouring	.0024	.0040	.0045	.0060	.0070	.0080	.0100	.0120

Copper Alloys

	Slotting		Peripheral		Contouring	
	Roughing	Finishing	Roughing	Finishing	Roughing	Finishing
Radial Width (Rw)	1xD	1xD	.25xD	.05xD	.1xD	.04xD
Axial Depth (Ad)	.1xD	.05xD	1xD	.8xD	.2xD	.05xD
Speed (sfm)	400	400	400	400	600	600

	Feed / Tooth by Diameter (inch)							
	1/4		3/8		1/2–5/8		3/4	
Operation	Roughing	Finishing	Roughing	Finishing	Roughing	Finishing	Roughing	Finishing
Slotting	.0010	.0015	.0016	.0020	.0035	.0040	.0045	.0055
Peripheral	.0015	.0020	.0020	.0028	.0040	.0045	.0055	.0070
Contouring	.0020	.0025	.0024	.0040	.0045	.0060	.0070	.0080

Plastics

	Slotting		Peripheral		Contouring	
	Roughing	Finishing	Roughing	Finishing	Roughing	Finishing
Radial Width (Rw)	1xD	1xD	.25xD	.05xD	.3xD	.04xD
Axial Depth (Ad)	.5xD	.05xD	1xD	.8xD	.3xD	.05xD
Speed (sfm)	280	325	350	400	400	450

	Feed / Tooth by Diameter (inch)							
	1/4		3/8		1/2–5/8		3/4	
Operation	Roughing	Finishing	Roughing	Finishing	Roughing	Finishing	Roughing	Finishing
Slotting	.0010	.0015	.0016	.0020	.0035	.0040	.0045	.0055
Peripheral	.0015	.0020	.0020	.0028	.0040	.0045	.0055	.0070
Contouring	.0020	.0025	.0024	.0040	.0045	.0060	.0070	.0080

rpm = sfm x 3.82 / tool diameter
rpm = (m/min x 1000) / (3.14 x tool diameter)
feed per minute = feed per tooth x number of teeth x rpm

rpm = sfm x 3.82 / diámetro de la herramienta
rpm = (m/min x 1000) / (3.14 x diámetro de la herramienta)
avance por minuto = avance por diente x Nº de dientes x rpm

r/min = pi/min x 3,82 / diamètre d'outil
r/min = (m/min x 1000) / (3,14 x diamètre d'outil)
avance par minute = avance par dent x nombre de dents x r/min

S-Carb Series 43 and 47 Speed and Feed Recommendations – Extended Reach – Metric

CARB
Solid Carbide End Mills for Aluminum

Aluminum

	Slotting		Peripheral		Contouring	
	Roughing	Finishing	Roughing	Finishing	Roughing	Finishing
Radial Width (Rw)	1xD	1xD	.25xD	.05xD	.3xD	.04xD
Axial Depth (Ad)	.5xD	.05xD	1xD	.8xD	.3xD	.05xD
Speed (m/min)	610	610	610	610	610	610

Feed / Tooth by Diameter (mm)

	6		8–10		12–16		20	
Operation	Roughing	Finishing	Roughing	Finishing	Roughing	Finishing	Roughing	Finishing
Slotting	0.040	0.050	0.090	0.100	0.110	0.140	0.180	0.215
Peripheral	0.050	0.070	0.100	0.110	0.140	0.180	0.215	0.250
Contouring	0.060	0.100	0.110	0.150	0.180	0.200	0.250	0.300

Copper Alloys

	Slotting		Peripheral		Contouring	
	Roughing	Finishing	Roughing	Finishing	Roughing	Finishing
Radial Width (Rw)	1xD	1xD	.25xD	.05xD	.1xD	.04xD
Axial Depth (Ad)	.1xD	.05xD	1xD	.8xD	.2xD	.05xD
Speed (m/min)	125	125	125	125	185	185

Feed / Tooth by Diameter (mm)

	6		8–10		12–16		20	
Operation	Roughing	Finishing	Roughing	Finishing	Roughing	Finishing	Roughing	Finishing
Slotting	0.025	0.035	0.040	0.050	0.090	0.100	0.110	0.140
Peripheral	0.035	0.050	0.050	0.070	0.100	0.110	0.140	0.170
Contouring	0.050	0.065	0.060	0.100	0.110	0.150	0.170	0.200

Plastics

	Slotting		Peripheral		Contouring	
	Roughing	Finishing	Roughing	Finishing	Roughing	Finishing
Radial Width (Rw)	1xD	1xD	.25xD	.05xD	.3xD	.04xD
Axial Depth (Ad)	.5xD	.05xD	1xD	.8xD	.3xD	.05xD
Speed (m/min)	85	100	110	125	125	135

Feed / Tooth by Diameter (mm)

	6		8–10		12–16		20	
Operation	Roughing	Finishing	Roughing	Finishing	Roughing	Finishing	Roughing	Finishing
Slotting	0.025	0.035	0.040	0.050	0.090	0.100	0.110	0.140
Peripheral	0.035	0.050	0.050	0.070	0.100	0.110	0.140	0.170
Contouring	0.050	0.065	0.060	0.100	0.110	0.150	0.170	0.200

rpm = sfm x 3.82 / tool diameter
rpm = (m/min x 1000) / (3.14 x tool diameter)
feed per minute = feed per tooth x number of teeth x rpm

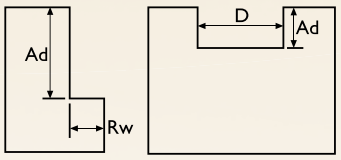
rpm = sfm x 3.82 / diámetro de la herramienta
rpm = (m/min x 1000) / (3.14 x diámetro de la herramienta)
avance por minuto = avance por diente x Nº de dientes x rpm

r/min = pi/min x 3,82 / diamètre d'outil
r/min = (m/min x 1000) / (3,14 x diamètre d'outil)
avance par minute = avance par dent x nombre de dents x r/min

Amorphous Diamond Coatings (AD)
Speed and Feed Recommendations – Fractional and Metric

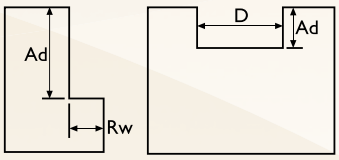
Cutting Diameter		Feed Rate Per Tooth					
Inch	mm	Slotting		Peripheral		Contouring	
Finishing		Rw 1 x D	Ad .03 x D	Rw .06 x D	Ad .45 x D	Rw .02 x D	Ad .03 x D
		Speed 3280 - 5900 sfm (1000 - 1800 m/min)					
Roughing		Rw 1 x D	Ad .25 x D	Rw .1 x D	Ad .65 x D	Rw .1 x D	Ad .25 x D
		Speed 1310 – 1970 sfm (400 – 600 m/min)					
1/16	1,6	0.0003 in	(0.008mm)	0.0004 in	(0.010 mm)	0.0005 in	(0.011mm)
1/8	3	0.0006 in	(0.016mm)	0.0008 in	(0.020 mm)	0.0009 in	(0.022mm)
3/16	5	0.0013 in	(0.032mm)	0.0016 in	(0.041 mm)	0.0017 in	(0.044mm)
1/4	6	0.0013 in	(0.032mm)	0.0016 in	(0.041 mm)	0.0017 in	(0.044mm)
5/16	8	0.0027 in	(0.068mm)	0.0034 in	(0.086 mm)	0.0037 in	(0.094mm)
3/8	10	0.0027 in	(0.068mm)	0.0034 in	(0.086 mm)	0.0037 in	(0.094mm)
1/2	12	0.0041 in	(0.103mm)	0.0046 in	(0.117 mm)	0.0050 in	(0.127mm)

Amorphous Diamond tool coatings are ideal for machining non-ferrous materials. Any SGS solid carbide tool can be coated with Amorphous Diamond.



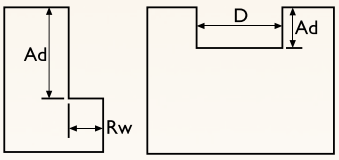
Radial Width of Cut (Rw)
Axial Depth of Cut (Ad)
Tool Diameter (D)

Los recubrimientos para herramientas de diamante amorfo son ideales para el maquinado de materiales no ferrosos. Toda herramienta SGS de carburo sólido puede recubrirse con diamante amorfo.



Ancho radial del corte (Rw)
Profundidad axial del corte (Ad)
Diámetro de la herramienta (D)

Les revêtements d'outil en diamant amorphe sont parfaits pour l'usinage des matériaux non ferreux. Tous les outils en carbure massif SGS peuvent être revêtus de diamant amorphe.



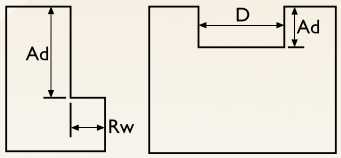
Largeur radiale de taille (Rw)
Profondeur axiale de taille (Ad)
Diamètre de l'outil (D)

Dia-Carb CVD Diamond Coatings
Speed and Feed Recommendations – Fractional and Metric

DIA-CARB™ Diamond Coating

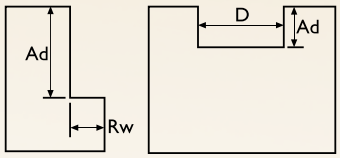
Cutting Diameter		Feed Rate Per Tooth					
Inch	mm	Slotting		Peripheral		Contouring	
Finishing		Rw 1 x D	Ad .03 x D	Rw .06 x D	Ad .45 x D	Rw .02 x D	Ad .03 x D
		Speed 3280 - 5900 sfm (1000 - 1800 m/min)					
Roughing		Rw 1 x D	Ad .25 x D	Rw .1 x D	Ad .65 x D	Rw .1 x D	Ad .25 x D
		Speed 1310 – 1970 sfm (400 – 600 m/min)					
1/16	1,6	0.0003 in	(0.008mm)	0.0004 in	(0.010 mm)	0.0005 in	(0.011mm)
1/8	3	0.0006 in	(0.016mm)	0.0008 in	(0.020 mm)	0.0009 in	(0.022mm)
3/16	5	0.0013 in	(0.032mm)	0.0016 in	(0.041 mm)	0.0017 in	(0.044mm)
1/4	6	0.0013 in	(0.032mm)	0.0016 in	(0.041 mm)	0.0017 in	(0.044mm)
5/16	8	0.0027 in	(0.068mm)	0.0034 in	(0.086 mm)	0.0037 in	(0.094mm)
3/8	10	0.0027 in	(0.068mm)	0.0034 in	(0.086 mm)	0.0037 in	(0.094mm)
1/2	12	0.0041 in	(0.103mm)	0.0046 in	(0.117 mm)	0.0050 in	(0.127mm)

Dia-Carb End Mills are for machining abrasive materials such as graphite composites.



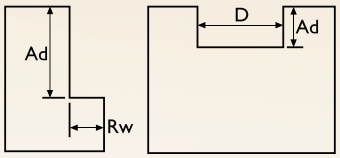
Radial Width of Cut (Rw)
Axial Depth of Cut (Ad)
Tool Diameter (D)

Las fresas Dia-Carb son para el maquinado de materiales abrasivos, como los compuestos de grafito.



Ancho radial del corte (Rw)
Profundidad axial del corte (Ad)
Diámetro de la herramienta (D)

Les fraises à queue Dia-Carb sont conçues pour usiner des matériaux abrasifs, comme les composites à base de graphite.



Largeur radiale de taille (Rw)
Profondeur axiale de taille (Ad)
Diamètre de l'outil (D)

Cutting Conditions – General Purpose Carbide End Mills – Fractional

Condiciones de corte
Conditions de coupe

Fresas de carburo sólida de uso general
Usage général des fraises carbure monobloc

material	speed in sfm	feed (in / tooth)		
		1/32 – 1/4	>1/4 – 1/2	>1/2 – 1
Structural Steel / Aceros de construcción / Acier à construction				
< 150 Bhn	490	.0006 - .0014	.0010 - .0030	.0028 - .0071
< 190 Bhn	410	.0006 - .0014	.0010 - .0030	.0024 - .0039
< 250 Bhn	295	.0006 - .0010	.0010 - .0022	.0022 - .0031
Case Hardening Steel / Aceros de cementación y temple / Aciers à cémentation				
< 240 Bhn	330	.0010 - .0014	.0014 - .0031	.0031 - .0071
< 300 Bhn	260	.0006 - .0010	.0010 - .0024	.0024 - .0031
Nitriding Steel / Aceros de nitruración / Aciers à nitruration				
< 300 Bhn	295	.0006 - .0010	.0010 - .0024	.0024 - .0031
< 40 Rc	230	.0004 - .0008	.0010 - .0020	.0014 - .0024
Heat Treatable Steel / Aceros de temple / Acier trempé				
< 200 Bhn	260	.0006 - .0016	.0010 - .0033	.0022 - .0067
< 240 Bhn	200	.0006 - .0014	.0010 - .0026	.0022 - .0047
< 40 Rc	165	.0004 - .0010	.0010 - .0014	.0014 - .0039
< 45 Rc	115	.0004 - .0006	.0006 - .0012	.0014 - .0024
Tool Steel / Aceros de herramientas / Acier à outils				
< 240 Bhn	295	.0010 - .0013	.0022 - .0026	.0039 - .0059
< 300 Bhn	230	.0006 - .0010	.0014 - .0022	.0022 - .0039
< 40 Rc	200	.0004 - .0008	.0010 - .0014	.0014 - .0039
< 45 Rc	150	.0004 - .0006	.0010 - .0014	.0010 - .0039
> 45 Rc	100	.0002 - .0006	.0008 - .0012	.0008 - .0031
Stainless Steel / Acero Inoxidable / Acier inoxydable				
< 200 Bhn	260	.0004 - .0006	.0010 - .0016	.0014 - .0031
< 250 Bhn	200	.0004 - .0006	.0008 - .0012	.0010 - .0026
< 280 Bhn	130	.0002 - .0006	.0004 - .0010	.0008 - .0020
Cast Steel / Aceros de fundición blanda / Fonte tendre				
< 150 Bhn	360	.0006 - .0010	.0012 - .0020	.0031 - .0059
< 190 Bhn	260	.0004 - .0008	.0006 - .0014	.0031 - .0039
> 190 Bhn	200	.0002 - .0006	.0006 - .0012	.0020 - .0031
Cast Steel – Hard / Aceros de fundición dura / Fonte dure				
	130	.0006 - .0010	.0010 - .0014	.0016 - .0020
High Temp. Alloys / Aceros resistentes a altas temp. / Alliage à haute temp.				
< 200 Bhn	115	.0006 - .0010	.0010 - .0012	.0016 - .0020
< 240 Bhn	65	.0004 - .0006	.0008 - .0010	.0014 - .0018
< 330 Bhn	60	.0004 - .0006	.0008 - .0010	.0014 - .0018
< 40 Rc	60	.0004 - .0006	.0006 - .0008	.0012 - .0016
< 45 Rc	40	.0004 - .0006	.0006 - .0008	.0008 - .0014
> 45 Rc	25	.0002 - .0004	.0004 - .0007	.0004 - .0012
Titanium Alloys / Aleaciones de titanio / Alliage de titane				
< 160 Bhn	330	.0004 - .0008	.0008 - .0020	.0020 - .0031
< 220 Bhn	230	.0004 - .0008	.0008 - .0020	.0020 - .0031
< 300 Bhn	100	.0002 - .0006	.0006 - .0012	.0012 - .0026
< 45 Rc	35	.0002 - .0004	.0004 - .0010	.0010 - .0020
Malleable Cast iron / Fundición maleable / Fonte aciérée malléable				
< 200 Bhn	560	.0004 - .0010	.0008 - .0026	.0020 - .0047
> 200 Bhn	360	.0002 - .0008	.0008 - .0020	.0020 - .0039
Gray Cast Iron / Fundición gris / Fonte aciérée grise				
< 200 Bhn	395	.0008 - .0013	.0008 - .0026	.0020 - .0071
> 200 Bhn	260	.0004 - .0008	.0008 - .0020	.0020 - .0039
Copper / Cobre / Cuivre				
< 150 Bhn	820	.0004 - .0008	.0008 - .0020	.0020 - .0059
Copper Alloys – Soft / Aleaciones de cobre blandas / Alliage de cuivre - tendre				
	590	.0006 - .0016	.0020 - .0039	.0039 - .0059
Copper Alloys – Brittle / Aleación de cobre fragil / Alliage de cuivre - mou				
	490	.0006 - .0016	.0020 - .0039	.0039 - .0059
Copper Alloys – Tough / Aleaciones de cobre dura / Alliage de cuivre – dur				
	460	.0006 - .0016	.0020 - .0039	.0039 - .0059
Aluminum – Low Silicon / Aluminio - bajo contenido de silicio / Aluminium – faible teneur en silice				
	1200	.0012 - .0028	.0039 - .0059	.0051 - .0098
Aluminum – High Silicon / Aluminio – alto contenido de silicio / Aluminium à forte teneur de silice				
	650	.0012 - .0020	.0020- .0039	.0039 - .0079
Magnesium Alloys / Aleaciones de magnesio / Alliage de magnésium				
	1300	.0012 - .0020	.0020 - .0039	.0059 - .0120
Zinc Alloys / Aleaciones de zinc / Alliage de zinc				
	1150	.0014 - .0020	.0024 - .0039	.0047 - .0120

All recommendations should be considered a starting point, with possible variations to achieve optimum results. Increase the speed 20% when using coated end mills.

Todas la recomendaciones deberían ser consideradas como punto de partida, con posibles variaciones para conseguir óptimos resultados. Incrementar la velocidad un 20% cuando se utilicen fresas recubiertas.

Les informations techniques mentionnées sont des valeurs moyennes données à titre indicatif et sont modifiables pour optimiser les résultats. Augmenter la vitesse de 20% lorsque vous utilisez des fraises revêtues.

The Machining Applications – Carbide End Mill Selection Guide – Fractional

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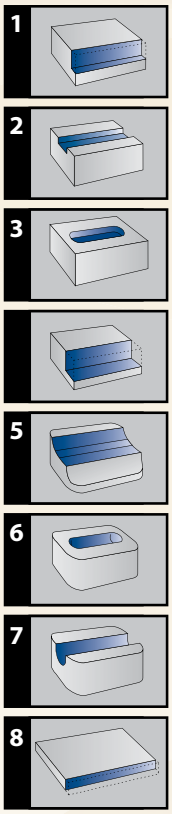
Aplicaciones mecanizadas
Applications d'usinage

Guía de Selección *Para Fresas de Carburo*
Guide de sélection des *fraises en carbure*



Note: All recommendations should be considered only as a starting point, with possible variations to achieve optimum results.

1) Profiling/Finishing Cut: Use 4 Flutes.
2) Slotting: Use 3-Flute to resist chatter. Use 2-Flute or Roughing Mill for maximum chip removal.
3) Plunge/Slot: Use 2-Flute for maximum chip removal. Use 3-Flute to resist chatter.
4) Profiling/Roughing Cut: Use Roughing Mill for rapid material removal.
5) Contour Finishing: Use 3-or 4-Flute, Ball End.
6) Plunge/Slot Contouring: Use 2-Flute, Ball End for maximum chip removal. Use 3-Flute, Ball End for improved surface finish.
7) Contour Slotting: Use 3-Flute, Ball End to resist chatter. Use 2-Flute, Ball End for maximum chip removal.
8) Profiling/Thin Material: Use 2 or 4 Straight Flutes.

Se deben considerar las recomendaciones como puntos de partida únicamente, con posibles variaciones, para obtener resultados óptimos.

1) Perfilado/cortes para acabado: use de 4 filos.
2) Ranurado: use de 3 filos para evitar vibración. use de 2 filos o fresas de desbaste para obtener un máximo desalojamiento de viruta.
3) Cajas/Ranurado: use de 2 filos para obtener un máximo desalojamiento de viruta. Use de 3 filos para evitar vibración.
4) Perfilado/cortes de acabado: use fresas de desbaste para obtener un desalojamiento rápido del material.
5) Acabado de contornos: use de 3 ó 4 filos punta radial.
6) Contorneo para hundimiento y ranurado: use de 2 filos punta esférica para obtener un máximo desalojamiento de viruta. Use de 3 filos punta esférica para un mejor acabado de la superficie.
7) Ranurado en contorno: use de 3 filos punta esférica para evitar vibracion. Use de 2 filos punta esférica para obtener un máximo desalojo de viruta.
8) Perfilado/materiales delgados: use de 2 ó 4 filos rectos.

Les valeurs ci-dessus ne sont données qu'à titre indicatif. Déterminez vous-même la valeur optimale.

1) Coupe profilée/finition: utilisez une fraise à 4 dents.
2) Mortaisage: utilisez une fraise à 3 dents pour résister aux vibrations. Pour un enlèvement maximal des copeaux, utilisez une fraise à 2 dents ou une fraise d'ébauche.
3) Plongée/rainure: pour un enlèvement maximal des copeaux, utilisez une fraise à 2 dents. Utilisez une fraise à 3 dents pour résister aux vibrations.
4) Coupe profilée/dégrossissage: utilisez une fraise d'ébauche pour enlever la matière rapidement.
5) Finition des contours: utilisez une fraise à 3 ou 4 dents, à bout plat.
6) Contour en plongée/rainure: pour un enlèvement maximal des copeaux, utilisez une fraise à 2 dents, à bout hémisphérique. Pour améliorer la finition de surface, utilisez une fraise à 3 dents, à bout hémisphérique.
7) Mortaisage des contours: utilisez une fraise à 3 dents, à bout hémisphérique pour résister aux vibrations. Pour un enlèvement maximal des copeaux, utilisez une fraise à 2 dents, à bout hémisphérique.
8) Profilage/matière mince: utilisez des fraises à 2 ou 4 dents droites.

End Mill Fresas Fraise		Machining Apps. Aplicac. Mecan. Appl. Usinage		Titanium Inconel Titanio Inconel Titane Inconel	Stainless Steel Acero inoxidable Acier inoxydable	Steel Hard–Soft Acero Duro–Suave Acier	Castings Hard–Soft Fundiciones Duro–Suave Fonte	Graphite Grafito Graphite	Brass Latón Laiton	Aluminum Aluminio Aluminium	Plastic Plástico Matière synthétique	Fiberglass Fibra de Vidrio Fibre de verre	Wood Madera Bois
		1	2										
	Series 1, 10,14,16			■	■	■	■	■	■	■	■	■	
	Series 3, 11,15,17			■	■	■	■	■	■	■	■	■	
	Series 5			■	■	■	■	■	■	■	■	■	
	Series 1B,10B, 14B			■	■	■	■	■	■	■	■	■	
	Series 3B,11B, 15B			■	■	■	■	■	■	■	■	■	
	Series 5B			■	■	■	■	■	■	■	■	■	
	Series 21, 22									■	■	■	■
	Series 60 60˚ Helix			■	■	■							
	Series 61 Roughing Mills				■	■	■						
	Series 62 Roughing Mills			■									
	Series 63 Roughing Mills								■	■	■	■	

Cutting Conditions – General Purpose Carbide End Mills – Metric

Condiciones de corte
Conditions de coupe

Fresas de carburo sólida de uso general
Usage général des fraises carbure monobloc

material	speed in m/min	feed (mm/tooth)			material number	description
		1 – 6	>6 – 12	>12 – 25		
Structural Steel / Aceros de construcción / Acier à construction						
< 500 N/mm²	150	0,015 - 0,035	0,025 - 0,075	0,07 - 0,18	1.0037	St 37-2
< 650 N/mm²	125	0,015 - 0,035	0,025 - 0,075	0,06 - 0,1	1.0050	St 50-2
< 850 N/mm²	90	0,015 - 0,025	0,025 - 0,055	0,055 - 0,08	1.0070	St 70-2
Case Hardening Steel / Aceros de cementación y temple / Aciers à cémentation						
< 800 N/mm²	100	0,025 - 0,035	0,035 - 0,08	0,08 - 0,18	1.0301	C 10
< 1000 N/mm²	80	0,015 - 0,025	0,025 - 0,06	0,06 - 0,08	1.7012	13 Cr 2
Nitriding Steel / Aceros de nitruración / Aciers à nitruration						
< 1000 N/mm²	90	0,015 - 0,025	0,025 - 0,06	0,06 - 0,08	1.8509	41 CrAlMo 7
< 1300 N/mm²	70	0,01 - 0,02	0,025 - 0,05	0,035 - 0,06	1.8519	31 CrMoV 9
Heat Treatable Steel / Aceros de temple / Acier trempé						
< 700 N/mm²	80	0,015 - 0,04	0,025 - 0,085	0,055 - 0,17	1.0406	C 25
< 900 N/mm²	60	0,015 - 0,035	0,025 - 0,065	0,055 - 0,12	1.0540	C 50
< 1200 N/mm²	50	0,01 - 0,025	0,025 - 0,035	0,035 - 0,1	1.5122	37 MnSi 4
< 1400 N/mm²	35	0,01 - 0,015	0,015 - 0,03	0,035 - 0,06	1.6582	34 CrNiMo 6
Tool Steel / Aceros de herramientas / Acier à outils						
< 800 N/mm²	90	0,025 - 0,032	0,055 - 0,065	0,1 - 0,15	–	–
< 1000 N/mm²	70	0,015 - 0,025	0,035 - 0,055	0,055 - 0,1	–	–
< 1200 N/mm²	60	0,01 - 0,02	0,025 - 0,035	0,035 - 0,1	–	–
< 1400 N/mm²	45	0,01 - 0,015	0,025 - 0,035	0,025 - 0,1	–	–
> 1400 N/mm²	30	0,005 - 0,015	0,02 - 0,03	0,02 - 0,08	–	–
Stainless Steel / Acero Inoxidable / Acier inoxydable						
< 700 N/mm²	80	0,01 - 0,015	0,025 - 0,04	0,035 - 0,08	1.4301	X 5 CrNi 18 10
< 850 N/mm²	60	0,01 - 0,015	0,02 - 0,03	0,025 - 0,065	1.4006	X 10 Cr 13
< 950 N/mm²	40	0,005 - 0,015	0,01 - 0,025	0,02 - 0,05	1.4122	X 35 CrMo 17
Cast Steel / Aceros de fundición blanda / Fonte tendre						
< 500 N/mm²	110	0,015 - 0,025	0,03 - 0,05	0,08 - 0,15	1.0446	GS-38
< 650 N/mm²	80	0,010 - 0,02	0,015 - 0,035	0,08 - 0,1	1.0553	GS-60
> 650 N/mm²	60	0,005 - 0,015	0,015 - 0,03	0,05 - 0,08	1.0554	GS-70
Cast Steel – Hard / Aceros de fundición dura / Fonte dure						
	40	0,08 - 0,015	0,015 - 0,035	0,03 - 0,15		
High Temp. Alloys / Aceros resistentes a altas temp. / Alliage à haute temp.						
< 700 N/mm²	35	0,015 - 0,025	0,025 - 0,03	0,04 - 0,05	2.4816	NiCr 15 Fe
< 900 N/mm²	20	0,01 - 0,015	0,02 - 0,025	0,035 - 0,045	1.4921	X 20 CrMoV 12 1
< 1100 N/mm²	18	0,01 - 0,015	0,02 - 0,025	0,035 - 0,045	1.4911	X 8 CrCoNiMo 10 6
< 1250 N/mm²	18	0,01 - 0,015	0,015 - 0,02	0,03 - 0,04	1.4980	X 5 NiCrTi 26 15
< 1400 N/mm²	12	0,01 - 0,015	0,015 - 0,02	0,02 - 0,035	2.4973	NiCr 19 CoMo
> 1400 N/mm²	8	0,005 - 0,01	0,01 - 0,018	0,01 - 0,03	2.4969	NiCr 20 Co 18 Ti
Titanium Alloys / Aleaciones de titanio / Alliage de titane						
< 550 N/mm²	100	0,01 - 0,02	0,02 - 0,05	0,05 - 0,08	–	–
< 750 N/mm²	70	0,01 - 0,02	0,02 - 0,05	0,05 - 0,08	–	–
< 1000 N/mm²	30	0,005 - 0,015	0,015 - 0,03	0,03 - 0,065	–	–
< 1500 N/mm²	10	0,005 - 0,01	0,01 - 0,025	0,025 - 0,05	–	–
Malleable Cast iron / Fundición maleable / Fonte aciérée malléable						
< 200 HB	170	0,01 - 0,025	0,02 - 0,065	0,05 - 0,12	–	–
> 200 HB	110	0,005 - 0,02	0,02 - 0,05	0,05 - 0,1	–	–
Gray Cast Iron / Fundición gris / Fonte aciérée grise						
< 200 HB	120	0,02 - 0,032	0,02 - 0,065	0,05 - 0,18	–	–
> 200 HB	80	0,01 - 0,02	0,02 - 0,05	0,05 - 0,1	–	–
Copper / Cobre / Cuivre						
< 500 N/mm²	250	0,01 - 0,02	0,02 - 0,05	0,05 - 0,15	–	–
Copper Alloys – Soft / Aleaciones de cobre blandas / Alliage de cuivre - tendre						
	180	0,015 - 0,04	0,05 - 0,1	0,1 - 0,15	–	–
Copper Alloys – Brittle / Aleación de cobre fragil / Alliage de cuivre - mou						
	150	0,015 - 0,04	0,05 - 0,1	0,1 - 0,15	–	–
Copper Alloys – Tough / Aleaciones de cobre dura / Alliage de cuivre – dur						
	140	0,015 - 0,04	0,05 - 0,1	0,1 - 0,15	–	–
Aluminum – Low Silicon / Aluminio - bajo contenido de silicio / Aluminium – faible teneur en silice						
	360	0,03 - 0,07	0,1 - 0,15	0,13 - 0,25	–	–
Aluminum – High Silicon / Aluminio – alto contenido de silicio / Aluminium à forte teneur de silice						
	200	0,03 - 0,05	0,05 - 0,1	0,1 - 0,2	–	–
Magnesium Alloys / Aleaciones de magnesio / Alliage de magnésium						
	400	0,03 - 0,05	0,05 - 0,1	0,15 - 0,3	–	–
Zinc Alloys / Aleaciones de zinc / Alliage de zinc						
	350	0,035 - 0,05	0,06 - 0,1	0,12 – 0,3	–	–

All recommendations should be considered a starting point, with possible variations to achieve optimum results. Increase the speed 20% when using coated end mills.

Todas la recomendaciones deberían ser consideradas como punto de partida, con posibles variaciones para conseguir óptimos resultados. Incrementar la velocidad un 20% cuando se utilicen fresas recubiertas.

Les informations techniques mentionnées sont des valeurs moyennes données à titre indicatif et sont modifiables pour optimiser les résultats. Augmenter la vitesse de 20% lorsque vous utilisez des fraises revêtues.

The Machining Applications – Carbide End Mill Selection Guide – Metric

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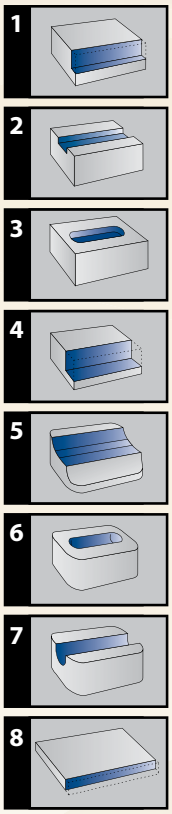
Aplicaciones mecanizadas
Applications d'usinage

Guía de Selección *Para Fresas de Carburo*
Guide de sélection des *fraises en carbure*



Note: All recommendations should be considered only as a starting point, with possible variations to achieve optimum results.

1) Profiling/Finishing Cut: Use 4 Flutes.
2) Slotting: Use 3-Flute to resist chatter. Use 2-Flute or Roughing Mill for maximum chip removal.
3) Plunge/Slot: Use 2-Flute for maximum chip removal. Use 3-Flute to resist chatter.
4) Profiling/Roughing Cut: Use Roughing Mill for rapid material removal.
5) Contour Finishing: Use 3-or 4-Flute, Ball End.
6) Plunge/Slot Contouring: Use 2-Flute, Ball End for maximum chip removal. Use 3-Flute, Ball End for improved surface finish.
7) Contour Slotting: Use 3-Flute, Ball End to resist chatter. Use 2-Flute, Ball End for maximum chip removal.
8) Profiling/Thin Material: Use 2 or 4 Straight Flutes.

Se deben considerar las recomendaciones como puntos de partida únicamente, con posibles variaciones, para obtener resultados óptimos.

1) Perfilado/cortes para acabado: use de 4 filos.
2) Ranurado: use de 3 filos para evitar vibración. use de 2 filos o fresas de desbaste para obtener un máximo desalojamiento de viruta.
3) Cajas/Ranurado: use de 2 filos para obtener un máximo desalojamiento de viruta. Use de 3 filos para evitar vibración.
4) Perfilado/cortes de acabado: use fresas de desbaste para obtener un desalojamiento rápido del material.
5) Acabado de contornos: use de 3 ó 4 filos punta radial.
6) Contorneo para hundimiento y ranurado: use de 2 filos punta esférica para obtener un máximo desalojamiento de viruta. Use de 3 filos punta esférica para un mejor acabado de la superficie.
7) Ranurado en contorno: use de 3 filos punta esférica para evitar vibracion. Use de 2 filos punta esférica para obtener un máximo desalojo de viruta.
8) Perfilado/materiales delgados: use de 2 ó 4 filos rectos.

Les valeurs ci-dessus ne sont données qu'à titre indicatif. Déterminez vous-même la valeur optimale.

1) Coupe profilée/finition: utilisez une fraise à 4 dents.
2) Mortaisage: utilisez une fraise à 3 dents pour résister aux vibrations. Pour un enlèvement maximal des copeaux, utilisez une fraise à 2 dents ou une fraise d'ébauche.
3) Plongée/rainure: pour un enlèvement maximal des copeaux, utilisez une fraise à 2 dents. Utilisez une fraise à 3 dents pour résister aux vibrations.
4) Coupe profilée/dégrossissage: utilisez une fraise d'ébauche pour enlever la matière rapidement.
5) Finition des contours: utilisez une fraise à 3 ou 4 dents, à bout plat.
6) Contour en plongée/rainure: pour un enlèvement maximal des copeaux, utilisez une fraise à 2 dents, à bout hémisphérique. Pour améliorer la finition de surface, utilisez une fraise à 3 dents, à bout hémisphérique.
7) Mortaisage des contours: utilisez une fraise à 3 dents, à bout hémisphérique pour résister aux vibrations. Pour un enlèvement maximal des copeaux, utilisez une fraise à 2 dents, à bout hémisphérique.
8) Profilage/matière mince: utilisez des fraises à 2 ou 4 dents droites.

End Mill Fresas Fraise		Machining Apps. Aplicac. Mecan. Appl. Usinage		Titanium Inconel Titanio Inconel Titane Inconel	Stainless Steel Acero inoxidable Acier inoxydable	Steel Hard–Soft Acero Duro–Suave Acier	Castings Hard–Soft Fundiciones Duro–Suave Fonte	Graphite Grafito Graphite	Brass Latón Laiton	Aluminum Aluminio Aluminium	Plastic Plástico Matière synthétique	Fiberglass Fibra de Vidrio Fibre de verre	Wood Madera Bois
		1	2										
	1M			■	■	■	■	■	■	■	■	■	
	3M			■	■	■	■	■	■	■	■	■	
	5M			■	■	■	■	■	■	■	■	■	
	1MB			■	■	■	■	■	■	■	■	■	
	3MB			■	■	■	■	■	■	■	■	■	
	5MB			■	■	■	■	■	■	■	■	■	
	21M, 22M									■	■	■	■
	60M 60˚ Helix			■	■	■							
	61M				■	■	■						
	62M			■									
	63M								■	■	■	■	